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Honor — Fraternity — Justice

Ministry of Economy and Finance

Directorate of Studies and Programming

RAMS PROJECT

Rural Assessment and Manpower Surveys

Dossier de Projets

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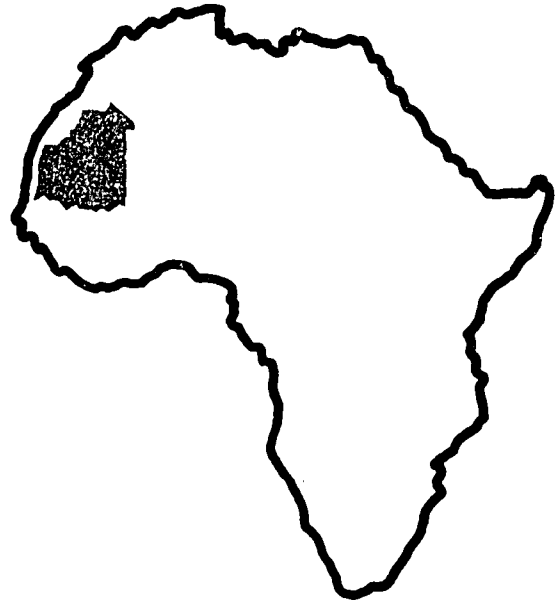

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Project Dossier

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Introduction

This series of reports under Project Identification and Formulation consists of two parts, the first "Project Dossier", consisting of 12 specific projects that have been identified and described, and the second, a special all-encompassing report on educational reform entitled "Education as a Development Tool". The latter contains a broad series of recommendations for the various levels of education and, because of the critical need for reform, is presented as a separate report.

All of the projects presented are an outgrowth of RAMS' Phase I reports and the Option Papers formulated during Phase II. They are not, by any means, intended to represent a total multi-sectoral selection of activities; nor are they a recapitulation of proposals emerging from all of the RAMS reports. Rather, they are a selected group of projects focusing essentially on two sectors that are critical to Mauritania's economy: environment and employment. There are also projects in fisheries, rangeland management and integrated rural development.

The CILSS project format has been adopted for the 12 projects in the interest of following a standard format familiar to both donors and recipients in the Sahel.

There has been no attempt to establish priorities among the projects. Indeed, a primary task before the GIRM is that very task but in a larger sense, viz., in the framework of a coherent national development plan.

It should be noted that the GIRM already has a panoply of projects that have been proposed by donors, reviewed by individual ministries and para-statal organizations and, for all intents and purposes, ready to be launched. The GIRM, in reality, is less in the need for additional project recommendations than it is for the means to implement them. Budgetary restrictions and the lack of skilled and professional manpower are among the major constraints confronting the GIRM and limiting its ability to implement programs, both small and large.

The projects identified in this report should, therefore, be considered as illustrative. Some are developed in much greater detail than others, some are costed out, others are not. Several in the environmental protection field are already familiar to the GIRM and have been approved in principle. Some weigh less heavily on Mauritania's absorptive capacity than others. Donors considering any of these activities will have to evaluate these considerations carefully in consultation with the GIRM.

In addition to RAMS Phase I reports, all of the Phase II methodological and Option Papers should also be consulted for other specific activity proposals. The Health/Nutrition and Agricultural Institutional Framework papers suggest a broad spectrum of choices. The Employment paper suggests the formulation of an Entrepreunerial Code as a basis for promoting labor-intensive investment. The Consolidated Statement provides some general guidelines on a training and data analysis project in regional development planning. Of major importance also is the input-output model which is presented in the Framework for Calculating Rural GDP which could be further developed and refined as a tool to identify and evaluate specific investment opportunities in the rural sector.

RAMS reports have stressed two major elements in the final definition of project requirements: (1) the need to involve the community and the local government unit in the process, and (2) the need to understand with precision the social make-up and setting in which the project will operate. To ignore these two facets would be to risk the failure of an effective project design.

Environment

PROJECT SUMMARY

	Date : June 8, 1981
	Title of Project: Coordination of Environment Protection and Anti-Desertification Campaign
	Regions: Nouakchott, Hodh el Gharbi and Assaba / Sector: Environment

Project Objectives: The creation of a strong administrative structure capable of maintaining a continious and coordinated line of thought and action between the central government and the field services, the assessment, the implementation and coordination of anti-desertification actions, such a structure would help the free flow of information which is now inadequate.

Total Estimated Costs: US$ 2,000,000	External Financing Requirement: US$ 1,770,000

Summary: To assist the GIRM to implement the anti-desertification strategy adopted in May 1980, it is proposed to create a coordination unit. A number of recommendations are made to establish a National Commission and adeministrative support for two regions.

Project duration: 2 years	Starting date: As soon as possible.

1. Title — Coordination of an Environmental Development and Anti-Desertification Campaign "The Backbone of the Anti-Desertification Campaign"

2. Region (s) — Nouakchott, Hodh el Gharbi and Assaba

3. Project Objectives

To assist the GIRM in creating a well-articulated administrative structure capable of maintaining continuous and coordinated line of thought and action between the Government (NADC, MRD, ADD) and the field (Regions, Prefectures) in order to implement and evaluate environmental development and anti-desertification policies and to coordinate action; this structure will also serve as a bottom-upwards means of information flow, which has heretofore been inadequate.

4. Rationale

The anti-desertification strategy for the development of the Sahel was defined by CILSS and the Club du Sahel. It was adopted by Mauritania and refined by a national seminar held in May, 1980 in Nouakchott. The strategy cannot be carried out unless there are adequate means at the government's disposal for coordinating the required anti-desertification actions. Such means of coordination are the object of this project proposal.

The decision to create a National Anti-Desertification Commission was made in May, 1980 (the decree is waiting to be signed) is an indication of a national will to coordinate policy in this area. But the lack of personnel on all levels of the Mauritanian administration has hampered the effective implementation of the strategy that was adopted; the coordination of the various activities in this area cannot be assured at present. The proposed project is mainly designed to improve this coordination.

The Seminar for Drawing Up a National Anti-Desertification Plan of Action, organized by the MRD in Nouakchott between May 26 and

May 28 with the help of UNSO included a statement about the urgency of intensifying an anti-desertification campaign in its conclusions. Furthermore, the decree (awaiting signature) creating the National Anti-Desertification Commission (NADC) establishes the Minister of Rural Development as Vice-President of the NADC and the Director of the Department of Environmental Protection (DEP), which, in another document, is to become the Anti-Desertification Department (ADD), as Permanent Secretary.

For reasons of convenience, but particularly for budgetary reasons, it is not possible to give administrative support to all the regions. Therefore, it is suggested that the project should be first implemented in the capital and then in two regional administrative centers and in two Prefectures. This proposal suggests the Assaba Region and Kiffa, its administrative center plus the Prefectures of Barkeol El Obeid and Kankossa; the other project area would be the Region of Hodh el Gharbi, Aioun its administrative center plus the Prefectures of Kobenni and Tintane.

General proposals designed to coordinate the anti-desertification campaign have already been presented by UNSO (1979) and this proposal takes up in part the recommendations already made by Baumer and Sabra(1980 : p. 43), and adopted by the DEP in its Fourth Plan projects and financing proposals (1980).

5. Project Description

5.1 Physical Location

The project consists essentially of posting a certain number of highly qualified advisors to work with Mauritanian administrators in order to insure a continuous vertical flow of information (bottom-up and top-down):

- 1 temporary consultant-advisor to be posted to the Minister of Rural Development, the Vice-President of the NADC;
- permanent advisor to work with the Director of the DEP;
- 1 advisor to work with each of the Governors in Assaba and Hodh el Gharbi;
- 1 advisor to work with each of the following Prefects: in Barkeol el Abiod, Kobenni, Kankossa and Tintane.

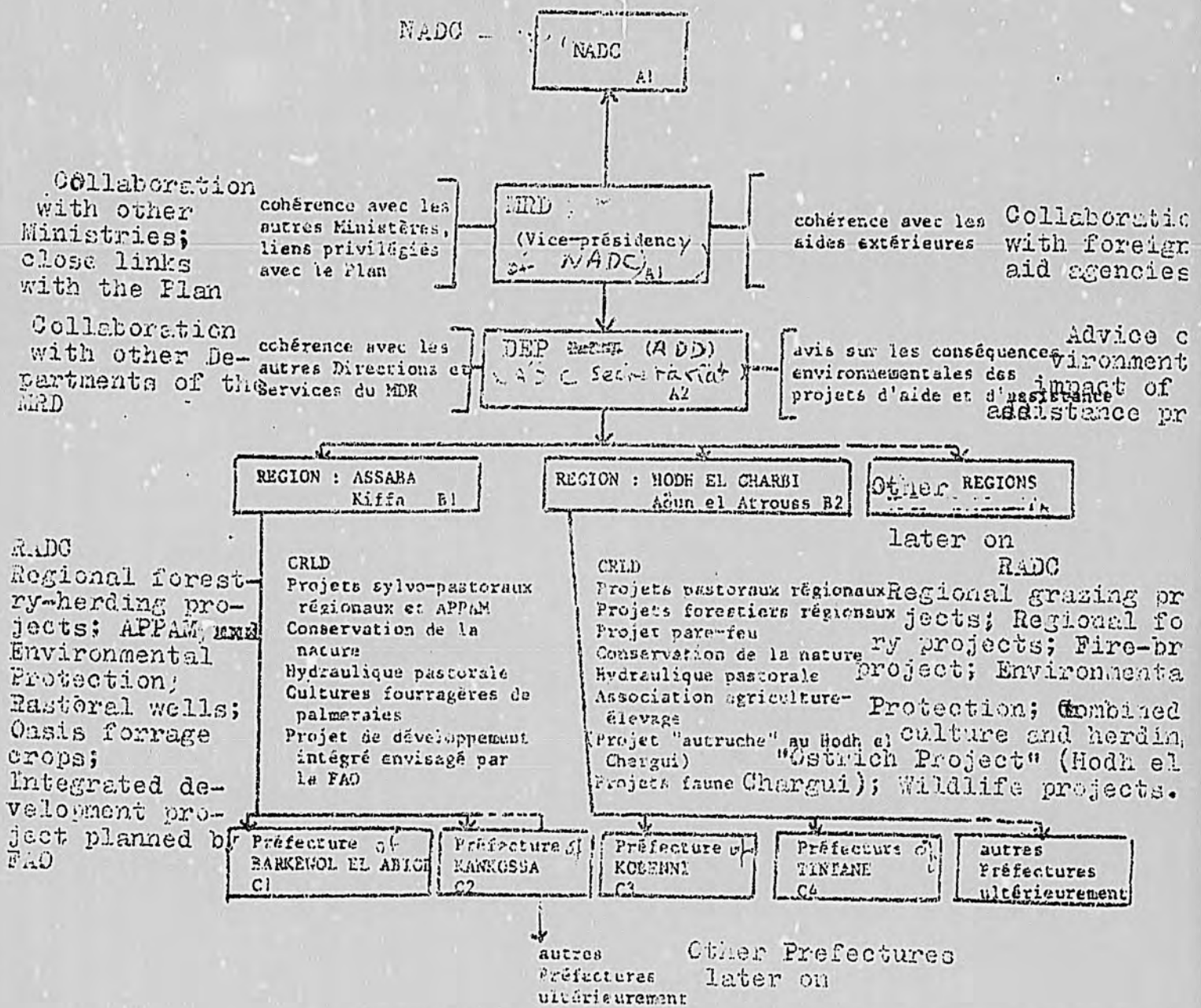
The government will have to furnish an office for each of these advisors and make sure that each has secretarial help, proper communications and office support.

The advisors' main responsibility will be to inform their counterparts about appropriate technologies for solving their problems. Either they themselves will know these techniques or they will know where to go for the necessary information. In order to facilitate their task, the project plans call for an appropriate technology information center specializing in anti-desertification and drought campaigns. This center should cooperate with the Plan, the IMRS and most of all with the project proposal known as "Instructional Posters and Information Campaign for the Anti-Desertification Program (see following project proposal). The center will have to collect as much material as possible from the various cultural centers in Mauritania and in neighboring countries.

Figure 1 outlines the proposed organization

5.2 Social Context

The project will serve all levels of Mauritanian society but it will have the strongest impact on high level civil servants who will be the counterparts of the advisors in question. In fact, the main role of each adviser will be to constantly insure that decisions made are in accord with the national anti-desertification strategy and to carry out (informal) on-the-job training of the persons they advise as well as those working with them and others at their headquarters. The advisors must make sure that all necessary efforts are made on the regional and the Prefectural levels to give anti-desertification efforts the priority that they require.



Organizational chart proposed for the "backbone" of a coordinated MF environmental development & anti-desertificati Campaig

FIGURE 1 : Organigramme proposé pour une "épine dorsale" de la coordination de l'aménagement de l'environnement et de la lutte contre la désertisation

Les indications A1, A2, B1, B2 ... se rapportent à la description des postes.

A_1, A_2, B_1, B_2 .... refer to job descriptions.

Figure 2: Coordination of the Environmental Development and Anti-Desertification Campaigns

LOCATION	INSTITUTIONS	MAIN FUNCTIONS	MAIN ASSOCIATED ACTIVITIES
NOUAKCHOTT	NADC	Advising the President and assisting the Permanent Secretary in order to insure cohesion in the strategy and in its implementation.	
	MRD	Assisting the Minister and the Secretary General in coordinating participation in the strategy xxxxx by the Ministry's own services and foreign assistance programs.	Questions related to training. Regulatory and legislative questi
	DEF (ADD)	Assisting the Director in conceptualising and in implementing the strategy.	Research in forestry and grazing lands; nurseries. Coordination of assistance and forestry, pastoral and environmental projects action-wide. National projects concerning vegetation and wildlife (map making) on a 1: 2,500,000 scale).
AIOUN EL ATROUSS and KIFFA	Regional administrative centers	Regionalization of environmental development and anti-desertification activities; Coordination of regional services. Developing a sense of commitment and activism among regional civil servants in accord with the spirit of the strategy. Creation and operation of the RADC's.	Helping to insure coordination between the environmental and anti-desertification strategy and the large-scale projects concerning environmental development and renewable resources (map making) on a 1: 200,000 scale).
BARKEWOL EL ABIOD, KANKOSSA, KOBENNI and TINTANE	Prefectures	Program implementation on the field level. Developing commitment and activism in the Prefectures and Districts. Contact with local population.	In-service personnel training. Participation by local people Application of the strategy on the local level in Districts, villages, encampments. Surveys of land tenure situation of grazing lands, of nutritional situation etc. Inventory of desertification. Map-making on 1:50,000 and 1:20,000 scales.

Table I
Inclusive Annual Salaries/Fees Paid to
the Advisors (in US dollars)

	Training Activities	Field Demonstrations
Consultant advisor	15 000	5,000
ADD Advisor	30,000	10,000
Governor's Advisor		
Aioun el Atrouss Kiffa	30,000	5,000
Prefect's Advisor		
Barkewol el Abiod	5,000	10,000
Kankossa	5,000	10,000
Kobenni	5,000	10,000
Tintane	5,000	10,000
	125,000	65,000

6. Budget

A tentative budget (in US dollars) appears in Table 2 (attached) showing international currency contributions.

The GIRM's involvement will include:

- the director of the ADD, the governors of Assaba, and Hodh Gharbi, the four Prefects of Barkewol el Abiod, Kankossa, Kobenni and Tintane, ADD personnel in these four Prefectures, all on a virtually full-time basis;
- a documentalist (who will have had prior training for 1 year);

- six or seven chauffeurs;

- secretarial assistance (typist, telephones, etc.);

- office and seretarial facilities, particularly an office at ADD headquarters in Nouakchott, a documentation room in Nouakchott and an office in each of the six towns outside of the capital that are to receive advisors;

- a secretary-typist (able to do stenography), to be trained for a year before the project starts.

The total amount of outside assistance for this project will be about $1,700,000 US over a two-year period.

7. Implementation Plan

Around October, 1982, the ADD should be considerably strengthened if the proposed RAMS/MB 2 Project, "Accelerated Training of Environmentalists and Anti-Desertification Specialists is implemented as hoped, by September, 1981

The MRD will have improved its planning ability through the research unit recommended by UNSO and its coordinating ability through the "Backbone" of the Anti-Desertification Campaign, which is being proposed by this project. The project would be divided into two phases.

The proposed dates assume the following:

a) that project activities in "Accelerated Training of Specialists in Environmental Development and Anti-Desertification Strategies" begin in September, 1981 and that the four trainees who are to be trained would be at their posts before October, 1982;

b) that financing of Phase 1 of this project has been approved and that Consultant A_1 has been recruited before November, 1981.

Table 2: Budgetary Contribution (in US dollars)

	TOTAL		1st year: Aug. 1981 to Aug. 1982 1ère ANNEE (août 1981-août 1982)		2nd year: Aug. 1982 to Aug. 1983 2ème ANNEE (août 1982-août 1983)	
One consultantspecializing in anti-desertification work for 1 month each time	10 m/m	67 200	5 m/m	32 000	5 m/m	35 200
One advisor for the Director of the ADD (level 5)	24 m/m	99 960	12 m/m	47 600	12 m/m	52 360
One advisor each for governors of						
Aasaba	24 m/m	79 800	12m/m	38 000	12 m/m	41 800
Hodh el Gharbi	24 m/m	79 800	12 m/m	38 000	12 m/m	41 800
One advisor each for the prefects of;						
Barkewol	24 m/m	79 800	12 m/m	38 000	12 m/m	41 800
Kankossa	24 m/m	79 800	12 m/m	38 000	12 m/m	41 800
Kobenni	24 m/m	79 800	12 m/m	38 000	12 m/m	41 800
Tintane	24 m/m	79 800	12 m/m	38 000	12 m/m	41 800
	18 m/m	64 000	12 m/m	33 200	6 m/m	30 800
	18 m/m	42 200	6 m/m	14 000	12 m/m	28 200
One documentalists (P3)	12 m/m	75 600	6 m/m	36 000	6 m/m	39 600
One secretary (stenographer-typing) (P1)	226 m/m	827 760	113 m/m	390 800	113 m/m	436 960
12. Various consultants for one month each						
13. Special indemnities for local personnel		31 500		15 000		16 500
Administrators (1 000 days/year $30(US)/day		5 250		2 500		2 750
Chauffeurs and others (1 000 days/year $ 5(US)/day		36 750		17 500		19 250
19. Sub-total		864 510		408 300		456 210

20.	Sub-contracting			
21.	Periodic maintenance, overhaul of vehicles	2,000	900	1,100
22.	Maintenance of radio communications aparatus	2,500	1,000	1,500
29	Sub- total	4,500	1,900	2,600
30.	Training			
31.	Local or regional scholarship to train a secretary-typist executive secy. level.	12 m/m 14,320	12 m/m 14,320	
32.	Regional scholarship for documentalist	12 m/m 14,320	12 m/m 14,320	
33.	Organization programs and demonstrations (see table 1)	125,000 65,000	80,000 30,000	45,000 35,000
34.	Other meetings	30,000	15,000	15,000
39.	Sub-total	248,640	153,640	95,000
40.	Equipment			
41.	One Renault R5			
42.	6 Land-Rovers	10,000 125,000	10,000 125,000	
43.	Extra office furniture and equipment	10,000	10,000	
44.	Camoing equipment	8,000	7,000	1,000
45.	Training material and equipment	5,000	5,000	
46.	Material and equipment for demonstrations, including fencing	25,000	20,000	5,000

47. Filing cabinet for documents. Equipment for filing, documentation, photostating (enlarging and reducing), typewriter, photographic material, etc.	16,000	14,000	2,000
48. Purchase of books, magazine subscriptions, documents acquisition, inclu. film rental, etc.	20,000	10,000	10,000
49. Sub-totl	219,000	201,000	18,000
50. Other Costs	40,000	18,000	22,000
51 Vehicle maintainance	15,000	5,000	10,000
52. Costs of Reports	8,000	3,000	5,000
53. Secretarial, typing costs	6,000	4,000	2,000
54. Various office supplies, equipment	6,000	4,500	1,500
56 Sub-total	75,000	34,500	40,500
Total	1,411,650	799,340	612,310
Contingency (10%)	141,165	79,934	61,231
	1,552,815	879,274	673,541
Overlook Costs (14%)	217,394	123,098	94,296
Grand Total	1,770,209	1,002,372	767,837

Phase I : Activities Preliminary to Implementation

June 1981 : Request by GIRM and order of a Renault 5.

August, 1981 : First consultancy of Advisor A_1, first meeting of the NADC. Ordering of vehicles and office equipment.

Nov. 1981 : Second consultancy meeting of the legislative and regulatory commission on renewable resources.

February, 1982 : Third consultancy, second meeting of the NADC.

May, 1982 : Fourth consultancy

August, 1982 : Fifth consultancy, third meeting of the NADC.

Phase II : End of Implementation, Beginning of Development and Training

August, 1982 : Documentalist and Advisor A_2 begin working.

September 1982 : Advisors B_1 and B_2 begin working.

October 1982 : Advisors C_1, A_2, C_3 and C_4 begin working. Week-long seminar for the advisors and their counterparts in Nema.

December 1982 : Beginning of training programs.

Personnel Needs

The number of persons needed for the project is clear from the above-mentioned description : 7 advisors including one to be posted in Nouakchott and five in the field; in addition, there is to be a consultant advisor and a documentalist in Nouakchott.

The number of counterpart personnel is also evident from the project description. A special link must be created between the civil servants in the ADD Regional services on the Regional and Prefectural levels; the nature of these links is described in the RAMS Project/MB 2. On the other hand, training activities will take place locally and will be organized according to particular needs related to training and informing the counterparts and their collaborators; a detailed program cannot be set up until after the Project has begun and after consulting with the Demonstration Projection "Environmental Development" which is to begin at the same time.

8. Relations with Other Projects and Possible Follow-Up

As mentioned above, this project is intimately linked with RAMS Projects/MB 2, 3, and 4. It is sincerely hoped that the four projects will be implemented as soon and as simultaneously as possible because they are essential to protecting the the Mauritanian environment and therefore, in the medium term, Mauritania's very survival.

If the project were to produce positive results in a short time, it would be quite possible to shorten the advisors' length of service in these 4 Prefectures and to transfer them to 4 new Prefectures, either in the same regions (Assaba and Hodh el Gharbi) such as: Guerou and Boumdeid in Assaba and Tamchakett in Hodh el Gharbi, or to other regions, such as:

Hodh el Chargui	: Nema, the main administrative center, and in the Prefectures of Djiguenni, Timbedra, Bassikounou and Oualata;
Tagant	: Tidjikja, the main administrative center, and in the Prefectures of Moudjeria and Tichitt.

LIST OF ABREVIATIONS

APPAM	Projet mauritano-hollandais d'aménagement des pâturages et de production animale en Mauritanie
A.I.D.	USAID
C.O.P.	Chief of Party (Coordonnateur du Projet) RAMS
CMSN	Comité militaire du salut national
CILSS	Comité inter-états de lutte contre la sécheresse au Sahel
CNERV	Centre national d'élevage et de recherche vétérinaire
CTFT	Centre technique forestier tropical
CNLD	Commission national pour la lutte contre la désertisation
DA	Direction de l'agriculture, MDR
DE	Direction de l'élevage, MDR
DLD	Direction (proposée) de la lutte contre la désertisation, MDR
DPN	Direction de la protection de la nature, MDR
FAO	Organisation des Nations unies pour l'alimentation et l'agriculture
FED	Fonds européen de développement
FMEL	Fédération mondiale des églises luthériennes
GEFOSAT	Groupement d'étude pour les fours solaires à applications tropicales
GRET	Groupement de recherche et d'échanges technologiques
GRIM	Gouvernement de la République Islamique de Mauritanie
IEMVT	Institut d'élevage et de médecine vétérinaire des pays tropicaux
IMRS	Institut mauritanien de la recherche scientifique
MDR	Ministère du développement rural
MAC	Mission française d'aide et de coopération
NAS	National Academy of Sciences (Académie des sciences des USA)
OADA	Organisation arabe pour le développement de l'agriculture
OCDE	Organisation commune pour le développement économique
OMB	Office mauritanien du bétail
OMM	Organisation météorologique mondiale
OMS	Organisation mondiale de la santé

OUA	Organisation de l'unité africaine
PNUD	Programme des Nations unies pour le développement
RAMS	Rural Assessment and Manpower Study, projet USAID (= Mission d'étude pour l'évaluation du secteur rural et des ressources humaines)
RIM	République Islamique de Mauritanie
SEDES	Société d'étude et de développement économique et social
SONADAP	Société nationale pour le développement des oasis
UBAF	Union des banques arabes et françaises
UF	Unité fourragère (1 UF = 6 897 kilojoule)
UNSO	Bureau des Nations unies pour la région soudano-sahélienne
UICN	Union internationale pour la conservation de la nature
UM	Ouguiya mauritanien (1 US $ = 47 ou 48 UM)
UNESCO	Organisation des Nations unies pour l'éducation, la science et la culture
UNEP	Programme des Nations unies pour l'environnement
VISP	"Visiting International Scientist Program" (= Programme US de consultants scientifiques internationaux)
WWF	"World wildlife fund", Fonds mondial pour la nature

1. PROJECT SUMMARY

	June 8, 1981
Proposed by: RAMS	Title pf Project: Accelerated Training of Environmental Protection and Anti-Desertification Specialists Phase I: Setting up a non-formal system.

Country: Mauritania	Region: Nouakchott	Sector: Environment
Ministry or Department Concerned:	The Ministry of Rural Development Protection Services	

Objectives of Project:	To make up for the serious lack of personnel, in quality and quantity and provide for the accelerated training of Environmental and Anti-Desertification specialists.

Total Estimated Cost: US$ 2,000,000	External Financing Requirement: US$ 1,770,000

Summary Description: It is proposed tha the existing Environmental Protection Service be transformed into an Anti-Desrtification Department - to attain this goal, a program to train "barefoot" veterinarians, "Barefoot" range management specialists and other.

Duration of Project: 2 years	Date of Initiation : As soon as possible:

I. Title Accelerated Training of Environmentalist and Anti-Desertification Specialists

Phase I: Setting up a non-formal system.

II. Place:

Essentially in Mauritania agricultural and extension work at the National School for Agricultural Training and Extension (ENFVA) in Kaedi, and occasionally in other ..., ... regional organizations. Especially in Hodh Gharbi, Assaba and Gorgol, in support of RAMS Project/MB 3 "Demonstration Project for Environmental Management and Integrated, Harmonious Development".

III. Objectives

To make up for the serious lack of personnel (quantitatively and qualitatively) capable of doing accelerated training of specialists in environmental improvement and anti-desertification work.
This will permit the beginning of urgent indispensable measures, with the least possible delay especially in the following areas:

- development of rural roads;
- forestation and reforestation
- soil conservation
- firewood supplies
- water supplies and qualities
- preservation of flora and fauna

The planned training must particularly permit the development of decentralized activities in the field, such as those anticipated as part of the Small Projects (SP. in this report) and those which are planned and carry out by the Regional Anti-Desertification Committees (RADC). The training of counterparts indispensable to the success of the proposed Projects is a further goal.

4. Rationale

4.1 The current Personnel of the Dept. of Environmental Protection (DEP)

The transformation of this into an anti-desertification department has been recommended since Feb. 1980. There are very few employees: according to Title 7, Chapt. 6 of the budget entitled, "Ministry of Rural Development, Department of Agro-pastoral Development and Protection (Ministere du developpement rural, Direction protection et amenagement agro-pastoral") in the beginning of 1980 the Department consisted of:

- 4 engineers from the l'Ecole forestiere des Barres (France) 3 of whom had previously taken courses at the Ecole foresterie du Banco (Ivory Coast)
- 1 technical assistant who is an engineer from the Ecole d'agriculture de Bambey (Senegal)
- 20 B-level (conducteurs) and 38 C-level (moniteurs) agents trained at the ENFVA in Kaedi; in addition, 6 new B-level agents are foreseen in 1981.
- 33 wardens (gardes forestiers) with practically no training
- 9 assistant wardens without training.

As Montalembert explained in 1979 there is reason to wonder why the personnel situation evolved as follows:

		1977	1980
Management staff	(A level)	5	5
Conducteurs	(B level)	21	20 + 6 (expected)
Moniteurs	(C level)	81	80

But it must be noted that the lowest category is effectively operational only under constant supervision and monitoring, because it has not received any training.

The number of employees is insufficient to cope even with forestry needs alone which have been estimated in the aforementioned study:

Table A

	1980			1990		
Tree Plantations	A	B	C	A	B	C
Setting up	1	4	40	2	10	100
Management	1	2	20	1	7	70
Natural Planting	1	2	10			
Management	1	6	60	5	23	250
Wildlife and Parks	1	5	50	5	25	250
Sub-total	5	19	180	13	67	670
Planting Management	2	4			6	
Research and Teaching	2	2		3	6	
Participation in the Integrated development		7		2	10	
Total	11	32	180	21	87	670
Evaluation 1977	(15)	(60)	(500)	(20)	(80)	(600)

In another evaluation (Winterbottom) the following needs were established in July 1979 but not put into a time frame:

Table B

	Now in Service		Personnel Needs	To be Trained	
Water and forestry					10
Engineers	2		42	36	
		Management level 6			26
Field Service Engineers	4				
Assistant Engineers	3	Technicians 26	80	54	
Supervisors	23				54
Field agents	41	Field operations agents	350	257	200
Forestry Rangers	52				57

But will there be funds in the Departmental budget to train and pay 347 new persons? How long will it take to carry out the required training?

Furthermore is it possible between now and 1990 to find scholarships for the candidates, budgetary credits to create jobs, 15 engineering candidates, 50 technical candidates and several hundred field agents candidates at the same time? It is hardly probable, especially given the existing training system which does not at all favor agriculture and in which the students have free choice in the area of study without taking into consideration the needs of the nation.

These estimates have not taken into account the need for pastoral specialists no matter how urgent they may be. These needs are estimated to be at least 5 engineers, 10 technicians by 1985 at the latest.

Theoretically in the long run, the ideal would be for the Anti-Desertification Department to place a high level A1 engineering generalist, with several A2-level engineers and field service agents (ingenieurs destravaux) under his direction, in each Region, especially in each Prefecture.

Table C

The following forestry program was the basis of estimating personnel needs:

	1977	1980 initial estimates	1980 Probable achievement	1990
Tree Plantations (ha.)				
- installation	700	1,400	700	2,200
- management of overall area	4,000	7,400	6,400	20,000
Natural groves (ha.)				
- annual demarcation			10,000	
- management of overall area		150,000	50,000	200,000

These goals do not appear to have been reached in 1980.

In order to cover the whole nation with a classical structure such as this one, technician working under each engineer and assistant engineer would have to be far more numerous. There would also have to be many more field agents to cover the arrondissements.

Unfortunately such a plan is impossible to put into action without a substantial delay: it takes at least 6 years of formal education after the baccalaureat to train an A1 level engineer and 4 years to train a field service engineer (Ing. des travaux). In addition, the candidates are scarce and the budget allotments do not exist.

A more realistic solution would be to attend to the more urgent needs of Mauritania: this would consist of reversing the classic formal order of general training followed by specialization.

Instead, in the proposed system, specialists would be trained in limited areas to solve urgent problems which would have been identified at the National level. The specialists would start to work as soon as possible and after several years of service, the better ones would be given further training to expand their capabilities. They would then return to the field in positions of greater responsibilities, after a few more years of service, additional training would be available, and soon. Such an informal system, which was advocated and partially started by Abderamane REMILI, at "l'Institut Universitaire de Technologie Agricole de Mostaganem"(Algeria) gives the following advantages:

- Trainees are recruited at the village and encampment levels from among those who are motivated to better their own conditions and those of their relatives. Men and women are trained who will have few problems in continuing to live in their rural environment. This differs from the graduates of formal training systems most of whom come from well-to-do urban backgrounds.

- They are recruited based on motivation (psychological basis) and not according to titles.

- The cost is modest because the training periods are short and expenses are also paid back during the 2 or 3 years after each training period. There are not only quantitative and qualitative improvements in production, but also an increase in security and the standard of living. There is also a reduction in the tendency to migrate towards the larger urban centers.

- It permits start of well-planned development projects and carefully programmed training sessions with a minimum amount of delay.

A serious problem involving the Civil Service will arise in at least 8 to 10 years.

It is necessary to contemplate a longterm and progressive reform of the civil service in order that the "barefoot" technicians of this proposed training scheme can, when they reach a certain level of competence, eventually enter the civil service. Their achievements should facilitate, if they so desire, an entry into the administration. But it is also possible that there will be enough private or community initiatives at that time to promote integrated rural development and thus offer conditions inducing the men to stay in the areas where they grew up. There will possibly be more formally trained civil servants who will want to work in the field, where real power is hidden, than in the Ministries.

It should be noted that the present Project does not intend to replace the educational system but to create a system of accelerated training which would complement the existing system. Furthermore, the present report is only a rough draft; the Project document will need much longer and extensive preparation. A further recommended priority is to recruit a consultant to draw up the Projecy Document.

5. Description

Generally speaking, the specialists who will be needed right away to get the projects started (smallprojects and others) will be trained in a series of short, progressive, sessions in the field aimed at 3 distinct categories of personnel:

A. Administrative agents who would be given the accelerated training in the form of short refresher courses or training session. The FAO Project for training tree nursery workers for Arbor Day, 1980 (Project (TOP/MAU/003T) which was implemented very quickly, thanks to the diligence of the FAO representative, is an example of what can be done in this fashion.

B. Rural nomads or villagers chosen for their motivation to initiate development, would gain functional literacy in stages which would respond to their problems as the learners themselves identify them

C. Mauritanian men and women who have already had formal training in connection with the responsibilities that they will have in the fiels.

The limited time available for preparing this proposal did not allow for going into great detail or drawing up a complete program but the following are some proposals which should be included in the Project.

5.1 Training of 5 pastoralists for the Anti-Desertification Department

It is very surprising that a country such as Mauritania, which is essentially a livestock raising country, has not one pastoralist (1) although this kind of specialization which has common bases with forestry and is a very specialized domain has defined as: "a group of arts and sciences which combines raising the standard of living of the herders (social objective) with increasing the profitability of extensive herding (economic objective), production and maximum use of all types of forage resources (technical objective). Within this framework, integrated, harmonious development of the natural resources of a country is possible" (Baumer et Rey, 1974:5)

Unfortunately, there are not yet any complete courses on Pastoralism in French for tropical Africa, but it is possible to devise specific courses adapted to Mauritanian needs. This could be accomplished through appropriate training programs organized particularly in the following centers;

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(1) One Mauritanian veterinarian is now taking the 1st sessions of courses of the UNESCO post-graduate course in integrated Pastoral Development of the Sahel.

- ENEVA at Kaedi
- Forestry School of Rabat-Sale (Morrocco)
- Montpellier (France), home of
  - The Louis Emberger center of Ecological and Botano-sociological Studies (CEPE) of the CNRS
  - The National Center of Agronomical Studies for Hot Regions (NEARC) with the Institute of Training Agronomists for Hot Regions (IFARC)
  - The Mediterranean "Ecotheque"
  - National School of Advanced Agronomics (Montpellier ENSAM)
  - The National Institute of Agronomic Research (INRA); Montpellier branch
  - The Malian project for an International Center for Livestock Raising in Africa. (ILCA)

It would seem utopic to want to train Pastoralist personnel, whom Mauritania urgently needs, through the classic channels; it would be very difficult to find candidates with the desired preparatory qualifications. Therefore a special program which would permit the training of 15 specialists viewed as indispensable, in 2 years (school years 1982 - 83, and 1983 - 84) is also proposed. These specialists would therefore be available in July 1984. If the Mauritanian Government could designate 15 candidates to be trained starting in Oct. 1982, and continue to pay their salaries and foresee their classification as engineers (5) and technicians (10) starting in July 1984, it would be possible to:

- set up a specially designed training program;
- look for financing.

This task could be an extension of the UNESC Project for postgraduate study of range management in the Sahel Project RAF/79/017 The Project document expressly foresees the possibility of ad hoc training courses, depending upon the expressed wishes of the learners.

Within a formal training system, this would help meet some of the needs for specialized pastoralists in the Anti-Desertification Department. It is conceivable if action were quickly taken to find the necessary funds that a year could be gained and the specialists could be trained by July 1983 instead of July 1984.

At the end of the training program, the proposed transfer of the Forestry and Pastoral Development Service of the Anti-Desertification Department to Kiffa would allow it to be closer to the problems and the areas of activity.

5.2 Training of Inland Fisheries Specialists

If one takes into account the lack of specialists in inland fisheries, and the fact that inland waters can and do play a large role in providing the country with animal protein, it would be desirable to organize a Conservation Service and develop inland waters as described in paragraph 3.2.1 of Baumer's report (June 8, 1981) in which program of 9 months at the ENFVA in Kaedi for 15 people is proposed; 13 of these would be trained to be the 1st level personnel of the Service, cf. paragraph 3.2.1 and would not finish their studies.) This special course could be organized by an expert in hydrobiology and inland fishing who would be assigned to the ENFVA and who would have consultants and appropriate pedagogical equipment (ponds, aquariums, boats, nets, and fishing tackle etc.) at his disposal.

The details for the preparation of the course (detailing the importance of the prevention of water-borne diseases, needed as the type and number of consultants as well as their length service, and the necessary equipment etc. will be determined by Mr. Reizer.

At the end of the course there will be 13 technical agents. A scholarship in training in fishing, fishponds and pisciculture at Bouake (Ivory Coast) will be given to the 4 most outstanding students. If, in the meantime, the project to create a secondary level fishery training program proposed to the CILSS were financed, the 4 trainees would be sent there.

At the same time a fisheries specialist must be trained at the post-secondary level, either under the supervision of specialists in Arlon (Belgium) or Toulouse or Montpellier (France) in order to assume responsibilities as head of the Service in late 1983.

But this training presupposes that at least 2 years before it ends, the government will provide the following necessary budget allotments: one inspector, 4 supervisors and 8 field agents. Given the importance of these stakes, it is hoped that the necessary $750,000 (US) will be rapidly found to insure that the Service is functional. The project is planned for a start in Sept. 1981.

As follow-up measures, it would be prudent to provide for :

- a refresher course for the agents in 1984;
- a refresher course for the supervisors;
- personnel turn-over;
- Promotion possibilities;
- numerical increase of personnel;
- yearly visits of the expert or a consultant for some time.

In the training which will be given at the ENFVA, particular importance will be given to the rural extension methods (animation) so that the agents will be trained not only to diffuse what they have learned but so that they can train assistant extension workers thus lessening their work. This is foreseen as a special operation. (5.3)

5.3 Training of Assistant extension workers - inland fisheries

With brief seminars in the field ... or along the river, using the vernacular languages (Wolof, Poular, Sonike) and using audio visuals (in cooperation with RAMS Project/MB 4 Pamphlet and Publicity Program for the Anti-desertification Campaign)" to give the fishermen and their wives the information, the techniques, the know-how needed to improve their daily lives:

. fishing methods;

. tackle and its repairs;

. pisciculture in natural and man-made ponds

. water-linked diseases; prevention and treatment

. food from fish

. drying and preserving of fish, etc.

These fishermen and their wives will spontaneously help by spreading their knowledge afterwards. Methods to facilitate the transmission of their skills will be sought (giving money or goods to those with the best dried fish for example, recognition by WFP for the creation of fish ponds or reservoirs etc.) Means of recognition other than money are also being sought to motivate the fishermen and their wives to become informal fisheries extension workers.

The seminars will be organized with Mauritanian personnel, but 3 consultants are planned to prepare them. (a Mauritanian or Senegalese sociologist and nutritionist, preferably also from the Senegal River Valley). Small training aids are also planned.

The following materials for developing familiarity with the project are desirable:

- a report including photographs, maps, cassette tapes (songs of the fishermen for example) made by the Anti-Desertification Department

- radio and press coverage of a good part of the training

- a liaison with the aforementioned project "Pamphlet and Publicity Program for the Anti-Desertification Campaign".

5.4 Training of "Barefoot" Herding Extension Auxiliaries

The training of "barefoot" herding extension auxiliaries, persons chosen by the herders from among themselves (preferably nomadic transhumant herders) is to be of the most basic kind and is to be closely linked with the following project proposal (Demonstration Project for Environmental Management and Harmonious Integrated Development).

It is advisable, in effect, that Government intervention be as discreet as possible in order to insure the ultimate success of the overall strategy of which these accelerated training programs are only one element and which are to be eventually taken over by the population itself. The selection of these trainees will be suggested by a sociologist or a Mauritanian extension agent speaking Hassaniya - or Poular among the Peulhs - and actual selection will be done by the leaders of sub-groups of the population (sections, tents, encampments, Families ..) involved in the Project.

The themes at first will be limited to one or two per session and always chosen by the herders. The sessions will become progressively longer and will allow for a number of themes to evolve gradually. Written records will allow the beneficiaries to be identified; the most hard-working will be able, after several months, to become assistant extension agents: their new stature should be decided by their social group which will mark their election in a concrete fashion: for example by giving a mount, or a saddle; at this time, the Project will aid the new assistant extension agent by giving him several resources (for example barbed wire to protect a demonstration area, rock salt, concentrated food for the livestock, a scythe for the hay ...) appropriate to his situation . If the assistant extension agent is a nomad or herder, he should be authorized to mark his tent or mount with a small pennant which will be that of all the "barefoot extension agents" because it is important that they be distinguisable and recognized.

The progress of the Project will be done as follows, as concerns international personnel:

Pastoralist no. 2 will have as his first function to set up the demonstration plots will be used as training sites. This is why his first stay is to be for 2 months and his first stays are to be close together. His last two stays in the second year, would be shifted to take into account the physiological state of the vegetation. He will supervise the demonstration plots and will create or suggest new ones.

Pastoralist no. 1 will come intermittently (5 times : 1 month.), essentially to aid the extension with technical advice, extension training materials, and technical content for training modules.

The extension agent should speak Hassaniya or Arabic and have solid experience in nomadic life and herding in arid zones; he should be prepared to share the rugged life of the herders (living in a tent in the emcampments). It would be an advantage if he could ride a horse or a camel and a supply of mounts is to be made available.

The vehicles will be equipped like those of the project proposed for the Dromedary Institute project and include in particular : an electric air pump, a hand pump, two spare tires, a tire (without the rim) and 4 extra inner tubes, a tool kit, a distributor, a set of spark plugs, a tire repair kit, jerrycans, a jack etc. They will be equipped with a radios to communicate with the Prefecture and with the proposed project vehicles in RAMS/MB 3 "Demonstration Project for Environmental Management".

The extension agent should be able to have at his disposal the following Hassaniya-speaking and if possible, Poular-speaking Mauritanian specialists:

- 2 extension agents, trained in pastoralism, in forestry in animal husbandry or at least in agriculture (but only one of the two) for 250 days in the field per year each, over a two year period (this could be 500 consecutive days at least one of the two extension agents should always be available during the 730 days of the project.

- two sociologists, preferably from the IMRS, each in the field for 150 days per year over two years

- two hygienist-nutritionist, for 200 days each in the field each year over two years; they will help in the domain of health concerning women and children, milk collection, processing and preservation, nutrition, and will be evidence of the dedication to integrated rather than sectoral development.

The payment of salaries and normal indemnities of this personnel will be the Government's responsibility but some special indemnities for the days spent in the field, such as a mount and its trappings, have been planned for them in the project budget.

Among the subjects which will probably be of interest to the herders - and for certain subjects, of interest to the wives of the herders - and for which it will be suitable to plan demonstration plots are:

- hay making (importance of hay making season);
- simple silage (trench silo with addition of salt);
- pasture rotation (varying times and varying vegetation groups);
- propagation by breaking/splintering stumps of Andropogon gayanus;
- propagation of Panicum turgidum in deep sand (see the "Note sur le m'rokba" in Appendix 5 of the Report by Baumer and Sabra, 1960);
- the effect of mineral supplements on the performance of animals
  - milk processing and preserving.
  - etc.

Other ideas will surely be found, notably as inspired by Boudet (1977).

It will also be desirable to have a trial demonstration of phosphate use on pastures, using the phosphates of Kaedi, which will be better used to improve Mauritanian soils, which are nearly

everywhere deficient in nitrogen and in phosphates, than in being exported to obtain hard currency.

Also in the same vein, a trial demonstration of field or pasture enrichment should be done by planting legumes (cajanus cajan, vigna vexiliata, V.unguiculata Indigo Fera sp. pl., Lathyrus sp. pl. and Faid herbia albida better known as "cadd" with or without the addition of phosphates.

5.5 Other Accelerated Training Programs

Due to time constraints, it has not been possible to elaborate further in this report. Other accelerated training programs should be planned, notably for:

- "Barefoot Veterinarians" (inspired by Halpin, 1981)
- "Barefoot Agronomist-Forage auxiliaries"
- "Barefoot Nurses, hygienists, nutritionists"
- "Barefoot foresters"
- Counterparts for the Development Projects, even "Barefoot Counterparts"
- etc.

6. Implementation Plan

As has already been written, this project constitutes a whole with the following projects: "Coordination of an Environmental Development and Anti-Desertification Campaign" "Pamphlet and Publicity Program for the Anti-Desertification Campaign and above all "Demonstration Project for Environmental Management and Harmonious Integrated Development", that it will complement very effectively.

7. Budget

For the 4 identified operations, the following budgets have been calculated (in U.S.$).

Operation 5.3 : Training of Auxiliary Extension Agents for the Conservation and Improvement of Inland Waters

	Total	1983-1984	1984-1985
4-day seminar to train auxiliary extension agents in Boghe, Rosso, Kaedi, Gouraye	42 000	20 000	22 000
then at: Keur Massene, Jder el Mohguene, Dar el Barka, Bababe, MBagne, Djowol, Wompou	38 500		38 500
4-day seminar to train female auxiliary agents in water-linked health problems and in the nutritional aspects of fish in Rosso, Boghe, Kaedi, Maghama, Gouraye	52 500	25 000	27 500
then at Rkiz, Keur Massene, Lexeiba (Trarza), Dar el Barka, Bababe, Mbagne, Lexeiba (Gorgol), Djowol, Sive, Wompou	55 000		55 000
9 months consulting time to prepare seminars including:			
2 X 1 m/m regional	12 000	12 000	
1 X 1 m/m international	8 300	8 300	
Extension/training material: pictures, drawings, models, tapes, etc;	10 000	6 000	4 000
	218 300		
Contingency	21 830		
	240 130		
Management costs	33 618		
TOTAL	273 748		

1. Project Summary

Date: 8 June 1981

Reference: RAMS	Title of Project: Demonstration Project for Environmental Management and Harmonious Integrated Development	
Country: Mauritania	Regions: Hodh el Charbi, Gorgol, and also Assaba and Hodh ech Chargui	Sector: Integrated Rural Development
Ministry or Department Concerned: The Ministry of Rural Development Environmental Protection Service		

Objectives: Considering the necessity of accomplishing integrated development activities with the total participation of the population and sub-groups concerned, the particularly disturbing progress of desertification in Mauritania and the lack of successful efforts in livestock projects in dryland Africa, the Project is designed to concretize in the field and among the people, the strategy of the anti-desertification campaign adopted by the government and more specifically:

- to mobilize the concerned population in activities of environmental management;
- to develop a rapid method for the population to gain the basic understanding necessary for the extension of the fight against desertification;
- to carry out field-level training in environmental management and anti-desertification strategies for all levels of personnel.

Total estimated cost: equivalent of U.S.$ 6,5000,000	Outside financing required: Phase I (16 months) 1,015,029 US$ Phase II (2 years + 3 years for the training) 4,310,032 US$

Summary Description:

Extension-training for herders and farmers in the methods of conservation and management of natural resources as well as involving the population in the work of safeguarding the environment; reforestation, dune-stabilization, wind breaks, pasture management, improvement of hygiene and nutrition.

Purpose of the Project:

"Pastoralism is that assembly of arts and sciences which leads to the improvement of the quality of life of the herders (social objective), to the increase in the quantity of livestock (economic objective) and to the production and regular and continued maximum utilization of forage resources of every type (technical objective), in the framework of harmonized integrated development of the natural resources of a country" (Baumer and Rey, 1974). Harmonized integrated development "for a given population and its sub-groups is a series of transitions at the most rapid rate possible and at the least possible cost from a less human way of life to a more human way fo life" (Lebret, 1961).

This project, which can only be undertaken as part of a group of projects constituting a strategy against desertification, is, in sum, a project which accompanies the project "Coordination of an Environmental Development and Anti-Desertification Campaign" and it presumes that the project "Accelerated Training of Environmentalists and Anti-Desertificaiton Specialists" has already been initiated even itfonly on the level of counterpart training which is a necessary part of the project. Moreover, this project will have to work in close collaboration with other rural development projects and most especially the EDF project for the development of animal production in southeast Mauritania, the APPAM project, the World Bank project for the development of livestock in southeast Mauritania, the EDF project for reconstituting the gum tree forests, etc.

Moreover, accompanying the present project is a series of sub-projects which must be closely integrated and coordinated with it, but which could eventually be financed separately.

In the confused situation which prevails at present in Mauritania concerning pastoralism the present project will undertake

to prove the viability of a anti-desertification such as that which stems from the Baumer and Sabra report (1980), from the conclusions of the seminar of May, 1980 and the strategy for pastoral management such as the one outlined by the RAMS Project (Wilkes, 1981). Taking into consideration the experience and the results of various projects related to animal production, to forestry and to the fight against erosion which have taken place in Mauritania, the present project will attempt to prove the viability of a strategy by applying it to field conditions. Its aim is not only to specify principles of land management and especially of grazing lands, under Mauritanian conditions but also to demonstrate in the field, on a large scale and with the participation of the concerned population, (especially the herders,) the advantages which can be expected from management of the pastoral environment for harmonious integrated development.

2.1 This project is consistent with the spirit of the Plan in that it will contribute to food self-sufficiency. Specific , it will aid in improving milk and meat production, especially for home consumption by several of the poorest sub-groups of the population. The project is completely dependent upon the participation of the populations to which it will relate. In particular, it will assist as often as possible the youngest population groups, both aiding in the training of youth and in developing truly functional literacy, especially among the herders.

It is also expected that this project, in the spirit of the Plan, will aid in redistributing income, thereby particularly assisting the most disfavored parts of the population in the country. In addition, the project will aid in reaching major national goals such as the stabilization of dunes, reforestation and environmental protection.

Finally, it will constantly draw upon the traditional cultural values of the population involved.

2.2 The project in all its aspects conforms to the recommendations of the CILSS and the Club du Sahel for anti-desertification campaign and involving popular participation. The objective of agro-sylvo-pastoral improvements will be achieved by: establishing an inventory of renewable natural resources, and subsequently, by

continuous updating ("monitoring") and improvement of the firebreak network; simultaneously creating pasture reserves and animal food sources and protecting pastures with the consent of the herders and external donors;putting areas off-limits and developing a system of pasture rotation; progressive installation of rotating pastures, first as a demonstration project with the assistance of additional fodder and animal food supplements furnished through external aid, and then becoming more generalized: qualitative improvement of trek routes by planting of root cuttings from perennial forage grasses, reconstituting eroded or worn out pastures by appropriate methods nabatean squares, reseeding pf the soil, establishing ensilage reserves in a year of high rainfall which can be preserved for 2 or even 3 years; developing and improving of hay tedding, etc. These measures of pasture improvement will bear fruit only if the herders modify their attitudes and if measures for improving the herds are taken at the same time. Also it will be necessary to begin with small demonstration activities to sensitize the population before considering programs covering thousands of hectares, even if the latter are very necessary for the survival of Mauritania. The large-scale pastoral programs will not have a chance to succeed unless the herders decide to change their way of life: it is this change of attitude which the future of the country depends upon. When this change is made, management methods can be changed: better herd composition, with fewer cattle; a better mix of sexes and age classes, research on the most resistant or most productive strains, etc. Only then will animal health measures have their full effect.

2.3 Insofar as sector objectives are concerned, these are not yet precisely known in the sector affected by this project, but the discussions which were held with Mauritanian officials in the course of designing their project, give the impression that it is completely consistent with these objectives.

The project will improve the system of pastoral production in every possible way and, given the extent to which the affected population desires or, at least accepts the project. The latter is generally oriented toward cattle; however, a system of cattle production cannot function at all satisfactorily to meet the needs of the people in an environment as difficult and with climate variations as great as in the Sahel without " the support of the essentially different dynamic of sheep and goat herders". (CIPA, 1980). As a result, one is forced to give a much more important place to the camel and to small ruminants as well as to grazing systems. The project

will also seek to bring together the agricultural and livestock sectors. As an FAO mission (Reyntjen, et al, 1975) remarked six years ago, the program for animal production lacks the essential structural link for encouraging effective pasture use and assuring connection between large-scale livestock raising and semi-intensive or intensive fattening which should logically be developed as irrigated farming increases. It is thus useful to develop methods and structures which will permit realization of the complementarities existing between the grazing zone and the fattening zone (see Appendix 6) on the condition that the costs of fodder production decrease sharply, which particularly resuppose that there are much more economical methods for lifting water than motorpumps (shadouf, water helix, water wheel, windmill, ...). In fact, in the feasibility studies of February 1975 (Rosso) SEDES evaluated the cost of a cubic meter pumped water at 1 UM at Rosso and at 1,2 UM at Kaedi; it followed that the price of an FU (unit of fodder) produced through irrigation was very high, for example, at Rosso

3,49 UM for growing grass

4,77 UM for UF of hay

5,49 UM for UF of silage

The prices are very high and the fodder produced under these conditions would not be able to support the cost of truck transportation to where the herds are located. Thus it would be necessary to use caravan transportation and in certain cases, whenever land conditions permit transhumance of herds to the places where irrigated fodder is produced.

2,4 The project fits perfectly into the objectives of the regions where it will carry out its primary activity

Gorgol: fodder production through irrigated agriculture, soil conservation and research on cooperative forms of association between forage producers and herders.

Hodh el Charbi: projects involving development of farmland, forests, grazing land, and the planting of gum tree groves. The Project will also study the possbilities of wildlife management in this region, particularly in its relation to the production of domestic animals.

2.5 The Project's specific objectives can be expressed in terms of whom it will benefit and what it will produce. The principal beneficiaries will be the local people, especially the most disadvantaged among them, and the herders, both nomadic and recently sedentarized. Other programs are planned to help farmers in oases and on irrigated fields. As for output, it is difficult to quantify what is expected from the Project before Phase I has been completed. However, the following qualitative changes should take place:

- an increase in forage available to grazing animals and thus improved and increased milk production
- higher quality meat
- a general increase in the profitability of herding
- much greater participation on the part of the local people in the development projects affecting them
- on-site training of local farmers and herders geared towards improving herding practices and the quality of life in general.

These latter can be transformed, as part of RAMS Project/MB2, into "barefoot herding extension agents", "barefoot foresters", health extension agents, etc.

2.6 As already stated above, the Project is closely tied to the EDF Project for the Improvement of Livestock Production in southeast Mauritania, and it must carefully take into account the results of the APPAM project and of the EDF project for the restoration of gum tree groves in the southern oases. Thanks to the regional anti-desertification committees and to the "backbone" of the anti-desertification campaign which will be created by RAMS Project/MB1, the Project will play an essential mobilizing role which will complement the other work being done in integrated rural development.

3. Context of the Project

3.1 Geographical Situation

Two regions have been chosen for the assignment of Project personnel (see Figure 1):

- Gorgol for development of irrigated forage production and

- Hodh el Gharbi, for forestry and livestock production development

but these limits are not exclusive. In Hodh el Gharbi, the Project will profit from the presence of anti-desertification advisors who, as part of RAMS Project/MB 2, will report to the Governor in Aioun el Atrouss and to the Prefects at Tintane and Kobenni. However, the Project will consider other opportunities to work outside but still near the selected areas.

The Gorgol region, bordering the Senegal River, has the important feature of irrigable soils, notably hydromorphic soils and subarid vertical brown soils. Several irrigation projects are already under way. Outside the Senegal River Valley the vegetation consists typically of groups of jujube trees; varieties of jujube developed in Rajastan and Haryana (India), which produce large tasty fruit, might be introduced here. Elsewhere in the region, Mimosas and Acacia tortilis, subsp. raddiana, can be found at high elevations.

The regions of Aioun el Atrouss, with its subarid brown soils featureless sand, and abundant growth of Acacia Senegal, is probably the area of Mauritania which most closely resembles the Kordofan (Republic of Sudan), center of the world's gum arabic production.

The map attached shows the location of the principal sites where the Project's work is planned. Note that Kaedi can be reached both from Nouakchott and from Aioun Atrouss in one day. Also, Air Mauritania flies there several times a week. Aioun el Atrouss can be reached in one day from Nouakchott by paved road (=493 km). A project is planned to build a road linking Kaedi and Kiffa, via M'bout and Kankossa. Few facilities or amenities exist in Kaedi or Aioun el Atrouss, and even fewer at Kobenni, but with strict household planning and good radio contact, it is possible to live decently there.

3.2 Human Situation

The population in the project area is of varied ethnic origin. Moors are the principal group in Hodh el Gharbi, whereas Peuhls and Toucouleurs predominate in Gorgol. In Hodh el Gharbi, the density of sedentary population ranges from 1 per km^2 in the western part to 5 per km^2 in the Kobenni area. In Gorgol, the density is above 5 throughout and reaches 20 per km^2 near Kaedi; this is the highest density of sedentary population measured in Mauritania. The nomadic population, in the western half of Hodh el Gharbi, reaches

3 persons per km^2 and represents 60 to 90% of the population of this region. Nomads account for only 10 to 20% of the population around Kobenni and even less around Kaedi; in Gorgol the nomadic population is primarily in the north, along the borders of the Brakna, where it constitutes about 30% of the total.

The population of Kaedi is approximately 30,000, and that of Aioun el Atrouss approximately 20,000. In Hodh el Gharbi there is:

- in Aioun el Atrouss; one regional hospital, one dispensary, one PMI (maternal-child center), and two roving health teams

- dispensaries in Tintane, Kobenni, and Tamchekett

In the Gorgol there is:

- in Kaedi; one regional hospital, one dispensary, one PMI (maternal-child health center), one mobile health extension unit

- dispensaries in Maghama, M'bout and Monguel.

There are also eight other medical facilities in the Region.

3.4 Administrative Situation

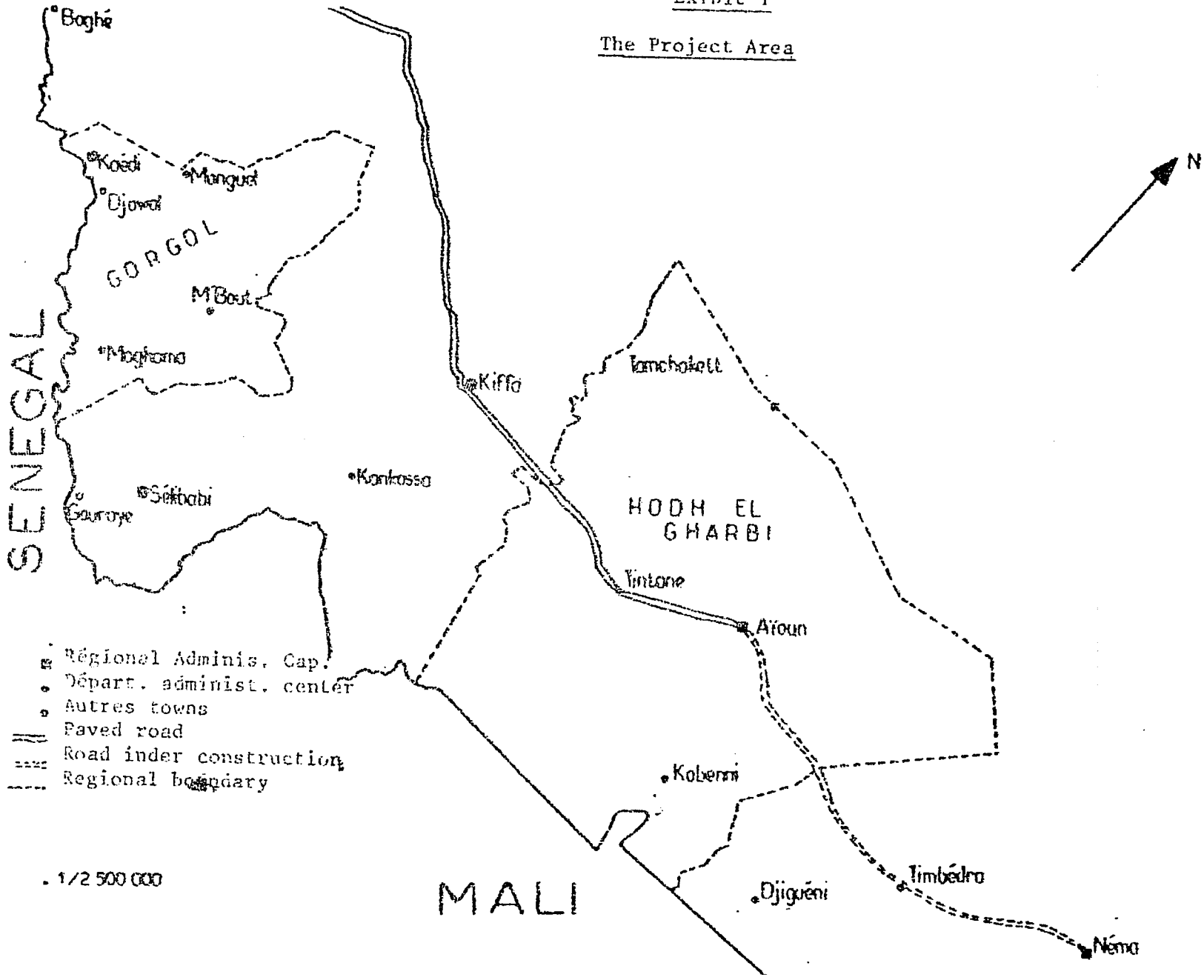
The Project will be connected to and administratively supervised by the ADD (Anti-Desertification Department). The Governors of Hodh el Gharbi and Gorgol will provide supervision at the regional level. The ADD offices at Aioun el Atrouss and Kaedi will collaborate very closely with the Project and support its activities. In the 2nd region, the Prefectures of Tintane and Kobenni will be the most involved in the Project's work, especially Kobenni, which will be the center of work concerning wildlife and of health and nutrition.

4. Necessary Resources

4.1 Technical resources

Exibit 1

The Project Area



4.1.1 During its initial or preparatory phase, the Project will identify the people and groups to be involved, identify sites, and detail its work activities.

a) Identifying people and groups to be involved will involve locating, with the aid of the authorities and of the herders and farmers, persons who are ready to help themselves and who want advice and technical support towards increasing their security, their standard of living and their quality of life; it is they who are at the heart of the Project. This aspect is particularly important as local participation is not merely necessary but absolutely indispensable to harmonious integrated development. Indeed, if the 650 million dollars spent in Africa over the last 10 years on livestock projects has produced almost no results, it is primarily because these projects were carried out without the consent and participation of the local population.

b) Indentifying sites will mean working with members of the local population to select the places where the Project's work will take place, such as: a plot for observing undisturbed plant growth processes, a plot for a natural forage plant reproduction center, places for collecting surface water, firebelts, areas requiring sand dune stabilization, areas for reforestation of gum trees or other species, areas for village wood lots, etc.

c) Detailing work activities will require first taking stock of all the information and all the experiences, both positive and negative, having to do with the development of grazing land in Mauritania. This will entail a visit to FAO headquarters by the Chief of Project, and, during the first phase, two inter-Project meetings in Nouakchott under the auspices of the ADD. In addition, a detailed plan of operations will be drawn up for the second phase, which in order to be effective must immediately follow Phase I.

Phase II will continue the work identified or begun in Phase I, with the ever-increasing participation of the local people,

whose efforts will sustain the Project's work once it has gained momentum. For example, the local population will make recommendations to the Project staff, harvest foodstuffs produced (grain, for example), consult with staff about Project goals, guard the fields under cultivation, guard and organize differentiated pasturage plots and pasturage rotations plots, create, maintain, and use the seedbeds, organize the production, mixing and storage of silage, etc.

4.1.2 The work to be done will proceed from the plan outlined above. Phase I will be concerned primarily with information dissemination, extension work and general preparation. Nevertheless, certain urgently needed improvements identified by herders and farmers--wells, silos, differentiated pasturage, etc - - will be built.

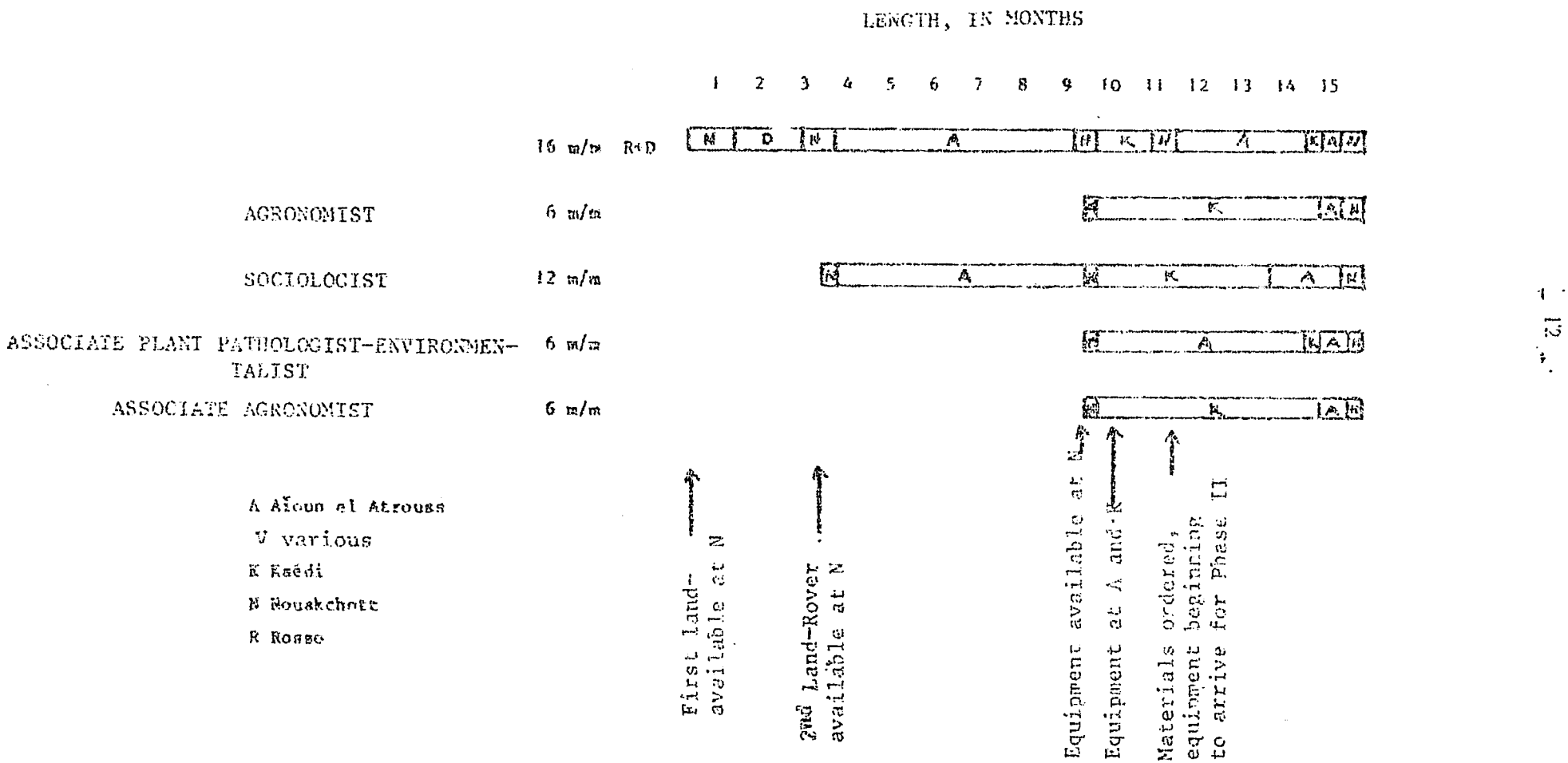
4.1.3 Equipment needed. In Phase I little equipment is needed, but it must all be available from the very beginning. Required are:

- one Land Rover, available when the Chief of Project arrives in Nouakchott
- a second Land Rover, available 3 months later, when the agronomist arrives.

These Land Rovers must be equipped with portable radio sets allowing them to communicate among themselves and with the regional capitals; and also to communicate over short and medium distances with the roving Project teams, who should have the same radio equipment. Also needed are topographic instruments, binoculars, photogaphic and sound recording equipment (with film, reels, cassettes, etc.), gardening tools, fencing materials for seedbeds, etc. The agronomist will need seeds, materials to build a compost heap, bags, packets and labels, and perhaps a small power tiller. All the equipment and necessary accessories must be in place in Aioun el Atrouss and Kaedi at the beginning of the Project's 10th month, for the use of the two associate specialists, and if necessary, for the two specialists based at Aioun el Atrouss.

Extension work at Kaedi and possibly at Aioun el Atrouss will require audio-visual equipment. The ENFVA in Kaedi probably already has the necessary materials (given to it by the UNDP), and the Anti-Desertificaton Information Project (№ 46) can provide the Hodh el Charbi with the means to acquire equipment, including film rental, tapes, slides, etc.

Table 1 - Plan of Operations (Phase I)



4.2 Human Resources

4.2.1 Supervisory personnel. The Project committee will be presided over by the Minister of Rural Development , vice-president of the NADC, and consist of: the Plan, the Director of the ADD, as secretary; the Director of the Livestock Service, the Director of the Agricultural Extension Service, the General Secretary of the MRD, as head of agronomic research and foreign aid, the IMRS, Departments of Health,

Education, the Project Director (and his staff if he wishes), and his counterpart, the FAO representative.

The committee will meet as follows: the first week of the first month, fourth month, and tenth month, and during the last two weeks of the eleventh month in order to prepare Phase II; and at the beginning of the last week of the fifteenth month to assemble the final report on Phase I.

4.2.2 Implementation personnel. The following operative personnel must be present from the first day of the project.

1) One full-time counterpart to the Chief of Project, for 16 months

2) One full-time counterpart to the agronomist

3) One full-time counterpart to the sociologist, for at least 9 months.

Two extension agents will be assigned to Gorgol to work with irrigated forage, and four to Hodh el Charbi to work with livestock, or if possible with both herding and forestry. The Project's goal remains, however, that the improvements brought to the area be implemented by the local people themselves.

4.2.3 Expatriate personnel. In Phase I there will be

1 ecologist, Chief of Project, for 16 months

1 agronomist, for 6 months

1 sociologist, for 12 months

1 associate plant pathologist/environmentalist and 1 associate agronomist, each for 6 months.

The attached Table I shows the personnel schedule. Note that the Chief of Project will spend one month prior to the start of the Project performing research, mostly at FAO headquarters in Rome, and if necessary at the EDF and at the Dutch agencies in charge of the APPAM project.

The arid lands ecologist, who will be Chief of Project, must have extensive field experience in the development of arid areas, and also in trek route development. He must speak and write French fluently, know basic Arabic and be prepared to learn more, in order to be able to rate a UN level 3 on a test to be given at the end of Phase I. If, as is hoped, the Project is sponsored by one of the UN specialized agencies, the Chief of Project must be well aquainted with the structure and operation of that agency; he will spend 15 days at its headquarters before reporting to Mauritania. The ability to ride a dromedary or a horse would be helpful. He must be in top physical condition and be ready to adapt to primitive living conditions in villages or encampments; to work in a team (ADD) and to supervise his own team (the Project); to collaborate closely with the RAMS project/MB 1 advisors and with the ADD Director who, with his advisor, will determines Project policy. He will also work with the Governor in Aioun el Atrouss who, with his advisor, will adapt Project policy to the needs of Hodh el Charbi.

The Chief of Project will have direct contact with

- The Governor of Gorgol in Kaedi
- The Governor of Hodh el Chargui in Nema
- The Prefects of Kobenni, Tintane, Timbedra and Djinguenni.

The Chief of Project will represent the Project in the NADC of the 1st and 2nd Regions.

The sociologist must speak fluent Arabic (or Hassaniya) and French. He should have lived and worked among African arid-area herders, and be familiar with aridland development and truck-route construction and forestry development. He must have had practical agricultural extension experience in semi-arid pastoral areas in Africa or the Middle East. Under the supervision of the Chief of Project, he will solicit the local people's environmental development, inform them about the philosophy and techniques of environmental development and about improving the quality of life as defined by the MRD; and lead the populations concerned into full participation in the Project. He will be posted in Aioun el Atrouss.

The Agronomist must have had solid experience in arid lands development; in arid forage production and rainfed agriculture but most especially in irrigated agriculture. He must speak fluent French; and even a superficial knowledge of Arabic, Hassaniya or Pouloulour would be helpful. Under the supervision of the Chief of Project and with the help of an associate specialist, he will prepare Phase II's development of irrigated forage production (in cooperation with SONADER, CNRADA, and other projects and farmers' groups).

He will take part in forage production training, notably at the ENFVA and in extension training programs for farmers and herders.

He will do joint research with the forestry specialist on trees and shrubs as sources fo forage for grazing animals.

He will encourage and aid certain small projects (SP) in his sector if financial support can be found; for example

- the small integrated rural development project in the Selibaby area prepared by USAID 9 (VISP, 1981)
- PP 11 "M'bout area Integrated Rural Development", (BAUMER & SABRA, 1980: 65-67)
- PP 7 "Cadd(Khaya senegalensis) planting in farming areas" (i,l.c. 51-53)

SP 7 "The Anti-Desertificaton cmapaign in the agricultural cooperative at Djowol"(Le: 54-56)

He will seek to find means of developing cooperative associations between livestock owners and farmers who raise forage crops for the livestock.

He will represent the project in the RADC of the Gorgol Region.

The expert concerned with fodder raising will concentrate particularly on SP 7. He should be able to ride a horse well, and should be a graduate agronomist.

The expert concerned with improving trek routes should be a graduate ecologist, agronomist or forester. He should be able to ride a horse or camel well, or be prepared to learn how. He will, under direction of the Chief of Party, be responsible for installation and maintenance of demonstration plots posts for growing fodder crops, and for taking botanical-ecological samples.

In the second Phase of the project (Table 2) it is also planned to have experts who were associated with Phase I, for stays of 18 or 24 months.

- a zoologist (specialized in wildlife)
- a hydrologist (pastoral water resources)
- a nutritionist
- an associate wildlife ecologist
- an associate specialist. Each one for 12 months

and it will planned to have for 24 months each:

- a forester
- an extension worker
- an associate range improvement specialist and
- a selective breeding specialist

The timetable for Phase II will be worked out during Phase I. The places where the experts will be assigned are mentioned in Tables 1 and 2. These areas are planned, in Aioun el Atrouss, in Kaedi and in Kobenni.

During Phase II of the project the forester will work principally around Aioun and Atrouss. The administrative center of the 2nd region, and particularly along the Timbedra-Tintane road. He, with the cooperation of the local populace, and with the assistant of WFP will attempt to achieve the following goals:

(Requests for assistance to be made during Phase I)

1) Planting of a gum tree grove which would benefit both livestock owners and farmers

2) Taking measures to stop erosion of the Tintane-Aioun road and of the Atrouss-Timbedra road, which will be surveyed and blacktopped within the next few years,

3) Upgrading living conditions, notably by restoring vegetation in villages located near the road to encourage their people to remain in them rather than moving alongside the road,

4) Protection of groves and pastures against fire,

5) Giving support to the forestry inspection service at Aioun el Atrouss. ADDX.

6) Contribution to the restoration of the Capparidae (cf SP9)

All along the "Road of Hope" (the Nouakchott-Kiffa-Nema road) the rural dwellers have left their nearby villages and settled right next to the road, thinking htat it will bring some opportunity to make money. Damage to the soil alongside the road, already begun by the passage of the road-building machines, is only aggravated by the press of these crowds of people and of their herds.

The area which the road crosses outside Aioun el Atrouss is ecologically and botanically very like those where the best gum groves (Kordofan, the Sudan) are found. It is made up of a network of rather reddish stabilized dunes which stand out from depressions of finer, brownish sand, which appears to contain small accumulations of organic matter. It seems possible that shallow, low-volume wells could be used in some of these depressions. The woody vegetation is principally made up of Balanites Aegyptiaca, but there is also Boscia Senegalensis, Maerua Cassifolia, Capparis Decidua, Ziziphus mauritania, Bauhinia Rufescens, Acacia Tortilis Subsp. Raddiana.. On the dunes the woody vegetation includes Acacia Senegal, Acacia Nevia, Acacia Tortilis Subsp Raddiana, Ceptadenia Pyrotechnica, Euphorbia Balsamifera; the grassy cover includes essentially Cenchrus Echinatus but also C. Prieurii, Eragrostis Tremula, E. Aspera, Stipagrostis Hirtigluma, A. Ciliata, Aristida Pallida, A. Funiculata, A. Adscemsionis, A. Mutabilis, Andropogon Gayanus (very little), Digitaria Gayana, Cteniumelegaus, Schoenefeldia Gracilis etc. The appearance of the soil and vegetation give the impression that it must be good pasture-land, used until the beginning of the dry season, well suited for sheep and camels, and that improving these pastures and starting gum groves would be possible. It should be remembered that in this respect, Mauritania produced 7,000 tons of gum annually through good and bad years until the drought, and was the world's second producer.

Besides, the concentration of herds and overgrazing have led to renewed sand dune movement near some settlements and water points. It is high time to undertake dune stabilization activities in these areas. The UNSO report of May, 1979, (p 48) suggested sending a team to study methods to be used in preventing sand from drifting over roads. The team of four experts, a soils engineer, a forester, a civil engineer and a hydrologist, would stay for two of three months. Compared with such a high-powered mission, the project being proposed here seems insignificant, but it is hoped that its quick start will enable some worthwhile research to be done in protecting the road as a whole Without the cooperation of the people living along the road, who are directly affected by local conditions, no method can succeed in stabilizing sand dunes without an enormous investment. Besides, the lessons learned from the project, along with those of the restoration of gum tree groves by the EDF and of the campaign against sand infiltration at Nouakchott and Magta Lahjar make up a coherent body of knowledge which should enable these programs to be started on a large scale, in effect, the beginning of nationwide programs.

Like all other activities of this project, these should demonstrate to the prople what they themselves can do and replicate in other places. The methods must also be simple, inexpensive and straightforward and must be undertaken by a group resolved to undertake on its own an activity that it realizes it can benefit from with the help of local officials, who are sensitive to the motivation and limitations of the villages and encampments (eg. land tenure problems) the first priority will be to identify such groups.

The general method then will be to trace out areas suitable for establishing demonstration plots in a swath 15 kilometers wide extending the length of the road, 10-12 km wide on the north; 3-5 km wide on the south side. There must be good soil and plant conditions, as well as willing laborers nearby. The plots could be multi or single purpose, they could be intended for one or several of the following activities:

1) after appropriate soil preparation and protective measures, planting of gum tree seeds or shoots near a village which could care for the trees and harvest their gum, with the possibility of introducing a gum tree grove into the crop rotation cycle.

2) Planting reserves of trees as forage material around a water hole.

3) Having villages plant trees for firewood.

4) Enlarging the natural production of forage-producing members of the Andropogon family, particularly andropogon gayanus by stumping and protecting plants for at least two years.

5) Creating firebreaks to protect good pastures and exposed gum tree groves from fires. The people would create the firebreaks, using the Sudanese method.

The forester, who should arrive in February, is scheduled to stay for two years.

As for planting gum trees, it will be done as follows:

First, second and third months

Arrival and settling in of the Chief of Party, identification of likely groups of people and areas when success could be expected (insofar as such a study has not been done in Phase I by the sociologist and the ecologist, with the help of the ADD), harvesting the yield of forage producing trees and preparation of seeds, harvest and finally the purchase of gum tree seeds, preparation of tree nurseries at Timbedra, Aioun el Atrouss, Aouinat by Zbil and Tintane. The walls around the nurseries will be made of mud bricks whenever possible, or if thorn branches or euphorbia (Euphorbia Tirscalli and E.balsamifera) ; Irrigated Leucaena glaucocephala, will also be tried which could be eaten by livestock and Moringa aleifera which produces edible leaves and an oil which can be used in cooking or in watchmaking.

Fourth and fifth months

Preparing the samplings in the nurseries: Capparidacees, gum trees, but also for Arbor Day on August 15, Prosopis, Parkinsonia, neem . . .

Staking out locations for planting areas and building the necessary fences, though the people of the area will normally be responsible for protecting the plantations; several armed and mounted guards are planned for the project team, as well as money for building several metal fences to protect the most valuable installation (Capparidacae nurseries, for example)

Fifth and sixth month

Planting after heavy rain, with help from the nearby people.

The caring for and guarding the plantation - the procedure is to be repeated the following year. The small groves of gum trees planted in an area where damage to the gum tree caused by overplanting of dryland crops in the same area, will help pave the way for EDF's important project of renewing the gum tree groves in preparation for it extension into the Hodhs. This will start in Trarza (between Méderdra and Rosso and west of Lake R'KIZ,) in Brakna (about fifty kilometers north of Boghe) in Guidimaka(near Selibaby, on the road to kankossa) and in Assaba (north of Kankossa) (CASTAN, verbal communication)

As for the planting of forage crop trees around waterholes, the locations or users who agree to guard them (payment of thirty guards is planned) will receive enough supplies to plant twenty tree reserves. The main nursery will be created during Phase I of the project, under guidance of the ADD, financed by the project: windmill or motor pump, water hoses, watering buckets, spades, shovels, picks, rakes, planters, hose of several types, tracing lines, sieves, polyethylene bags, wheelbarrows, barbed wire, several sizes of galvanized wire, (for fences and for making wire sunscreen, fertilizer, cement, metal fence posts, both flat and T-shaped, cement for setting posts, construction of a catchment basin large enough to breed Tilapias, and creation of a compost pit, water vaporizers anti plant pest equipment, fencing, metal labels, cloth sacks, cardboard labels, surveyor's rods, measuring tapes, wire cutters, pruners axes, clippers, well ropes, pulleys, buckets. The forester is expected to spend a month during Phase I supervising the establishment of the nursery, which will be the main one for the planting of forage-producing trees, as well as firewood trees. During this time he will help the ADD officials at Aioun el Atrouss to identify new sites for nurseries and firewood groves, will advise them in the establishment of the first nursery and in the preparation of instructions to make it productive as soon as possible during Phase II.

3) The village firewood groves will be placed in the chosen sites insofar as possible Phase I, efforts will be made to find sites near villages where the people are ready to:

- send someone to the central nursery for training,
- build and maintain their own nursery,
- do the groundwork, planting and guarding themselves.

The WFP will be asked to help in funding the work. Whenever the location is suitable andropogon gayanus will be planted in the woods). It is an excellent forage producer that should be encouraged in order to reseed the trek routes; a botanist-ecologist will be needed to help with this effort. The WFP will be asked to support the effort as far as possible. Other forage plants can be introduced or re-introduced including fruit trees, notably Ziyphus Mauritania, an improved Indian variety which produces very large fruit.

5) If firebreaks are needed to protect the pastures and groves, they will be created, using local labor to the greatest possible extent.

The current method of grading a firebreak with two passes of a roadgrader to clear a lane ten meters wide would cost about $100 US per kilometer plus about $50 yearly per kilometer to maintain it. But this type of firebreak is too narrow and clearly could not stop a brush fire fanned by a fairly strong wind: actually the burning particles can be airborne over 30-40 meters while still flaming. Another suggested type of firebreak would involve the local people concerned, and would bring them some money.

A final recommendation is to consider using firebreaks as means of communication) as well as for demonstration and experimentation sites.

However, these two use might conflict., for example, if it is decided to plant perennial graminaceous plants such as andropogon guyanus on the northern half of a firebreak, it would grow back after each yearly burning off of the firebreak and would thus provide fodder for the livestock; it would be incompatible with using the firebreak as a road.

The suggested method is:

To clear a strip by hand, 50 cm. wide, on the windward side at right angles to the wind.

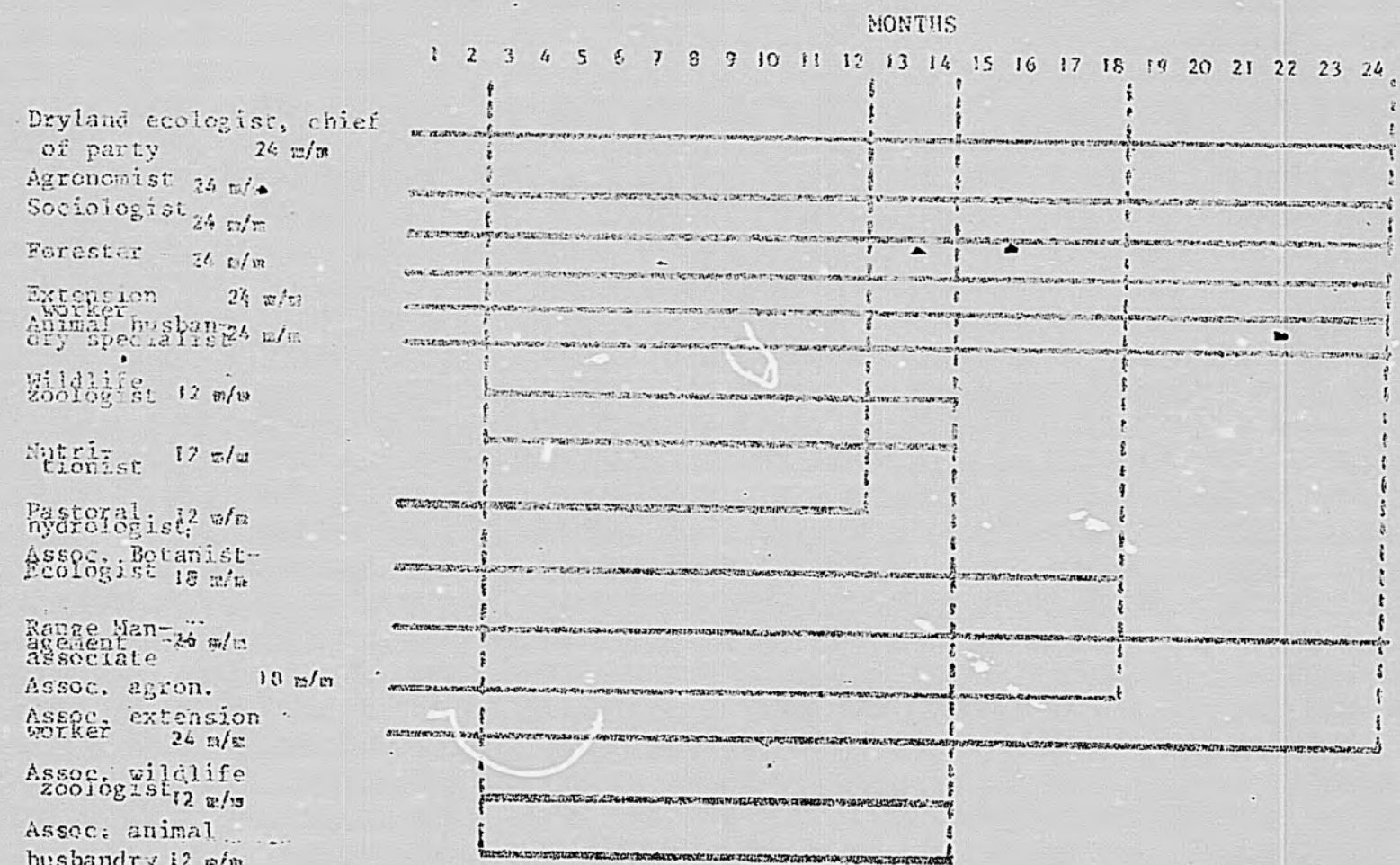
Clear a strip by hand, 2 meters wide parallel to the first strip, downwind and 50 to 80 meters away.

Burn the area between the two strips, watching carefully from downwind. Pick a day when the wind is very light or still, or preferably, a night.

This method, having been used for twenty-five years, notably in Kordofan (Sudan) requires:

- Excellent logistics
- Participation by the local population
- Barrels of water for the workers.

Table 2: TENTATIVE TIMETABLE (Phase II)



- Vehicles to carry water for the workers and, if needed, workers and relief drivers for the night shift

- Hand tools, hoes, shovels, picks, etc.

- Buckets, a pump and firebeaters

Close supervision ... hard, sustained work day and night when it is less difficult by teams to be able to do 10 km per day with 160 men It would perhaps be desirable for the young volunteers to be able to participate in the work. If one estimates that two men can clear 200 square meters in 24 hours, since each kilometer of firebreak means 3,000 sq. m. to clear (one strip 1 meter wide and one strip two meters wide) It theoretically would require 150 men to do 10 km. per day, in practice 160. With 160 men working a month (5,000 man-days of work) 300 km. of firebreak could be made, burning while the wind is calm each time a large enough section is ready and the grass well dried.

In addition, all along and in the interior of the firebreak, there will be more and more field trials and demonstrations, which will progressively heighten the awareness of the stockmen.

Particularly:

Enclosures for observing the undisturbed growth of natural vegetation;

Increased growing of perennial grasses plants by root cuttings

Planting forage-producing cress

Placing salt blocks near waterholes

Harvesting seeds of perennial forage-producing plants.

As for the cost of this method, it is a little more expensive than using a road grader but:

1) Three-fourths of the money goes to the local people

2) At least half of the workers' pay could perhaps be given

in food from the WFP. The maintenance costs are less expensive than with heavy machinery, particularly if vehicles are permitted only along the edges on the downwind side of the firebreak, thus retarding the regrowth of vegetation and making the necessary burnoffs safer and easier.

In any event, one should consider the remarks of Castelli Gattinara et al, (1978) about the cost of making firebreaks with machines: "concerning planned firebreaks, it should be remembered that the limited budgets of some Mauritanian services suggests that they concentrate on activities which will not require periodic and expensive maintenance (which can hardly be counted on) to remain useful."

"A firebreak which is not regraded after the rains automatically becomes useless. When one drives around in the interior one can see hundreds of kilometers of firebreaks, overgrown since the last rains and thus no longer serving their purpose. Money invested in this sector would seem more efficient and lasting if concentrated in promoting a campaign to heighten people's awareness of different aspects of animal husbandry, including the dangers and prevention of brush fires."

Within this project it is hoped that 300 km of firebreaks will be created the first year and 900 km the second year, requiring, respectively 5,000 and 15,000 man-days of work.

6. Regarding protection and restoration of soils, attention will be given to protecting the Road of Hope by appropriate planting (Euphorbia balsamifera, Tamarix articulata, Acacia tortillis subsp raddiana, Ricinus communis, Callotropis procera, Ittipagrostis sp, Panicum Turgidum, Leptadenia spartium, etc) while taking soils and rainfall into account.

The project forester must work closely with the forestry service of Aioun el Atrouss, even providing leadership, because his main roles will be to assist with the technical and practical training of its Mauritanian staff.

1. Seeds: Morphological and botanical considerations, biology and physiology (germination, dormant period, the value of seed selected, germination trials, experimentation centers.

2. Seed production: Seelction and propagation techniques according to biological type; cultivation, harvest, protection, storage of seeds and plants, cost of seed production.

Legal questions concerning commerce. Guarantees. International organizations. Visits to seed selection and production fields (plant improvement and seed production centers.)

3) Specific studies concerning developmental activities. Seed projects. Seed farmers.

1 grant to attend the course on crop storage and protection to be held in Montpellier 13 October - 11 December 1981.

Goals:

To provide the officials in charge of storage the scientific and practical information they need to assure efficient protection of foodstuffs stored in hot regions.

Program overview

1) Discussions between participants and storage experts visits to collection and storage silos (corn, rice, sorghum forage) and processing plants (drying, pelletizing)

2) Storage problems and solutions. Changes in foodstuffs and reduction of losses. Study of parasites and treatment of foodstuffs. Visits to laboratories, experimentation stations, harbors.

3) Products and supplies

Up-dating knowledge Botany-pharmacy, treatment supplies,

protective equipment

Visits to services and private organizations

4.2.4 Training will play a very important role in the project because one of its major goals is to bring about popular participation. Obviously the people cannot take their own destiny in hand without some minimum technical contribution.

We should recall that the Phase II counterparts should be trained during Phase I on the other hand, the Phase I counterparts, (thanks to Project RAMS/MB 2) will be trained to the extent possible. Otherwise the following training is planned:

a) Some short training courses in forage crop raising and protection, on marketing at the ENFVA, Kaedi; it is hoped that the school can include the project agronomist on its professional staff and, later, several other experts;

b) As for practical extension courses for farmers, (notably concerning the agricultural cooperatives at Djowol (SP) and the integrated rural development around M'bout (SPIT) a pilot training session to heighten awareness, training programs at Kobenni, Djigueni, Tintane, Timbedra, with the help and cooperation of the prefects and their advisors in the anti-desertification campaign, in connection with RAMS Project/MB 1.

c) It is otherwise proposed to include in the project training program:

2 scholarships of 1 year for the 3rd session of the graduate course (CPU) on integrated pasture improvement in the Sahel (Project RAF/79/017) organized by UNESCO in Dakar.

1 grant to fund attendance at a training course on developing seed use in hot regions, to be held in Montpellier from 18 May - 13 July, 1982.

Goals

To provide qualified personnel required by the developmental agencies which will manage the seed project.

Program overview

session
During a preliminary, the participants will present problems already identified in their own countries and the questions they would like to have considered during the following three sessions.

4) Projects: management of storage, techniques and extension all together

Three participants will be sent to Montpellier to attend the training course on introducing nutrition in agricultural and rural development projects, 16 March - 14 May 1982

Goals: To heighten awareness of the nutritional aspects of their projects in the minds of agronomist and economist who develop and manage agricultural development projects. To prepare them to introduce nutritional consideration into the various different phases of the ongoing projects.

Program overview

General human nutrition considerations, qualitative and quantitative requirements according to group and class (age, sex, job, etc.) Groups to become aware of the point of view of "needs" the foods. The large food systems. Quality of foods, protection, first treatment, food hygiene. Socio-economic aspects of food supply, group awareness of the economic point of view. Nutritional and food supply research: implementation, analysis, use.

Typology of food distribution problems according to location and project.

Nutritional situation and project progress: needs to be met. Effects of farmer situation on project design. Direct and indirect effects of projecton nutritional conditions.

Case Studies - applying FAO recommendations - critique. It is suggested that three scholarships be given during this last training program:

1. To an economist from the MRD or the Plan
2. To an agronomist from Medh el Charbi
3. To an agronomist from Gorgol

These five scholarships could be given for study in one institution ; grantees would be eligible to receive scholarships for a second year.

A scholarship in agro meteorology, one in plant production and one in animal husbandry. Each of these one-year scholarships would suit student engineers holding a diploma recognized as being equivalent to a diploma granted in general agronomy by the national agronomic Institute of Paris-Grignon, or the French National Schools of Agronomy. Engineers with three years of professional experience or, exceptionally, students at third level or from schools with entrance requirements equal to the French National Institutes of Agronomy could also be admitted.

After one year the students receive a diploma in tropical agronomy, equivalent ot an academic diploma (DEA). After the second year, those who continue could receive a degree of Tropical agronomy engineer, which is highly honored and recognized by the Engineering Licensing Commission of the French Ministry of Education.

5 Expected Impact of the Project

5.1 Physical effects

The project is expected to reduce erosion (especially wind erosion) along the "Road of Hope", increase both irrigated and drylands forage production, to improve water distribution and conservation.

5.2 Economic effects

On the economic side, the results are difficult to predict, but efforts will be made during Phase I to forecast the economic results of Phase II.

From the start of Phase I the following benefits will be noted: increase in fodder production, increase in fodder reserves, improvement in supply conditions.

5.3 Social effect

The social effect will be significant. The people in the target areas will become more aware that someone is looking after them, and expectations are that they will be encouraged to take their destiny in their own hands by taking over the management and improvement of their environment, which is necessary if the economic

activities of the area are to be maintained. It is hoped that much of the work will be done with support from the WFP, which would also assist in building up forage supplies which would lead to rotation and putting certain areas off limits.

The project will help to reduce the exodus from rural areas and migrations toward "Road of Hope" as Mondot (1981-80) wrote "It is obvious that the agricultural potential of Mauritania cannot be reached unless, along with the campaign against desertification, all means are used to persuade people to stay in their villages rather than moving to the towns, especially to Nouakchott, where they are unable to feed themselves and where they live in want."

But the project will facilitate the migration of herdsmen, which is necessary for their rational use of scattered natural resources in the target areas.

But above all, it is by bringing the people to participate in development and by the training role which the advisors and especially their counterparts will play, which will make the project effects felt in the social domain. A special effort will be made to reach disadvantaged groups by the health nutrition advisor in activities concerning women (infections, Hemorranges, improvement in the processing and keeping of milk, reducing the work of gathering and using firewood, etc) and activities concerning children (improvements in breast feeding, promoting the use of protein-rich legumes, vitamin-rich fruits, etc). It is hoped that these efforts will be supported by UNICEF.

5.4 Environmental effects

The environmental effects will be widespread and beneficial, as can be expected any time pastoral areas are improved (see Baumer, 1981 Human and Physical Environmental Impacts of Pasture Improvements, appendix 4) for more on this subject.

6. Methods of Finance

6.1 Possible Funding sources

It would be desirable that such a project be financed by an international organization. This would assure a more uniform level of achievement across the board. The FAO (via UNDP) seems to

be the most capable of running these four projects. Given the predominant role played by Mauritania on the frontline of the anti-desertification campaign, it is hoped that international solidarity, and particularly Arab brotherhood will provide total and timely financial of this project and the associated sub-project

Tables 3 and 4 illustrate necessary funding in hard currency (US$ equivalents) respectively for Phase I and II of the project.

6.2 Required Outside financing

The total funding in hard currency for achieving Phase I (16 months) is judged to be US$ 1,015,029, and for Phase II (2 years plus three years for scholarships) to be US$ 4,310,032. It must be remembered that the WFP and UNICEF are expected to contribute but the time constraints during project preparation prevented an estimate of what they could give.

In any case, one could expect their contributions to be used to:

Facilitate planting of firewood trees at the village level;

Stabilize sand-dunes adjoining villages especially north of "The Road of Hope";

Furnish fodder stocks, which would persuade herdsmen to use pasture rotation and to put certain areas off limits, which is the key to pastoral upgrading in general and pasture rotation in particular ;

Establish small village pharmacies;

Improve existing wells by deepening them;

Construct firebreaks, etc.

Otherwise, the three sub-projects listed below (paragraph 9.1, 9.2 and 9.3 would cost, respectively,

SP 17	140,147	US dollars
SP 18	18,069	
SP 26	50,160	

They are examples of small projects calling for intense local extension efforts, which should became more and more numerous at the Regional Anti-Desertification Commission level.

6.3 Mauritanian Government Contribution

The government's main contribution will be to furnish to the project during Phase I:

- The necessary sites in Aioun el Atrouss, Kaedi, Djigueni, Kobenni, Timbedra and Tintane,

- Three counterparts:

  An engineer or graduate in science, counterpart of Chief of Party for sixteen months,

  An agronomic engineer or agricultural engineer, counterpart of the agronomist for six months, based in Kaedi,

  A sociologist for at least nine continuous months as counterpart to the project sociologist;

- Two full time extension agents for six months in Gorgol, two animal husbandry or grassland experts and two ADD officers, all full time, in Hodh el Gharbi, one of each category for ten months, plus one of each category for the last six months of Phase I;

- The time of officers of all levels needed to consult, design projects, participate in planned training sessions;

- An official from government food storage service of Gorgol or Hodh el Gharbi in October, November and first half of 1981 for a training program on techniques of storing and protecting harvest after they are gathered.

- Three agronomists, preferably:

  An economist from the plan or from the MRD

  An agronomist from Hodh el Gharbi

  An agronomist from Gorgol

  For a training program from mid March to mid may 1982

on introducing nutritional considerations into agricultural and rural development projects.

- A range manager, a forester or an agronomist or preferably a technician from the seeding project to participate in training program on developing the usage of planting, from mid-May- mid-July, 1982.

- Two drivers, one for 15 months, the other for the last six months of the project etc. .

During the Phase II the counterparts, technicians and extension workers which the government is to furnish will be more numerous; their number and required training will be spelled out during Phase I. As they will be expected to travel by horse and camel, special payments are planned, to be disbursed by Phase II during the three years of Phase II, following the schedule listed below:

1	First Year	100%
2	Second Year	80%
3	Third Year	50%

The constraints furnished by the government during Phase II will include the following, each for 24 months, unless otherwise indicated:

- An ecologist or agronomist or range manager or forester to be counterpart to the Chief of Party.
- An agronomist to work in Kaedi
- A sociologist
- A forester
- A wildlife zoologist (12 months)
- A water specialist (12 months)
- An extension worker
- A health worker and/or nutritionist (12 months)
- A selective breeding specialist

Furthermore, the government should agree to provide candidates to receive training scholarships; these candidates would progressively replace the counterparts at the end of the project and some of the counterparts would then receive training scholarships.

7. Project Management and Organization

The Chief of Party will report to the Governor of the Second Region. On the technical side he will work closely with the governor's advisor from RAMS project MB/1. The chief should be a member of the regional anti-desertification committee. The agronomist assigned to Kaedi will refer technical questions to the Chief of Party, but will be in constant liaison with the governor of Gorgol and will be part of the RAIC of this region. Overall the project is considered a step forward in demonstrating and testing the strategy of the anti-desertification campaign, which has already been defined by the government, and will be refined by the "Backbone" constituted by RAMS project MB 1.

7.2 Table 5 illustrates schematically the relationships between the project organization and local administrative organization.

7.3 The reports which the project chief is to furnish will be determined in meetings of the project control committee the chief will assign reporting duties (and frequency) to the advisors on the project.

8. Studies to be Done

The limited time for preparation of this project did not allow for detailed discussion with the competent authorities. Besides, it is convenient to consider this project design along with the RAMS projects MB 1, 2 and 4, which are closely related to it. Consequently, it would be desirable for the GIRM to set up a meeting with AID or the FAO (working with UNDP and with UNSO) to finish designing the project and working out formalities. The work could be done in three to four weeks by a drylands ecologist specializing in forest and pasture improvement, and an economist familiar with project designing and cost calculating. It would be efficient to combine this work with final preparation of RAMS project MB 1, 2 and 4. That would cost this project about $10,700, broken down as follows:

Consultant for 4 weeks	6,000
Travel, including in-country	3,700
Secretarial Costs	1,000

9. Additional Information

Below are listed 3 sub-projects (referred to as small projects SP in the report of Baumer and Sabra, 1980) which could be separately financed, but which must be technically tied to this project:

9.1 PP 17 Protection and improvement of Tintane palm grove

9.2 PP 18 Anti-Desertification campaign at Kobenni

9.3 PP 26 Anti-Desertification campaign at the Nema palm grove

Table 3 - Foreign Exchange Contribution (US dollars) for Phase I

	TOTAL		1st year		2nd year	
10. PERSONNEL (costs calculated in class 10)						
11. Experts and associate experts						
Dryland ecologist, Chief of Party (P5)	16 m/m	104 413	12 m/m	76 400	4 m/m	28 013
Agronomist (P4)	6 m/m	35 680	2 m/m	11 150	4 m/m	24 530
Sociologist-extension (P4)	12 m/m	69 130	8 m/m	44 600	4 m/m	24 530
Assoc. botanic ecolog.(P2)	6 m/m	25 600	2 m/m	8 000	4 m/m	17 600
Assoc. agronomist (P2)	6 m/m	25 600	2 m/m	8 000	4 m/m	17 600
	46 m/m	260 423	26 m/m	148 150	20 m/m	112 273
12. Indemnities for local personnel						
Extension workers (1000 days/yr at 5 $/day)		10 500		5 000		5 500
Supervisory personnel (200 days at $ 20/day)		8 400		4 000		4 400
		18 900		9 000		9 900
19. Sub-total		279 323		157 150		122 173
20. Subcontracts						
21. Air reconnaissance and/or aerial photo interpretation and satellite imagery		20 000				20 000
22. Vehicle maintenance		2 000		1 000		1 000

23. Radio communication equipment maintenance		2 500		1 000		1 500
24. Botanic identification, bromatological analyses, water and soils analyses, veterinary diagnoses		5 000		3 000		2 000
29. Sub-Total		29 500		5 000		24 500
30. TRAINING						
31. Developing short courses in the field and at FNFVA for demonstration, training, forage raising, forage protection, firewood conservation, fodder plant multiplication, working out ways of increasing pasture production		80 000		30 000		50 000
32. Training/demonstration sessions at prefectures of Aïoun el Atrouss, Djiguemi, Kaédi, Kobenni, Timbedgha et Tintane		60 000		25 000		35 000
33. Scholarships for foreign study - 2 regional 1 year scholarships for the CPU (Project RAF/79/017) Integrated Pastoral Improvement in the Sahel	2 x 2 m	31 080	12 m	14 800	12 m	16 280
- 1 international 2 month scholarship on seed usage	2 m	6 270			2 m	6 270
- 1 international 2 month scholarship on storage and safeguarding harvests	2 m	5 700	2 m	5 700		

- 3 international 2 month scholarships on working nutrition into rural and agricultural development projects	3 x 2 m	17 100	3 x 2 m	17 100	
39. Sub-total		200 150		92 600	107 550
40. EQUIPMENT					
41. Vehicles				-	
2 Land Rovers, equipped, incl radios		46 000		46 000	
1 horse with harness for Kaedi		650		650	
2 horses with harness for Aïoun el Atrouss		1 300		650	650
2 camels with harness for Aïoun el Atrouss		1 800		900	900
42. Furniture for offices and houses		10 000		9 500	500
43. Medium range radio transmitters and power sources		10 000		10 000	
44. Camping gear		16 000		14 000	2 000
45. Scientific supplies		15 000		14 000	1 000
46. Agricultural equipment		40 000		35 000	5 000
47. Fencebuilding tools and materials		70 000		40 000	30 000
48. Extension supplies		5 000		5 000	
49. Sub-total		215 750		175 700	40 050

50. MISCELLANEOUS			
51. Spare parts for vehicles, scientific and communications equipment	6 000	2 000	4 000
52. Maintenance of vehicles and feed for mounts	50 000	25 000	25 000
53. Reporting costs	10 710	5 100	5 610
53. Secretarial/typing costs	8 000	2 000	6 000
54. Odds and ends, office supplies	5 000	3 000	2 000
55. Expendable supplies for extension work	5 000	4 000	1 000
59. Sub-total	84 710	41 100	43 610
Total	809 433	471 550	337 883
Contingency (10 %)	80 943	47 155	33 788
	890 376	518 705	371 671
Management costs (14 %)	124 653	72 619	52 034
TOTAL	1 015 029	591 324	423 705

TABLE 2 - Cost of Phase II in Foreign Exchange (US Dollars)

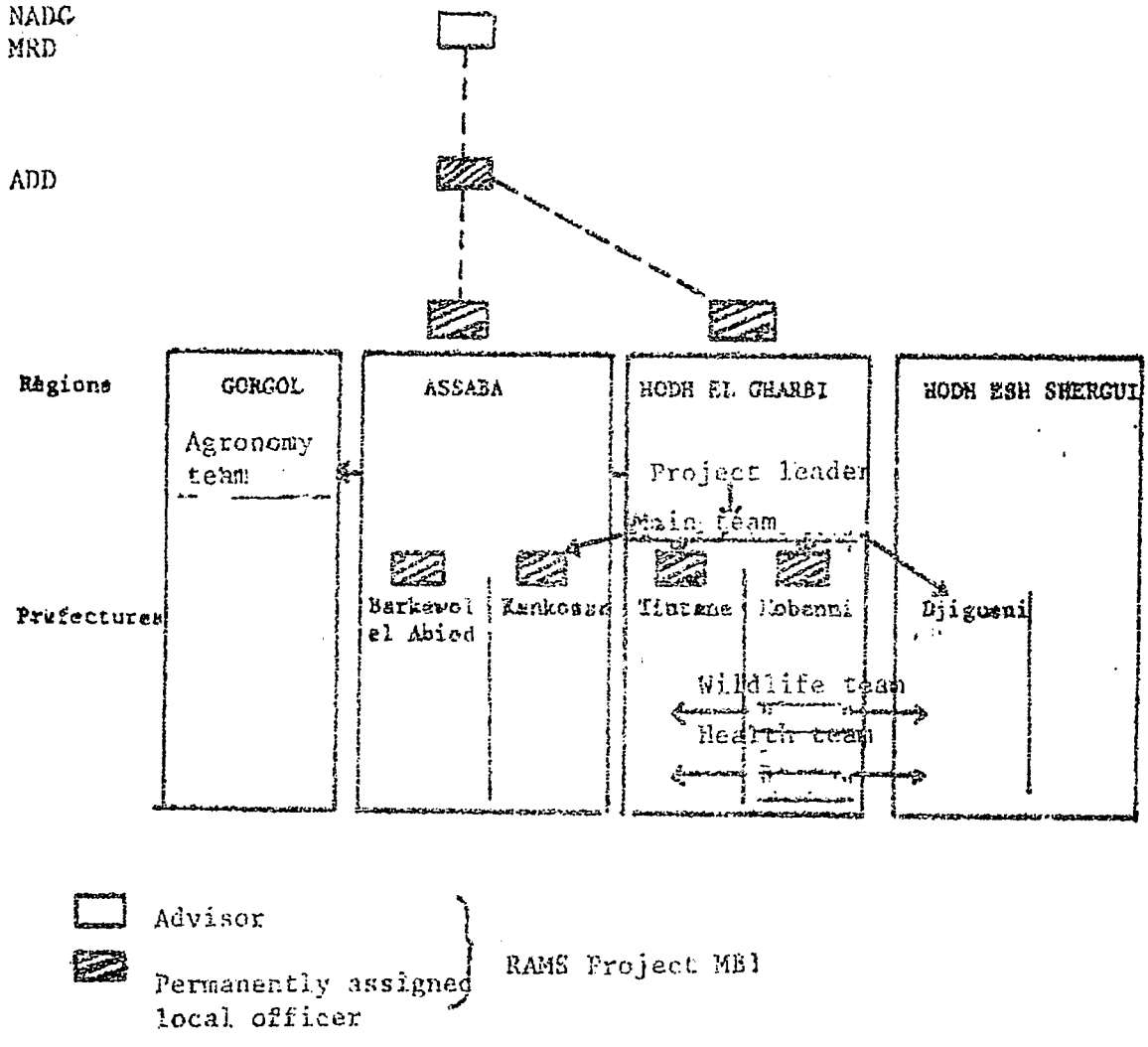
	TOTAL		First Year		Second Year	
10. Personnel (Costs based on Class 10)						
11. Experts and Associates						
Drylands Ecologist, COP (D1)	24 m/m	192 654	12 m/m	91 740	12 m/m	100 914
Agronomist (P5)	24 m/m	176 484	12 m/m	84 040	12 m/m	92 444
Sociologist-Ext. Worker (P4)	24 m/m	154 539	12 m/m	73 590	12 m/m	80 949
Asso. Botanists-Ecologist(P2)	18 m/m	115 500	12 m/m	55 000 *	6 m/m	60 500
Associate Agronomist (P2)	18 m/m	115 500	12 m/m	55 000 *	6 m/m	60 500
Zoologist (P4)	12 m/m	74 816	10 m/m	61 325	2 m/m	13 491
Water Specialist (P3)	12 m/m	64 350	12 m/m	64 350	-	-
Forester (P4)	24 m/m	154 539	12 m/m	73 590	12 m/m	80 949
Extension Worker (P5)	24 m/m	176 484	12 m/m	84 040	12 m/m	92 444
Asso. Extension Worker (P2)	24 m/m	115 500	12 m/m	55 000	12 m/m	60 500
Asso. RAMS Manager (P2)	24 m/m	115 500	12 m/m	55 000	12 m/m	60 500
Health Nutritionist (P3)	12 m/m	65 422	10 m/m	53 625	2 m/m	11 797
Selective Breeding Spe. (P2)	12 m/m	55 916	10 m/m	45 833	2 m/m	10 083
Zootechnician (P4)	24 m/m	154 539	12 m/m	73 590	12 m/m	80 949
Asso. Breeding Specialists(2)	12 m/m	55 916	10 m/m	45 833	2 m/m	10 083
	288 m/m	1 787 659	172 m/m	971 556	116 m/m	816 103

12. Field costs for local personnel:			
Extension workers (3000 days $6/day)	37 800	18 000	19 800
Supervisory personnel (600 days, $24/day)	30 240	14 400	15 840
Counterparts (150 days, $24/day)	43 200	27 000	16 200
	111 240	59 400	51 840
19. Sub-total	1 698 899	1 030 956	867 943
20. SUB-CONTRACTING			
21. Vehicle maintenance	15 000	7 000	8 000
22. Radio maintenance	15 000	7 000	8 000
24. Scientific research and analysis	5 000	2 500	2 500
29. Sub-total	35 000	16 500	18 500

30	TRAINING (the numbers in parentheses are approximate)											
31.	Local training programs		200 000		90 000		110 000					
32.	International or regional training scholarships for the counterparts											
	2 years in ecology and improving drylands (international)	24 m									12 m(30 000)	12 m (33 000)
	1 year in ag. extension and forestry	12 m							12 m (20 000)			
	2 X 2 years in forestry (regional)	2x24 m							12 m (20 000)	24 m(45 000)	12 m (26 000)	
	1 year in agronomy of irrigated fodder (internat)	12 m							12 m (26 000)			
33.	Scholarships for overseas training of non-counterpart Mauritanians under the Project											
	2 X 2 years in ecology and drylands improvement	2x24 m	93 634	24m	45 540	24m	50 094					
	2 X 1 year in agronomy of irrigated fodder (internat)	2x12 m	45 540	24m	45 540							
	2 years in sociology of rural development in drylands	24 m	47 267	12m	22 270	12m	24 997					
	3 X 2 years in forestry (regional)	3x24 m	102 564	36m	48 840	36m	53 724					
	3 X 2 in wildlife management (regional)	3x24 m	102 564	36m	48 840	36m	53 724					
	3 X 1 year in reaising small ruminants (regional)	3x12 m	32 560	24m	32 560							
39.	Sub-total	360 m	626 129 (+ 200 000)	156m	333 590	108m	232 539		36m (66 000)	36m(75 000)	24 m (59 000)	

40. EQUIPMENT			
41. Vehicles			
6 Land Rover with radios and other equipment	160 000	160 000	
Mounts and harnesses	5 000	3 500	1 500
42. Furniture and equipment for offices and guest houses	20 000	15 000	5 000
43. Two-way radios	20 000	18 000	2 000
44. Camping equipment	15 000	12 000	3 000
45. Scientific equipment	10 000	10 000	
46. Small agricultural items	20 000	15 000	5 000
47. Fence building equipment and materials	30 000	15 000	15 000
48. Extension materials	15 000	10 000	5 000
49. Sub-total	295 000	258 500	36 500

Table 5 - PROJECT AND ADMINISTRATIVE STRUCTURE



PROJECT SUMMARY

	Date : June 8 ,1981

Reference : RAMS	Project Title: Mass Media Campaign for Anti-Desertification Program	
Country: Mauritania	Region: Nouakchott	Sector: Environment
Ministry of Department Concerned:	Ministry of Rural Development Environmental Protective Service	

Project Objectives:	To devise a series of technical pamphlets giving instruction on how to organize an Anti-Desertification Campaign primarily for government offices as well as for farmers and herders. To create an awareness to Mauritanians of the different means to fighting desertification.

Total Estimated costs: US$ 300,000	External Financing: US$ 180,000

Summary: Taking into account the insufficient budget of the Ministry of Rural Development, the inadequate technical training of ministerial staff to combat desertisation, the lack of guidance given to the field staff, the ignorance of the people about desertification. A mass media effort is needed in Mauritania.

Project Duration: 2 years	Starting Date: As soon as possible.

1. Title Information Campagn for the Anti-Desertification Program

2. Location Rome (Italy), Nouakchott and throughout Mauritnaia

3. Goals To quickly create a first series of technical pamphlets giving specific directions to organize an anti-desertification campaign; intended primarily for staff of the administration and of the ADD in particular, but also for concerned farmers and livestock owners.

4. Rationale The ADD has insufficient funding. Its personnel frequently have inadequate technical training, preventing them from making a meaningful independent contribution to the struggle against desertification. Very often the field personnel do not receive guidance. On the other hand, the people are somewhat aware of the desertificaton problem, and could be motivated if they were taught exact procedures: only a nationwide effort, which the WFP could probably help in the context of a project, could possibly end the desertification of Mauritania.

There can be no coherent program of natural resource management with the goal of sustained, reliable production, without the willing cooperation of livestock owners.

Except for small regional demonstrations, it is not possible to achieve a general improvement program in a limited portion of the country. This is due to the general nature of the problem (nation-wide) and to the related problems which, on the one hand is the mobility of the herds and inherent regional inter-dependence, and on the other hand, the requirement for equity, as taught by the Koran, and specifically for an easing of the already glaring inequities between the level, type and quality of life of urban versus rural people.

A thorough and concrete instructional plan, must be developed and eventually promulgated in all strata of the population, which involves popularizing all resources and methods which could be employed against desertification. All available means must be used to reach this goal.

In other respects, a number of coherent proposals has been advanced by separate donor agencies, especially by the RAMS Project including notably the following three:

RAMS/MB	1	Coordination of an Environmental Development and Anti-Desertification Campaign
RAMS/MB	2	Accelerated Training of Environmentalists and Anti-Desertification Specialists
RAMS/MB	3	Demonstration Project for Environmental Management and Harmonious Integrated Development.

These three proposals, along with the project herein proposed, constitute a group which should be considered as a unit

Furthermore, a network of small projects (S.P) was proposed for the implementation of this strategy and some of them will very likely be started up beginning in 1982, which will allow the perfection and demonstration of simple procedures, for example in the area of range management, (SP 28) restoration of gum tree groves and of reforestation (SP 42), and of dune stabilization (SP 29). Assistance to the ADD is required in order to write and quickly distribute the technical pamphlets giving all the necessary instructions for successful accomplishment of certain operations. There could also be pamphlets showing how to establish and manage a tree nursery (choice of location, construction of the enclosure, ingredients of a compost pile, filling polyethylene bags, irrigation methods, protection from parasites and predators, methods of seed protection, preparation of seeds for planting, ect.), pamphlets about planting and caring for gum trees, pamphlets on forage trees, their uses and reproduction, pamphlets on caring for palm tree, which are abundant but terribly neglected and thus not fruitful, located in numerous lowlands where the water table is near the surface; pamphlets on simple and inexpensive methods of dunes stabilization, pamphlets on construction of fuel-efficient wood burning stoves, etc.

5. Description

In order to minimize the costs and to insure quick, efficient publication of these proposals, it is suggested that the most important pamphlets be agreed upon jointly by the ADD and the FAO office in Mauritania. Then that a first batch of pamphlets be

prepared by the ADD in draft form, double spaced, and sent to a consultant whom the FAO would choose He would edit the pamphlet , working closely with the appropriate technical offices of the FAO, and with specialized intitutions such as IEMVT, CT FT and the Ecole Forestiere de Rabat-Sale, (Morocco). Then the edited pamphlets would be returned to the ADD and several weeks later - long enough to allow for observations from ongoing projects and from field personnel, say two to three months later - the consultant would come to Nouakchott for about two weeks of final editing of the pamphlets with the ADD before sending them to be printed.

5.2 In general, the information must be given in Hassaniya, which is more widely understood than classical Arabic. But French which carries certain prestige, might also be used to a small extent.

5.3 The printers must publish very simple technical pamphlets at least once a week, based on those proposed in the RAMS proposal

MB/4 Pamphlet and Publicity Program for the Anti-Desertification Campaign. Once every fortnight there will be a detailed success story in the domain of the campaign, every second one will be about Mauritania; in other weeks, the stories will be about projects in other African countries or village-level successes in other arid developing countries, which might be appropriate in Mauritania. In order to produce written information, the involvement of the following will be sought: the FAO printing service, the United Nations information center in Geneva, the UNESCO printing service, the United Nations magazine, Development Forum, published in Geneva, Gret, Developpement et Cooperation magazine, Jeune Afrique, Marches Tropicaux, the EEC printing service . A consultant is to be engaged for two months to initiate this printing program.

5.4 By use of audio-visual equipment donated to the Agricultural Department by the FAO, color slide programs will be arranged which should provoke a lively discussion between the audience and the extension worker, who should

(a) Be extremely well-informed;

(B) Write down any questions which he may be unable to answer adequately, study them at his leisure, and

and then write the answers, and send them back to the questioners so that they may have the answers read to them.

It is actually quite important that a lively dialogue be established between the general public and the technicians by means of the extension workers.

5.5 Mauritanian extension workers should of course be detailed to this project, and it is planned that two of them will receive specialized training for this purpose. Their training will be peincipally short intensive courses and visits to the FAO in Rome, to the United Nations information center in Geneva, to the UNESCO printing service in Paris, to the FRUAT laboratories in Montpellier, to the ecotheque and to the CNTE in Montpellier, to Radio Ivorienne (Abidjan) to Radio Tunis, to Bamako, to the Medenine Institute of Arid Regions (Tunisia) etc.

5.6 Radio broadcasting to the countryside will be reshaped, intensified and directed toward the anti-desertification campaign. It will include contests with answers on cards which need only be punched with a nail. In order to personalize the broadcasts by citing the answers received from the listeners; these contests will have prizes as well. In instituting these programs particular attention must be given to the wise observations of Castelli-Gattinara et al. June 1979, 155 -159. News about pasture and livestock conditions will be broadcast every two or three days.

5.7 A special short training course will be arranged for the prefects in order that they may be the first to receive important news and to have their opinions. This course should coincide with the visit of one of the advisors mentioned in RAMS proposal MB1 and preferably with a visit from the principal advisor. It will be organized by Mauritanian authorities; a simple grant from the project is foreseen.

5.8 The training of a cameraman-photographer is planned, as well as a visit by a consultant in film-making and photography.

5.9 A carefully prepared and selected series of documentary films will be shown in every theater in Mauritania for two or three months; it could include films prepared by the United Nations conference on desertification and particularly the excellent film series from the BBC and Seuil audio-visuals. Showing in the cultural centers of Nouakchott will also be requested.

5.10 A mobile exposition on the anti-desertificaton campaign will be prepared and shown in principal cities, but especially in areas where the campaign will be going on, and most especially in the area proposed by RAMS MB/3

5.11 Attempts will be made to reach an agreement with the Senegalese relevision, whose broadcasts are received in Mauritania, to have four broadcasts focused on the anti-desertification campaign:

- one on Arbor Day in Mauritania, focusing on reforestation,
- one on the national anti-desertification commission,
- one on dune stabilization,
- one on sylvan-pastoral improvements, preliminary to development projects.

6. Implementation Program

Request is to be formulated by the Government as soon as possible, immediately after approval of the project by the NADC (see above) or after acceptance of the project financing proposals presented by the current DEP for the IVth plan.

In addition it is desirable that:

1) The consultant who is to prepare the pamphlets could begin work in Rome by September 1981,

2) The visits of three planned consultants each overlap by one week to facilitate the exchange of information,

3) The first visit of the film-making photography consultant coincide with Arbor Day or with an NADC meeting.

4) The training program for extension workers be prepared as soon as possible (SP 43) and that their training begin as soon as possible, whether as proposed by RAMS MB/2 or by another means.

7. Estimated Budget in US$

For convenience the budget is divided into two sections:

A. That portion concerned especially with the pamphlets;

B. That portion concerned with audio-visual materials strictly speaking.

7a).

Consultant 4 man-months, 2 of which in Mauritania	$ 22,400
Two consultant trips outside Mauritania	5,400
In-country travel	2,000
Incentive bonuses to best Mauritanian authors (20 bonuses @$50)	1,000
Secretary in Nouakchott (two man-months)	3,000
Other secretarial costs	1,000
Office and telephone costs	800
Photographic and graphic supplies	1,000
Printing Costs	5,000
Contingency 10%	41,600
Contingency 10%	4,160
	45,760
Management Fees 14%	6,406
	$ 52,166

7b	Consultant for rural-broadcasting 2 man-months	12,000
	Travel	2,000
	Consultant for Hassaniya language newspaper 2 man-months	12,000
	Travel	2,000
	Film-making - photography consultant 2x1 man-months	12,000
	Travel	2,000
	Land-Rover	15,000
	Maintenance and operation	6,000
	Training of two extension workers 2x6 man-months	36,000
	Travel	8,000
	Training of one cameraman - photographer 4 man-month	12,000
	Travel	3,000
	Rural radio contests	4,000
	Film transport, rentals, etc	2,000
	Photographic and audio-visual equipment	7,000
	Prefects' training course	1,500
	Mobile exposition, panels, packing, photos	5,000
		143,500
	Contingency 10% 10%	14,350
		157,850
	Management Fee 14%	22,097
		179,947

8. Possible Sequels and Relations with other Projects

If the project is deemed worthwhile by the principals, it could be extended beyond the planned one year. An updated, revised edition of the pamphlets should be programmed by the ADD after one or two years. The project could serve as a center for distribution of instructions gleaned from other integrated rural development projects. In short, it could guarantee the publicity for these projects, make them familiar, and diffuse their lessons widely. As for the directives, they will be promulgated by the proposed ADD (the reorganized DEP), which will be the logical cooperating government officer for the project. On questions regarding use of vernacular languages, it is highly recommended that Mr. Jacques Bugnicourt, at ENDA (Envriornment and Development) program in Dakar (BP 3370, Tel. 22 42 29) be consulted.

For audio-visual, consult Mr. Henry Dore, advisor to project MAU/79/006, audio-visual department of the National Pedagogical Institute. (I.P.N)

It is recommended to study a project done in western Upper Volta, where small, cheap radios were set up so as to enable the rural radio broadcasts to be heard everywhere ; It seems that a grant from UNIDO made this enterprise possible . . . of course there is no need for more radios in Nouakchott, as it is already saturated with them.

1. PROJECT SUMMARY

	Date: June 8, 1981	
Proposed by: RAMS	Title of Project: Dromedary Institute. Phase I: Preparatory Activities and Feasibility Study.	
Country: Mauritania	Region: Desert and Semi-desert Areas	Sector: Integrated Rural Development (pastoralism)
Ministry or Department: CNERV (National Livestock and Veterinary Research Center)		

Objectives of Project: The project is designed to give a precise picture of the life of dromedary herders in the North of Mauritania in order to find ways of improving it. The project also involves a feasibility study for the creation of an International Dromedary Institute.

Total Estimated Cost: $4,000,000 US	External Financing Requirement: $3,056,000 US

Summary Description: The project will collect the information on grazing lands, water, human needs, herd conditions that will serve as data for development activities such or encouraging forage crops in oases, prevention of dromedary diseases, etc. Data gathering will be concentrated in the traditional dromedary-raising areas around Chinguetti, Ouadane, Oualata and Tichitt in Phase I, which will lead to further activities in Phase II. The project data will enable the creation of an international program to improve dromedary raising (milk, meat, wool, transportation).

Duration of Project: 2 years	Date of Implementation: Jan. 2, 1981

2. Project Purpose

2.1 The project is completely compatible with the objectives of the IVth Plan (1981-85), which is now being prepared, in that the project is designed to study the possibilities of increasing the production of milk and meat, which will contribute to attaining food self-sufficiency in Mauritania.

It is also related to the objectives of the Plan:

- because it will contribute to the development of the most neglected areas of Mauritania, thus helping to reduce the inequalities between the different parts of the countries through a more equitable distribution of assured income in one of the least developed and most drought-stricken sectors of the rural population;

- because it will help halt the process of environmental deterioration and will favor gradual regeneration of the environment in areas with a particularly fragile ecological balance;

- because it will contribute to the revitalization of the traditional dromedary centers (Chinguetti, Ouadane, Oualata, Tichit) which are being restored with the help of UNESCO;

- because it will raise the value of typical Mauritanian products with a minimm of imported inputs.

2.2 The project is closely related to the anti-desertification strategy proposed for Mauritania (Baumer and Sabra, 1980), which was accepted by the Minister of Rural Development together with the projects which were suggested as part of the strategy. These projects are to be the concern of the Department of Environmental Protection (DEP), whose transformation into Anti-Desertification Department (ADD) has been proposed elsewhere (Baumer and Sabra, 1980; Baumer, June, 1980), as part of the financing proposals for the IVth Plan, together with about forty other projects. This project is a response to the recommendations of the National Seminar for Drawing up an Anti-Desertification Campaign, which was held in Nouakchott between May 26 and 28, 1980 by the Ministry of of Rural Development (MRD) with the cooperation of UNSO. In fact:

- the project will contribute to our understanding of vegetation in desert and sub-desert areas so that appropriate actions can be taken to enable it to grow back and eventually be improved;

- it is hoped that the project will sentisize the herders to the seriousness of the damage to vegetation and encourage them to mobilize in a common campaign against desertification;

- by slowing down the dislocation of traditional structures, the project will favor the adoption of conservation measures to protect the vegetation and the environment;

- the project will contribute to the DEP and to the Livestock Department by training badly-needed specialists through more formalized field-based training and through formal institutionalized training;

- it will help to increase production of forage crops, especially in oases;

- it will help to protect wildlife in arid as well as zonal desert areas by greater information availability and if necessary, non-formal education with limited goals and appropriate methods for the target population; it will facilitate the creation of a National Park for the addax, as suggested elsewhere (see RAMS Project/MB 6).

- Mauritania's renewable resources, which are in effect part of the nation's assets, will be preserved by adjusting the size of the dromedary herds to the availability of forage resources;

- through a better understanding of the herds and of grazing lands, the project will help to improve range and herd management and thereby alleviate the social and human problems that afflict the herders during protonged periods of drought;

- technical and economic supervision of the dromedary herders will be facilitated, particularly in the areas of herd management, selective breeding and preventive veterinary care;

- voluntary cooperation between the dromedary herders and the Institute's activities will be a sign of its effectiveness;

- the project will contribute to integrated development; through technical, social and economic improvement of the relations between the dromedary herders and the oasis farmers who grow forage crops;

- it will impact on research, experimentation and extension work by promoting integration between them;

- it will increase knowledge of water resources and of wells in dune and in absolute desert areas;

- finally, it will help to monitor changes in vegetation in these areas.

2.3 The project concerns several quite distinct but necessarily complementary sectors:

- range improvement (Forestry and Range Service of the ADD),

- animal production (Livestock Department),

- hydraulics (Hydraulics Department)

There will be a contribution to each of these sectors, as described in section 2.2 above.

2.4 The vast majority of Mauritania's dromedary herds live in the areas to be covered by the project's activities. Almost everywhere, the dromedary (and the goat) are the main source of milk and a major source of meat. Furthermore, in a very wide area of these regions, the dromedary is the only possible means of transportation; it is certainly the best adapted and the most economical means.

The world camel-dromedary population is estimated to be 14,369,000 according to the 1976 FAO annual statistics and of which 8,788,000 dromedaries live in Africa. This is not only a major kind of capital but is also a source of revenue for million of people: dromedaries are also their main source of food (milk, meat) and their only means of transportation. Furthermore, dromedaries are, together

with the wild animals, the animals which make the most efficient use of arid and absolute desert areas which constitute(Paylore and Greenwell, 1979) about 12% of the arid zones of Africa as a whole.

It is worth noting that dromedary meat is as rich and as good as other kinds; although it is sometimes tough it is well-liked. The quality of the meat could probably improved through selective breeding and appropriate facilities, especially with a better supply of forage, as shown by the work previously done in Chad (Farcha), Mali (Sotuba) and Niger. Much can be done to improve herding methods and trek routes; it must be remembered that appropriate development of these trek routes is one of the most productive ways of controlling desertification because these are the areas where dust and sand, which are the visible signs of wind erosion usually start.

2.5 In Phase I, the project will consist mainly of a feasibility study and preparatory work. Nevertheless, the preliminary results will be immediately useful to all dromedary herders. These results will also be useful to the Livestock Department in order to prepare treatment and vaccination campaigns or possibly to encourage the herders themselves to take care of disease prevention/prophylaxis. The proposed Anti-Desertification Department will also find the preliminary results of use in helping to conserve soils and vegetation in arid and even hyper-arid zones. Finally, the project will help increase milk and meat production as well as production of camel hair, particularly in Phase II. The use of these products will be improved and, it is hoped, jobs will be created.

During the feasibility study, the possibilities of transforming the institute into an International Dromedary Institute, following the examples of:

The Baumer and Tahara FAO report (1979) will be carefully studied.

The research suggestions of Dr. El Tayeb Ahmed Mohamed El Amir (see Chapter 9)

The decisions of the Arab countries conference on the establishment of an International Dromedary Institute, which was held in Khartoum Sudan in the spring of 1980.

Particularly:

. creation in Chinguetti, in liaison with UNESCO, ALECSO and the FAO of a research center to study dromedary and other desert animals;

. creation of a dromedary riding and breeding center in Chinguetti.

. creation of veterinary and training labs for dromedaries in Chinguetti,

. creation, along with IMRS of a socio-economic; research study of camel-raising sub-groups;

establishment, along with the overall project proposed by FAO to UNEP "Trees and woody plants for arid areas" of a research unit for studying drylands woody plants.

. establishment at Chinguetti or Ouadane of service specializing in eimproving dromedary and wild animal trails in drylands, to be included in the pastureland and forestry section of the proposed Anti-Desertification Department.

2.6 The project should have ties to other projects, for instance:

. The proposed project to create a simple method of rapidly inventorying trails (Baumer et Sabra, 1980);

. The existing APPAM project on rangeland animal production improvement in Mauritania, for instance for techniques in studying rangeland.

. The existing project of inventorying renewable resources, notably identification of major types of rangeland and their permanent control;

. The proposed project to raise ostriches at Oualata (Baumer 8 June 1981)

The project being studied by UNESCO to rehabilitate the historic towns of Chinguetti, Oualata, Tichitt, notably for housing the Institute office in the restores houses and for creating new activities in these towns.

- The proposed integrated development project for the Imraguen : especially for possibilities of using wind and solar energy and for housing and architectural problems in drylands (Baumer 8 June 1981)

- The livestock development project in the Southeast of Mauritania, being studied by the EDF, for several technical, sociological and commercial questions.

- The project being studied by the EDF for re-establishing the gum tree grovesnotably concerning the foraging of dromedaries in gum tree groves and use of the dromedary as a saddle or pack animal.

The oasis development project of Assaba, now being implemented through USAID financing.

The proposed (Addax) National Park (Baumer, 8 June 1981) But the project should be carefully coordinated by the proposed Environmental Improvement Project and the Anti-desertification Campaign, especially where it touches on using Project Design Unit proposed by UNSO in May 1981, particularly for preparation of Phase II of this project.

3. Content of the Project

3.1 Physical Setting

The natural regions covered by this project are essentially located in very dry, dry and semi-dry areas, where from less than 100 mm (4 inches) of rain (Saharan region) to 400 mm (16 inches)(north Sahelian region) fall annually.

Together the regions cover an area of about 915 200 km^2 (357,500 square miles) or about 80% of the entire country, and cover essentially rangeland where dromedaries may be raised, but where few other rural activities could succeed, outside of the oases.

The monotony of the countryside is broken only by the sandstone mesas of Adrar, Tagant, Dar Tichit, Oualata and Nema, the cliffs of the sandstone plateau of Zemmour in the far north, the rocky plateaus of Hank and the numerous isolated Guelbs of Inchiri and Tiris Zemmour.

Elsewhere vast stretches of dunes (ergs, akle, barkhane, etc) dominate, alternating with flat reg areas.

There are two distinct hydrographic zones:

- the first, marked by a total absence of streams, covers the dry and extra dry cones of the Mauritanian Sahara. Its borders are imprecise, varying year to year, as it rains more or less;

- the second area, is that which has at least seasonal streams which end without draining into the ocean. It includes the Sahel regions with most rainfall and even the mountain Saharan regions of Adrar and Tiris Zemmour (915 M, 3,002 maximum elevation. The waters which somteimes turn the dry stream beds into torrents supply water to the gueltas and especially the water tables of the stream beds which feed the oases of Adrar and Tagant. For the essential infrastructure of the existing EPD, see map 1.

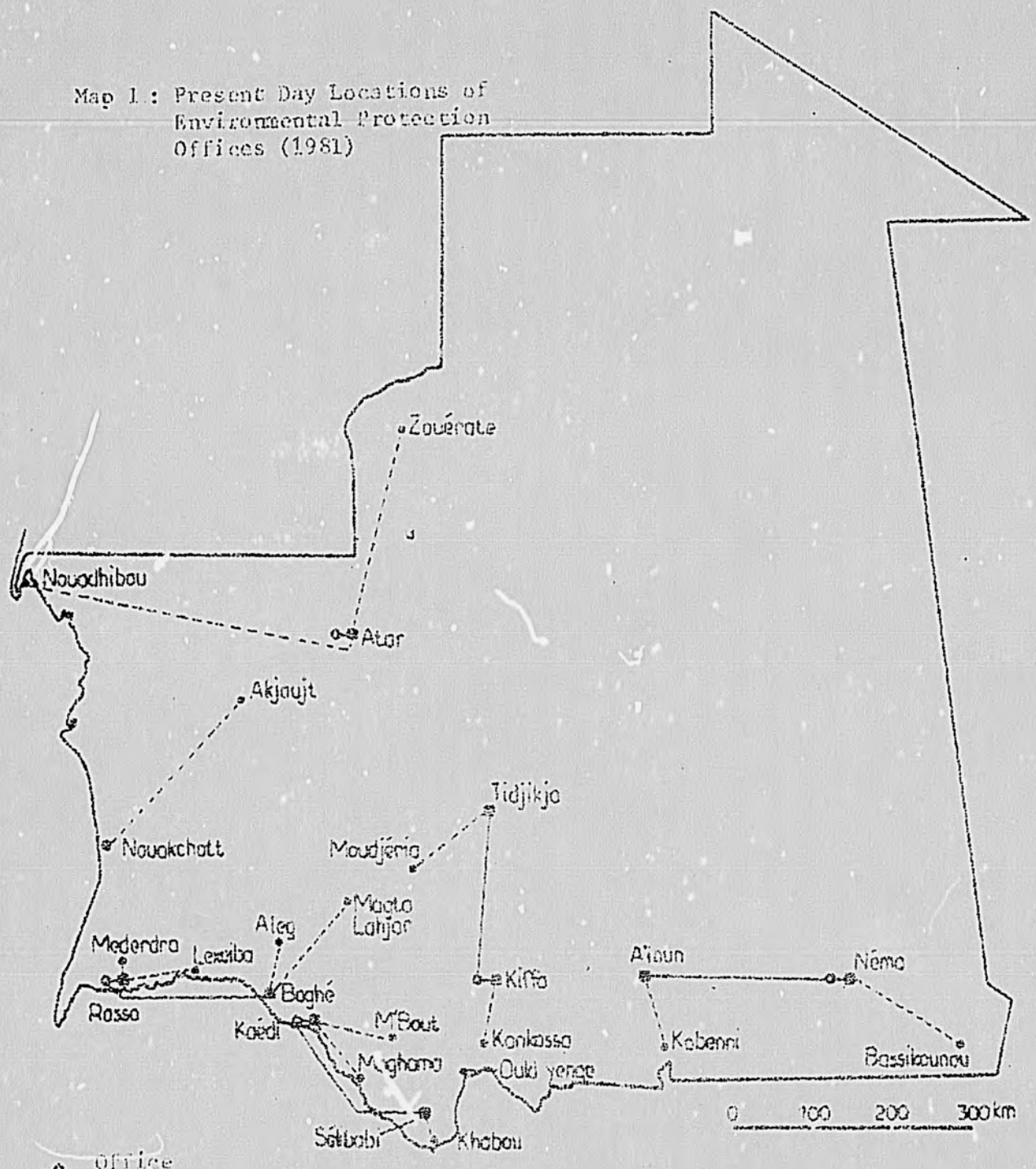
3.2 Human Picture

The project is to intervene in a mainly Moorish-inhabited desert and sub-desert area, strongly bound to a rangeland and economy and traditions. The breeding of livestock, especially dromedaries largely dictates life styles in these area.

The dromedary, a well-adapted transport animal, is the main source of food products such as milk, meat and by-products such as wool, leather and droppings. It still has enormous prestige, particularly among the older settled nomads, many of whom could rather resume a nomadic life than vegetate in slums at the edges of towns and cities. Most of the estimated 700,000 dromedaries in Mauritania live in this area. The towns selected as bases of the project, Chinguetti and Ouadane in the Adrar, Tichitt and Oualata along the Dhar are former caravan rest steps from caravan trading days, and the Moorish population is interested in them for cultural, historical and religious reasons.

The choice of these localities, well-known for there role in the country's history, will surely make the project well-known among the population directly concerned. Given these factors, the people will probably welcome it.

Map 1 : Present Day Locations of Environmental Protection Offices (1981)



3.3 Economic Picture

The main economic activities in the immense area covered by the project are presently:

- Mining in the Sahara (iron ore in F'Derick and Zouerate) and its export on the coast at Nouadhibou (also a fishing center); copper mining at Akjoujt has stopped and rare earth mining in Adrar and Trarza is not developed, except at Bou Naga, at the edge of the region ; in 1977 5,941,000 metric tons (thousand) of iron were exported by Mauritania during the first seven months of the year, contrasted with 9,664,000 (tons) in 1976,

- Palm tress are grown in the Tagant and Adrar Oases. Production is broken down as follows (Kraiem, 1980 a & b.)

Production Area	Own Consumption (tons)	Sold (tons)	Total Production Tons	%
Adrar	4,320	3,600	7,920	48
Tagant	2,900	2,450	5,350	32
Assaba	1,400	1,200	2,600	16
Hodh Occidental	260	250	510	3
Other regions	120	100	220	1
Total	9,000	7,600	16,600	100

- Livestock breeding, principally dromedaries in the dry and very dry areas,

- Breeding of sheep, goats dromedaries and Moorish cattle in varying numbers in semi-dry areas.

In the country as a whole, the income from livestock breeding only comes to 26% of the total (Siegel, 1981 a) but at the family level there are large differences and it is still virtually 100% of income for some families in the project area. The income comes to an average of US$ 288.00 for the Moors, compared to the national average of US$ 300.00, but some breeders in the north probably make less than US$ 150.00 per year.

3.4 Administrative Situation

The project area is not sharply defined (CF map 2). Nevertheless, the project will concentrate on the following regions, in order of priority: Adrar, Inchiri, Hodh el Chargui, Tagant, Dakhlet Nouadhibou, Tiris Zemmour. This takes into account the fact that before this last unusual dry spell, the largest number of dromedaries was in this area. It also considers the possibility of exchanges with other prepared projects (CF 2.6)

The project of restoring old towns,

The proposed UNSO project for dune stabilization in Northern Mauritania,

The proposed project to breed ostriches at Oualata,

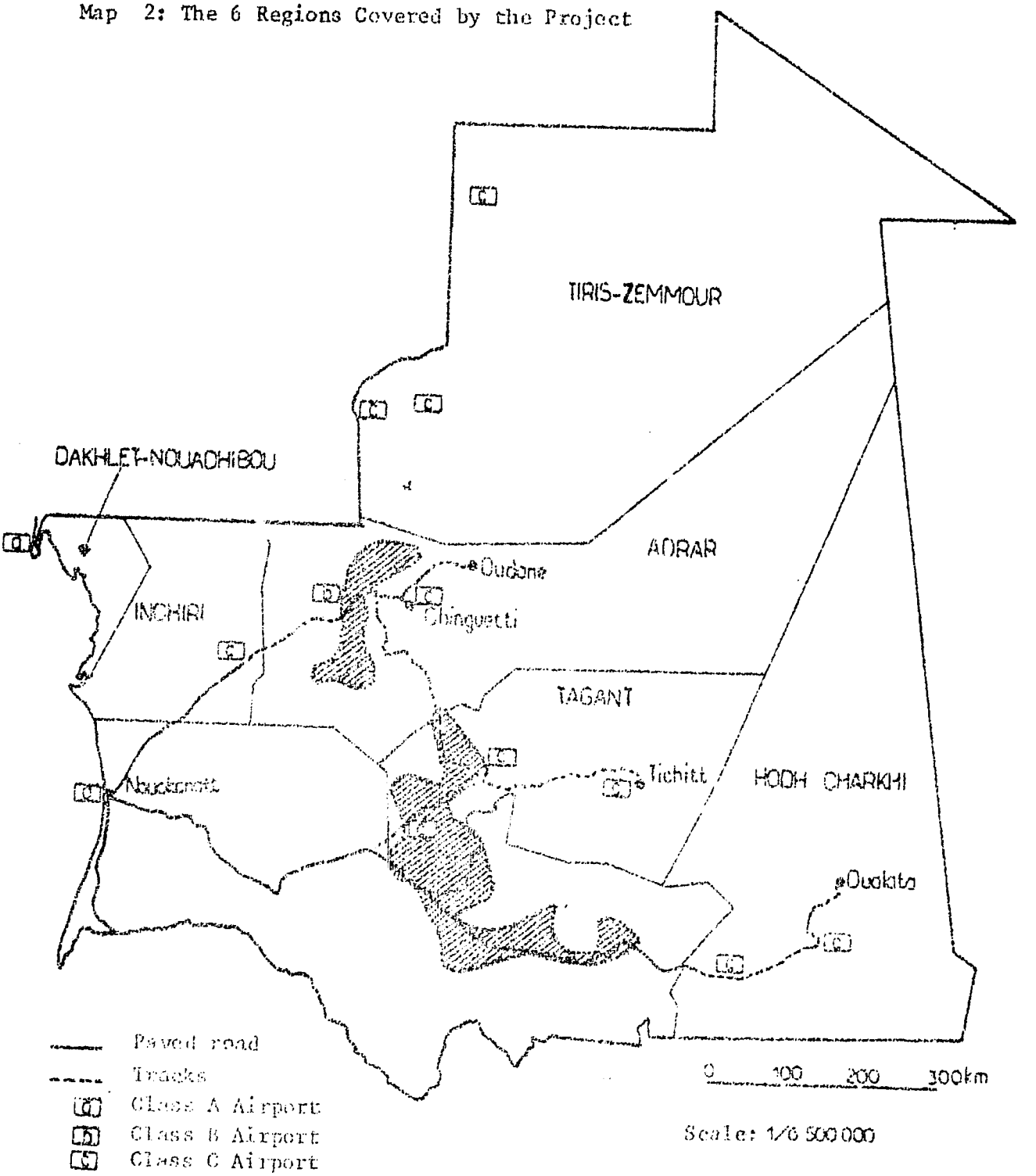
The integrated development project for the Inraguen,

The Southeast Mauritanian livestock project,

The proposed international addax park,

The choice of area may be surprising, since it does not correspond to the present distribution of dromedaries which have now taken refuge in the south of the country, where they suffer from trypanosomiasis. The choice is also influenced by the fact that a major goal of Phase I is to find out whether renewed dromedary activity is possible. It is in any case desirable in the north. Some notes on adminstrative structures of the project target areas are found in Table 1. Daily radio contact is intended bwtween the project office in Chinguetti and the regional headquarters at Atar, as well as with the Range Management Office planned for Kiffa. Besides this, each vehicle and caravan of the project will make daily radio contact with project headquarters.

Map 2: The 6 Regions Covered by the Project



4. Estimated Resource Requirements

4.1 Technical Needs

4.1.1 The project researchers will gather needed data by living with the camel drivers and enlisting their widespread participation. It is necessary for the project's vehicles, caravans and personnel to be quickly recognized by the population as being "of their own" and that they be recognized from afar. For this double requirement:

1. All project vehicles, tents, buildings and caravans will carry white triangular pennants with the silhouette of a dromedary outlined in green, which will be the official project banner. It goes without saying that the authorities will need to approve this plan before it is used.

2. All members will wear an emblem of the same green dromedary on a white background.

It is by frequent trips in Land Rovers, but even more by camel caravans that the project will gather necessary data and documents. The samples which can be preserved will be kept at project headquarters in areas gradually to be set aside for this purpose; if the project does not have a second phase, the samples from Phase 1 will be handled over to the Mauritanian Institute for Scientific Research (IMRS). Since the project must make visible, solid improvements in order to be understood by the people, a crop raising effort is planned as a model of fodder production in addition to the raising of several fruits and vegetables in the oases or palm groves.

4.2.2 The institute will pay special attention to the areas where dromedaries were once most numerous (Inchiri, Adrar, Trarza) and areas where economic development might be possible (Tagant and Hodh El Gharbi) Topics to be studied are the wildlife, plants, the camel population (number, types, health, nutrition, migration, watering etc.), people (family budgets, nutrition, health, social aspiration, fuel problems, food, education and basic human need problems, water availability, etc.) The goal of these studies is not only to acquire a better understanding of the project area and its people, but also to win the confidence, support and participation of the people, to work our with them a program of research and development. During

the research process necessary samples of flora, fauna, geology, ect, and data collected will be gathered: field notes, recordings, photos, interviews, etc. The Mauritanian employees of the Institute will follow a schedule calling for at least five months per year in vehicular or camel caravans, at most three months at their post and the rest of the time in the Chinguetti office or in a field office (Ouadane, Oualata, Tichitt), The expatriates will also spend at least five months per year in the caravans.

4.1.3 Necessary equipment will include, specifically:

a. a minimum of office furnishings: tables, chairs, files, kerosene or butane lamps, cabinets, mats, Moorish tea sets (tray glasses, charcoal stove, teapot) Moorish rugs and tapestries, solar powered fan and smalllwater pump to enable some cooling, etc.

b. For transportation:

3 Land Rovers with canvas covers, 4 wheel drive front winch equipped, with extra fuel tanks, roof platforms, jerrycans, snad ladders, shovels for getting out of loose sand, mechanic tool kit, spare parts (spark plugs, filter, alternator, with electric and hand pumps, tire repair kit, fire extinguishers, two way radio, with compass movable bench and support bass bar behind the cab, two spare wheels and extra tires and tubes.

one Berliet truck for long distance heavy hauling with two-way radio.

1 pickup truck, four wheel drive, with a way radio

a herd of camels large enough to always have ten riding and ten pack camels ready to leave on short notice and enough harnesses and tappings to outfit them all, finances to engage independent camel drivers to accompany as guides, haulers, etc.

c. For camping

In addition to two-way radios in the vehicles, at least two equally powerful sets for the caravan and a set of portable units for short distance communication between the logistic vehicles and the

circulating tactical caravans: Tents, mats, or carpets, cushions, leather supply bags, covers, kitchen goods, butane lamps, portable water filters, two mess kits.

a medicine kit for the caravan and for urgent needs of camel drivers met along the route

flare pistols and flares, flashlights for signaling

d. Scientific equipment

navigation equipment (maps, aerial photos, sextant, compass, star guide)

botanical and floral presses

tubes, cars, jars, cords, rubber bands, nets, plastic bags, glass slides, test tubes, sealable bottles, boxes, etc. for taking samples;

Basic relevant documentation for the institute such as Bulletin de l'Institut fondamental d'Afrique noire, publication of Saharan Research Institute of Algiers, Spanish and Moroccan publications, Arabic, French and English works on dromedary, texts from the Drylands Institute of Medenine, Tunisia and the Desert Institute of Cairo, etc.

portable bookcases for protection of books

files and filing boxes for the protection of manuscripts, repots, etc.

16 mm movie camera and film

2 excellent 35 mm single lens reflex cameras such as Canon Al or Minolta TXI with set of lenses and films

agri-meteorological equipment

for a small meteorological station at Chinguetti

portable instruments: anemometer, thermometer, rain gauge, etc.

binoculars

c. For the housing of Chinguetti personnel:

- residential cooling devices using wind or solar enegy, the experience of the proposed Iramguen Integrated Development project will be used; data from the proposed Integrated Development of the Imraguen will be incorporated in the UNESCO project of reconstructing the historic cities.

Plans include:

In Chinguetti: project headquarters, staff housing and guest houses.

In Ouadane: staff housing and guest quarters

In Oualata: staff housing

In Tichitt: staff housing.

- water filters
- a hut for the guard of the oasis crops and a hut for the dunes crops guard if crops are planted.

In Chinguetti the houses will consist of, in one of or several buildings:

1 office A for counterpart of the Head of the project

1 office B for the chief of project

1 office C for the administrative officer and his counterpart.

1 large office D for the secretaries

2 large offices E and F for other expatriates

1 storage area, securely lockable for stocking material

1 remote storage area for fuel

1 shelter for vehicles (J)

1 camel pen (K)

1 house[L] for chief camel driver or 1 very comfortable tent; houses[M] for advisors and counterparts; a guest houses [N].

The following must be adjoining or very near to each other, A & B; B & C; C & D; H & J; K, L & M.

f. For the necessary "gift"

- selected seeds, garden tools, fertilizer for oasis dwellers;
- sugar, tea, salt blocks and vitamins and minerals for the camel drivers.
- several books on Mauritania for foreign visitors as well as local craft items.

g. For demonstrating planting, especially of food crops in oases (at least in Chinguetti);

seeds, garden tools, simple trickle irrigation systems (use data of the German-Senegalese forestry project at Vindou-Tiengoli and M'bar Toubab in Ferlo), items needed to construct a shodouf and a compost pit, black plastic sheeting, a solar powered pump, hoses, simple tools for building a sunshield,

h. For the employees:

a complete uniform (sarwal, sheish, jellaba, sandals, a belt etc.

4.1.4 Identifying needs as exactly as possible by concentrating on:

- Raising the living standards of the people
- Breeding better dromedaries (for meat, transport, riding, milking)
- Finding better ways to use camels, especially for transport
- Improving the camels' migratory feeding areas and developing a more rational use of them.
- Halting the desertification of the country.

It will be realized that vast stretches of desert and sub-desert areas of Mauritania are highly representative of the African continent and the Arabian peninsula, and include most of the ecosystems usually found in dry and very dry areas.

The main task of the Institute will be to conduct research on the dry and very dry areas of Mauritania, at the same time attempting to engage the interest and participation of the population.

The techniques to be used will be simple. They will consist essentially of traveling with the dromedary drivers to better study their needs and their environment.

Between caravan trips and inspection tours in Land Rover, the project personnel will write their reports, study data, and will keep in contact with prefectoral and regional authorities and herders.

The agricultural program will be in the form of an extension program for the oasis dwellers who grow fodder for sale to the nomads and in a small test station to be made available to the project, comprising irrigated plots in palm groves and unirrigated areas outside palm groves for dune stabilization, for example, on growing atriplex.

A few activities will be sub-contracted. Thus considerable funds are foreseen for aerial reconnaissance and/or interpretation of satellite imagery on aerial photographs. This should be done with the army and in cooperation with the project now conducting an inventory of renewable resources; periodic maintenance of vehicles will be contracted; so will maintenance of radios and equipment; In case of problems in identifying plants, some money is planned for sending duplicate samples to an internationally recognized botanical taxonomy laboratory which has a specialist who is knowledgeable about the plants of the Saharan border regions; possible institutions include the Montpellier Botanic Institute, the Royal Botanical Garden at Kew or the Geneva Botanical conservatory,

Money is planned for nutritional analyses by a competent laboratory; The National Livestock Laboratory of Dakar-Hann (Senegalese) and the Agricultural and Veterinary Medicine Institute of Tropical Centers (IEMVT) of Maisons Alfort (France) are both recommended.

For veterinary diagnoses, some funds are planned for gathering and sending specimens to Nouakchott, Dakar, to Maisons Alfort and to the National Veterinary School in Toulouse (France). For water analyses some money is planned to fund collecting water samples and sending them to be analyzed, particularly for salt content.

4.2 Personnel Needs

All key personnel of the project have to know how to ride camels, drive, be in excellent health, and be able to stay in the desert for up to two months at a time. They must be able to either speak fluent French or good Arabic or Hassaniya. Whichever the dominant language may be, they must have at least be functional in their second language.

All key personnel must know Morse Code and be skillful users of two way radios, compasses sextants and the portable agri-meteorological intruments of the project. They must be able to figure out needed amounts of water, food, fuel for vehicular or camel-back journeys.

4.2.1 Project Supervision

A special committee for dromedaries will be created under the National Anti-Desertification Committee (CNLD). The Minister of Rural Development, vice-president of CNLD will preside over it. It will include the project director, the Director of the Livestock Department the Director of the IMRS, the FAO representatives, one member from the organization or country financing the project. It is strongly recommended that Prof. Hubert Gillet (France) Prof. Jeremy Swift (England) and a representative of ALESCO be invited to attend committee metings; funds are planned to cover their expenses of attending the first and third committee metings. The committee wil meet twice a year to review the project. It will report its findings to MAC and the donor country or organization.

4.2.2 Local Personnel

Local Personnel will be essentially:

a counterpart (full time) for each expatriate advisor

a guard for each of the four towns where project activities are to be based

5 drivers

a chief camel driver

6 camel drivers, including two interpreters

a guardian for oasis crops and if necessary, one for dune crops

a librarian who should be fluent in French and Arabic, mainly to research existing data in Chinguetti and Oualata that could be of value to the project. This work would be be done in cooperation with UNESCO's efforts in collecting and classifying manuscripts which is planned as part of its project to restore historic towns. The librarian researcher could be used as an interpreter in Chinguetti or its outskirts and in Ouadane.

4.2.3 Expatriate Personnel

It is recommended that this project be implemented by the FAO. Some required qualifications have already been described in 4.1.1.

4.2.3.1 Chief of Project (2 years). An ecologist experienced in desert problems and having substantial knowledge of botany, with training in agronomy, forestry or veterinary medicine:

4.2.3.2 Administrative Officer (2 years). Experienced in organizing camel or motorized expeditions and in their logistics; a former officer of the camel corps could be appropriate.

4.2.3.3 Economist (1 year). Will essentially work with the Chief of Project, with the advisors of the proposed project "Coordination of Environmental Development and Anti-Desertification Campaign" and of the proposed project "Accelerated Training of Environmentalists and Anti-Desertification Specialists"and with the Mauritanian authorities and the donor agency, in order to:

- help with the preparation of Phase II, under the direction of the Chief of Project,
- Establish projections of the economic uses of the dromedary in Mauritania,

- Do a study of the family budgets of dromedary raisers.

4.2.2.4 Physiologist specializing in dromedaries (2 years). Zootechnician or veterinarian with experience working in the Moslem world and in arid lands, will need to do an analysis and a study of the future of dromedary raising in Mauritania stressing particularly:

- The nutritional requirements of the animals,
- Possible products: milk, meat, wool, etc. and the possibilities of increasing and improving these products, particularly by selective breeding,
- The possibilities of using the dromedary for transportation,
- Health and breeding problems.

4.2.2.5 Oasis Agronomist (24 months): Agronomists with training or experience in cultivating oasis soils will undertake near project headquarters and perhaps in other nearby oases demonstrations, and simple extension work in irrigated oasis forage crops and conservation of forage by simple methods: tedding, storage under tap or in pit. This should occupy 70% of his time. For the rest, according to possibilities and needs expressed by the herders, he will demonstrate dune stabilization methods, planting on the dunes, diversification of oasis crops (fruits and vegetables). In his work he will attempt to use the most appropriate technology for making compost. The use of solar and wind energy (pumping, drying fruit), making best use of water (trickle irrigation aquaculture in the irrigation ponds, raising ducks in the irrigation canals).

Note: It would be desirable that all these advisors already be accustomed to be working together and to have had some training in common.

4.2.4 Training

The project consists essentially of a feasibility study and in ground work activities. Training will be done especially in the field through contacts with personnel of the institute, particularly that of the counterparts. However, to prepare Phase II some training scholarships are planned:

- 1 4-year scholarship for a high school graduate speaking both Arabic and French if possible coming from a dromedary herding ethnicgroup and expecting to work with dromedaries, to take specialist advanced training in dromedary ecology in Tunisia (University of Tunis), Tunisia Agronomic Research Institue, and Medicine Drylands Institute;

- 1 2-year for a graduate in science, if possible from an ethnic froup of camel herders who intend to work at improving the vegetation of arid zones, to take advanced specialized training at the Montpellier(France) "Louis Emberger" Center for Ecological and Botanical-Sociological Studies, Botanical Institute, National Center of Agronomic Studies for Hot Regions (Centre national d'Studes agronomiques pour les regions chaudes), etc.

- setting up a pilot training program in Chinguetti to begin training "barefoot veterinarians": that will involve assembling some 20 dromedary drivers chosen by their colleagues to learn simple principles of veterinary amedicine and selective bredding. This program is much more of a test to determine difficulties in this kind of training method in order to determine if it could be generalized to train enough dromedary raisers to make a difference within such a short time;

- In the same vein, a 3-day session in Chinguetti is to be arranged for the wives of 15 dromedary drivers on the theme " cleanliness and milk preservation". Like the previous one the session will be organized by the Institute but with the participation of the IMRS (sociologists, ethnologists) and of officials from the Livestock Service . (Veterinarian, Zootechnician) roughly 5 Mauritanian specialists for each of the sessions, for respectively 7 and 5 days.

4.3 Financial Requirements

The Institute should be financially autonomous.

4.3.1 The Budget should be approximately US$ 3,056,000 about 1,920,000, the 1st year and about 1,138,000 the second year of which:

	1st year	2nd year	total
Construction and maintenance	374,000	96,000	470,000
Personnel	256,450	331,990	588,440
Equipment	872,500	149,500	1,022,000

The Mauritanian contribution in ouguiyas is not included in this figure.

The construction costs include fixing up a hut and but not buying a tent for guards in Chinguetti and contribution toward the costs of restoring the houses which would be used:

As office	$ 100,000
As guest houses at Chinguetti (1st year) and Ouadane 2nd year	100,000
For housing in Chinguetti	200,000
As field base at Ouadane (2nd year)	20,000
at Oualata	20,000
at Tichitt	20,000
Total	460,000

This sum of 460,00 dollars would be a very significant contribution to the UNESCO project of rebuilding historical towns. As for personnel costs it will be noted that a significant share would go to Mauritanian employees-around 362,000 dollars of the total 588,400, for 61% of which about 165,900 in the first year.

The foreign exchange contributions are shown in Table 2 (in US dollars).

4.3.2 The costs are calculated at price levels as of June 1981 for the first year and an inflation factor of 10% added for the second year. Delays and transit risks to commodities indicate that heavy items should be ordered for delivery to the port of Dakar and brought to project site by project vehicles which would be broken in during the trip. The scientific equipment would be safer traveling as accompanied luggage of the expatriate personnel. Some items could be brought in Dakar (camping gear, butane lamps, office furniture, etc.) and in Mauritania (Moorish tents, blankets, mats, garden tools, saddles, harnesses, unifiorms, etc.)

4.3.3 Thus some items could be bought with ouguiyas; so could maintenance, extra personnel costs, repairs, fuel, lubricants and spare parts for vehicles, unless any of these goods and services could be obtained tax free by payment in hard currency.

4.3.4 Because of long lead time in obtaining commodities, the vehicles should be ordered at least 8 months before the arrival of the advisors. But delivery times vary from month to month; status should be verified regularly from the time project financial negotiations begin.

It is difficult to buy a large number of dromedaries at once, and three to four months should be allowed for this. The head camel driver should be responsible for this, assisted by two camel herders well known to NADC. It is suggested that Abdullah Ould Si AISSA of Boutilimit be included. Table 2 gives an overview of the order of spending the funds. Notice that the 15,000 for Item 22 will be reimbursed to the donor if not used in an emergency evacuation.

Table 2

Costs in Foreign Exchange (US Dollars)

10	Personnel (costs calculated in	
11	Advisors	
	Drylands Ecologist, Chief of Party	
	Administrator	

Tabel 2: Costs in Foreign Exchanges (US Dollar)

			Total	First year		Second year	
10. PERSONNEL (costs calculated in class 0)							
11. ADVISORS							
Dryland Ecologist, chief of party	(D1)	24 m/m	132 090	12 m/m	62 300	12 m/m	69 190
Administrator	(P4)	24 m/m	106 260	12 m/m	50 600	12 m/m	55 660
Economist	(P4)	12 m/m	55 660			12 m/m	55 660
Camel specialist	(P3)	24 m/m	93 660	12 m/m	44 600	12 m/m	49 060
Oases agronomist	(P3)	24 m/m	93 660	12 m/m	44 600	12 m/m	49 060
Sociologist	(P3)	24 m/m	93 660	12 m/m	44 600	12 m/m	49 060
			574 990	60 m/m	247 300	72 m/m	327 650
12. EXPATRIATE CONSULTANTS IN:							
Camel Migrations		2 m/m	13 900	2 m/m	13 900		
Camel Nutrition		2 m/m	13 900	2 m/m	13 900		
Doctor-Hygienist-Nutritionist		2 m/m	13 900	2 m/m	13 900		
Camel Genetics	Before the 10th month	1 m/m	9 130			1 m/m	9 130
Transportation Logistics		1 m/m	9 130			1 m/m	9 130
Camel Pathology		2 m/m	15 290			2 m/m	15 290
Improving Output		1 m/m	9 130			1 m/m	9 130
Processing Dromedary Products		1 m/m	9 130			1 m/m	9 130
Non-Formal Education/Literacy		2 m/m	15 290			2 m/m	15 290
Assorted		2 m/m	17 430	1 m/m	8 300	1 m/m	9 130
Preparation of Phase II		1 m/m	9 130			1 m/m	9 130
Attendance of three high level international experts at the first and third meetings of the institute committee (travel, stipends, expenses)		1.1/2 m/m	27 000	3/4 m/m	13 500	3/4 m/m	14 850
		18.1/2 m/m	163 710	7.3/4 m/m	63 500	10.3/4 m/m	100 210

13. FIELD SPECIAL EXPENSES

13.1	Expatriate personnel 160 days/year in caravan, $50/day 205 day/year in Chinguetti, $30/day		32 000 24 600	44 000 33 825
13.2	Expatriate Consultants 75 days in caravan, $50/day (also 100 days second year)		3 750	5 500
13.3	Local consultants (payment in ouguiyas) principally to act as counterparts to expatriate sociologists, veterinarians, doctors, foresters, economists, etc. 12 airline trips Nouakchott-Atar-Nouakchott	2 924	1 440	1 464
	24 manmonths extra field personnel payment calculated as follows: 365 days in caravan $50/day,	38 325	18 250	20 075
	365 days, $10/day	7 665	3 650	4 015
13.4	Local personnel (5 counterparts) 160 days/year in caravan, $50/day 205 days/year, $10/day		32 000 8 200	44 000 11 275
13.5	Local personnel other than counterparts 4 guards for towns and workmen and guards for crops, $4/day	18 396	8 760	9 636
	5 drivers 250 day/year, $10/day	26 250	12 500	13 750
	6 cameldrivers 150 days/year, $20/day	37 800	18 000	19 800
	1 chief cameldriver 150 days/year, $40/day	12 200	6 000	6 600
	Extra allowances for 2 cameldrivers/interpreter)	7 665	3 650	4 015
	Librarian-Researcher	7 665	3 650	4 015
	Amount for hiring and paying guides, scouts, messengers, workemn, escorts, cameldriver, etc	200 000	90 000	110 000
19.	Sub total	588 440	256 450	331 990

20. SUB-CONTRACTING			
21. Aerial reconnaissance and/or evaluation of aerial photos and satellite imagery	200 000	110 000	90 000
22. Airborne emergency evacuation	15 000	7 500	7 500
23. Vehicle maintenance	24 000	10 000	14 000
24. Radio maintenance	10 000	4 000	6 000
25. Botanical identification/classification	4 000	3 000	1 000
26. Bromatological analyses	6 000	2 000	4 000
27. Veterinary diagnoses	2 000	1 000	1 000
28. Water analyses	6 000	4 500	1 500
29. Sub total	267 000	142 000	125 000
30. TRAINING			
31. 2 scholarships of 2 years in camel ecology	86 940	41 400	45 540
32. 2 scholarships of 2 years in grass cover restoration	86 940	41 400	45 540
33. Session of training of "Barefoot veterinarians" (1 week for 20 camel drivers)			
Allowances to participants	1 400		1 400
Travel and allowances for Mauritanian lecturers	1 400		1 400
Secretarial costs, data, reports, fees, etc.	5 000		5 000
34. Session on introduction of health practices and milk preservation (3 days for 15 camel drivers wives)			
Allowances to participants and their husbands	900		900
Travel and allowance to lecturers	1 750		1 750
Secretarial costs	5 000		5 000
39. Sub total	189 330	92 800	105 530

Note: Item 22 is provided only for a real emergency, and will be reimbursed to donor if not used. On the other hand it can be increased if several evacuations become necessary.

40.	EQUIPMENT, COMMODITIES AND SUPPLIES			
41.	Office and household furniture, appliances and supplies	35 000	35 000	
	Cost of repairing houses	460 000	370 000	90 000
42.	Vehicles			
	3 specially equipped land rovers	69 000	69 000	
	1 Gazelle Berliet heavy truck	100 000	100 000	
	1 Berliet SL 900 truck	54 500	54 500	
	1 herd of about 40 dromedaries with all equipment, $800/camel; 15 salles, $100	33 500	33 500	
43.	Medium range two-way radios and generators	100 000	70 000	30 000
44.	Camping material	55 000	50 000	5 000
45.	Scientific equipment	60 000	55 000	5 000
46.	Gifts	15 000	7 000	8 000
47.	Agricultural equipment and supplies	35 000	25 000	10 000
48.	Uniforms for 5 advisors, 5 counterparts, 5 drivers, 7 camel drivers, librarian, pennants and insignia	5 000	3 500	1 500
49.	Sub total	1 022 000	872 500	149 500

4.3.5 Costs of maintenance and operations are very high. If efficient operation under very harsh conditions, far from any region facility is desired, very high costs must be expected. Thus, not only ordinary allowances (which the government pays for local personnel) but also special allowances for expatriate as well as local personnel are foreseen.

Project personnel will receive special allowances in addition to regular expense allowances. The rates will be different for the field, for Chinguetti and for the base post; the allowances for local and expatriate personnel will differ. These allowances are also foreseen for drivers, workers, guides, guards, etc. The allowances will be paid as follows: 10% at the end of each month; 90% after completion of six months. For service of less than six months, the 90% will not be paid.

No electrical generator is planned for the project, rather the more portable butane lamps are to be purchased. Perhaps eventually wind or solar generators will be possible.

As for feeding and watering the camel herd and fueling the vehicles:

a) The project will try to form a cooperative association with the oasis dwellers by which they would agree to supply a fixed amount of fodder and dates at fixed prices;

b) The project will ask for permission from authorities and traditional chiefs for free passage, pasturing and watering the herd.

c) It would be prudent to plan to set up stocks of mineral salts and fodder in Chinguetti at the beginning of the project, and to expedite the agronomic activities to assure renewing (fodder crops) and storage (drying, storage) of the latter.

5. Expected Results

The improved understanding of the vegetation in the target areas is of great importance to enable the Project in Phase II, to safeguard and possibly enhance this vegetation, which is the basis for all rural activity in the immense target area.

The agricultural demonstrations will lead to diffusing improved methods of growing and storing fodder, growing fruits and vegetables, making compost, using renewable energy, saving water, stabilizing dunes, etc. By virtue of these uses, the demonstration will be an important element in improving oasis agriculture.

5.1 Economic Effects

Although it is not possible to calculate how much at this stage, the agricultural activities will probably promote an increase in yield-directly, and indirectly. of greater worth than the project s investment in this sector. Perhaps also, even before the end of Phase I the benefits from resuming camel caravan transport would be felt by the Mauritanian economy, esseentially through the considerable saving on fuel and lubricants,imported spare parts and through a better distribution of profits among the most needy classes (camel drivers rather than truckers).

But once more, since Phase I is essentially a feasibility study, it is only in Phase II that significant economic advantages can be expected.

Nevertheless, the important contribution which the project will present toward rehabilitating the towns of Chinguetti, Ouadane, Oualata and Tichitt will have a definite, economic effect although one that cannot be stated in precise figures at present.

It is hoped that the project will start an influx of scientific visitors and even tourists, which could certainly continue to grow during Phase II.

5.2 Social Effects

The expected social effect could be significant. Actually, the most needy of Mauritanians would benefit most and they are those who live in insecure and precarious condition. The local people would probably become more favorable towards the government, and confidence would be restored among people in these areas, more or less neglected up to now; this will only favor the success of Phase II if it follows immediately after Phase I. Also, the participation of the local population is absolutely necessary. for example in finding the camel drivers, guides and scouts familiar with the area. This will give the population a sense of responsibility for the success of the project.

But it is clear that in Phase II the beneficial social effects will all be noticed, principally due to activities directed toward particularly vulnerable groups such as women and children, who would have been included in Phase I except for financial constraints on the project.

5.3 Environmental Effects

The entire project is considered a part of the strategy of the anti-desertification campaign, and will improve the environment. Nevertheless, some precautions must be taken to be sure that the frequently heavy automobile traffic around Chinguetti does not bring about rapid erosion. Thus, the access roads and parking area should be laid out so as to cause a minimum amount of environmental damage. Certain protective measures must be taken around the access roads with the consultation of the local authorities. The protective measures could perhaps be tied in with Arbor Day'

5.5 Effects on National Budget and on the Balance of Payments

No visible positive effect on the balance of payments during the short duration of Phase I can be expected. But no negative effect either because the proposed financing is a capital grant.

The project would, however, draw upon the national budget because the government is to disburse payments in ouguiyas for:

a) salaries

of counterparts

of 6 guards

of 6 camel drivers

of the chief camel drivers

of 5 drivers

of one librarian - researcher

b) allowances for the personnel

c) providing houses and offices

d) providing Mauritanian specialists (salaries and allowances) to participate in the two planned training sessions; a total of 28 days for the first session and 25 man-days for the second. Special supplementary allowances are foreseen in paragraph 33 of the budget and the transport of the specialists between Nouakchott and Chinguetti could be provided by the project Land Rovers.

e) consultants travel between Nouakchott and Chinguetti, 3 trips the first year and 6 the second year.

f) a yearly one-week inspection trip by the Director of the proposed Anti-Desertification Departmentn (or by his representative) and his advisor from the "Coordination of an Environmental Development and Anti-Desertification Campaign" project.

Even though these amounts are small compared to the hard currency contribution of the donor, it is proposed that they be paid by the project to the extent shown below, because of Mauritania's financial difficulties.

	First Year	Second Year
a) salaries	100%	50%
b) allowances	50	-
c) site	50	50
d) Training session salaries	-	-
allowances	-	50%
travel	-	100%
e) consultant in-country travel +	100	25
annual inspection	50	-

Experiment 5 Study in vitro to determine

1. IVDMD

2. free ammonia

3. result of supplementing clover IVDMD with urea and molasses, evaluating of the cost of these experiments done in 1974 gives, in Sudanese pounds:

Experiment 1	281
" 2	844
" 3	379
" 4	158
10 camels and 10 sheep	2,000
labor	750
miscellaneous	87
	4,500

6. Four experiments will be conducted:

Experiment 1, digestibility test (1 month)

(i) 3 camels and 3 sheep for each series,

(ii) the series will be: T1 control (half and half)

T2 formula in concentrated feed, T3 all fodder (100% clover).

The formulas will be:

	T1	T2	T3
cotton seed oil-cake	20	10	
wheat bran	30	25	
sorghum	30	15	
clover	10	20	100
peanut shell	10	30	

(iii) digestibility trial for nitrogenized balance

(iv) collecting samples of food, urine, droppings and analyses to determine CP, CF, EE, NFE

(v) study of absorption of food and water

Experiment 2, treatment, with Rumensine (3 months)

(i) 3 camels and 3 sheep for each series

(ii) same formulae as in experiment i, with Rumensine added

(iii) the animals will be weighed before the experiment and every 28 days during the experiment.

(iv) the different parameters of animal performance will be noted.

Experiment 3, using urea and molasses (3 months)

(i) 3 camels and 3 sheep for each treatment,

(ii) the treatments will be controlled, T1 with half forage and half concentrates, treatment T2 rich in concentrates, urea and molasses, T3 forage plus urea and molasses.

The formulae will consist of:

	T1 T1	T2(%)	T3(%)
cottonseed oil cakes	12	10	
wheat bran	30	25	
sorghum	30	15	
clover	10	20	70
peanut shells		30	
urea	8		20
molasses	10		20

(iii) measurements of animal performance

Experiment 4

(i) 1 camel and 1 sheep will receive fistulas

(ii) the animals will be given a control formula made up of 10% cottonseeds oil cakes, 25% wheat bran, 15% sorghum, 20% of clover and 30% peanut shell.

(iii) determining volatile fatty acids

Developing better uses of camel products	wool use expert, butter and cheesemakers, leather tanners

If as it is hoped, the Committee favors creation of an International Dromedary Institute, the activities to be planned would be both numerous and urgent. In addition to those already mentioned would be added many others such as dromedary pathology, ecology, wildlife ecology in dromedary areas (particularly in liaison with the proposed project of the Addax National Park, watering and feeding camels, etc.) The schedule of this project provides for a consultant be detailed to the project during the 18th month to draw up a detailed project paper for Phase II, under supervision of the project director and financed by the Institute Committee.

In paragraph 9.3 there is an example of the research which could be conducted by the Institute.

9.2 Associated sub-project

If SP 45 "Assistance to Northern Herders" could be started, it would mesh harmoniously with the establishment of the Institute. This project was identified only least year (Baumer and Sabra, 1980) without giving a thorough project description the introductory notes identified as goals: to suggest a pilot project for palm groves and pastures within the concept of the anti-desertification campaign, working with Project 17, Assistance to Northern Herders, proposed in the UNSO report 1979:47): A study should be conducted to identify ways and means of facilitating the regrowth of the grass cover in the North. It seems so much more necessary to do something for the northern stockmen because the inequity of natural conditions between the norht (disadvantages) and the south (relatively advantaged) has been widened by the concentration of projects in the south. "Since independence the great majority of government activities as well as most foreign aid projects have been in the south, primarily because the investments there bring a better return." (Castelli Gattinara et. al June 1979: 161)

A priori, assistance to the Northern herders should include inter alia increases in food crops in palm groves and in some wadi beds, increasing use of forage-producing trees (Capparidacae to the extent they can resist drought, and especially acacia tortilis subsp raddiana, A. nubica, A. ehrenbergiana and perhaps A. millifera in the low clayey areas), creation of fodder growing cooperatives, building of retention dams to help raise the water table in the palm groves, digging several wells or drilling deep wells to help the migratory herds in their passage through Tagant.

9.3 Research Proposals

This research proposal was presented by Dr. El Tayeb Ahmed Mohamed El Amine, in charge of projects in the Land Use and Soil Conservation Administration in the Sudan (cf. Baumer and Taharma 1979).

Goals

1) Evaluate the digestibility of fodders and concentrated feeds, comparing small ruminants (sheep) and pseudo-ruminants (camels);

2) Evaluate the performance of these animals use of Rumensine;

3) Study use of nitrogenous materials by ruminants and pseudo-ruminants;

4) Study the possibility of mass vaccinations of both ruminants and pseudo-ruminant, using in vitro methods.

Plan for the Study

1) 10 camels and 10 sheep will be used;

2) 1 camel and 1 sheep will receive fistulas;

3) a thorough program will be used (2 animals for each treatment, 2 species, 3 repetition ;

4) The feed will be mixed with three different percentages of fodder and concentrated feed:

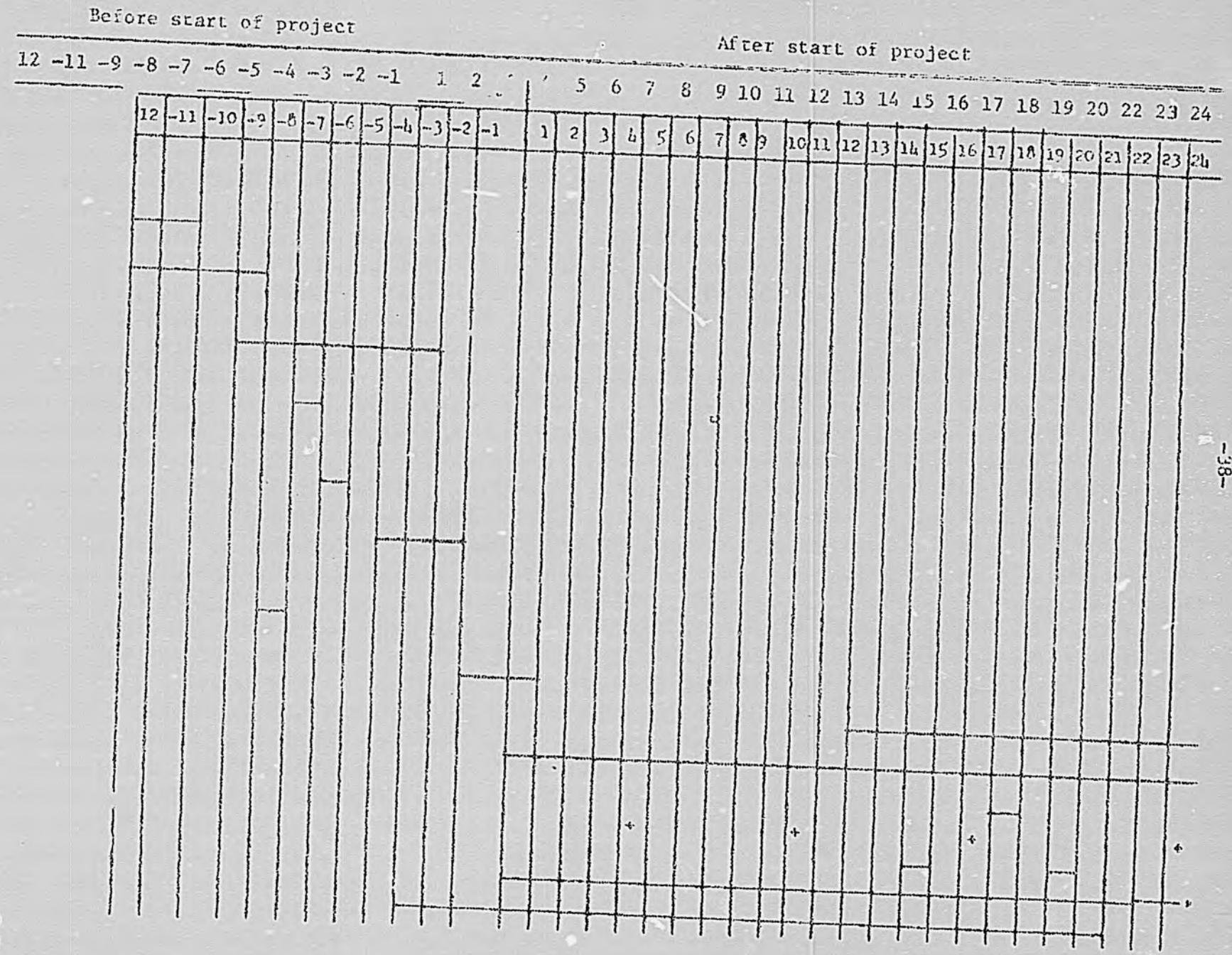
   a) strong in concentrated feed (80%) vs 20% fodder

   b) control formula - half and half

   c) high in clover content (100%)

5) the formula will consist of sorghum, dried cottonseed oil-cakes clover, wheat bran, peanut shell, ordinary salt, urea, molasses, sulfuric additive (Rumensine)

Table 4: Implementation



(see bibliography on following pages), as well as the conference papers produced at the meeting in Khartoum (1977) on dromedaries, which would be desirable to have translated into English and French.

9. Appendices

9.1 Proposition for Phase II

According to the results acquired during the first 15 months of the project (5th synthesised report from project director to institute committee, it will be for the NADC to decide (third report from the Institute Committee) how to follow up Phase I. The choices are outlined below.

Phase I: Discouraging Results: Stop project

Good Results: Purely National

International

If the committee's choice tended towards a national Phase II, we could expect the principal activities to be oriented as follows:

Principal Types of Activities	Kinds of specialists needed "F" means trained in 1981 or 1982 in the " Accelerated Training" Project.
	Specialist in soils conservation (F) + consultants
Improvement in fodder production and storage at the oases	Agronomists
Improvement of grazing lands and trek routes	Range management (F)
Improvement of health and nutrition	Doctors, nutritionists, hygienists
Functional literacy	Non-formal educators/literacy trainers
Better camel breeding	Geneticists, Zootechnicians.

report to the committee, using the reports of the other advisors, which will be attached as appendices. The following diagram illustrates the project monitoring and reporting schedule. (see Table 4) 1st month: Document setting responsibilities and goals for each advisor. 5th, 11th, 17th, 44th months: project committee meetings.

8. Studies to be Done

8.1 Additional Studies to be Done

A visit of about 4-6 weeks would be necessary, preferably by the writer, in order to edit the document and to:

- see the possibilities of using the building in Chinguetti. Discuss the issue with UNESCO, learn when the repairs would be finished and the facilities ready for occupancy;
- begin to elaborate in more detail the terms of reference for each expert;
- explain the project to the Governor of Adrar and to the prefect of Chinguetti and take note of their opinions for use in eventually amending Phase I;
- explain the project to reliable camel drivers and record their remarks;
- get exact prices of needed materials which could be bought in Mauritania or Senegal;
- with approval of the NADC, explain the project to prospective donors, notably those with Nouakchott offices;
- work up list 8.2 shown below after consulting with the MRD, IMRS, various Nouakchott libraries, IFAN, and ORSTOM in Dakar.

8.2 Listing of Studies already Accomplished

This list remains to be done, but we will consult Adam, 1962; GAUTHIER-PILTERS, 1965 and 1975; MONTEIL and SAUVAGE 1949/1953; NAEGELE, 1977, SAUVAGE, 1946 and the bibliographies of these works

Tabel 3: Reporting Schedule

Month	From each expert to the Director		By the Head of the Committee: Synthesis of trimestrial reports	Committee meetings (with reports)
	Brief administrative report	Technical report		
1	No. 1			
2	No. 2			
3		No. 1 (months 1-3)		
4	No. 3			
5	No. 4		No. 1	
6		No. 2 (months 1-6)		No. 1
7	No. 5			
8	No. 6		No. 2	
9		No. 3 (months 7-9)		
10	No. 7			
11	No. 8		No. 3	
12		No. 4 (months 7-12)		No. 2
13	No. 9			
14	No. 10		No. 4	
15		No. 5 (months 13-15)		
16	No. 11			
17	No. 12		No. 5	
18		No. 6 (months 13-18)		No. 3 (preparation of Phase II)
19	No. 13			
20	No. 14			
21		No. 7 (months 19-21)		
22	No. 15			
23	No. 16			
24		No. 8 (months 1-24) (final report)		

Adequate quarters in each of the four former caravan crossroads will be furnished to the project by the government. An agreement will be made with UNESCO for prompt restoration and equipping of these buildings.

6. Method of Financing

6.1 For project financing it is suggested to quickly contact, in order of priority, the following possible donors: the Franco-Arab Banking Union (UBAF), ALESCO, Arab Agricultural Development Fund, other Arab funds, the World Bank, ADB, etc.

6.2 As stated above, it is hoped that virtually all of Phase I will be financed by an outside donor.

6.3 For Phase II, most financing will also be from an outside donor, but financing could be divided into two general elements concerning 1) activities of international interest, which would require external financing and 2) development activities benefitting Mauritania immediately and directly, which could expect more serious financial support from Mauritania than in Phase I.

7. Management and Organization of the Project

7.1 The project will be attached to the NADC and a special committee called the Dromedary Institute Committee will be formed within the NADC to oversee the project (CF 4.4.1) The parent organization during Phase I will be the CNERV. The project will be managed by the project chief, assisted full time by a Mauritanian co-director. Their reports will be countersigned by each other. These reports will be sent to the president of the Dromedary Institute Committee, with copies to the director of the proposed Anti-Desertification Department and to the director of the CNERV.

The project experts will report to the project director who will coordinate and orient their activities and consequently those of their counterparts. Their reports will be addressed through the project director, (who will receive copies) to the appropriate office of the concerned agency.

7.2 The project will be attached to the NADC and particularly to the CNERV and to the proposed ADD. On the local level, the administration

will remain in contact with the prefect of Chinguetti and will report its activities and discuss them with the governor of Adrar. Through him, other governors of regions in project target area will be informed of developments and they in turn will keep the prefects informed about project activities and particularly the travel of project personnel into their areas of jurisdiction. The prefects,the regional governors, who will be coordinated by the governor of Adrar, will pass along requests and news concerning the project.

These relationships will be confirmed by the signing of the project paper by the government, and a precise agreement will be worked out at the beginning of the project.

7.3 Within a month after the arrival of each advisor, an agreement will be signed between the NADC, the project director and the donor representative if there is one in Mauritania. The agreement will set out as precisely as possible the advisor's responsibilities and the goals he should achieve. A system of reporting will be worked out for the project; each month each advisor with his counterpart will write a brief appreciation of the extent to which he has achieved the prescribed goods. Every three months each advisor will make a detailed report on his achievements. The even-numbered reports will review the detailed progress report of the preceding odd-numbered report. They will thus cover a six-month period and can be used in semi-annual meetings of the Dromerday Institute committee.

7.4 Starting Procedure

Nothing in particular

7.5 Project Timetable

CF Table 4.

An exact plan will be made for dates of submitting reports and will be linked to the schedule of committee meetings.Every six months the director and the project coordinator will give a synthesised

The following must be adjoining or very near to each other, A & B; B & C; C & D; H & J; K, L & M.

f. For the necessary "gift"

- selected seeds, garden tools, fertilizer for oasis dwellers;
- sugar, tea, salt blocks and vitamins and minerals for the camel drivers.
- several books on Mauritania for foreign visitors as well as local craft items.

g. For demonstrating planting, especially of food crops in oases (at least in Chinguetti);

seeds, garden tools, simple trickle irrigation systems (use data of the German-Senegalese forestry project at Vindou-Tiengoli and M'bar Toubab in Ferlo), items needed to construct a shodouf and a compost pit, black plastic sheeting, a solar powered pump, hoses, simple tools for building a sunshield,

h. For the employees:

a complete uniform (sarwal, sheish, jellaba, sandals, a belt etc.

4.1.4 Identifying needs as exactly as possible by concentrating on:

- Raising the living standards of the people
- Breeding better dromedaries (for meat, transport, riding, milking)
- Finding better ways to use camels, especially for transport
- Improving the camels' migratory feeding areas and developing a more rational use of them.
- Halting the desertification of the country.

It will be realized that vast stretches of desert and sub-desert areas of Mauritania are highly representative of the African continent and the Arabian peninsula, and include most of the ecosystems usually found in dry and very dry areas.

The main task of the Institute will be to conduct research on the dry and very dry areas of Mauritania, at the same time attempting to engage the interest and participation of the population.

The techniques to be used will be simple. They will consist essentially of traveling with the dromedary drivers to better study their needs and their environment.

Between caravan trips and inspection tours in Land Rover, the project personnel will write their reports, study data, and will keep in contact with prefectoral and regional authorities and herders.

The agricultural program will be in the form of an extension program for the oasis dwellers who grow fodder for sale to the nomads and in a small test station to be made available to the project, comprising irrigated plots in palm groves and unirrigated areas outside palm groves for dune stabilization, for example, on growing atriplex.

A few activities will be sub-contracted. Thus considerable funds are foreseen for aerial reconnaissance and/or interpretation of satellite imagery on aerial photographs. This should be done with the army and in cooperation with the project now conducting an inventory of renewable resources; periodic maintenance of vehicles will be contracted; so will maintenance of radios and equipment; In case of problems in identifying plants, some money is planned for sending duplicate samples to an internationally recognized botanical taxonomy laboratory which has a specialist who is knowledgeable about the plants of the Saharan border regions; possible institutions include the Montpellier Botanic Institute, the Royal Botanical Garden at Kew or the Geneva Botanical conservatory,

Money is planned for nutritional analyses by a competent laboratory; The National Livestock Laboratory of Dakar-Hann (Senegalese) and the Agricultural and Veterinary Medicine Institute of Tropical Centers (IEMVT) of Maisons Alfort (France) are both recommended.

For veterinary diagnoses, some funds are planned for gathering and sending specimens to Nouakchott, Dakar, to Maisons Alfort and to the National Veterinary School in Toulouse (France). For water analyses some money is planned to fund collecting water samples and sending them to be analyzed, particularly for salt content.

4.2 Personnel Needs

All key personnel of the project have to know how to ride camels, drive, be in excellent health, and be able to stay in the desert for up to two months at a time. They must be able to either speak fluent French or good Arabic or Hassaniya. Whichever the dominant language may be, they must have at least be functional in their second language.

All key personnel must know Morse Code and be skillful users of two way radios, compasses sextants and the portable agri-meteorological intruments of the project. They must be able to figure out needed amounts of water, food, fuel for vehicular or camel-back journeys.

4.2.1 Project Supervision

A special committee for dromedaries will be created under the National Anti-Desertification Committee (CNLD). The Minister of Rural Development, vice-president of CNLD will preside over it. It will include the project director, the Director of the Livestock Department the Director of the IMRS, the FAO representatives, one member from the organization or country financing the project. It is strongly recommended that Prof. Hubert Gillet (France) Prof. Jeremy Swift (England) and a representative of ALESCO be invited to attend committee metings; funds are planned to cover their expenses of attending the first and third committee metings. The committee wil meet twice a year to review the project. It will report its findings to NADC and the donor country or organization.

4.2.2 Local Personnel

Local Personnel will be essentially:

a counterpart (full time) for each expatriate advisor

a guard for each of the four towns where project activities are to be based

5 drivers

a chief camel driver

6 camel drivers, including two interpreters

a guardian for oasis crops and if necessary, one for dune crops

a librarian who should be fluent in French and Arabic, mainly to research existing data in Chinguetti and Oualata that could be of value to the project. This work would be be done in cooperation with UNESCO's efforts in collecting and classifying manuscripts which is planned as part of its project to restore historic towns. The librarian researcher could be used as an interpreter in Chinguetti or its outskirts and in Ouadane.

4.2.3 Expatriate Personnel

It is recommended that this project be implemented by the FAO. Some required qualifications have already been described in 4.1.1.

4.2.3.1 Chief of Project (2 years). An ecologist experienced in desert problems and having substantial knowledge of botany, with training in agronomy, forestry or veterinary medicine:

4.2.3.2 Administrative Officer (2 years). Experienced in organizing camel or motorized expeditions and in their logistics; a former officer of the camel corps could be appropriate.

4.2.3.3 Economist (1 year). Will essentially work with the Chief of Project, with the advisors of the proposed project "Coordination of Environmental Development and Anti-Desertification Campaign" and of the proposed project "Accelerated Training of Environmentalists and Anti-Desertification Specialists"and with the Mauritanian authorities and the donor agency, in order to:

- help with the preparation of Phase II, under the direction of the Chief of Project,
- Establish projections of the economic uses of the dromedary in Mauritania,

- Do a study of the family budgets of dromedary raisers.

4.2.2.4 Physiologist specializing in dromedaries (2 years). zootechnician or veterinarian with experience working in the Moslem world and in arid lands, will need to do an analysis and a study of the future of dromedary raising in Mauritania stressing particularly:

- The nutritional requirements of the animals,
- Possible products: milk, meat, wool, etc. and the possibilities of increasing and improving these products, particularly by selective breeding,
- The possibilities of using the dromedary for transportation,
- Health and breeding problems.

4.2.2.5 Oasis Agronomist (24 months): Agronomists with training or experience in cultivating oasis soils will undertake near project headquarters and perhaps in other nearby oases demonstrations, and simple extension work in irrigated oasis forage crops and conservation of forage by simple methods: tedding, storage under tap or in pit. This should occupy 70% of his time. For the rest, according to possibilities and needs expressed by the herders, he will demonstrate dune stabilization methods, planting on the dunes, diversification of oasis crops (fruits and vegetables). In his work he will attempt to use the most appropriate technology for making compost. The use of solar and wind energy (pumping, drying fruit), making best use of water (trickle irrigation aquaculture in the irrigation ponds, raising ducks in the irrigation canals).

Note: It would be desirable that all these advisors already be accustomed to be working together and to have had some training in common.

4.2.4 Training

The project consists essentially of a feasibility study and in ground work activities. Training will be done especially in the field through contacts with personnel of the institute, particularly that of the counterparts. However, to prepare Phase II some training scholarships are planned:

- 1 4-year scholarship for a high school graduate speaking both Arabic and French if possible coming from a dromedary herding ethnicgroup and expecting to work with dromedaries, to take specialist advanced training in dromedary ecology in Tunisia (University of Tunis). Tunisia Agronomic Research Institue, and Medicine Drylands Institute;

- 1 2-year for a graduate in science, if possible from an ethnic froup of camel herders who intend to work at improving the vegetation of arid zones, to take advanced specialized training at the Montpellier(France) "Louis Emberger" Center for ' ological and Botanical-Sociological Studies, Botanical Institute, National Center of Agronomic Studies for Hot Regions (Centre national d'Studes agronomiques pour les regions chaudes), etc.

- setting up a pilot training program in Chinguetti to begin training "barefoot veterimarians": that will involve assembling some 20 dromedary drivers chosen by their colleagues to learn simple principles of veterinary amedicine and selective bredding. This program is much more of a test to determine difficulties in this kind of training method in order to determine if it could be generalized to train enough dromedary raisers to make a difference within such a short time;

- In the same vein, a 3-day session in Chinguetti is to be arranged for the wives of 15 dromedary drivers on the theme " cleanliness and milk preservation". Like the previous one the session will be organized by the Institute but with the participation of the IMRS (sociologists, ethnologists) and of officials from the Livestock Service . (Veterinarian, Zootechnician.) roughly 5 Mauritanian specialists for each of the sessions, for respectively 7 and 5 days.

4.3 Financial Requirements

The Institute should be financially autonomous.

4.3.1 The Budget should be approximately US$ 3,056,000 about 1,920,000, the 1st year and about 1,138,000 the second year of which:

	1st year	2nd year	total
Construction and maintenance	374,000	96,000	470,000
Personnel	256,450	331,990	588,440
Equipment	872,500	149,500	1,022,000

The Mauritanian contribution in ouguiyas is not included in this figure.

The construction costs include fixing up a hut and but not buying a tent for guards in Chinguetti and contribution toward the costs of restoring the houses which would be used:

As office	$ 160,000
As guest houses at Chinguetti (1st year) and Ouadane 2nd year	100,000
For housing in Chinguetti	200,000
As field base at Ouadane (2nd year)	20,000
at Oualata	20,000
at Tichitt	20,000
Total	460,000

This sum of 460,00 dollars would be a very significant contribution to the UNESCO project of rebuilding historical towns. As for personnel costs it will be noted that a significant share would go to Mauritanian employees-around 362,000 dollars of the total 588,400, for 61% of which about 165,900 in the first year.

The foreign exchange contributions are shown in Table 2 (in US dollars).

4.3.2 The costs are calculated at price levels as of June 1981 for the first year and an inflation factor of 10% added for the second year. Delays and transit risks to commodities indicate that heavy items should be ordered for delivery to the port of Dakar and brought to project site by project vehicles which would be broken in during the trip. The scientific equipment would be safer traveling as accompanied luggage of the expatriate personnel. Some items could be brought in Dakar (camping gear, butane lamps, office furniture, etc.) and in Mauritania (Moorish tents, blankets, mats, garden tools, saddles, harnesses, unifiorms, etc.)

4.3.3 Thus some items could be bought with ouguiyas; so could maintenance, extra personnel costs, repairs, fuel, lubricants and spare parts for vehicles, unless any of these goods and services could be obtained tax free by payment in hard currency.

4.3.4 Because of long lead time in obtaining commodities, the vehicles should be ordered at least 8 months before the arrival of the advisors. But delivery times vary from month to month; status should be verified regularly from the time project financial negotiations begin.

It is difficult to buy a large number of dromedaries at once, and three to four months should be allowed for this. The head camel driver should be responsible for this, assisted by two camel herders well known to NADC. It is suggested that Abdullah Ould Si AISSA of Boutilimit be included. Table 2 gives an overview of the order of spending the funds. Notice that the 15,000 for Item 22 will be reimbursed to the donor if not used in an emergency evacuation.

Table 2

Costs in Foreign Exchange (US Dollars)

10	Personnel (costs calculated in	
11	Advisors	
	Drylands Ecologist, Chief of Party	
	Administrator	

Tabel 2: Costs in Foreign Exchanges (US Dollar)

			Total	First year		Second year	
10. PERSONNEL (costs calculated in class 3)							
11. ADVISORS							
Dryland Ecologist, chief of party	(D1)	24 m/m	132 090	12 m/m	62 300	12 m/m	69 190
Administrator	(P4)	24 m/m	106 260	12 m/m	50 600	12 m/m	55 660
Economist	(P4)	12 m/m	55 660			12 m/m	55 660
Camel specialist	(P3)	24 m/m	93 660	12 m/m	44 600	12 m/m	49 060
Oases agronomist	(P3)	24 m/m	93 660	12 m/m	44 600	12 m/m	49 060
Sociologist	(P3)	24 m/m	93 660	12 m/m	44 600	12 m/m	49 060
			574 990	60 m/m	247 300	72 m/m	327 690
12. EXPATRIATE CONSULTANTS IN:							
Camel Migrations		2 m/m	13 900	2 m/m	13 900		
Camel Nutrition		2 m/m	13 900	2 m/m	13 900		
Doctor-Hygienist-Nutritionist		2 m/m	13 900	2 m/m	13 900		
Camel Genetics	)	1 m/m	9 130			1 m/m	9 130
Transportation Logistics	) Before the	1 m/m	9 130			1 m/m	9 130
Camel Pathology	) 10th	2 m/m	15 290			2 m/m	15 290
Improving Output	) month	1 m/m	9 130			1 m/m	9 130
Processing Dromedary Products)		1 m/m	9 130			1 m/m	9 130
Non-Formal Education/Literacy)		2 m/m	15 290			2 m/m	15 290
Assorted		2 m/m	17 430	1 m/m	8 300	1 m/m	9 130
Preparation of Phase II		1 m/m	9 130			1 m/m	9 130
Attendance of three high level international experts at the first and third meetings of the institute committee (travel, stipends, expenses)		1.1/2 m/m	27 000	3/4 m/m	13 500	3/4 m/m	14 850
		18.1/2 m/m	163 710	7.3/4 m/m	63 500	10.3/4 m/m	100 210

13. FIELD SPECIAL EXPENSES

13.1 Expatriate personnel			
160 days/year in caravan, $50/day		32 000	44 000
205 day/year in Chinguetti, $30/day		24 600	33 825
13.2 Expatriate Consultants			
75 days in caravan, $50/day			
(also 100 days second year)		3 750	5 500
13.3 Local consultants (payment in ouguiyas) principally to act as counterparts to expatriate sociologists, veterinarians, doctors, foresters, economists, etc.			
12 airline trips Nouakchott-Atar-Nouakchott	2 924	1 440	1 484
24 manmonths extra field personnel payment calculated as follows: 365 days in caravan $50/day,	38 325	18 250	20 075
365 days, $10/day	7 665	3 650	4 015
13.4 Local personnel (5 counterparts)			
160 days/year in caravan, $50/day		32 000	44 000
205 days/year, $10/day		8 200	11 275
13.5 Local personnel other than counterparts			
4 guards for towns and workmen and guards for crops, $4/day	18 396	8 760	9 636
5 drivers 250 day/year, $10/day	26 250	12 500	13 750
6 cameldrivers 150 days/year, $20/day	37 800	18 000	19 800
1 chief cameldriver 150 days/year, $40/day	12 200	6 000	6 600
Extra allowances for 2 cameldrivers/interpreter)	7 665	3 650	4 015
Librarian-Researcher	7 665	3 650	4 015
Amount for hiring and paying guides, scouts, messangers, workemn, escorts, cemeldriver, etc.	200 000	90 000	110 000
9. Sub total	588 440	256 450	331 990

20. SUB-CONTRACTING			
21. Aerial reconnaissance and/or evaluation of aerial photos and satellite imagery	200 000	110 000	90 000
22. Airborne emergency evacuation	15 000	7 500	7 500
23. Vehicle maintenance	24 000	10 000	14 000
24. Radio maintenance	10 000	4 000	6 000
25. Botanical identification/classification	4 000	3 000	1 000
26. Bromatological analyses	6 000	2 000	4 000
27. Veterinary diagnoses	2 000	1 000	1 000
28. Water analyses	6 000	4 500	1 500
29. Sub total	267 000	142 000	125 000
30. TRAINING			
31. 2 scholarships of 2 years in camel ecology	86 940	41 400	45 540
32. 2 scholarships of 2 years in grass cover restoration	86 940	41 400	45 540
33. Session of training of "Barefoot veterinarians" (1 week for 20 camel drivers)			
Allowances to participants	1 400		1 400
Travel and allowances for Mauritanian lecturers	1 400		1 400
Secretarial costs, data, reports, fees, etc.	5 000		5 000
34. Session on introduction of health practices and milk preservation (3 days for 15 camel drivers wives)			
Allowances to participants and their husbands	900		900
Travel and allowance to lecturers	1 750		1 750
Secretarial costs	5 000		5 000
39. Sub total	189 330	82 800	105 530

Note: Item 22 is provided only for a real emergency, and will be reimbursed to donor if not used. On the other hand it can be increased if several evacuations become necessary.

40.	EQUIPMENT, COMMODITIES AND SUPPLIES			
41.	Office and household furniture, appliances and supplies	35 000	35 000	
	Cost of repairing houses	460 000	370 000	90 000
42.	Vehicles			
	3 specially equipped land rovers	69 000	69 000	
	1 Gazelle Berliet heavy truck	100 000	100 000	
	1 Berliet SL 900 truck	54 500	54 500	
	1 herd of about 40 dromedaries with all equipment, $800/camel; 15 salles, $100	33 500	33 500	
43.	Medium range two-way radios and generators	100 000	70 000	30 000
44.	Camping material	55 000	50 000	5 000
45.	Scientific equipment	60 000	55 000	5 000
46.	Gifts	15 000	7 000	8 000
47.	Agricultural equipment and supplies	35 000	25 000	10 000
48.	Uniforms for 5 advisors, 5 counterparts, 5 drivers, 7 camel drivers, librarian, pennants and insignia	5 000	3 500	1 500
49.	Sub total	1 022 000	872 500	149 500

4.3.5 Costs of maintenance and operations are very high. If efficient operation under very harsh conditions, far from any region facility is desired, very high costs must be expected. Thus, not only ordinary allowances (which the government pays for local personnel) but also special allowances for expatriate as well as local personnel are foreseen.

Project personnel will receive special allowances in addition to regular expense allowances. The rates will be different for the field, for Chinguetti and for the base post; the allowances for local and expatriate personnel will differ. These allowances are also foreseen for drivers, workers, guides, guards, etc. The allowances will be paid as follows: 10% at the end of each month; 90% after completion of six months. For service of less than six months, the 90% will not be paid.

No electrical generator is planned for the project, rather the more portable butane lamps are to be purchased. Perhaps eventually wind or solar generators will be possible.

As for feeding and watering the camel herd and fueling the vehicles:

a) The project will try to form a cooperative association with the oasis dwellers by which they would agree to supply a fixed amount of fodder and dates at fixed prices;

b) The project will ask for permission from authorities and traditional chiefs for free passage, pasturing and watering the herd.

c) It would be prudent to plan to set up stocks of mineral salts and fodder in Chinguetti at the beginning of the project, and to expedite the agronomic activities to assure renewing (fodder crops) and storage (drying, storage) of the latter.

5. Expected Results

The improved understanding of the vegetation in the target areas is of great importance to enable the Project in Phase II, to safeguard and possibly enhance this vegetation, which is the basis for all rural activity in the immense target area.

The agricultural demonstrations will lead to diffusing improved methods of growing and storing fodder, growing fruits and vegetables, making compost, using renewable energy, saving water, stabilizing dunes, etc. By virtue of these uses, the demonstration will be an important element in improving oasis agriculture.

5.1 Economic Effects

Although it is not possible to calculate how much at this stage, the agricultural activities will probably promote an increase in yield-directly, and indirectly. of greater worth than the project s investment in this sector. Perhaps also, even before the end of Phase I the benefits from resuming camel caravan transport would be felt by the Mauritanian economy, essentially through the considerable saving on fuel and lubricants, imported spare parts and through a better distribution of profits among the most needy classes (camel drivers rather than truckers).

But once more, since Phase I is essentially a feasibility study, it is only in Phase II that significant economic advantages can be expected.

Nevertheless, the important contribution which the project will present toward rehabilitating the towns of Chinguetti, Ouadane, Oualata and Tichitt will have a definite, economic effect although one that cannot be stated in precise figures at present.

It is hoped that the project will start an influx of scientific visitors and even tourists, which could certainly continue to grow during Phase II.

5.2 Social Effects

The expected social effect could be significant. Actually, the most needy of Mauritanians would benefit most and they are those who live in insecure and precarious condition. The local people would probably become more favorable towards the government, and confidence would be restored among people in these areas, more or less neglected up to now; this will only favor the success of Phase II if it follows immediately after Phase I. Also, the participation of the local population is absolutely necessary. for example in finding the camel drivers, guides and scouts familiar with the area. This will give the population a sense of responsibility for the success of the project.

But it is clear that in Phase II the beneficial social effects will all be noticed, principally due to activities directed toward particularly vulnerable groups such as women and children, who would have been included in Phase I except for financial constraints on the project.

5.3 Environmental Effects

The entire project is considered a part of the strategy of the anti-desertification campaign, and will improve the environment. Nevertheless, some precautions must be taken to be sure that the frequently heavy automobile traffic around Chinguetti does not bring about rapid erosion. Thus, the access roads and parking area should be laid out so as to cause a minimum amount of environmental damage. Certain protective measures must be taken around the access roads with the consultation of the local authorities. The protective measures could perhaps be tied in with Arbor Day.

5.5 Effects on National Budget and on the Balance of Payments

No visible positive effect on the balance of payments during the short duration of Phase I can be expected. But no negative effect either because the proposed financing is a capital grant.

The project would, however, draw upon the national budget because the government is to disburse payments in ouguiyas for:

a) salaries

of counterparts

of 6 guards

of 6 camel drivers

of the chief camel drivers

of 5 drivers

of one librarian - researcher

b) allowances for the personnel

c) providing houses and offices

d) providing Mauritanian specialists (salaries and allowances) to participate in the two planned training sessions;a total of 28 days for the first session and 25 man-days for the second. Special supplementary allowances are foreseen in paragraph 33 of the budget and the transport of the specialists between Nouakchott and Chinguetti could be provided by the project Land Rovers.

e) consultants travel between Nouakchott and Chinguetti, 3 trips the first year and 6 the second year.

f) a yearly one-week inspection trip by the Director of the proposed Anti-Desertification Departmentn (or by his representative) and his advisor from the "Coordination of an Environmental Development and Anti-Desertification Campaign" project.

Even though these amounts are small compared to the hard currency contribution of the donor, it is proposed that they be paid by the project to the extent shown below,because of Mauritania's financial difficulties.

	First Year	Second Year
a) salaries	100%	50%
b) allowances	50	-
c) site	50	50
d) Training session salaries	-	-
allowances	-	50%
travel	-	100%
e) consultant in-country travel +	100	25
annual inspection	50	-

Adequate quarters in each of the four former caravan crossroads will be furnished to the project by the government. An agreement will be made with UNESCO for prompt restoration and equipping of these buildings.

6. Method of Financing

6.1 For project financing it is suggested to quickly contact, in order of priority, the following possible donors: the Franco-Arab Banking Union (UBAF), ALESCO, Arab Agricultural Development Fund, other Arab funds, the World Bank, ADB, etc.

6.2 As stated above, it is hoped that virtually all of Phase I will be financed by an outside donor.

6.3 For Phase II, most financing will also be from an outside donor, but financing could be divided into two general elements concerning 1) activities of international interest, which would require external financing and 2) development activities benefitting Mauritania immediately and directly, which could expect more serious financial support from Mauritania than in Phase I.

7. Management and Organization of the Project

7.1 The project will be attached to the NADC and a special committee called the Dromedary Institute Committee will be formed within the NADC to oversee the project (CF 4.4.1) The parent organization during Phase I will be the CNERV. The project will be managed by the project chief, assisted full time by a Mauritanian co-director. Their reports will be countersigned by each other. These reports will be sent to the president of the Dromedary Institute Committee, with copies to the director of the proposed Anti-Desertification Department and to the director of the CNERV.

The project experts will report to the project director who will coordinate and orient their activities and consequently those of their counterparts. Their reports will be addressed through the project director, (who will receive copies) to the appropriate office of the concerned agency.

7.2 The project will be attached to the NADC and particularly to the CNERV and to the proposed ADD. On the local level, the administration

will remain in contact with the prefect of Chinguetti and will report its activities and discuss them with the governor of Adrar. Through him, other governors of regions in project target area will be informed of developments and they in turn will keep the prefects informed about project activities and particularly the travel of project personnel into their areas of jurisdiction. The prefects, the regional governors, who will be coordinated by the governor of Adrar, will pass along requests and news concerning the project.

These relationships will be confirmed by the signing of the project paper by the government, and a precise agreement will be worked out at the beginning of the project.

7.3 Within a month after the arrival of each advisor, an agreement will be signed between the NADC, the project director and the donor representative if there is one in Mauritania. The agreement will set out as precisely as possible the advisor's responsibilities and the goals he should achieve. A system of reporting will be worked out for the project; each month each advisor with his counterpart will write a brief appreciation of the extent to which he has achieved the prescribed goods. Every three months each advisor will make a detailed report on his achievements. The even-numbered reports will review the detailed progress report of the preceding odd-numbered report. They will thus cover a six-month period and can be used in semi-annual meetings of the Dromerday Institute committee.

7.4 Starting Procedure

Nothing in particular

7.5 Project Timetable

CF Table 4.

An exact plan will be made for dates of submitting reports and will be linked to the schedule of committee meetings-Every six months the director and the project coordinator will give a synthesised

report to the committee, using the reports of the other advisors, which will be attached as apprendices. The following diagram illustrates the project monitoring and reporting schedule. (see Table 4) 1st month: Document setting responsibilities and goals for each advisor. 5th, 11th, 17th, 24th months: project committee meetings.

8. Studies to be Done

8.1 Additional Studies to be Done

A visit of about 4-6 weeks would be necessary, preferably by the writer, in order to edit the document and to:

- see the possibilities of using the building in Chinguetti. Discuss the issue with UNESCO, learn when the repairs would be finished and the facilities ready for occupancy;
- begin to elaborate in more detail the terms of reference for each expert;
- explain the project to the Governor of Adrar and to the prefect of Chinguetti and take note of their opinions for use in eventually amending Phase I;
- explain the project to reliable camel drivers and record their remarks;
- get exact prices of needed materials which could be bought in Mauritania or Senegal;
- with approval of the NADC, explain the project to prospective donors, notably those with Nouakchott offices;
- work up list 8.2 shown below after consulting with the MRD, IMRS, various Nouakchott libraries, IFAN, and ORSTOM in Dakar.

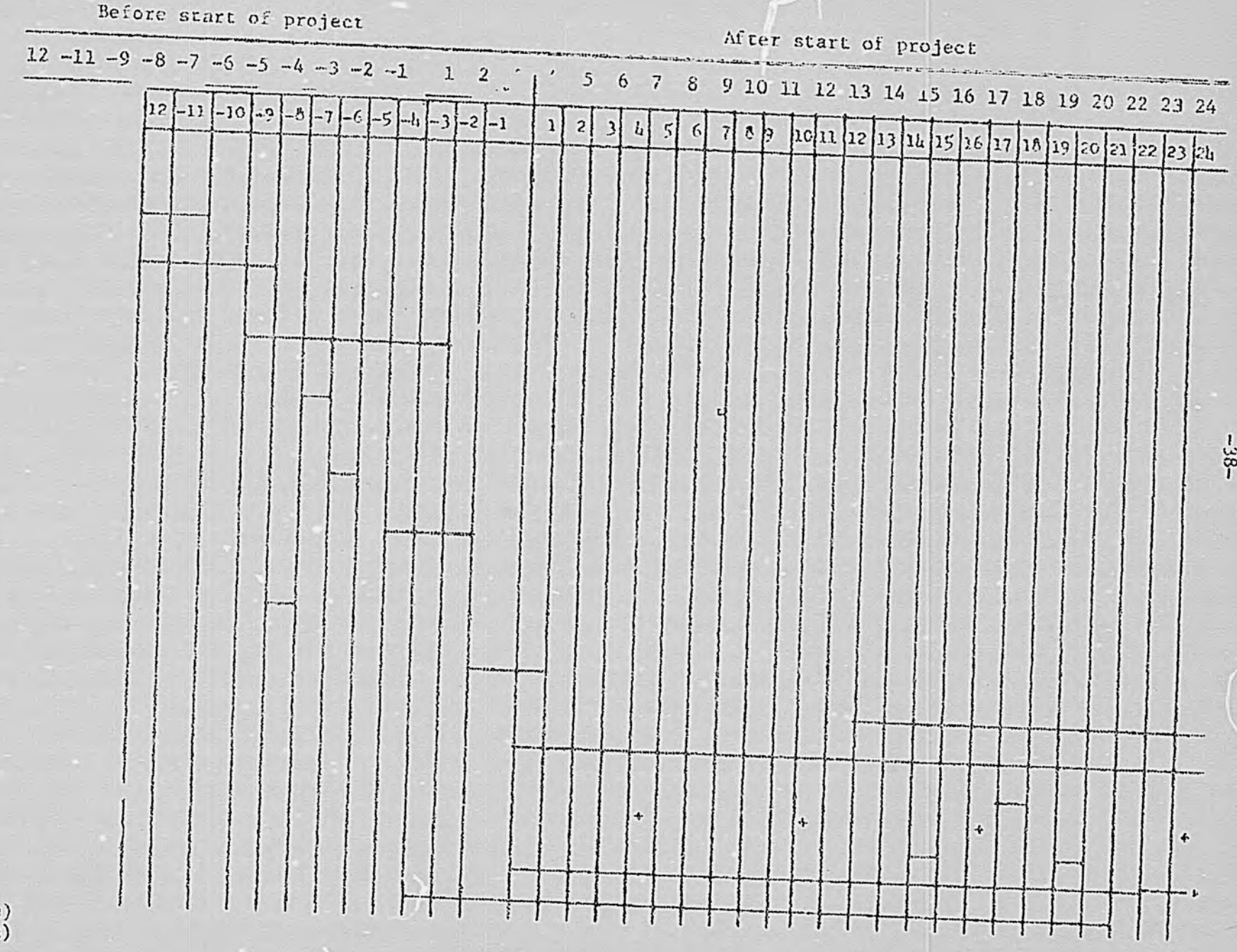
8.2 Listing of Studies already Accomplished

This list remains to be done, but we will consult Adam, 1962; GAUTHIER-PILTERS, 1965 and 1975; MONTEIL and SAUVAGE 1949/1953; NAEGELE, 1977, SAUVAGE, 1946 and the bibliographies of these works

Tabol 3: Reporting Schedule

Month	From each expert to the Director		By the Head of the Committee: Synthesis of trimestrial reports	Committee meetings (with reports)
	Brief administrative report	Technical report		
1	No. 1			
2	No. 2			
3		No. 1 (months 1-3)		
4	No. 3			
5	No. 4		No. 1	
6		No. 2 (months 1-6)		No. 1
7	No. 5			
8	No. 6		No. 2	
9		No. 3 (months 7-9)		
10	No. 7			
11	No. 8		No. 3	
12		No. 4 (months 7-12)		No. 2
13	No. 9			
14	No. 10		No. 4	
15		No. 5 (months 13-15)		
16	No. 11			
17	No. 12		No. 5	
18		No. 6 (months 13-18)		No. 3 (preparation of Phase II)
19	No. 13			
20	No. 14			
21		No. 7 (months 19-21)		
22	No. 15			
23	No. 16			
24		No. 8 (months 1-24) (final report)		

Table 4: Implementation



(see bibliography on following pages), as well as the conference papers produced at the meeting in Khartoum (1977) on dromedaries, which would be desirable to have translated into English and French.

9. Appendices

9.1 Proposition for Phase II

According to the results acquired during the first 15 months of the project (5th synthesised report from project director to institute committee, it will be for the NADC to decide (third report from the Institute Committee) how to follow up Phase I. The choices are outlined below.

Phase I: Discouraging Results: Stop project

Good Results: Purely National

International

If the committee's choice tended towards a national Phase II, we could expect the principal activities to be oriented as follows:

Principal Types of Activities	Kinds of specialists needed "F" means trained in 1981 or 1982 in the " Accelerated Training" Project.
	Specialist in soils conservation (F) + consultants
Improvement in fodder production and storage at the oases	Agronomists
Improvement of grazing lands and trek routes	Range management (F)
Improvement of health and nutrition	Doctors, nutritionists, hygienists
Functional literacy	Non-formal educators/literacy trainers
Better camel breeding	Geneticists, Zootechnicians.

Developing better uses of camel products	wool use expert, butter and cheesemakers, leather tanners

If as it is hoped, the Committee favors creation of an International Dromedary Institute, the activities to be planned would be both numerous and urgent. In addition to those already mentioned would be added many others such as dromedary pathology, ecology, wildlife ecology in dromedary areas (particularly in liaison with the proposed project of the Addax National Park, watering and feeding camels, etc.) The schedule of this project provides for a consultant be detailed to the project during the 18th month to draw up a detailed project paper for Phase II, under supervision of the project director and financed by the Institute Committee.

In paragraph 9.3 there is an example of the research which could be conducted by the Institute.

9.2 Associated sub-project

If SP 45 "Assistance to Northern Herders" could be started, it would mesh harmoniously with the establishment of the Institute. This project was identified only least year (Baumer and Sabra, 1980) without giving a thorough project description the introductory notes identified as goals: to suggest a pilot project for palm groves and pastures within the concept of the anti-desertification campaign, working with Project 17, Assistance to Northern Herders, proposed in the UNSO report 1979:47): A study should be conducted to identify ways and means of facilitating the regrowth of the grass cover in the North. It seems so much more necessary to do something for the northern stockmen because the inequity of natural conditions between the norht (disadvantages) and the south (relatively advantaged) has been widened by the concentration of projects in the south. "Since independence the great majority of government activities as well as most foreign aid projects have been in the south, primarily because the investments there bring a better return." (Castelli Cattingra et. al June 1979: 161)

A priori, assistance to the Northern herders should include inter alia increases in food crops in palm groves and in some wadi beds, increasing use of forage-producing trees (Capparidacae to the extent they can resist drought, and especially acacia tortilis subsp raddiana, A. nubica, A. ehrenbergiana and perhaps A. millifera in the low clayey areas), creation of fodder growing cooperatives, building of retention dams to help raise the water table in the palm groves, digging several wells or drilling deep wells to help the migratory herds in their passage through Tagant.

9.3 Research Proposals

This research proposal was presented by Dr. El Tayeb Ahmed Mohamed El Amine, in charge of projects in the Land Use and Soil Conservation Administration in the Sudan (cf. Baumer and Taharma 1979).

Goals

1) Evaluate the digestibility of fodders and concentrated feeds, comparing small ruminants (sheep) and pseudo-ruminants (camels);

2) Evaluate the performance of these animals use of Rumensine;

3) Study use of nitrogenous materials by ruminants and pseudo-ruminants;

4) Study the possibility of mass vaccinations of both ruminants and pseudo-ruminant, using in vitro methods.

Plan for the Study

1) 10 camels and 10 sheep will be used;

2) 1 camel and 1 sheep will receive fistulas;

3) a thorough program will be used (2 animals for each treatment, 2 species, 3 repetition ;

4) The feed will be mixed with three different percentages of fodder and concentrated feed:

   a) strong in concentrated feed (80%) vs 20% fodder

   b) control formula - half and half

   c) high in clover content (100%)

5) the formula will consist of sorghum, dried cottonseed oil-cakes clover, wheat bran, peanut shell, ordinary salt, urea, molasses, sulfuric additive (Rumensine)

6. Four experiments will be conducted:

Experiment 1, digestibility test (1 month)

(i) 3 camels and 3 sheep for each series,

(ii) the series will be: T1 control (half and half)

T2 formula in concentrated feed, T3 all fodder (100% clover).

The formulas will be:

	T1	T2	T3
cotton seed oil-cake	20	10	
wheat bran	30	25	
sorghum	30	15	
clover	10	20	100
peanut shell	10	30	

(iii) digestibility trial for nitrogenized balance

(iv) collecting samples of food, urine, droppings and analyses to determine CP, CF, EE, NFE

(v) study of absorption of food and water

Experiment 2, treatment, with Rumensine (3 months)

(i) 3 camels and 3 sheep for each series

(ii) same formulae as in experiment 1, with Rumensine added

(iii) the animals will be weighed before the experiment and every 28 days during the experiment.

(iv) the different parameters of animal performance will be noted.

Experiment 3, using urea and molasses (3 months)

(i) 3 camels and 3 sheep for each treatment,

(ii) The treatments will be controlled, T1 with half forage and half concentrates, treatment T2 rich in concentrates, urea and molasses, T3 forage plus urea and molasses.

The formulae will consist of:

	T1 T1	T2(%)	T3(%)
cottonseed oil cakes	12	10	
wheat bran	30	25	
sorghum	30	15	
clover	10	20	70
peanut shells		30	
urea	8		20
molasses	10		20

(iii) measurements of animal performance

Experiment 4

(i) 1 camel and 1 sheep will receive fistulas

(ii) The animals will be given a control formula made up of 10% cottonseeds oil cakes, 25% wheat bran, 15% sorghum, 20% of clover and 30% peanut shell.

(iii) determining volatile fatty acids

Experiment 5 Study in vitro to determine

1. IVDMD

2. free ammonia

3. result of supplementing clover IVDMD with urea and molasses, evaluating of the cost of these experiments done in 1974 gives, in Sudanese pounds:

Experiment	1	281
"	2	844
"	3	379
"	4	158
10 camels and 10 sheep		2,000
labor		750
miscellaneous		87
		4,500

1. PROJECT SUMMARY

June 8, 1981

Reference: RAMS	Title: Ostrich Breeding and Preliminary Wildlife Observation Program	
Country: Mauritania	Region: Hodh Oriental	Sector: Integrated Rural Development
Ministry or Department concerned: Ministry of Rural Development: ENEVA		

Project Objectives: To undertake a reconnaissance survey in the Hodh Oriental to evaluate wild fauna that survived the drought during the past decade, especially ostrich, addax, oryx and antelope. Assess the feasibility of breeding ostrich incaptivity or limited freedom and determine its economic potentials for meat, feathers, leather, job creation, etc.

Total Estimated Cost: US$ 250,000	External Financing Required: US$ 160,000

Summary: Survey and assess ostrich breeding and its economic potential. Train an ENEVA graduate and assign a consultant for the survey.

Project Duration: 3 years	Starting Date: As soon as possible.

1. Title: Ostrich Breeding and Preliminary Wildlife Preservation Plan in Eastern Hodh

Origin: Baumer and Sabra (1980 S.P 33), received by the D.E.P 1980 Financing proposals for the Fourth Development Plan (1981-85)

II. Location : Eastern Hodh, project centre in Oualata, in the premises that are to be restored by the UNESCO old cities restoration project.

III. Objectives :

1. to undertake a reconnaissance visit to eastern Hodh in order to assess wild fauna left alive after the exceptional drought of the last decade : especially ostrich, and possibly addax and oryx antelope varieties. To make a report on the possibilities of creating and running a wildlife reserve or a national park and even an international one in the area.

2. To ensure the training of a Mauritanian technical assistant in ostrich breeding for the project Management.

To capture a few ostriches and to create a breeding center near Oualata or Nema.

3. If it seems impossible or dangerous to capture local wild ostriches, they will have to be brought in by plane from other countries (such as Mali, Cameroun, Central African Republic, Zaire?)

4. To evaluate ostrich breeding possibilities in captivity or conditions of limited freedom. To evaluate economic potentials of ostrich meat, feathers, leather and employment creation.

IV. Rationale

There are still many ostriches living in Eastern Hodh which have managed to resist the exceptional drought of the last decade and there are perhaps other wild animals like addax and

oryx. Before the drought it was not unusual to breed ostriches in gardens in Nema, where they were sometimes used for food. Furthermore, the Nemadi, who were essentially hunters, would frequently catch ostriches. Ostrich meat is well-like. Ostrich feathers can be sold on the international market and would allow local artisans to make magnificient fans, even punkas (room fans), a more appropriate form of technology than air conditioners or electric fans, which require electricity . Ostrich leather is of good quality even when tanned under local conditions; it can be used to make wallets, bags, change-purses etc.; when well-finished, it is sought after by glove makers (notably Millau et Grenoble in France.)

On the other hand, wildlife is well-adapted to the environment, but has suffered a lot from the drought and particularly from the increasing use of firearms. Given the fact wildlife is able to produce only a few kilograms of animal protein per 100 hectares in arid areas and particularly hyper-arid areas such as the Majabat al Koubra, together with the interest in conservation for scientific and genetic purposes, it would be conceivable and useful to create a Wildlife Reserve in this region. Such a park would have the advantage of connecting with a similar park in neighboring Mali. It could be called "International Addax Park".

V. Description

5.1 Preliminary enquiries to be made in France (Castres, Millau, Grenoble), in Switzerland (Geneva, Zurich, Winterthur in Italy (Florence) and at the UNIDO headquarters in Vienna and FAO headquarters in Rome about the potential uses of ostrich products, particularly as leather or glove making. The survey will especially cover the following points: Minimum quantities required by manufacturers, the qualities that the product may have and local pretanning possibilities and methods.

5.2 To take advantage of his passing through Geneva and Rome, the researcher will pick up all existing information on ostriches and their breeding from IUCN and the FAO and if it is necessary, he will make contact for the same purpose with major zoos (Paris-Vincennes, Montpellier Thoiry, Marseilles in France, Rome in Italy) and with countires where ostrich breeding (such as Kenya and Botswana) is done.

These two combined surveys need a consultant for a period of one and a half months, travel expenses (by car) and eventually, the purchase of documentation and typewriting services.

5.3 An expert for a period of three months then for two one-month periods, able if possible, to ride camels. (As it is becoming very difficult to approach ostriches by car since mineral prospectors and armed military patrols cross the region). The expert will be based in Oualata. He will cross the area by Land Rover and camel from east to north and will be in radio contact twice daily. Air reconnaissance will be also undertaken, if possible, with a light aircraft.

VI. Operation Plan

a. To urgently send a graduate of the ENFVA in Kaedi for a twelve-month training course in ostrich breeding. This training will be as follows: three months in theorical training, documentation and basic English initiation at the Regional Wildlife Conservation school in Garoua (Cameroun) a one month practical course in the National Parks of Northern Cameroun and in Chad, if possible, and 8 months at specialized breeding station, preferably in Kenya the trainee's knowledge of English must be adequate, if not, he will have to continue his training in a French speaking country. (Zaire?)

It will be advisable to choose a trainee from Eastern Hodh who will be willing in any case to live there for many years and to specialize in wild animals.

b. The reconnaissance excurions should be undertaken by the consultant accompanied whenever possible by the trainee after his training courses, or if necessary, daring his studies.

c. The consultant will write up precise and detailed instructions about the breeding procedures.

d. The consultant will pay a first visit six months and another twelve months after the beginning of the breeding process. If the wildlife reserve mentioned in the goals has been created or simply approved, he will

have to write up a series of instruction for its operation and for the keeper's training (for whom he must define terms of references).

If the project is approved quickly and if financing is obtained (AID has already shown some interest), the following steps should be taken:

June 1980	- Project approval - Recruitment of the trainee by the government - Recruitment of the consultant by the implementing agency
Sept. 1981 - July 1982	- Training course
Autumn 1981	- Preliminary investigation (para. 5.1 & 5.2)
August-October 1982	- First stay of the consultant and air reconnaissance
August-October 1983	- Second stay of the consultant
End of 1983	- Third stay of he consultant

VII Cost Estimate (in US$)

An inflation rate of 10% a year has been calculated.

Preliminary investigation (year one)

One consultant for one and 1/2 months	9,900
Trips and allowances	4,000
Documentation-eventual purchase cost	250
Secretarial expenses	1,000

Training Course (year one)

Twelve month scholarship	36,000
Travel and allowances	3,000

The Project Itself (year two and three)

	2nd year	3rd year
First stay of 3 months	19,800	
Travel and allowances	2,530	
Second stay of one month	7,260	
Travel and allowances	2,200	
Third stay of one month		7,986
Travel and allowances	2,420	2,420
Allowance for one assistant		4,030
Breeding keeper (guard) allowances	1,650	1,815
Hut-building	550	
Pasture keepers (2)		
allowances	4,400	4,480
mounts and equipment	3,300	
A Land Rover (Long Frame) pick up with front windlass supplementary tanks, cabin roof gallery, 3 spare wheels, automatic inflator, a hand pump, jerry cans transmitter receiver	22,000	

		2nd year	3rd year
Supplies and maintenance for the Land Rover with spare parts such as (two tires, electric distributor, filters spark plugs etc.		4,400	4,480
camping equipment (tents, beds, jerry-cans barrels, stoves, gas, lamps flare alarm pistols elect. signaling lamp.		2,200	550
Portable short distance radios		5,500	1,100
Equipment for catching and transporting ostriches		1,650	
Cost of renting camels, and trucks to transport ostriches water, gas, supplies . .)		3,300	3,630
Building and maintenance of an enclosure for ostriches		2,200	550
Extra food for ostriches		880	1,210
Report expenses		3,300	1,210
Reconnaissance aircraft rental		6,500	38,071
		89,220	38,071
Contingency	(10%)	8,922	3,807
		98,142	41,878
Management	(16%)	13,740	5,863
		111,382	67,761
Total			159,623

The above financial estimate is deliberately reduced to the minimum as far as the expatriate staff is concerned. A continual assistance for a year would be better. Among financing organizations which could deal with this project the WWP seems to be appropriate, or a bank consortium such as UBAF or a development bank. It should be possible to interest manufacturers who could use ostriches leather in order to get them involved in production. Implementation could be left to the FAO. An American expert has already been entatively idenified for the second and third year phases of the work. There is alo a consultant who has been identified for carrying out the preliminary investigations.

VIII. Enventual Follow-Up and Relations with Other Activities

A project to study wild animals, including birds, in order to enumerate species in certain part of Mauritania, appears in a UNSO report : (1979 47). The project involves selecting sanctuaries and proposed parks and reserves. The project being considered here covers only a small number of these objectives.

A major effort is being made to preserve the natural environment in the National Park of the Bank d'Arguin, which is sponsored by a committee directly supervised by the government and there are three French technicians who will soon be posted at the solar and wind station or Tnouik. A liaison should be established between this committee and the project.

This project would be an important continuation and may facilitate the creation of a national Addax park based on the reintrduction and the extension of this antelope as well as of the oryx and the ostrich. A park which could be extended from the Aouana in the south to the Abukan and Erg Chech in the north covering a part of the eastern Adrar: So it must however be noted that because of the migratory habits of the addax, such a park could take its full value only if similar dispositions were taken on the other side of the border I.E. in Mali (see the study made on the addax by the IUCN in 1975) Thus it is an International Park for the Addax that is being recommended.

There is a link provided with this project in the proposal of the "Dromedary Institute" project.Contact with wildlife experts provided for in the porposed "Environmental Development and Anti-Desertification" project RAMS/ MB3) should also be provided for.

Références

BAUMER, M. et M. Sarba - 1980 - Lutte contre la désertisation : Mauritanie

1) Rapport remis le 7 février 1980 au Ministère du Développement Rural.

2) Rapport édité en juin 1980 par la FAO sous le n°TCP/MAU/8910 (I), vi + 164 p.

DPN (Direction de la Protection de la Nature) - déc. 1980 - Plan Quadriennal 1981/1985. Rapport général, sous-secteur Ecologie-Forêts. Nouakchott, Ministère du Développement Rural, 26 p.

UNSO - 1979 - Rapport de la mission de planification et de programmation de l'UNSO pour apouyer les efforts de la République Islamique de Mauritanie dans la mise en oeuvre du plan d'action pour combattre la désertisation, New-York, UNSO, 49 p. + ann. et cartes.

Employment Generation

1. PROJECT SUMMARY

	Date of Preparation: March 1981	
Proposed by: RAMS	Title of Project: Employment Generation in Wood-Working Sector.	
Country: Mauritania	Region: Trarza, Brakna Gorgol, Guidimaka, Assaba	Sector: Artisinal
Ministry or department: Ministry of Mines, Commerce and Industry		

Objectives of Project: To increase the range, number and quality of wood products produced by artisans in 6 small urban centers.

Total Estimates Cost: $1,700,000	External Financial Requirement: $870,000

Summary Description: Provide raw wood stock and make it available to wood-working artisans, organize training courses to improve the quality and range of products.

Duration of Project: 2 years	Date of Initiation: 1982

CHAPTER 2. PROJECT PURPOSE

The project is designed to: provide increased employment in the woodworking sector; increase the volume, range and quality of wooden artifacts available in rural areas that are made locally; replace expensive imported wood and products; increase the skills of existing carpenters; raise their income; and supply farmers with tools and equipment appropriate to their needs.

In terms of impact it is expected that some 100 woodworking artisans located in 6 towns will be the prime targets of the project, with the object of increasing the volume and value of work done by a factor of 3 to 4 in five years. The impact on direct employment would probably be to achieve a 4 to 5 fold increase, because of the enhanced appeal of the sector to apprentices.

It is complementary to the general thrust of development of agriculture in the riverine and rainfed areas, where it is also recommended that new methods of cultivation be adopted, not only on the rice perimeters but also on the traditional walo and dieri. It is suggested elsewhere that animal traction be used in this area, for which all equipment must be supplied e.g. harnesses and implements. The woodworking sector is a key element in this development.

CHAPTER 3. CONTEXT OF THE WOODWORKING PROJECT

3.1. Physical Situation

It is proposed that the effort be concentrated on a core of 6 centres in the riverine and rainfed zones. These are as follows, with region, climatic zone and 1977 resident populations.

Town	Region	Zone	Population ('000)
Rosso	Trarza	Riverine	15.9
Boghe	Brakna	"	7.9
Kaedi	Gorgol	"	20.4
Magama	Gorgol	"	4.6
Selibaby	Guidimaka	Rain-fed	5.5
Kiffa	Assaba	"	10.7

3.2 Human Situation

These are all settled centres with markets of varying levels of importance, but all related to extensive rural hinterlands. There are woodwoodworking facilities in each of the towns supplying a small share of domestic (i.e., local demand, the balance is met by goods from Nouakchott, or imports from Senegal, or not met at all.

3.3 Economic Situation

The income levels are difficult to assess but material derived from RAMS field studies indicates that wage levels in these towns are 70-120 UM/day for men and 50-70 UM/day for women. In Rosso and Kaedi 18 per cent and 34 per cent respectively of the working population earned less than 3,000 UM in 1978. In the other towns, the proportion in this category is not expected to be less than 34 per cent. The revenue of a carpenter, however, is well above the average, and it seems probable that he prices his services at 175-200 UM/day, depending on his skills.

The main problem restricting the growth of the woodworking sector is the shortage of timber. Virtually no wood is available in Mauritania, which results in the use of very low quality timber that would be used for firewood in other countries to the south. The better quality timber is all imported. Because of the very high cost of transport, it is very expensive to buy timber in the towns in the interior; Rosso is, in this respect, an exception. The woods most commonly imported are varieties of African hardwoods.

The artisans who use local timber generally obtain their supplies illegally from protected forests. In Kaedi, woodworkers were using both local and imported timber, but the latter is expensive and scarce. For most farm implements, donkey carts, and some simple building components the local wood is used, but for doors, shutters and furniture the carpenters need imported timber. The costs of this in a selection of wholesalers' yards in Nouakchott, were quoted in April 1981 as:

White woods	-	14,700 - 16,000
Yellow wood	-	25,000 - 27,000
Red wood	-	25,000 - 27,500
Plywood	-	2,300 per 20 mm^3

It was reported that these were based on landed prices in Nouakchott of:

		UM per m^3
White wood	-	12,000
Yellow wood	-	16,000
Red wood	-	21,000
Plywood	-	1,000 per 20 mm^2

The costs of timber landed at Rosso, imported from Senegal, were the same for white wood but rather less for redwood, and are :

		UM per m^3
White wood	-	12,000
Red wood	-	18,000

There are no more than 5 or 6 wholesalers of timber in Nouakchott. They do not distribute or transport wood to the rural centres but sell only to customers who buy direct.

Thus, it is not surprising that there is a tendency for woodworking artisans to abandon their craft because of the increasing shortage of domestic wood; the Mauritanian Service for the Protection of Nature does not appear to have any real deterrent effect but may act as further discouragement, since woodworking artisans do regard the Service as a problem to be faced.

The demand for wooden artifacts is strong, and would increase dramatically if supplies of wood were available. In these towns, it is now almost impossible to obtain doors, window shutters or office furniture (e.g., simple desks) so that these objects have to be brought in from Nouakchott. In Kaedi, the delivered cost is twice the retail price in Nouakchott, to cover transport and the trader's margin. The key to easing this situation is the supply of sawn timber, so that the first objective of this project must be to increase the availability of imported timber in rural centres.

CHAPTER 4. ESTIMATES OF RESOURCES NEEDED

4.1. Technical Requirements

4.1.1. The Proposed Strategy

The main problem is the shortage of sawn timber in the interior, therefore the first step is to guarantee a supply of this vital input material. The present system of private importation and wholesaleing of sawn timber is not effective in ensuring the distribution of wood to the six rural towns, apart from Rosso where it is imported direct. The obstacles to physical distribution in Mauritania are well known. Therefore, it seems that in order to achieve a break-through, use must be made of an existing successful institution with the physical and infra-structural means of undertaking the task of importing and distributing sawn timber. This suggests working with a parastatal organization which has the capability to import supplies from overseas, and has a transport fleet already serving rural areas. SONIMEX*, which imports rice, sugar and tea, and is the monopoly exporter of gum arabic, might be the most appropriate partner. It has its own fleet of trucks and a distribution system down to village level.

A secondary, but important, need is to upgrade the levels of skills among carpenters to take best advantage of the increased level of activity, and to introduce new tools and skills where needed.

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*Societe Nationale d'Importation et Exportation.

4.1.2 Work to be Undertaken

The first stage is to set up a mechanism for supplying timber to small towns in conjunction with the appropriate parastatal agency which would probably be SONIMEX, as discussed under 4.1.1.

The second step would be to assess the level of demand by type of timber by town.

The third would be to arrange a form of short-term credit to the woodworking shops to enable them to take advantage of the stocks of timber; alternatively, SONIMEX might consider holding stocks.

The fourth would be to co-ordinate a training program and to set it up and execute it.

Review of project would be conducted on an annual basis.

4.1.3. Equipment and Supplies

The equipment that would be required is sufficient to equip an office for a supervisor and import/distribution adviser; to provide him with transport and communication falicities; accomodation and transport for the two technical training officers, and some woodworking tools.

The equipment proposed would consists of:

Fixed assets: 1 storage shed for supplies of gas, oil, vehicle spares etc, 1 water tank
All in the operating area

Operating equipment:

1 mobile home fully equipped for long-term occupation e.g., including a spare generator;
1 Land Rover or equivalent
1 Sedan
2 2-way radio system
Stock of woodworking tools
Spares for vehicles
Office equipment i.e. typewriter, desk, filing drawers.

4.1.4. Implementation Technique

As discussed under 4.1.1., part of the implementation would be through co-operation with an existing parastatal institution, of which SONIMEX would be the most suitable. Assistance would be provided by the supervisor in determining demand, placing export orders, and servicing the physical distribution of sawn timber to the rural centres. He would also be responsible for identifying bottlenecks in the system and for recommending

solutions as appropriate. He would be physically based in SONIMEX's office in order to work closely with the agency, but also would be responsible for the other part of the project, that of upgrading woodworking skills through two technical training officers. These personnel would travel from town to town, on a scheduled tour basis and work with carpenters in their own workshops to introduce improved techniques and tools; the training would be of a practical, on the job, nature. If two visits can be made to each town in the first year, this should provide adequate information for designing a second year program. The operation could be centered in Kaedi, but would be essentially mobile.

The duration of the project would be two years. After this period, it is expected that the momentum will be sufficient to maintain the activities generated by the project.

4.2. Human Resource Needs

4.2.1. Supervising Personnel

One project manager would be required who should be attached to SONIMEX to supervise the preparing of orders for imported timber, and help to ensure its distribution to the target towns. He would also be responsible for all aspects of the field training program.

4.2.2. Implementation Personnel

In addition to a project manager, the implementation program would require two technical instructors to carry out the field-training. The expatriate staff would probably consist of:

project manager/supervisor
2 technical instructors

The back-up required would, to some extent, depend on the services likely to be offered by SONIMEX but should probably consist of :

1 secretary)
1 clerk) to service the supervisor
1 driver)

1 mechanic/driver)
) to service the intructors
1 translator)

4.2.3. Training

The manager/supervisor would be responsible for training the staff of SONIMEX to process the import of timber, and handle its distribution and sale to carpenters.

4.3 Financial Requirements

4.3.1. Overall Project Costs

The costs of the project are estimated as follows:

	UM '000	$ '000
Personnel	35,000	760
Supplies	5,000	110
Total	40,000	870

Capital costs are net of residual values.

4.3.2. Escalation Factors

It would be reasonable to build in a factor of 12-15% per annum to cover inflation in the event of implementation being delayed. The projected costs shown in 4.3.1. above, include a 10% contingency factor, except in respect of capital purchases.

4.3.3. Foreign and Local Costs

The breakdown between foreign exchange and local costs is between wages for locally employed personnel, plus subsistence and all other costs. This would show a division as follows:

	UM '000	$ '000
Foreign exchange	36,500	795
Local currency	3,500	75

4.3.4. Projected Timetable for Payment of Capital

All capital or investment costs, amounting to some 2.5 - 2.8 million UM would be incurred at set up. It is assumed that at the end of 2 years the equipment would have a residual value equal to 10 per cent of the purcahse price.

It is assumed that the capital costs would be made up as follows:

	UM '000	$ '000
Vehicles:	700	15
1 Land Rover with spares	700	15
1 Peugeot 504 " "	350	8
1 mobile home plus spare generator	1,150	25
Radio - 2 - way system	90	2
Office equipment	90	2
Woodworking tools	90	2
Structures	100	2
Total	2,570	56

4.3.5. Estimated Running Costs

These would be incurred on a monthly basis, but would amount to some UM 18.3 million a year - payable over a two-period, of which the local element would be about UM 1.7 million a year.

CHAPTER 5 Expected Project Impact

5.1. Physical Effects

It is expected that the project would contribute to an increase in the value added to wooden products within the GRTM. It is believed that the volume of output of carpenters would be increased 3 to 4 fold over a five year term. This might mean that over two years output would increase by 50% to 100%.

It is expected that within two years employment in the woodworking sector will have doubled, partly due to an influx of apprentices attracted to an expanding activity.

In terms of production of wooden artifacts, this output might best be measured as added value. Currently, it is possible that in the six rural towns, 100 carpenters are earning an average of UM 190/day for 120 days a year* or UM 2-3 million per year, which represents the net** value added by their labors. It is expected that this total will rise to UM 7-9 million over 5 years, which will be demonstrated by a dramatic increase in the use of locally made wooden artifacts.

Among the existing unfulfilled needs are:

construction components, such as doors, window shutters, window frames, and roof members;
furniture such as tables, chairs, beds and storage, cupboards, desks and benches;
implements of wood-ladders, pestles and mortars, kitchen utensils;
farms implements - handles and shafts.

There is a new category of demand which includes:

covers for irrigation pumps and motors;
wheel barrows;
animal harnesses for drawn implements;
fishing boats.

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* RAMS data suggest this is a reasonable average annual occupancy rate for artisans

** Excluding material costs.

5.2. Economic Effects

The economic benefits are threefold. The first is the value added measured in terms of income or employment generated. Secondly, there is a saving in foreign exchange, and thirdly there is thespin-off of re-distributed income on the community with its secondary impact on employment.

The added value generated by the project has been assessed above at UM 4.7 - 6.7 million after 5 years. Plotted over seven years, the incremental added value beyond UM 2.3 million might be as follows:

Year	1	2	3	4	5	6	7
UM million	-	1.0	2.0	3.0	3.5-4	4-4.5	4.7-6.7
$'000	-	22	44	66	76-87	87-100	100-145
% on $900,000	-	2.5	5.1	7.6	8.7-10.0	10.0-11.5	11.5-16.7

The added value, consequent on the work of the carpenters could be taken represent the savings in foreign exchange achieved by working timber in Mauritania, rather than importing the finished article. In fact, however, the saving might be somewhat less than 100 per cent in view of the greater efficiency of the overseas manufacturer. Therefore, perhaps 90 per cent of the value added could be assumed to a saving in foreign exchange - ie $90 - 135,000 per annum after five years.

The direct revenue generated by the project expenditure of $0.9 million would break even, at the lower level of output projected above, at the end of the 12th year, and assuming no further expansion after Year 7. On a more optimistic assumption, the break-even point would be reached after 10 years.

Alternatively, the cost per new job created is $0.9 million ÷ 400 = $2,180.

5.3. Social Effects

All new employment created in rural communities must have a widespread social impact, since it implies that there is less migration to the larger towns. Since it is probable that any woodworker will also make a contribution towards cultivation during the cropping season, there is an added benefit that this labor may enable his family to cultivate a slightly larger area of land, with the consequent increase in output and income. To some extent this contribution to agriculture might be offset by reducing the labor input by women, but overall there is likely to be a net benefit.

5.4. Environmental Effects

The environmental impact of increased woodworking is taken to be neutral. If, however, the availability of imported timber makes plundering the projected forest unattractive, there would be a real benefit to the environment.

CHAPTER 6. MODALITIES FOR FINANCING

6.1. Anticipated Sources

A major financing contribution is expected from SONIMEX in that it is assumed to be an agency for importing timber at its own risk. Clearly, there is a cost associated with this operation, but it is hoped that it can be passed on to the woodworking establishments, and in turn, to the customer. Since transport costs to rural areas are high, the local artisan has a considerable degree of protection from competitors, which can be reflected in his prices. Although it is also true that the transport costs for timber are high, they are not so great in general as those applying to finished goods, particularly bulk items such as furniture, Thus, it is hoped that SONIMEX's role can be self-financing.

The training and supervision role would be funded by an external agency, either on a grant basis, if unilateral, or as a long-term loan if provided by UNIDO, for example.

6.2 External Finance Requested

In view of the GIRM's budgetary constraints, it is necessary to look to a foreign source for all of the $900,000 required for training and supervision.

CHAPTER 7. PROJECT MANAGEMENT AND ORGANIZATION

7.1. Project Structure

It is envisaged that there would be a team of one supervisor and two technical instructors. The former would be based in Nouakchott and, it is hoped , be attached to SONIMEX. The two technical instructors would be based in the riverine area, and travel through the six nominated towns. They would report to the project manager/supervisor.

7.2. Relationship with GIRM

The status of the project would be seen as providing technical assistance in association with SONIMEX and the Ministry of Industry.

7.3. Tracking Results

The direct impact of the project can be measured by the annual volume of timber imported by SONIMEX.

CHAPTER 8 STUDIES TO BE MADE

8.1. Complementary Studies Needed

A study of the means of distribution to rural centres would be useful to determine whether there are shortages and shortfalls that can be overcome by intervention. It is, for example, known that transport is extremely expensive because of the inadequacy of the road infrastructure, the high cost of vehicles, and the high operating costs. But there is a need to improve distribution to the hinterland, and study is needed to find out if there is any scope for improvement. The professional time involved might be 6 man-months.

Rangeland Management

1. PROJECT SUMMARY

	Date of Preparation: March 1981	
Proposed by: RAMS	Title of Project: Rangeland Management	
Country: Mauritania	Region: Pasture Lands	Sector: Livestock
Ministry or department: Ministry of Rural Development: Livestock Service		

Objectives of Project: To train Mauritanians in rangeland management as a means of protecting the pasture lands and of using them rationally.

Total Estimated Cost: $500,000	External Financial Requirements: $325,000

Summary Description: To organize courses at the National Agricultural Training Center at Kaedi for about 15 Mauritanian technicians and to send 8 others to the United States for rangeland management training.

Duration of Project: 2 years	Date of Initiation: 1982

CHAPTER 2. PROJECT PURPOSE

2.1 Uncontrolled livestock grazing and fire are causing a greater adverse impact on the vegetative component of the natural environment of Mauritania than any other man-imposed factor. These factors extend country wide.

Uncontrolled grazing and indiscriminate burning depletes the vegetative resource, subjects vast areas to wind and water erosion, thus contributing to desertification.

Managed and controlled grazing, however, can harvest the national forage crop and at the same time improve the vegetative component of the environment, thus adding stability to the livestock sector and environmental enhancement, a major goal of the National Plan.

Specialists and field technicians, trained to apply the principles of range management, working within the Livestock Service and with the herders and breeders themselves, can help achieve these conservation and production goals.

2.2 Enhancement of the natural environment through application of sound range management practices will contribute directly to goals and strategy for man-caused degradation control and development in the Sahel.

2.3 Improving conditions for livestock production by applying sound range management practices on the rangeland will contribute to the goals of the livestock sector, to enhance the economic and living conditions of the rural population depending on livestock products for consumption and marketing.

2.4 Not Applicable

2.5 The specific object of this project is to train a small contingent of Mauritanians, as a beginning, to understand the basic principles of range management. They in turn can provide meaningful input into the livestock sector development plans and begin a "grass-roots" campaign to motivate herders and breeders to do a better job of range-livestock management.

It is not the intent to train or organize a so-called range use enforcement organization to direct and control the livestock grazing but to motivate the herders and breeders themselves to implement grazing practices that, through demonstration, prove beneficial to livestock and the vegetative resource. Strong emphasis will be placed on range extension for this purpose. Until strong motivation is indicated by the herders and breeders, actual project work should be limited to small demonstration activities.

It is proposed that 15 range technicians be trained at the National Agriculture training and Extension School at Kaëdi. Candidates for this training would be selected from villages and families with strong interest in livestock production. As a prerequisite, candidates must have completed Lycée and demonstrated a strong interest and aptitude in biology.

The course curriculum would concentrate on the basic principles of range management, range analysis techniques, and range management planning. Both classroom and field study are important and would share equal time and emphasis in the training curriculum. The course would be designed and presented by an expatriate instructor with both field and teaching experience. The duration of training would be two years. It is not intended to be a degree-oriented program, but those who complete the course would be recognized with a certificate and then assigned a field role in the Animal Production Unit of the Livestock Service to assist in range extension work, range-livestock project development and implementation.

As range-livestock development activities increase in Mauritania, the course could be repeated to supply necessary technicians. No livestock development project should be considered without extensive input from technicians trained in range management.

A second aspect of this training proposal is to train 8 range management specialists to serve in the Animal Production Unit in the Livestock Service. Training is proposed in The United States at a western university offering degrees in range management.

Upon completion of training, it is intended that the range specialists serve at the national and regional organizational levels in the Livestock Service at a par with the Veterinary Service personnel. Their major role would be to provide range management and development input into the country's agricultural planning and budgetary process; once priorities and programs are decided, they would provide the necessary coordination and technical direction to the range technicians and extension agents at the field and project level.

2.6 The RAMS Livestock Subsector Study (see Chapter 9 Donors) describes in brief detail the status of on-going efforts in range livestock development in Mauritania. These projects have met with varying degrees of success, partially due to the lack of trained Mauritanians in range management (extension, range analysis and planning). The most successful and long-lasting projects will be those identified and initiated by the herders and breeders themselves with donor funding support direct to the project. Having personnel with training in range management within the governmental structure will facilitate achieving this efficiency goal.

CHAPTER 3. CONTEXT OF THE PROJECT

3.1 Physical Situation

See RAMS Livestock Subsector Study and Range Managament Supplement.

3.2 Human Situation

The acceptance of range technicians from the social point of view will depend on the villagers', herders' and breeders' conception of the need for such help and their understanding of the contribution such trained individuals could provide in resolving some of their livestock production problems. The groundwork for the technicians' involvement must be firmly established by the so-called "bare foot extensionist" (see also Environment Sector of this Project Dossier).

The practice of selecting candidates for training from livestock-orientated families and villages will help the technicians, when assigned upon completion of training, fit into his new role and effectively carry out his responsibilities in the rural environment.

The candidates for the range specialist training must likewise have a firm livestock background with a demonstrated ability to work with the rural population.

3.3 Economic Situation

See RAMS Livestock Subsector Study.

3.4 Administrative Situation

See RAMS Livestock Subsector Study (Chapter VII Government Organization).

CHAPTER 4. ESTIMATE OF RESOURCE NEEDS

4.1 Technical Requirements

4.1.1 The main elements of this technical training project are -

A. Range technician training

Fifteen range technicians will be trained in range management at the National Training Center at Kaédi.

B. Eight range management specialists will be trained in the United States at a western university offering degree programs in range menagement. Possible training sites are New Mexico State University, Colorado State University, Utah State University and the University of Arizona.

4.1.2 Tasks involved include:

A. Range technician training

- Selection of Mauritanian training coordinator from whithin the Livestock Service.
- Selection of expatriate training instructor.
- Development of training curriculum.
- Select trainees.
- Conduct training program.
- Assign trainees to the field organization of the Livestock Service upon completion of the training program.

B. Range Specialist Training

- Select Mauritanian training coordinator to work with donor country coordinator.
- Select university and negotiate training agreement or contract.
- Select trainees.
- Conduct the training program.
- Assign trainees within the animal production unit of the Livestock Service upon completion of training.

4.1.3 Equipment and supplies would be limited to those items necessary to present the training program at Kaédi. Transportation for the field aspects of the training could also be required.

4.1.4 Implementation techniques: see tasks listed in 4.1.2.

4.2 Human Resources Requirements

4.2.1 Supervisory personnal for the training program would include the Mauritanian training coordinator and the donor country coordinator. Their involvement would be substantial during the early phases of the project, but after the program is underway their role would consist mainly of monitoring the program and helping solve logistical problems.

4.2.2 Same as 4.2.1.

4.2.3 The expatriate training instructor at Kaédi would work closely with the Mauritanian training coordinator in the selection of trainees, development of the training curriculum and the solving of logistical problems.

4.2.4 Orientation programs will be required for the Mauritanian training coordinator and expatriate training instructor.

A visit to the university selected to conduct the range specialists training may be included in the orientation program for the Mauritanian training coordinator.

Training Schedule

(Cost Estimates)

Category and Number of Trainees	1st Year	2nd Year	3rd Year	4th Year	TOTAL
Range Technician 15	5,875,000 UM $122,395	5,875,000 UM $122,395			11,750,000 UM $244,790
Range Specialist 8	962,168 UM $20,045	962,168 UM $20,045	962,168 UM $20,045	962,168 UM $20,045	3,848,672 UM $80,180 UM
TOTAL	6,837,168 UM $142,440	6,837,168 UM $142,440	962,168 UM $20,045	962,168 UM $20,045	15,559,672 UM $324,970

Average training costs:

In country = 391,667 UM/trainee/year
Out of country = 120,271 UM/trainee/year

Range Management Trained Personnel

	YEAR																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	TOTAL
Range Specialist[1)]					8	8	8	8	12	12	12	12	16	16	16	16	16	16	16	16	16
Range Technician[2)]			15	15	30	30	45	45	60	60	75	75	100	100	100	100	100	100	100	100	100
"Barefoot Extensionist"																					
TOTAL																					

1) The number of Range Specialists will increase until each livestock-orientated region has 1 - 5 depending on the number of projects being planned for the region and 4 serving at the national level.

2) The need for Range Technicians will increase at a rate proportionate to the number of range-livestock development projects.

3) The number of "barefoot" extension agents will increase until each livestock-orientated village and major transhumant herd has at least one.

4.3 Financial Requirements

A. Range Technicians Training at Kaèdi for 2 years

391,667 UM/trainee/year

15 trainees at 391,667 = 5,875,000 UM/year[1)]
Total Cost =11,750,000 UM = $244,790

B. Range Specialist Training in the United States for 4 years

120,271 UM/trainee/year

8 trainees at 120,271 = 962,168 UM/year[1)]
Total Cost = 3,848,672 UM = $ 80,180

Total Costs (A & B) = $324,971

CHAPTER 5. EXPECTED PROJECT IMPACT

5.1 Physical Effects

Not applicable

5.2 Economic Effects

Not applicable

5.3 Social Effects

Not applicable

5.4 Environmental Effects

See Chapter 2, Project Purpose

5.5 Effects on National Budget and Balance of Payments

Not applicable

CHAPTER 6. MODALITIES FOR FINANCING

6.1 It is anticipated that donor countries would finance the out-of-country training for the 8 Range Managements Specialists.

Financing for the in-country training of the 15 Range Technicians at Kaèdi should be shared with Mauritania, providing the student costs and expatriate instructor costs are met by the donor.

6.2 At this stage of project identification no formal requests for funding have been made. If the project proposal interests the Mauritanian

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1) Based on average costs presented in RAMS report on Formal Education.

Government officials, requests for funds from potential donor countries should receive high priority

CHAPTER 7. PROJECT MANAGEMENT AND ORGANIZATION

7.1 A training coordinator should be designated within the Animal Production Unit to oversee the range management training program. No organizational changes in the Livestock Service are anticipated until the trainees complete the training program and then modifications will have to made as discussed in Chapter 2 above.

7.2 Not Applicable

7.3 The training coordinator would have responsibility for monitoring all aspects of the training program and keeping the Ministry of Rural Development advised of progress made and problems encountered.

7.4 Detailed implementation procedure will be developed by the training coordinator upon approval of the project.

7.5 The time-table for implementation will also be developed by the training coordinator upon approval of the project.

CHAPTER 8. STUDIES TO BE MADE

8.1 Complementary Studies

Not applicable

8.2 List of Studies Completed

Not applicable

CHAPTER 9. ADDITIONAL INFORMATION AND ANNEXES

Not applicable

Integrated Rural Development

1. PROJECT SUMMARY

	Date of Preparation: Ap. [illegible] 1981
Proposed by: RAMS	Title of Project: Agricultural Extension via Mass Communications
Country: Mauritania	Region: Agricultural areas / Sector: Integrated rural development
Ministry or department: Ministry of Rural Development and SONADER	

Objectives of Project: To organize and develop a mass media campaign on agricultural techniques, utilization of fertilizers and water, animal health, etc.

Total Estimated Cost: Not estimated	External Financial Requirements: Not estimated

Summary Description: To train teachers, agricultural extension agents and others in group dynamics, in the use of tape recorders and the design of graphics and other visual aid materials.

Duration of Project: 5 years	Date of Initiation: 1982

2.4 Relation of Project to Objectives of the Region

The main objective of the Gorgol project is to develop its agricultural potential. It is the site of a major expansion of irrigated agriculture in the traditional "grain basket" of Mauritania. The drought turned the region from a grain-exporting to a grain-importing region, and the irrigation projects are designed to restore and expand the region's traditional role. The Casier Pilote du Gorgol, which SONADER is in the process of developing, is to play a major role in the region's economy in the very near future. The Foum Gleita reservoir is to open a large area in the center of the region to irrigated agriculture by 1985. The region's potential in dry-land farming) particularly in the Department of Maghama, in the south) is under-exploited and traditional recessional (walo) farming along the Senegal River can be improved.

Herding is another important activity in the region and is likely to become more as nomadic herders spend increasing amounts of time in the region or settle there permanently.

Thus, the proposed project's phase one focus is consonant with the economic priorities of the region in strengthening the ability of the extension services and SONADER to reach, counsel and train the farmers and herders.

The presence of a relatively dense popualtion and Mauritania's third largest city, Kaedi, provide a market for services and products that are either lacking or supplied at considerable expense from Noaukchott. Thus, training will help provide important goods and services while increasing employment opportunities. The project will also strengthen the inadequate educational health services in the region.

2.5 Specific Project Objectives

Phase I: Material

Construction of a broadcasting station and a programming and media center in Kaedi; provision of broadcasting equipment, tapes, multiple casstte recording equipment, video cameras and viewers, materials for charts, posters, silk-screening, developing photographs, mimeographing equipment.

CHAPTER II. PROJECT PURPOSE

2.1 Relation to Project to Objectives of National Plan

The Third National Development Plan called specifically for the creation of a Rural Educational Radio project to be set up in Kaedi (see section 6.1.5, Animation Rurale, p. 158). The priority given to the rural as a whole is the major theme of the Third and the forthcoming Fourth Plan.

2.2 Relation of Project to Strategy for Drought Control and Development in Sahel

CILSS has proposed a Rural Radio project covering neighboring member states. A CILSS human resources committee has been studying the question since 1978.

2.3 Relation of the Project to Objectives of Relevant Sector

The project is designed to give timely information about cultivation techniques, fertilizer use, pest control, water, animal health trek route management and other practices enabling farmers and herders to increase their production and income. At the same time, proposed radio broadcastswill instruct the listeners in ways of production that are not environmentally harmful.

In this first phase, the project will expand the out-reach capability of SONADER and the Rural Development Services which are short on personnel and vehicles. The project will also provide the means of reaching nomadic populations, who have heretofore been excluded from contact with all except the Livestock Service.

In its second phase, the project will be a learning tool for the entire range of rural people; illiterate adults, children, women, fishermen, artisans, unemployed youth, and village populations as a whole. It will complement or extend the out-reach and supervisory capability of: the Primary School Inspection Service and the Public Health Services, and help create new forms of training for artisans and unemployed youth.

Personnel

Training of supervisory and technical personnel; selection and training of field coordinators (extension personnel)

Clients

Members of SONADER rice cooperatives, listening groups to be created among dieri farmers, nomadic and transhumant herders. The number of groups to be formed or coordinated is, as yet, undetermined. Goals are: the understanding and application of appropriate cultivation methods enabling significacant increases in crops among farmers and an understanding of principles of range management, disease control, and herd size management among herders. By appropriate use of seed bed transplanting of seedling and fertilizer use, rice growers could more than double their present income. By applying simple principles of range management and controlling herd size, the herders could minimize damage to the environment through over-grazing and improve their herds by selling weak or old animals to conserve grass and water resources.

Phase II: Materials

Development and production of radio programs and accompanying manuals and visual aids for adult literacy, in-service teacher training, public health programs, vocational training.

Personnel

Training of primary school teachers in use of radio broadcasts in classrooms training teacher supervisors in the use of video and sound cassettes training devices. Training of public health service personnel in the use of radio communications, video and audio materials. Training of craft and vocational isntructors in the use of above-mentioned resources (numbers to be determined).

Clients

The training is to provide basic functional literacy and numeracy among adults, improve test scores and promotion rates among school children, a decrease in the incidence of communicable diseases, infant mortality and morbidity. In addition, the skills of traditional artisans are to be improved so they can produce greater quantities and varieties of items for local consumption at affordable prices; new skills are to be imparted to unemployed youth in the areas of mechanics, wood and metalworking and carpentry.

2.6 Complementary with Other Operations

The proposed project is to coordinate and build upon several Mauritanian institutions. The livestock and agricultural extension services and SONADER are to be intimately associated with the project starting

in Phase I. The regional office of the National Pedagogical Institute (IPN) will have a vital role to play starting in Phase II, as will the region's health services. The Farmers' Training Center in Kaedi and ENFVA will also play coordinating roles.

CHAPTER III. CONTEXT OF THE PROJECT

3.1 Physical Situation

The Gorgol region covers a relatively compact section of south-central Mauritania (13,600 sq. km.) and has pastoral areas, a rain-fed agricultural area along the Senegal and Gorgol Rivers. It is a relatively isolated region and is without any paved roads, although several are planned. Transportation is therefore difficult in the rainy season. Annual rainfall varies between 350 mm in the northern part of the region to 650 mm in the southern part.

3.2 Social and Economic Situation

In 1977, the Gorgol region had a population of 149,000. The population has been growing rapidly (at about 2.5% a year) and by 1980, the total population had grown to an estimated 158,000. Only Nouakchott has a greater rate of in-migration from other regions. The city of Kaedi itself is growing at 2.4% a year and is by far the largest town on the Mauritanian bank of the Senegal River. Overall population density is 11.01 persons per square kilometer, the greatest in rural Mauritania.

Nomads comprise about 10% of the population, and they are sedentarizing at about 5% a year.

Most of the population is Hal Poular, but there are significant groups of Soninke's a'ong the river and Moors in the pastoral and rain-fed agricultural areas (Departments of Monguel and M'Bout).

In employment terms, the active population is overwhelmingly agricultural (27,040 workers). The next largest group is apprentices, retirees and persons without occupations (2,570 persons) followed by commerce and transport workers (2,070) and artisans (1,250). Construction and public works employ only 740 persons, and industry employs but 60.

The proposed project is likely to be well-received. The 1979 RAMS Skills Survey indicated that most farmers in the Region (72%) are interested in technical advice, 62% have radio sets and 41% already listen to agricultural broadcasts.

In Phase II, adult learners would probably respond favorably to well-planned broadcasts and attractive visual media in functional literacy, health/nutrition and sanitation education.

The manufacturing and processing potential in Kaedi (meat, hides, flour, peanut and cotton oil) and the mechanical skills needed by mechanics, metal and wood workers will provide a ready market for the broadcasts and visual media programs for off-farm skills training.

3.3 Administrative Situation

The administrative infrastructure is inadequate to meet the training and support needs of farmers, herders and the other groups concerned with the proposed project. SONADER has 17 extension agents in Gorgol, the Agricultural Extension Service has 10 and the Livestock Service has 18 agents. Among sedentary persons, the agent-client ration varies between 1 to 123 (SONADER) to 1 to 701 (Agricultural Extension Service).

Concerned with other areas of rural life, the Environmental Protection Service maintains an office in Kaedi. It does not yet play an educational role. It has 10 agents in the region. The service is mainly concerned with training people in environmental measures.

The Ministry of National Education has 231 primary school teachers and 73 primary schools. Only 17.8% of the primary school-aged population is actually enrolled. 156 of the teachers have either little or no pedagogical training. There are only 7 supervisors.

Several activities concerned by the project have no supervisory service to help out. There are no field representatives of the Traditional Fisheries Service (Service des Peches Artisanales) or of any service concerned with crafts, commerce or employment. There is an office of the Inspection du Travail in Kaedi, but it is not involved in training or employment creation). The IPN (National Pedagogical Institute) has a new branch in Kaedi.

Other local institutions of primary interest to the project are the National Agricultural Research and Rural Development Center (CNRADA), the National Agricultural Training and Extension School and the representative of the AGRHYMET project, a UNDP-financed project to place meteorologists in strategic points in southern Mauritania to provide useful information on rainfall to farmers via the Agricultural Extension Service.

In addition to these governmental and international organizations, there are various local cooperatives. SONADER has been favoring the formation of rice-growing cooperatives, and there are indigenous craft and fishing

cooperatives, including the shoemakers' cooperative in Kaedi. None of these receives any kind of government financial or training support.

The administrative situation is therefore fragmented, and the project will require careful planning and coordination in order to use local administrative resources successfully.

CHAPTER IV. ESTIMATE OF RESOURCES NEEDED

4.1. Technical Requirements

a. Creation of centers:

- Construction of radio-station/media center
- Equipping of center
- Recruitment of administrative, technical and training personnel.

b. Work with other Services:

Phase I: Agricultural Extension/Livestock/SONADER

- Training or extension agents in gorup process and synamic skills
- Training of service agents in use of simple video cameras and casstte recorders
- Training of personnel in the use of charts, slides, posters and other visual aids.

Phase II: Above training program applied to:

- Teacher Supervisors
- Primary School teachers
- Health service personnel
- Environmental Protection agents
- Vocational skills trainers
- Fisheries coordinators

c. Role of local population

Phase I:

- Formation of listening forums of farmers and herders
- Selection of group leaders, spokesmen in group process skills, use of casstte recorders

Phae II:

- Formation of listening groups of artisans, vocational skills trainees, primary school teachers, fishermen, women,

- Selection of group leaders/spokesmen.
- Training workshops for group leaders/spokesmen in group process skills, use of cassettes recorders.

4.1.2 Work to be Undertaken

Phase I: This [illegible] phase is concerned with setting up the physical facilities for broadcasting and creation of audio-visual aids.

The training methodology is to be refined by working with [illegible] existing extension [illegible] from the [illegible] could double as listening groups.

The extension agents [illegible] slides and other equipment [illegible] to listening groups. The group leaders will be recording the [illegible] reactions, comments and questions on cassettes. These [illegible] and will collected by the extension agents [illegible] trans-mission to the radio [illegible] casts and [illegible] for visual [illegible].

Phase II: The system of [illegible] listening groups and using the audio-visual materials [illegible] training and feedback [illegible] become sufficiently well-established by the middle of Phase I (the first two years of the project) to allow [illegible] of the program to other audiences. Training [illegible] school supervisors, [illegible] teachers, health service and other types of extension personnel [illegible] the end of Phase I. Because of the [illegible] of physical facilities and supervisory personnel, [illegible] child protection centers (PMI's) and Nutritional [illegible] (CRNs) could easily be the next institutions reached [illegible] instruction on cassettes can complement [illegible] program. [illegible] instruct-ion is well-developed in the (United [illegible]) [illegible] the health, nutrition and child [illegible] to [illegible] in PMIs and CRNs.

As in the case of the farmers' [illegible] listening groups, the reactions, comments and questions of teachers, students and women would be recorded on cassettes and serve as feedback to the hospital in Kaedi, the regional Primary School Inspection Office and the regional branch of the National Pedagogical Institute (IPN).

The broadcast and visual media program [illegible] the artisan cooperatives, the off-farm skills training centers, depend on the creation of training infrastructure for the prospective audiences, as well as the recruitment of training and supervisory personnel (which are not the direct concern of this project).

4.1.3 Equipment and Supplies

Described in general categories, the project will require:

1. A transmitter and accompanying equipment capable of reaching a radius of 150 km
2. One medium-wave radio cassette player per listening group or classroom, a stock of audio-cassettes.
3. Portable video-cassette cameras and viewers for use by extension agents and trainers, a stock of video cassettes.
4. Silk screening, photographic, mechanical drawing equipments, artists' supplies.
5. Slide and filmstrip projectors (battery operated)

4.1.4. Implementation Techniques

Certain basic coordinating functions must be established among the services concerned.

The regional heads of the Agricultural Extension Service, the Livestock Service and SONADER must work together to insure that their field agents can travel together and share material insofar as possible. In some cases, the services have overlapping constituencies: rice farmers who also grow walo and dieri crops; and vegetable growers who also raise cattle, sheep or goats. Certain grups may listen to more than one type of broadcast. The Environmental Protection service has a valuable complementary role to play with both the farmers and herders and the 10 agents it has in the Gorgol region could and should help out in the extension work of its sister agencies.

A regular scheduled of visits by service personnel to the listening groups must be devised and followed, as the service personnel are to use video cameras and various visual aids to provide follow-up to the broadcasts. They will also be responsible for collecting the feedback cassettes recorded by the listeners for transmission to the services and to the radio station-media center.

4.2 Human Resource Requirements

4.2.1. The Radio broadcasts will require eleven operational persons:

1 Specialist in rural radio broadcasting
1 Announcer
1 Broadcasting equipment technician
1 Equipment maintenance technician
2 Sound recording technicians
4 Progarmers
1 Secretary

4.2.2 The Media center will require 8 persons:

1. Educationist specializing in instructional media
1 Educationist specializing in programming instruction
1 Photographer darkroom operator
1 Artist illustrator able to do silk screening, posters, etc.
1 Specialist in audio-visual media (video cassettes, film strips, slides, etc).
1 Assistant, able to operate mimeographing equipment
1 Secretary
1 Equipment maintenance technician

4.2.3 Expatriate Personnel

- 2 short-term consultants to develop the details of the project, including the institutional links among the concerned services. It is desirable that they return at the end of Phase I for a formative evaluation exercise and at the end of Phase II for a final evaluation.
- 1 long-term broadcasting media specialist to stay for the full four years of the project.
- 1 medium-term consultant to plan the training for the services' field personnel. The consultant should arrive 3 months before the start of the project and remain for its first 6 to 9 months.
- A varying number of foreign volunteers could play a role in the project as para-professional extension agents and village educators of various kinds. Peace Corps Volunteers are already working for SONADER and in PMIs in the Gorgol region. Volunteers could help coordinate the formation of listening groups and the circulation of recorded feed-back. They could also serve as local contacts for the extension personnel whose visits cannot always be frequent or regular (bad weather, vehicle problems, etc.).

4.2.4 Training

Short-term training may be required for Mauritanians concerned with certain technical skills. Long-term (2-3 years) may be required for the specialist in rural radio and the educators. These posts may temporarily be filled by expatriates.

Short-term programs and periodic refresher seminars are to be held for the service personnel responsible for coordinating the listening groups. They must learn how to operate simple A-V equipment (video cassette cameras and viewers, film strip and slide projectors). The National Pedagogical Institutes branch in Kaedi could play an important role in this area. It would be particularly responsible for developing the programmed instruction

cassettes for particular subjects in primary school in the region and in training the teachers in how to use them.

The crafts and off-farm skills training are not part of this project per se. This project is designed to provide the media back-up for on-site training carried out in cooperatives and training centers. A corps of trainers will have to be recruited before a broadcast and media program can be designed for the artisans and the unemployed.

CHAPTER V. EXPECTED PROJECT IMPACT

5.1. Economic Effects

Unlike previous proposed rural projects, Educational Media for Integrated Rural Development has a definite economic goal. By reinforcing the extension services and increasing the number of rural persons reached, timely information can be communicated enabling farmers, herders and others to increase their production or to take measures to prevent or reduce losses.

In the Phase II crafts and off-farm skill training component, assisting employment creation is a major goal of the project.

5.2. Social Effects

Virtually the whole community will eventually be addressed by broadcasts. Experience in other countries has shown that listening groups can become social groups with wider goals and interests apart from radio broadcasting. The proposed project's social impact is essentially in the areas of:

- Adult literacy
- Health and nutrition (particularly of young children)
- A wider availability of affordable consumer goods
- Enriched learning environment in school and improved learning of subject matter.

CHAPTER VI. MODALITIES FOR FINANCING

Further studies are required to determine which are the most appropriate types of equipment for this situation; therefore, precise costs can not be assigned at this time.

In terms of funding sources, foregin or international donor support is necessary to cover most expenses during the project. The project can become at least partly self-supporting through village-level fund-raising activities. The project is intimately linked to increased productivity; cooperatives and listening groups could agree to earmark a modest part of their production whose revenues could help pay for the broadcasts and media training. This strategy will succeed to the degree that listeners feel the project is meeting their needs.

A certain amount of local support is required to finance recurring expenses because the government is not likely to allocate the funds needed to cover all costs of the project once foreign funding ends.

This proposal should be considered as a pilot project which, if successful, would be established in other regions. Therefore, a relatively inexpensive, locally subsidized system has the greatest potential for further expansion.

CHAPTER VII. TIMETABLE FOR IMPLEMENTATION

Phase 1

Preliminary activities (3-4 months)

- Short-term consultants work with Radio Mauritanie and other concerned services to work out details of project implementation
- Recruiting of Mauritanian personnel for broadcasting and media center
- Pre-project (short-term) training for center personnel
- Departure of selected persons for longer term training, if necessary.

First Year

- Short-term training or orientation of field personnel in use of audio-visual materials, group dynamics:
  - Extension agents
  - Foreign volunteers (possibly)
- Establishment of broadcasting media center:
  - Buildings - constructed or rented
  - Installation of equipment
- Organization of listening groups:
  - Preliminary contact with farmers, herders via national radio, extension services, SONADER
  - Selection and short-term training of group leaders

Second Year

- Beginning of broadcasts and Visual Media Program
- Evaluation - end of second year

- seminar to evaluate experience since beginning of project
- Assessment of changes in practices, production among farmers and herders.

- Short-terms training or orientation of health care personnel, primary school inspectors and teachers, crafts and off-farm skills trainers in audio-visual materials and group dynamics.

Third Year

- Extension of program to Adult Literacy Classess, Primary schools, PMIs, CRENs, Artisan, Fishing and Youth Trainee Groups
- Use of programmed instruction via cassettes in primary schools, PMIs, CRENs, other training context

Fourth Year

- Continuation of Activities begun in 3rd year
- Final evaluation
- Transfer of project to Mauritanian Management

CHAPTER VIII. STUDIES

8.1 Complementary Studies

Cost and Technical Studies

Technical data are required on the types of equipment most appropriate for the project and the cost of these must be evaluated. Estimates of productivity increases and self-financing possibilities must be done as well.

Study of Administrative Means

The cooperating services will have to subsidize certain project costs (agents' salaries and transportation), and new organizations must be created for crafts, vocational skills training centers. How the services will share and coordinate resources must be determined.

8.2 Studies Already Carried Out

The World Bank had plans to set up a pilot rural radio project in Kaedi in 1973. Budgetary difficulties prevented the project from being implemented. The project involved, in addition to the radio station in Kaedi,

two mobile radio studios, and all-terrain vehicles to travel to villages and collect feed-back from the farmers.

Radio Mauritania operated a "Regions Sans Frontiers" program between 1977 and 1979 in which teams travelled about the country to collect "grass-roots" messages for broadcasting.

None of the above-mentioned projects had a multi-media approach or as diverse an audience as Educational Media for Integrated Rural Development. Furthermore, general government-farmer dialogue, a valuable goal in and of itself, was the main goal of these projects rather than training and employment-creation.

1. PROJECT SUMMARY

	Date of Preparation: March 1981
Proposed by: RAMS	Title of Project: Inter-Cropping/Animal Traction
Country: Mauritania	Region: Trarza and Guidimaka / Sector: Integrated rural development
Ministry or department: Ministry of Rural Development	

Objectives of Project: To increase cereal and peanut production through inter-cropping. The result will be to increase the personal income levels of the farmers in the project area.

Total Estimated Cost: $1,800,000	External Financial Requirements: $800,000

Summary Description: The project is divided into two phases, the first of which is to study traditional methods of agricultural production and to introduce improved techniques; the second phase consists of establishing pilot projects and initiating an integrated program of animal traction and inter-cropping.

Duration of Project: 3 years	Date of Initiation: 1982

CHAPTER 2. PROJECT PURPOSE

2.1 Relation of Objectives of National Plan

The main orientation of development in Mauritania is towards the well-being of Mauritanians and toward the economic development of the country. The immediate objectives of the Third Development Plan* were five-fold and included: (a) employment generation, (b) provision of adequate nutrition, (c) enhancement of the health status of the nation, (d) provision of education, and (e) protection of the environment.

The objectives of the proposed integrated Inter-cropping/Animal Tractions Project fit in either directly or indirectly with these national objectives. Inter-cropping implies increased food production per unit area in comparison with mono-cropping. It has evolved as a result of and continues to depend upon environmental climatic factors. It is perfectly adapted to uncertain rainfall probabilities, poor soil fertility and to its companion crop. The development and extension of the practice with the millet/groundnut combination should result in an increased production of the cash crop. The cereal/legume association provides an excellent balanced base for adequate nutrition, which has a key role to play in national health.

Furthermore, such development, by virtue of the resulting increased production of grains and legumes, would bring in its train, more adequate nutrition, increased employment in the direct production process as well as in the indirectly derived occupations, e.g., groundnut processing, handling, commercial transactions and storage.

The introduction and extension of animal traction should lead to the increase of cultivated acreage per active farmer.

2.2 Relation to Strategy for Drought Control and Development in Sahel

Dune soils in which millet is grown are subject to wind and water erosion. The function of the tall millet is protective as the stand breaks the force of the wind and reduces its erosive power to a considerable extent. The best protection for a sandy soil is provided by a complete vegetative cover and this is afforded by an intercrop in which the bare inter-rows of millet are sown with either groundnuts or cowpeas.

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*République Islamique de Mauritanie, 1980: 3e Plan de Developpement Economique et Social, Ministere du Plan et des Mines.

The utilization of soil moisture by the associated crops is complementary, i.e., the root system of the millet plant exploits the upper soil surface layers while the monocotyledonuos groundnut, extends its tap root to deeper layers to tap the moisture below.

2.3. Relation to Objective of Relevant Sector

In the Third Development Plan, one of the strategies proposed for the rural sector enunciates three objectives: increase of agricultural production in the rural sector: preventions of the process of environmental degradation and progressive regeneration of the natural environment.

Inter-cropping with millet/groundnut should increase production per unit area; the groundnuts would help satisfy the needs of auto-consumption and the marketing of excess produce should increase income levels among the rural population.

The groundnut crop adds fixed atmospheric nitrogen to the soil and this would assist in the reestablishment and maintenance of soil fertility. Thus the inter-cropping technique would contribute significantly towards reducing the process of environmental degradation.

2.4 Relation to Objectives of Region Where Project is Located

The project is expected to be implemented in the region near the Senegal river in at least two locations - one around Rosso and the other somewhere in the Guidimaka. The riverine zone is characterized by large tracts of land subject to inundation by floods, giving rise to heavy silty, clay soils (walo). Adjacent to these are the dune soils which are composed, mainly of sand (dieri). Because of the distinct physical and chemical properties of these soils, distinctive types of crop production systems have developed. On the walo soils, the cultivation of sorghum in association with cowpea comprises a general form of recession farming, depending upon the extent and duration of the Season's flood. With the proposed construction of the dam at Manantalis, it is expected that with controlled flooding every year, the practice of recession farming will be maintained initially, but will gradually be phased out as the area of irrigated perimeters for rice production increases. This implies a transition period in which sorghum/cowpea farmers expected to submit themselves to be trained to become rice farmers.

On the dieri soils, the cropping system that has evolved is the inter-cropping of millet with cowpea and berefs (melon) and in some areas groundnuts. This cropping system is absolutely dependent upon the rainfall and its vagaries, just as on the walo, the system is absolutely dependent upon the extent and duration of the flood. Generally, the farmers who cultivate the walo have a certain proportion of the dieri, which they cultivate. There are also Haratine-Moors, who, in addition to herding livestock, also cultivate millet in association with the groundnut on the dune soils, further away from the river.

Indications are that there will be a considerable number of people who will be deprived of the grain production of the walo, because of the proposed phasing out operations. It is extremely doubtful that the rate of development of the irrigated perimeters will absorb the labor that will be displaced by walo closure, nor is it very likely that the rice production by each family would ever rise to fulfil its total food needs!

Consequently, the development and extension of cultivated dieri should be a subject worthy of serious consideration.

It would serve to supplement food production on the irrigated rice perimeters. The nutritional quality of millet, being superior to that of polished rice, will help to balance the diet and contribution of groundnut to nutrition would continue to be invaluable.

The two locations that are proposed for the project are:

1. The villages of Dieuk and Breune Darrou where the inter-cropping of millet and groundnut is known and practiced.
2. A village near Kaedi where groundnuts are inter-cropped with millet.

Thus, the encouragement, enhancement and development of the inter-cropping technique will take place in a milieu, among farmers to whom the practice is not new. The improvements suggested, i,e., the extension of the millet/groundnut inter-crop throughout the dieri zone and the associated conversion to cultivation by animal traction should contribute significantly to the economic development of the region.

2.5. Specific Project Objectives

Beneficiary: Farmers and families in Dieuk, Breune Darrou and a village near Kaedi.

Production: A specific project objective would be to increase the agricultural production of both cereals and groundnuts in the project zone. It is intended that each project participant have the option of practicing inter-cropping of millet/groundnut on a portion of his land and millet and/or groundnut mono-culture on another portion. He would then have the means of comparing yields from both the systems if he desired.

Yields and Production: According to the RAMS report on Dryland Agriculture, the yield of unshelled groundnuts is 200 kg. per ha. in the dieri zone associated with the river. In the Guidimakha, the yields are higher, due very probably, to higher rainfall, ranging from 300-350 kg per hectare.

The data derived from the RAMS sampling survey are given in Table 1, in which also are presented details of the names of the village surveyed, the surface cultivated and the production. There were 17 villages,

in which groundnuts were found to be grown, in the sample, a total of 41.27 ha. cultivated with a total production of 9,621 tons.

Using these data, a yield estimate of groundnut production for Mauritania came to 2,500 metric tons, utilizing a production ratio of 2,405 kg. ha. (See Table 2.)

The estimate of cultivated acreage of 1,000 ha. is one-fifth the FAO estimate (5,000 ha.) presented in Table -5a, 5b, for 1979, from which the estimated production was 3,500 tons. In addition, Table A-5c and d, provides production forecasts for groundnuts under three scenarios.

Data from another RAMS sampling survey are presented in Table 3 which gives details of the production of sorghum, millet, beans, maize and groundnuts. From this table it will be noted that the weight of groundnuts produced as a percentage of total weight of agricultural produce is 50.3, while the value of the groundnuts, as a percentage of the value of the total weight of produce is 69.3.

Table 1
Groundnut Acreage and Production
RAMS - 1979/80

Village	Surface (ha.)	Education (kg.)
1. Hassi-Chagar	0.3	400
2. Hassi-Chagar	0.3	400
3. Abadah	n. sp.	6
4. Ain arba	0.12	40
5. Diammel Wali	5.0	1500
6. Ain Farba	0.2	100
7. Iruil	25.00	5000
8. Kaedi	0.5	150
9. N'Diago	5.0	400
10. N'Diago	0.15	35
11. N'Diago	2.0	400
12. N'Diago	0.5	100
13. El Aedi	0.5	100
14. Hass el Ghoula	0.5	200
15. E Aedi	0.5	600
16. El Aedi	0.2	40
17. M'Bedia Sakha	0.5	150

Table 2
Estimate of Total Production of Groundnuts in Mauritania
RAMS - 1979/80

Administrative Region	Production (kg.)	Area (ha.)	No. of farmers in Sample	Area Cult./ Farmer	Total No. of Farmers in in Region	Est. Area (ha.) [1]
Hodh El Charqui	1500	0.5	58	0.008	13,582	109
Hodh El Charbi	5140	2.5	30	0.023	9,600	800
Gorgol	150	0.05	100	0.0005	24,167	12
Trarza	1881	0.9	75	0.012	6,258	75
Guidimakha	950	0.1	58	0.0017	22,165	38
	9621	4.0				1,034

Production ratio: 2.405 kg/ha

Projected production: 2,500 tons

[1] Based on the ratio of production to area provided in the sample survey.

Source: RAMS Production Surv , 1980.

Table 3

Results of RAMS Sample Survey in Four Villages in Rosso Area

Village	No. Sampled	Sorghum		Millet		Beans		Groundnuts		Corn		Total	
		Prod. (kg)	Value (UM)	Prod. (kg)	Value (UM)	Prod. (kg)	Value (UM)	Prod. (kg)	Value (UM)	Prod. (kg)	Value (UM)	Prod. (kg)	Value (UM)
Dieuck	77	12,493	187,395	800	20,000	3,125	62,500	12,850	514,000	-	-	29,268	788,895
Breume Darrou	16	-	-	2,180	54,500	1,650	33,000	4,900	196,000	-		88,730	283,500
Oulab Bou Ely	4	-	-	500	12,500	1,250	25,000	900	36,000	-	-	2,650	73,500
Tenyeder	4	-	-	-	-	-	-	3,600	144,000	-	-	3,600	144,000
Totals	101	12,493	187,395	3,480	87,000	6,025	126,525	22,250	890,000	-	-	44,248	1,284,895

(1) The weight of produce of groundnuts as a percentage of total weight of produce for the four villages is

$$\frac{22,250 \times 100}{44,248} = 50.3\%$$ (considered as a good average)

(2) The value of the groundnuts as a percentage of the value of the total weight of produce is $\frac{890,000 \times 100}{1,284,895} = 69.3\%$

(considered as a very good average)

(3) Groundnuts are grown together with millet on the dieri land.

In order to gain an estimate of production increase and the consequent raising of the present income level, the following calculations were performed on the data in Table 4. The production figure for each village was divided by the mean yield of 200 kg/ha giving the areas cultivated in column.

Assuming that the yields per hectare are increased from 200 to 250 kg/ha. because of the the utilization of improved technology and better varieties, the increase in production would come but to that given in column 4.

Table 4
Production and Improved Production of Groundnuts

Village	No. of Villages	Area Prod.	Area cult.	Improved prod.(1)	Former value(2)	Increased value(2)
Dieuk	77	12,850	64.3	16,075	385,500	482,250
Breune Darrou	16	4,900	24.5	6,125	147,000	183,750
Lualad Bou Ely	4	900	4.5	1,125	27,000	33,750
Tenyeder	4	3,600	18.0	4,500	108,000	135,000
		22,250	37,875			

1) The improved production is obtained by multiplying the figures in column by the average yield of 250 kg. per ha.

2) The values are culaculated by multiplying the production figures in kilograms by 30 UM per kg.

The original average production per farmer was 220 kg. per farmer (22,250/101) which increased to 375 kg/per farmer (37,875/101). The increase in monetary value of the crop for each farmer is calculated as follows:

		Gross Income
220 x 30 UM =	6,600 = UM (Sells 2/5 of crop =	2,640 UM)
375 x 30 UM =	11,250 = UM (Sells 3/5 of crop =	6,750 UM)
	4,650 UM	4,110 UM

Production in one sample village, Tenyeder

The original average production per farmer in the village of Tenyeder was 3,600 kg-4 = 900 kg. of groundnuts.

Assuming that with inter-cropping and improved methods of cultivation by animal traction - the area cultivated was increased from 18 ha. to 30 ha. and the yield to 250 kg. per ha. of groundnuts (original yield = 200 kg/ha) the improved situation might be presented as follows:

Original Prod.	18 x 200 = 3,600 UM	3,600 x 30 = 108,000
Improved inter-cropping prod. (groundnuts)	30 x 250 = 7,500 UM	= 7,500 x 30 = 225,000
Millet	30 x 350 = 10,500 UM	= 10,500 x 20 = 210,000
Increase over original production		425,000
or an increase of 317,000/4 = 79,250 UM per farmer		317,000 UM

Foreign Trade

Though the earning of foreign exchange by trade is not envisaged, the increase of production will contribute considerably towards satisfying local demand, thus indirectly cutting down imports from Senegal.

2.6 Complementary with Other Operations

A major project in the region is the irrigated rice perimeter at M'Pourie. Farmers in the surrounding region have been invited to participate in cultivating a rice plot in the scheme. The villagers of Oualad Bou Ely, about 11 kilometers from Rosso, have worked on the rice paddies.

In this village, the farmer group interviewed was very emphatic about the fact that the irrigated rice perimeter at M'Pourie had not come up to expectations. Apparently, over the previous four years something had gone wrong during the season; either there was no water, or the water was not sufficient, or the pumping equipment did not operate; evedently organizational problems in the perimeter had not been overcome, the end result being a reduction in yields. Farmers were beginning to question the validity of the scheme.

However, assuming that the perimeter is made to function normally, the production of rice per farmer from a single crop a year (double cropping being impossible because of saltwater intrusion from the sea) is extremely unlikely to satisfy the food needs of himself and his family for a whole year. Consequently, he needs to utilize other land that he owns to supplement his food production. This is where the millet/groundnut integrated animal traction project will serve to fill the gap by providing the cereal grain and part of the groundnut crop for his subsistence and the other part for cash.

CHAPTER 3. CONTEXT OF THE PROJECT

3.1. Physical Situation

Description of the region and/or sector, taking into account previous studies and projects (details should be annexed if available). For example, exact locations (see attached map) description of the target area with favorable or unfavorable characteristics, existing infrastructure, etc.

The Rosso Region

The Rosso region is composed of walo soils and, away from the river, the dieri. Since the formation of the walo was due to fresh water flooding, there is generally no problem of salinity. When the river is in spate, water from the irrigation of the rice perimeters may be drawn from it. However, when the river level is low during the dry season, there is salt water intrusion and, consequently, water from the river is not utilizable for rice production.

The rains generally arrive in June, and the planting of the dieri is carried out. The flood reaches the Rosso region around November when the abundance of fresh water in the river makes it possible to grow rice. The proposed project is thus complementary. If, by October, the millet/groundnut crop is harvested, there will be free labor to commence work on the rice crop in November. This state of affairs should continue until such time as the Diama dam is constructed, which will ensure a fresh water supply in the Rosso region throughout the year, thus facilitating the double croppong of rice.

Maps: 1). Map showing locations where groundnuts were found to be cultivated in the RAMS survey. Figure 1.
2) Map showing probable location of the area around Rosso where the project is to implemented. Figure 2.
3) Map showing probable location of the area around Kaedi where the project is to be implemented.

3.2 Human Situation

Description of the project's social context, that is, the quantity and quality of the zone's human resources, characteristics of the local population, probable reaction of the population to the project, ethnic and demographic data.

The Rosso zone is inhabited by both Wolof and Haratine, Moors, in unknown proportions. In the Kaedi region, the majority of the population consists of Toucouleur people and the Peulh. The Wolofs and the Toucouleur are cultivators and farmers, while the Peulhs are herdsmen, though some of them have become sedentary, cultivating millet around their small villages in the dieri.

Though there are significant and marked ethnic differences, there are, however, important common denominations. In most of these communities the social structure is characterized by the extended family with its heads, elders and hierarchy. Notably, too, the craftsmen and artisans are such by virtue of the fact that they belong to castes, which reserve specific occupations for themselves, such as such blacksmithing, pottery-making, etc.

The probable reaction of the people to the proposed project should be one of interest. The Wolof farmers were contacted expressed gratitude that someone had thought sufficiently of them to come and talk to them. The Haratines in the village of Oulad ou Ely indicated that they had the manpower and the time.

3.3 Economic Situation

3.3.1 Description of Income Level

The average income level in Mauritaniahas been given as 80-100 UM per day. Labor shortage have apparently been reponsible for raising labor wages to 150 UM/day.

3.3.2 Main Economic Activities of Project Zones

The centers of Rosso and Kaedi, with populations of 16,000 and 20,000 respectively (1977census) have had influxes of people from regions hit by the drought. The agricultural products of the zone, mainly millet, cowpeas and groundnuts, are sold in the markets. There are also associated commercial trade and service activities.

Agriculture-related activities in these area include blacksmithing, butchering, construction, restaurants, transport and trade. As these towns are located along the river, fishing is an important activity; fresh and preserved fish are sold in the markets.

Rosso and Kaedi have agro-processing operations, both having abattoirs that function below capacity.

Generally, industrial activity and commerce and trade in population centers such as Rosso and Kaedi are dependent upon the agricultural industry in the surrounding hinterland -- - in this case the walo and dieri. Production in these areas is mainly subsistence, i.e., very little produce is available for marketing, export or trade. If each farmer could produce more of his millet/groundnuts and cowpeas from his limited resources, associated economic activities would establish themselves.

3.3.3 Natural Resources

The natural resources of the project zones are primarily the land resources of the dieri (rainfall dependent) and the walo (riverflood dependent). Water is the key to productivity on these soils. Whether there is sufficient rainfall or not on the dieri depends upon how far north the Inter Tropical Convergence Zone (ITCZ) moves. Whether there is sufficient water in the river or not depends upon the rainfall falling in the Futa Jallon highlands in Guinea. These uncertain weather patterns are determining factors in the evolution of the cropping systems that presently exist on the river valley. Agricultural practices, crop varieties, times of sowing, and relative areas of different crops on the different soils are all adapted to the "minimum risk" types of exploitation. The primary consideration of the farmer is necessarily subsistence.

3.3.4 Land Surface

The walo land is limited by virtue of two constraints. Basically, it is land formed by flood action, i.e., by the deposition of sand and from stagnant flood water. It is found in a restricted band along the river valley. Secondly, the extent of it that is avaiable for cultivation by recession farming is dependent upon the magnitude of each season's flood and its duration. The flood may cover a great extent of the walo but, if its duration is brief, there is insufficient time for the water to percolate into the heavy textured soil. On the other hand, the water may stay on the land for a longer period but the area covered by the flood may be less.

The dieri, relative to the walo is unlimited. The soil is fine sand with very high rates of percolation. Termite activities and the "nitrogen flush" has rendered the soil a fertile medium, the working of which is relatively easy. Except for the clearing of brush and debris there is no need for ploughing on prior cultivation. The planting process is simple and the area that can be planted is limited only by the capacity of a single

farmer supported by this family and the amount of bush he can collect in order to build an enclosure. This is important especially in a livestock rearing country like Mauritania. (In Niger, unlike Mauritania, the livestock seasonally migrate to the pastures in the north, thus leaving the farmer free to cultivate and harvest his millet without anxiety.)

In the Rosso area, the major constraint to walo cultivation with rice is the intrusion of seawater. It can also only be recession farmed according to the nature of the seasonal flood. The same may be stated for the Kaedi region.

In both regions, there is ample dieri to be farmed, but the Maratine farmers at Ouald Bou Ely admitted that a major constraint was to obtain sufficient fencing material to extend their enclosures.

The crop resources are mainly, millet, sorghum, cowpeas, groundnuts, and Beref (melon). There are crops well adapted to the Sahelian zone. Their root systems are well adapted to drought conditons, and they are able to withstand the high temperatures prevalent during the growing season. As a resource, they could offer more benefit if research were devoted to developing just those qualities that enhance their survival in the zone: drought, insect and pest resistant.

3.3.5 Economic Objectives of Project

The main objective of the project is the raising of agricultural production not only of the subsistence millet crop but also of the semi-subsistence, semi-cash crop of groundnuts. At the present time groundnuts are imported from Senegal and are sold at the Rosso market to satisfy local demand.

Groundnuts are used for the production of sauce which is consumed with rice, the whole constituting the midday meal. Thus, there is a regular demand for the product. In addition, the Moors who live in the northern region of the country also eat groundnuts during the tea-drinking ceremony in the morning.

An associated objective is the raising of the income level of the farmer in the project villages. The current estimated level of income per day per farmer is 70.UM. If he worked 300 days the amount he earns is equal to 21,000 UM per year. If his income level is raised to 100 UM per day, he would earn 30,000 UM. an increase of 9,000 UM.

To the extent that the project takes hold and progresses, it is expected that associated industries and activities will develop spontaneously. These will consist of transport and marketing.

3.3.6 Main Economic Problems

There are no recognizable banking systems which could extend capital and credit facilities to farmers, though in Rosso two banks, BIMA[1] and BCM[2], have branches. However, there appears to be a highly developed system of individual commercial credits and loans, though at exorbitant rates of interest. Cooperative structures are weak and are not sufficient well organized, lacking trained personnel to manage them. The lack of banking facilities implies the lack of facilities for savings.

The project regions are characterized by poor economic resources which have led to the development of a precarious subsistence economy. To convert this into a cash economy is an extremely difficult and complex task.

3.4 Administrative Situation

Description of existing administrative structures.
See paragraph 7.2.

CHAPTER 4. ESTIMATES OF RESOURCES NEEDED

4.1 Technical Requirements

4.1.1 Description of the chosen strategy and modalities for project implimentation. Participation of local population.

STRATEGY: Two Phases: I - Pre-project preparation
II - Implementation

Phase I: a) The study of the techniques and production methods used in traditional agriculture

i) in the inter-cropping of millet and groundnuts;
ii) in the quantification and qualification of processes, operations and quantities employed of seeds, fertilizer employed.

b) Application by project farmers of improved manual methods of inter-cropping with modified inputs.
c) The selection and training of draft animals (including donkeys) to pull the cultivators and the groundnut seeders of the project.

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1) Banque Internationale de la Mauritanie.

2) Banque de Commerce Mauritannienne.

d) Logistical preparation-provision of seeders, cultivators, harnesses, seeds fertilizers, etc., brushwood fencing
e) After harvest practice of cultivation by animal tractions. Training courses.

Phase II:a) Establishment of pilot projects in the project 1983 and villages with selected farmers.
b) Implementation of programme of the integration of animal traction with inter-cropping.
c) Extension to other farming villages in the dieri zone.

4.1.2 Brief description of work to be done.

Initially, farmers will be enlisted to implement improved methods of inter-cropping by manual methods. Simultaneously, those who have animals will undergo training in utilizing them with cultivators or with the groundnut-seeder for weeding or sowing. The animals themselves will have to be taught draft operations.

Logistics of the project involve acquiring materials and equipment to implement Phase II of the project. In the implementation of the integrated stage of the project, the calendar of operations gives will involve :

Cropping Calendar

1. Land preparation - no ploughing, only clearing and burning.
2. Thorn-bush fence completions.
3. Sowing by hand of millet in wide 3 meter rows.
4. Sowing of groundnuts, using animal traction, in the millet alleyways.
5. Fertilization of millet.
6. Cultivation of groundnuts using animal traction.
7. Harvest of millet.
8. Harvest of groundnuts.

4.1.3 Brief description of equipment and supplies needed.

The following items of equipment are needed:

10 - groundnut seeders
10 1 cultivators for groundnut.

Animals

10 teams of donkeys with harnesses.

Materials:

Sufficient thorn-bush for the extension of enclosures,
Groundnut seeds for 15 ha.
Millet seed for 15 ha.
Fertilizer: 225 kg/ha-1 of area for 15 ha
2 gm per hill of a population of 6666 hils hal
Superphosphate: 115 kg for 15 ha at the ratio of
1 gm per hill for a population of 6666 hils ha-1
of millet.

4.1.4 Short Description of Implementation Tehenique

The initial research and development of Phase 1 of the project will be carried out by a team of specialists consisting of an agronomist, an extension officer, an economist and an animal traction expert.

Techniques of inter-cropping will be developed by the agronomist in association with the Extension Officer. The animal traction expert will collaborate closely with them to perfect the techniques that will be applied in Phase II.

During Phase 1, extension agents will also be trained in the integration techniques. The animals will also be trained during Phase 1.

In Phase II, animal traction will be introduced and extended to all the farmers of farms participating in the project.

Implementation Techniques

In Phase 1 : Utilization of practical demonstration by extension agents guided by the agronomists:

(1) the inter-cropping technique
(2) the point-by-point application of fertilizers to the selected participating farmers before the advent of the rains and during the campaign. The 10 extension agents selected for training should be trained during this period under the supervision of the extension officer who will be working closely with the agronomist.

Phase II: The trained extension agents will participate in the enlistment of participating farmers, demonstrations, and in preparation for the campaign.

Demonstrations and publicity at the end of the campaign showing how the new technique has resulted in yielding higher production levels.

Continuation-Phase II: Repeat of the year but with measures taken for institutionalization, i.e., the establishment of the bases for the continuation and expansion of the proejct.

4.2 Human Resource Requirements

4.2.1 Supervisory Personnel:

1. Agronomist - expatriate officer, with experience in inter-cropping and animal traction.
2. Animal traction expert - expatriate officer, with training in the utilization of animal traction.
3. Extension officer - expatriate, with several years of experience.
4. Agro-Economists - short term. to test viability of implemented systems.
5. Administrative officer - Logistical support.

4.2.2 Implementation Personnel

1. Counterpart for Agronomist - National
2. Counterpart for Extension Officer - National
3. Extension agents (10) - One agent for each 3-5 villages.

4.2.3 Training

No foreign training is envisioned.

4.3 Financial Requirements

4.3.1 Estimate of the project's overall cost and separate estimates of: - the cost of construction
- the cost of equipment/materials.

For cultivators: a) Raw material
b) Tools (welders)
c) Fuel-charcoal
d) Nuts and bolts

Cost of supplies: a) Metal bars
b) Fertilizers - urea, rock phosphate, tripe superphosphate

1. Agronomist	$45,000 x 3 yrs	= $ 135,000.00
2. Extension officer	$40,000 x 3 yrs	= $ 105,000.00
3. Agro-Economist	$35,000 x 1 yr [1]	= $ 35,000.00
4. Animal Traction Spec.	$30,000 x 1 yr	= $ 30,000,00
5. Administrator		$ 25,000.00
		$ 330,000.00

1) Spread over the 3 years

National Counterparts and local extension agents paid according to local rates + 10%.

4.3.2 Estimates of possible excalation in the cost of the project.

1. Metal raw materials (past price history) extrapolation.
2. Fertilizer (past price history) extrapolation.

4.3.3 Estimates of foreign exchange
See above.

4.3.4 Estimated time-table for payment of investment and equipment costs

Foreign-supplied equipment should be procurred at the outset of the project.

4.3.5 Estimated Maintenance and operating expenses for the project (broken down according to local and imported inputs); cost of services such as insurance, transportation, electricity, expatriate and local personnel costs.

4.3.5.1 Imported inputs	Source
Metal bars for cultivators	U.S.
Transport truck	U.S.
Nuts and bolts	U.S.
Groundnut seeders (semoirs)	U.S.
Ferilizers: Urea	U.S.
Triple superphosphate	U.S.
Rock phosphate	Senegal

4.3.5.2 Local inputs

Thornbush for fences
Wood for implements
Leather for harnesses
Animal (draft donkeys)

CHAPTER 5. EXPECTED PROJECT INPUT

5.1 Physical Effects in terms of production and/or other outputs contributing towards meeting the project's specific objectives

Production: (1) Increase in groundnut produce
(2) Increase in weight of produce per unit area (millet and groundnut). See case for inter-cropping.

By-products: Groundnut haulms for livestock feed, sale, etc.

5.2 Economic Effects

5.2.1 The Case of Inter-cropping/Animal Traction

The case of inter-cropping rests upon the results of research carried out in experimental stations throughout the world. In the Sudanian zone in Nigeria research carried out at the Institute of Agricultural Research has demonstrated that :

(1) the productivity and profitability of inter-cropping legumes with cereals are greater than with mono-cropping.
(2) inter-cropping is highly adapted to the prevailing conditions of the agro-ecosystem.
(3) inter-cropping contributes significantly towards lessening the "risk" factor in Sahelian farming.

Norman (1970, 1979), in his studies in the Sokoto close-settled zone and in the Zaria villages, revealed the superiority of inter-cropping to mono-cropping from the standpoints of profitability, production, greater assurance of a harvest under the uncertain rainfall conditions prevailing in those regions. Baker (1979) demonstrates that the traditional "Gicci" system of inter-cropping millet with groundnuts controlling soil moisture, increased yield of produce per unit area and was more profitable than mono-cropping.

In the early 1960's (IRHO, 1963, 1965) research was initiated in Bambey, Senegal, to test the validity of inter-cropping. It was found that 2 ha. of inter-cropped millet and groundnuts brought as much revenue as 3 ha. of part sole crop millet and part sole crop groundnut.

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1. Baker, E.F.I., 1979: Mixed cropping in Northern Nigeria 1. Cereals and Groundnuts. Samaru Res. Bull. 297, I.A.R. Samaru, Zaria, N. Nigeria.
2. Norman, D.W., Buntjer, B.I., Godard, A.D., 1970: Inter-cropping Observation Plots at the Farmers' Level. Samaru Agric. Newsletters 1980, 12(6): pp. 97-101.
3. Noramn, D.W., D.H. Pryor &J.N. Gibbs, 1979: Technical Change and the small farmer in Hansaland. Northern Nigeria, East Lansing: African Rural Economy Program (Paper No. 21) Dept. of Agric. Economics Michigan State Univ.

Table 7. 1. Sole crop millet yield D1, C1 and B1 are in almost every case inferior to the millet yields from the associated crop.

e.g.,	D1 - sole crop	1,887.0 kilos
	D2 with groundnut	2,018.7 "
	D4 with groundnut	1,923.2 "
	D5 with groundnut	1,801.0 "
	D3 with groundnut	1,602.0 kilos

2. However, the economic return from the total mixed crop was greater than from the sole cropped millet with the exception of one case D3.

		Gross economic return (CFA)
e.g.,	D1 sole crop millet	94,365
	D2 millet + groundnut	104,743
	D4 " "	104,876
	D5 " "	109,574
	D3 " "	90,266

The validity of inter-cropping may be learned from Figure 3A which compares different systems of mono-cropping and inter-cropping.

The gross economic returns from two hectares may be summarized thus:

	(CFA)
Mono-crop millet (2 ha)	189,270
Mono-crop (millet + groundnut) 1 + 1 ha	116,218
Mono-crop (groundnut) 2 ha.	43,166
Inter-cropping (millet + groundnut) 2 ha	212, 898

IRHO, 1963: Rapport Annuel, Senegal et annexes, pp. 23-25, pp. 0-35: Cultures associees, Tivaouane et Darrou.

IRHO, 1965: Rapport Annuel: Senegal et annexes, pp. 27-30; pp. 30-34 Cultures associees, Tivaouane et Darrou.

Figure 3 A: Gross Economic Returns form 2 hectares of Mono-culture and Inter-cropping, Millet and Groundnut.

Source: Cunard, 1980.

	Cropping System			Crop Value from 2 Ha.	
	D1 One Ha.		D1 One Ha.		
Pure Crop	Millet 94,635 CFA		Millet 94,635 CFA	94,635 94,635	
				189.270	CFA
	Problem with millet in the following year				
	A4 One Ha.		A4 One Ha.		
Pure Crop	Groundnuts 21,583 CFA		Groundnuts 21,583 CFA	21,583 21,583	
				43,166	CFA
	Millet missing in one year				
	D1 One Ha,		A4 One Ha.		
Pure Crop	Millet 94,635 CFA		Groundnuts 21,583 CFA	94,635 21,583	
				116,218	CFA
	Decreased production				
	D4 One Ha.		D4 One Ha.		
Inter Crop	Millet 89,185 Groundnut 17,264		Millet 89,185 Groundnut 17,264	89,185 17,264 106,449 x2	
	Inter-cropping for several years.			212,898	CFA

Populations: Millet: 9999 hills ha-1.
Groundnut: 125,000 plants ha-1

There are many advantages that accrue from inter-cropping. There is evidence that soil fertility is maintained (Cunard, 1980) and therefore that an inter-crop can be carried on for more successive years than with a mono-crop of millet alone.

5.4 Environmental Effects: Possible, harmful, and positive effects.

Positive effects: There is better soil cover with an inter-crop and this serves to reduce soil moisture loss and erosion by wind and fierce beating rain. The fertility of the soil is maintained, by the nitrogen fixation process in the root systems ensure a more even removal of nutrients from different levels.

Possible harmful effects: If cultivation by animal traction is carried out prior to sowing, for example as a step in land preparation, there is a risk of aggravating wind erosion. With animal traction, a larger area will be cultivated per farmer, i.e., much more of the dieri land surface will be brought under cover.

CHAPTER 6

6.1 Anticipated Sources and Modalities
Various

6.2 External Financing Requested for:

6.2.1 Implementation Phase I - for

- Expatriate staff
- Equipment, materials and supplies
- Local staff

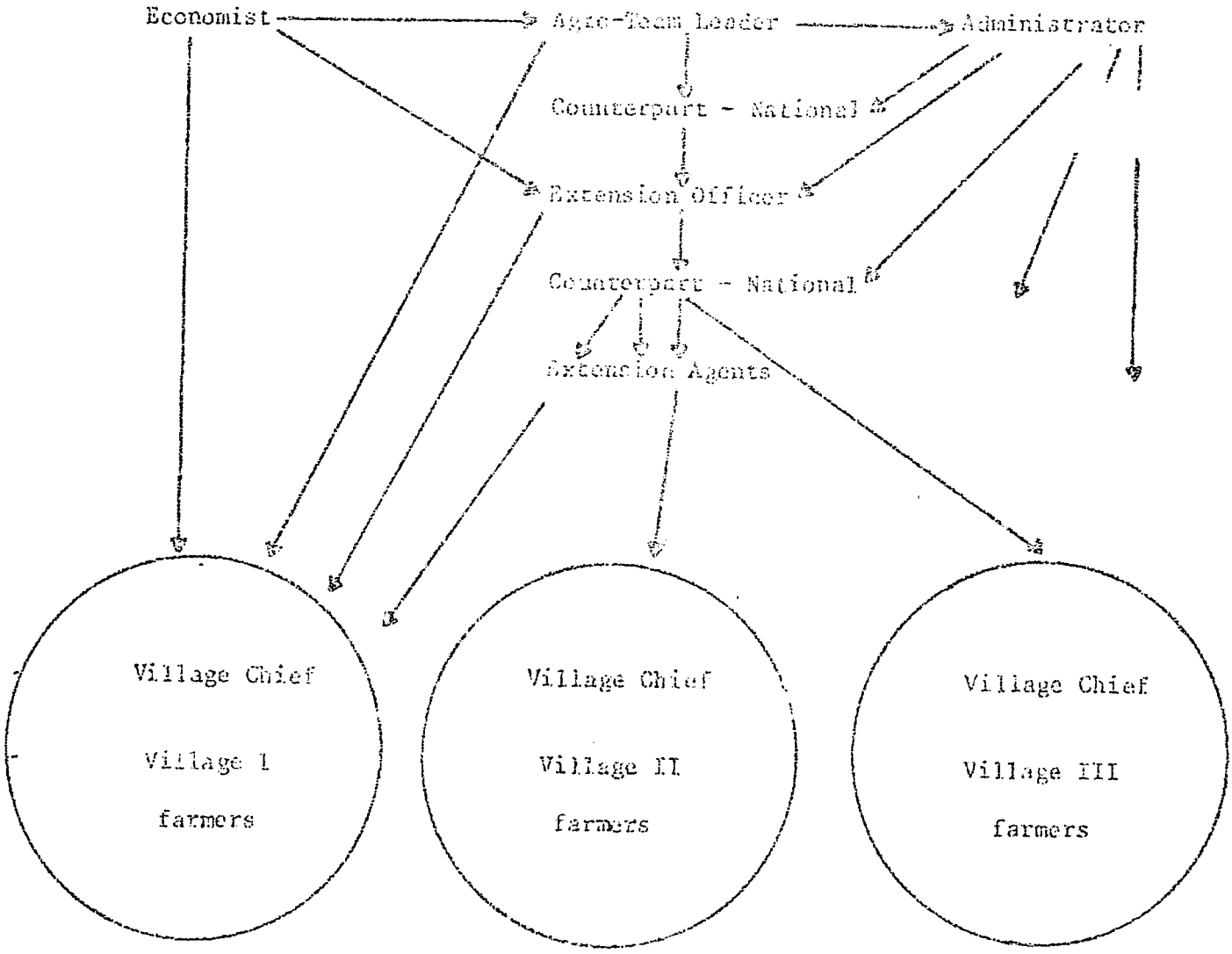
Phase II - 1st year

Phase II - continuation - nil

Cunard Annual Technical Report, 1980. Consortium for International Development Contract REDSO/WA: 76-84, USAID Niamey, Niger.

CHAPTER 7. DESCRIPTION OF THE STRUCTURES OF PROJECT ORGANIZATION

The project structure is presented in the following diagram:



The team leader has direct contact with the farmers. He also has indirect contact with the farmers through the Extension Officer and the Extension agents.

7.2 Relation Between Project's Structure and Country's Administrative Structure

The country's administrative structure is as follows: There are 12 regions (excluding the capital city), 54 departments and 38 districts (arrondissements).

The region is a decentralized entity placed under the authority of a governor who has executive power. The regional limits and its headquarters are fixed by presidential decree.

The department is under an administrative region and is under the authority of a prefect.

The district is an element of the department. The district chief is placed under the authority and the control of the prefect.

In the Trarza region, Boutilimit is the headquarters of a department and Aguilal-Faye is the headquarters of a district. Kaedi is the headquarters of the Gorgol. Monguel is the headquarters of a department and Lexeiba is the headquarters of a district.

The project should be related to the adminstrative structure in such a way as to facilitate implementation. The team leader should have direct access to the Prefect and to the Governor of the region in which the project is situated. Close cooperation and collaboration with the district is expected.

7.3 Summary description of System for Tracking Results of Projects and Monitoring Implementation

(1) Periodic evaluation of the following parameters:

- Level of production of millet and groundnuts for the whole village.
- Quantitites of groundnuts and millet transported to markets.
- Number of farmers participating.
- Surface area of land inter-cropped in relation to land mono-cropped.
- Market prices of groundnuts and cereals in the main town adjoining the project area.
- Signs of subsidiary industries - groundnut processing, oil produce.

7.4 Implementation Procedures

To be developed by the team leader in close collaboration with the government.

7.5 Timetable for implementation

1982	-	Preliminary studies
1983	-	Phase I
1984-85	-	Phase II
1986	-	Handing over to Mauritanian Government.

CHAPTER 8: STUDIES TO BE MADE

1. Preliminary studies - feasibility of project in Dieri zone.

2. Economic feasibility study.

1. PROJECT SUMMARY

	Date of Preparation: March 1981	
Proposed by: RAMS	Title of Project: Employment Generation in Metal Working Sector.	
Country: Mauritania	Region: Trarza, Brakna Gorgol, Guidimaka, Assaba	Sector: Artisinal
Ministry or Department: Ministry of Mines, Commerce and Industry		

Objectives of Project: To develop and improve artisinal metal-working and increase the number of artisans specializing therein.

Total Estimated Cost: $2,000,000	External Financial Requirements: $1,055,000

Summary Description: To identify a donor to supply iron metal scrap that will be provided to artisans (through cooperatives). Training courses will be organized to up-grade the artisans and expand their range of production to satisfy local demand.

Duration of Project: 2 years	Date of Initiation: 1982

CHAPTER 2. PROJECT PURPOSE

The purpose of the proposed project is to improve and expand the metal-working sector in six rural centers to a level at which the numbers employed can be progressively raised from the present level of about 250 to 1,000. A secondary objective is to improve the quality of tools and implements available to local farmers. Thirdly, an increase in the range and volume of cheap metal utensils and artifacts from cooking utensils through to pony carts and water tanks will bring about visible improvements in rural living standards.

It is a project designed to satisfy needs by exploiting available skills in metal-working and fabricating, based on the existing, established system of working and of imparting training.

It is proposed that the project concentrate on the introduction of new products so that the metal-working sector can contribute to the spread of mechanization in irrigation and farming, which is one of the effects of the extensive rice-growing projects now being developed along the riverine area. With growing dependence on mechanization, there is an immediate need for blacksmiths who can fabricate simple parts. At present, some artisans have shown that they are capable of making fittings for irrigation pipes, and the next step is to develop the skills necessary to produce parts for pumps. Thus, improvements to the capability of this sector are an essential part of the overall policy of CIRM in the riverine and rainfed area towards modern cultivation.

It is considered important to generate employment in rural areas, particularly towns, not only to stem the drift to Nouakchott, but even to attract some of the men of working age back from the capital. The effects of increased employment will also have a secondary impact on the level of activity in rural towns through the increased income generated by the sector as a whole.

CHAPTER 3. CONTEXT OF THE PROJECT ON METAL-WORKING

3.1 Physical Situation

It is proposed that the effort be concentrated on a core of 6 centers in the riverine and rainfed zones. These are as follows, with region, climatic zone, 1977 resident populations, and numbers of metal-working artisans.

			Proposed Core Centers	
Town	Region	Zone	Population (000)	Metal-working artisans*
Rosso	Trarza	Riverine	15.9	67
Boghé	Brakna	"	7.9	21
Kaédi	Gorgol	"	20.4	122
Magama	Gorgol	"	4.6	28
Selibabi	Guidimaka	Rainfed	5.5	24
Kiffa	Assaba	"	10.7	63

3.2 Human Situation

These are all settled centers with markets of varying levels of importance but all serving extensive rural areas. As can be seen from section 3.1., there are blacksmiths in each of these towns who supply only a small share of the local demand. The balance is met by goods from Nouakchott, or imports from Senegal, or not satisfied at all.

3.3 The Economic Situation

The most reliable information available on incomes is that derived from field surveys conducted by RAMS. These indicate that wage levels in these towns are 70 to 120 UM per day for men and 50 to 70 UM per day for women. In Rosso and Kaédi, 18% and 34% respectively, of the working population earned less than 3,000 UM in 1978. In the other four towns the proportion in this low-income category is not expected to be less than 34%. The artisans, however, earn considerably higher incomes than the average, which range from 70 to 600 UM a day, depending on the metal that they work[1]. An artisan using base metals may earn 250-270 UM a day and probably works for 140 days a year.

The major obstacle which prevents the expansion of the metal-working sector is the shortage of steel and tin. At the level of artisanal working, scrap metal is the principal source of raw material. Axe blades are made out of the leaf springs of vehicles; large pans and cooking stoves are made out of 55-gallon oil drums, but metal building components such as gates and frames are fabricated from steel strip. In all countries without a domestic supply of steel, the primary source is wrecked and derelict motor vehicles. But in Mauritania, because of the very low level of transportation, there is very little scrap. Indeed, although the sector is largely based on scrap

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* Including artisans making jewelry who are assumed to account for about 30% of the total.

1) RAMS study Economic Activities in the Private Sector, 1981.

metal, the artisans have not become sophisticated enough to use all the waste materials that are available. Empty cans for example are used in other parts of Africa to make oil lamps, or as food containers, or are beaten out, but in Mauritania they are left on the garbage dumps. Hence, in a situation of acute shortage, some raw materials are not put to use because the artisans are not sufficiently innovative or do not have enough experience in scrap conversion.

The metal-working sector in Nouackhott is considerably more advanced than its counterparts in rural towns. Nevertheless, its example has some bearing on the probable development of this sector in smaller centers. There is a distinction between the artisans who generally depend on scrap metal and the metal-working establishments which make doors, window frames and grills, where imported iron and steel are used.

Iron and steel are imported mainly from France, in the form of

sheet
flats
profiles and sections
bars
angles
reinforcing rods
corrugated sheet
wire

The taxes and duty charged are:

Tax	- 10%
Duty	- 5%
Intervention tax	- 10%

The final prices to the metal-workers tend to be high; 6 metres of box section steel about 3 inches square sells at 250 UM; reinforcing rods were quoted in April at 4,500 UM per 100 kg.

There are reported to be only two importers of iron and steel, both private companies. They satisfy the Nouakchott market but do not distribute in the hinterland. The volume of sales are relatively small as the importers buy in 50-ton quantities, or will place orders for only 20 tons of structural steel.

In Nouakchott, the metal-working shops and machinists offer a reasonably sophisticated range of domestic metal fixtures from window frames to water tanks, including tanker bodies. In the rural areas, however, the artifacts are restricted to those that can be made from scrap, generally implements, cooking stoves and large containers.

Retail prices quoted in Kaédi, Magama and Boghé were as follows:

	UM
Axe	200
Hoe	100
Rake	250

The stimulus needed to expand the range of activities of the metal-workers in the riverine and rainfed areas is supply of raw materials. The demand is strong, and will rapidly expand as mechanised cultivation spreads on the rice-growing projects which depend on irrigation, and with the use of tractors, numbers of which are being supplied by Iraq. At present, there complaints that the local blacksmiths can not supply the needs of SONADER in Magama, so that tools for use in the vegetable plots being established for those without work are bought from Nouakchott.

Scrap, in the form of crushed vehicles, is sold in Europe and North America at about $100/ton f.o.b (UM 4,600). It is proposed that a donor offer 500 to 1,000 tons of fragmented scrap, particularly leaf springs, a year free to Mauritania, to the value of $50,000 to $100,000 as a means of enabling the blacksmiths of these six towns to increase output. The metal may be sold to these end-users at a price which would cover transport and distribution costs. Certainly, after the deep water harbor at Nouakchott is completed, the costs of landing cargoes should be considerably reduced.

CHAPTER 4. ESTIMATE OF RESOURCE NEEDS

4.1. Technical Requirements

4.1.1 The Proposed Strategy

The first need is to provide metal to the artisans in the interior in adequate quantities to satisfy unfulfilled needs. It is proposed that a potential donor country be requested to supply scrap metal as grant aid. It would then be necessary to ensure its distribution at minimum cost, which might require the institutional support of an existing parastatal agency.[1] The second contribution would be to up-grade the levels of skills among blacksmiths and metal-workers with the purpose of widening the range of artifacts they are able to make, and to help them to use new techniques.

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1) In many ways it would be simpler to use an independent, private distributor, but there is a notable gap in this sector of the service economy, so that there may be no choice but to use a state-owned institution.

4.1.2. Work to be Undertaken

a. The potential donor, or donors, of scrap must be identified. The ideal mode of operation would be to ship parts of wrecked cars from Saudi Arabia and the Gulf in compacted form to Mauritania, possibly charging only the transport cost to the end-user.
b. An alternative source must be sought if no donor is forthcoming. A market exists in all industrialized countries for scrap metal which Mauritania would be obliged to approach as a customer. Possibly, there would be an opportunity for barter against ore exported from Mauritania, but the sum involved would not be large (see section 3.3 above).
c. Arrangments for the distribution of metal within Mauritania would be reviewed to determine whether government intervention is required.
d. If the metal is obtained at commercial rates from an overseas supplier, it might be necessary to provide short-term credit facilities to the metal-working cooperatives or individual blacksmiths to take advantage of the increased availability of raw materials.
e. Establish a training program for artisans.
f. Review supply and recommend modifications, if necessary.
g. Review the impact of training and assess future needs.

4.1.3 Equipment and Supplies

The equipment that would be required in Mauritania is basically accomodation and transport facilities for four technical training officers, who would operate as two mobile teams.

The equipment suggested consists of:

Fixed assets + 1 storage structure for supplies of gas, oil, vehicle spares, with a room for an office
1 water tank

Operating equipment + 2 mobile homes, equipped for long-term occupation, e.g., including a spare generator
2 Land Rovers, or equivalent
1 2-way radio system
Stock of metal- working tools and equipment
Spares for vehicles
Minimal office equipment

If it were necessary to intervene in the distribution of imported metal, then the purchase of one or two trucks might be required. It is estimated that these would cost about $85,000 each (UM 3.9 million) for vehicles with 17½ ton payload.

4.1.4. Implementation Techniques

At this stage, it is difficult to be specific about how raw material would be supplied. If scrap is donated, the responsibility of GIRM, or its agents, or a private establishment, would be restricted to landing and distribution. In order to truck steel to the riverine areas, it might be necessary to deal with a transport contractor, in which case it would be desirable to place the responsibility with a parastatal agency familiar with the problems; SONIMEX might be an appropriate choice, as discussed above in section 4.1.1.

The training element would be provided by the four technical instructors who would travel from town to town on the basis of a well-prepared and publicized schedule to work with the blacksmiths in their own workshops. There would be some specialization between the experts so that a variety of skills could be taught.. If two visits can be made to each town in the first year, this should provide adequate information on which to design a program for the second year. The operation could be based in Kaédi which is geographically at the center of the six towns, but would be essentially mobile.

It is envisaged that the duration of the training program would be two years. On the other hand, support in the form of raw materials supply would be needed until the country begins to generate large quantities of scrap, which is unlikely within five years.

4.2 Human Resource Needs

4.2.1. Supervisory Personnel

Unless assistance is required in importing scrap and other metal, supervision would be provided by a senior training officer.

4.2.2 Implementation Personnel

The implementation program would require four technical instructors to carry out field training. They would be specialists in the fabrication of metal by low technology who could teach by example and with tools and implements currently in use, or those that can be easily made in Mauritania.

The back-up required would probably consist of:

1 secretary/book-keeper
1 driver/mechanic
1 driver
2 translators

4.3. Financial Requirements

4.3.1. Overall Project Costs

The cost of the training element of program are estimated as follows:

	UA 000	$ 000
Personnel	43,400	945
Supplies	5,000	110
Total	48,400	1,055

Capital costs are net of residual [illegible]s calculated as 10% at the end of two years.

4.3.2 Escalation Factors

It would be reasonable to build in a factor of 12-15% to cover possible inflation in the event implementation is delayed. The projected costs shown in 4.3.1. above include a 10% contingency factor, except in respect of capital purchases.

4.3.3. Foreign and Local Costs

The breakdown between foreign exchange and local costs is between wages for locally employed personnel, including cost of construction of storage facilities and field office, plus field subsistence on the local side and all other costs which are assumed to be in foreign exchange.

These are:

	UA 000	$ 000
Foreign exchange	46,400	1,010
Local currency	2,000	45

4.3.4 Projected Timetable for Payment of Capital

All capital, or investment, costs would be incurred in setting the project up. It is estimated that these would amount to :

	UA 000	$ 000
Vehicles - 2 Land Rovers with spares	1,400	30
2 mobile homes plus 1 spare generator	2,250	50
Radio 2-way system	90	2
Office equipment	45	1
Metal-working equipment	180	4
Structures	110	2
Totals (roumded)	4,100	90

At the end of two years, it is assumed that there will be a residual value of 10%.

4.3.5. Estimated Running Costs

These would be met on a monthly basis and would total 22.3 million UM ($484,000) per year for two years.

CHAPTER 5. EXPECTED PROJECT IMPACT

5.1. Physical Effects

It is intended that this project should achieve an increase in added value in the metal-working section of 4 to 5 times the 1980-81 level over a period of five years. In order to grow at this rate there is expected to be a doubling of value-added over the two years of the life of the training project. Part of this rapid growth will be stimulated by the increased demand for metal artifacts by the rice projects which depend on mechanized irrigation, processing and cultivation.

This expansion can be measured as added-value contributed by the metal-working sector. At present, some 250 blacksmiths earn an average of 36,000 UM each a year, or a grand total of UM 9.1 million a year, which can be regarded as the value-added in metal-working in the six towns by labor input. The aim of this project is to raise this net value-added to a minimum of UM 36 million.

In terms of metal products this should include a whole range of domestic utensils that are currently imported, such as kettles, bowls, mugs, cooking pots;

farm implements, in improved form,
and considerably increased volume
parts for irrigation equipment and motors
lamps
structured items, such as gates, grills
transport equipment from donkey and pony carts to frames for pickup trucks
water tanks and small cisterns
bed springs and fittings for furniture, e.g., handles, hasps, hinges, etc.

5.2 Economic Benefits

These are:

a. The value-added in terms of income generated and employment created which is likely to be some 750 new jobs for craftsmen and apprentices at the end of five years.

b. A saving in foreign exchange which can be taken as the value-added in Mauritania adjusted by a factor of 20%, so that perhaps 80% of the value-added can be assumed to be a savings in foreign exchange. The adjustment reflects the greater efficiency and lower costs of the overseas supplier, and the fact that there will be a degree of substitution by metal of traditional materials. Thus, the savings in foreign exchange could be put at 29 - 36 million UM ($625,000 - $780,000) a year after five years.

c. The secondary benefits of redistributed income in a small community can be very considerable, since money earned is unlikely to be saved but rather put to work in buying livestok, improving dwellings, raising living standards and thereby generating further local employment.

The return on the training project costs can be plotted as follows on the basis of additional value-added:

Incremental Value-Added	Year						
	1	2	3	4	5	6	7
UM million	-	4.5	9	14-16	19-23	25-29	27-36
$ 000	-	98	195	300-350	410-500	540-630	590-780
% on $1.06 million	-	9	18	28-33	39-47	51-59	56-74

It should be pointed out, however, that the main stimulus to growth will be from the availability of raw materials, so that the benefits of training can not be viewed in isolation, even if they are the only cost inputs.

If the capital cost of one or two trucks is added, plus running and maintenance costs, a factor of $100,000 per vehicle would needed to be added. On this basis, the rate of return would be as follows:

	Year					
	2	3	4	5	6	7
1 truck % on $1.16	8	17	26-30	35-43	47-54	51-67
2 trucks % on $1.26	8	15	24-28	33-40	43-50	47-62

5.3 Social Effects

Any new employment, or activity, created in rural communities must have a new widespread social impact since it implies a reduction in the numbers migrating to the larger town. Since it is probable that a number of the metal workerswill also help in planting and weeding the crops on family plots, there is opportunity for the family to cultivate a slightly larger area of land, with a consequent increase in output and income. To some extent an increase in male labor might be offset by a lower labor input by women, but overall there is likely to be a net benefit.

The use of metal implements, particularly for water storage, could raise the level of hygiene simply because more water will be available even during the dry season. New products that can be made available from metal will enhance the quality of rural life.

5.4 Environmental Effects

The environmental effects of increased output by metal workers should be benign. At the least, there should be a greater tendency of recycling metallic waste which is currently left to rust.

CHAPTER 6. MODALITIES FOR FINANCING

6.1. Anticipated Sources

The major financing contribution would be made by a donor of scrap metal. All on-shore costs in Mauritania would be passed on to the blacksmiths and their customers. The question of distribution of metal from port of entry to the rural towns is one which might be handled through a para-statal agency, but the principle will be to ensure that the operation is self-financing.

The training team could be funded by an external agency as a long-term grant, which would be the procedure if UNIDO or UNDP were to be involved. Alternatively, other agencies or unilateral donors could be attracted to a low-cost project of this nature.

6.2 External Finance Requested

In view of the GIRM's budgetary constraints, it is necessary to look to a foreign source for all of the $1.06 million required for the technical training program.

A donor of scrap metal might be expected to spend $50,000-$100,000 a year in the cost of material alone. It would be necessary to maintain this supply over at least five years.

CHAPTER 7. PORJECT MANAGEMENT AND ORGANIZATION

7.1. Project Structure

A team of four technical instructors is proposed with some field office back-up. The team would be located in the riverine area, most probably at Kaédi, where a base would be established. The team would travel to the other five towns. International support services would be provided by the headquarters organization's representatives in Mauritania.

7.2 Relationships with GIRM

The status of the project would be seen as providing technical assistance in association with the Ministry of Industry and Commerce.

7.3 Tracking Results

The direct impact of the project can be measured by the levels of employment by blacksmiths in the six towns.

CHAPTER 8. STUDIES TO BE MADE

8.1 Complementary Studies Needed

It would be very important to the growth of metal-working in both the formal and informal sectors if options could be examined for setting up workshop areas in the six target towns. At present, blacksmiths are located at random rather than in any specialised location. In view of the aim of quadrupling the size of the metal-working sector, there will be a need to expand physically which could present the opportunity for providing municipal workshop areas. There would be obvious benefits to the metal-working sector if all those operating in it were located in the same area. This would offer scope for specialization, or co-operative ownership of expensive equipment which, in turn, would facilitate the use of more sophisticated techniques of manufacture and, possibly, of commercial operation. There could be advantages in locating complementary activities, such as woodworking and joinery, or mechanical workshops in the same area.

A study of the problems and advantages of establishing such workshop complexes could be carried out in one or two representative centers. The time involved need be no more than 8 man-months.

A second topic vital to the growth of private enterprises, which needs to be explored, is that of making loan capital available to small-scale concerns. In practice, there are no opportunities at present in any of these towns, except Rosso, for artisans to obtain loans or credit. If small businesses are to modernize and expand, access to capital is essential, but conventional loans may not be the solution when the borrowers are small artisans without assets which can be offered as collateral. The problem is severe in these towns and would require detailed study.

A team of two, working for about 6 months each, should be able to make some practical proposals for easing this lack of capital.

Traditional Maritime Fisheries

PROJECT SUMMARY:

Date: June 8, 1981

Reference: RAMS

Title of Project: Integrated Development of the Imraguen Region Phase I: Feasibility Study

COUNTRY: Mauritania

Region: Dakhlet Nouadhibou and Trarza

Sector: Artisanal Maritime Fishery

Ministry or Department concernced: Maritime Fisheries Department

Project Objectives: To study in depth and to inventory possibilities of developing the areas where Imraguens live, to help reduce their tenuous existence as fishermen.

Total Estimated Cost:
US$ 170,000

External Financing Required:
US$ 170,000

Summary: To carry out a study to assess the utilization of solar and aeolian energy to obtain salt from sea water and ice for the transportation and preservation of fish, to evaluate the possibility of dried fish to Akjoujt, ect.

Project duration: 18 months

Starting date: As soon as possible.

1. Title

Integrated Development of Imraguen Region. Phase 1: Feasibility Study.

2. Place:

The Mauritanian Coast, from Tiouilit (in the Region of Trarza) in the South, to the Western base of Cape Agadir (in the Region of Dakhlet Nouadhibou) in the North. A part of this Coast belongs to the Inchiri Region. Its major part, from the Western base of Cape Agadir till Cape Timirist is situated in the National Park of the Banc d'Arguin and any development in this area must first of all give priority to the preservation of vegetation and particularly:

- the protection of sea-birds
- the protection of the monk seal
- and the protection of fish spawning areas

Consequently it is the area between Nouamghar and Touilit that direct efforts to help Imraguen fishermen must be concentrated while conservation activities are to be concentrated between Cape Timiris and Cape Agadir.

3. Objectives

To carry out an in-depth study in order to establish an inventory of means of developing the area to help reduce the hazards confronting the lives of the Imraguen fishermen. Among other problems the question of how to use solar and aeolian (wind) energies will studied in order to:

- provide drinking water, which at present is brought entirely by tank-trucks from Nouakchott or from Nouadhibou by ship and sold at exhorbitant prices;
- desalinate sea water to obtain salt, especially for preserving fish (salt is presently imported from Kaolack, Senegal).
- provide means of refrigeration and especially ice-blocks for the conservation and handling of fish;

- improve the condition of certain concrete buildings (infirmary) dispensary, school and rest house, etc.

No chance will be neglected that might open up to some extent the Imraguen economy which is now completely dependent. Among the problems to be studied are:

- the transportation of fresh water and dried fish by camel caravans to and from Akjoujt.
- improving access to the area by improving the road from Nouakchott to Nouamghar;
- boat transportation between Nouakchott and Nouadhibou on one hand and the Imraguen Coast on the other;

  the creation of a surveillance post at Nouamghar for industrial fishing with a very rapid boat especially designed for protecting the waters of the National Park of the Banc d'Arguin.

- building of a small wildlife observation station at Iouik by the Franco-Mauritanian Cooperation where two or three researchers (expected at the end of 1981) could be permanently lodged, subject to approval by the IMRS and the National Museum of Natural History of Paris (professor Theodore Monod who is at present a scientific advisor to the National Park);
- a limited number of tourists with express permission from the IMRS could also stay there;
- a pilot project in restoring the vegetation (shade, forage, vegetables etc. . .)

4. Rationale

The very particular and difficult situation of the Imraguen has been the subject of many studies. An FAO project designed to open up the southern part of the Imraguen Coast has already been implemented and the present project could support its activities.

Mr. Reizer, fisheries consultant for the RAMS Project who visited the Imraguen Coast on May 22, points out that the Imraguen Coast is short of everything: fresh water, salt and energy supplies. Everything is imported except the fish. The Imraguen have no social services. Consuquently, they are absolutely illiterate.

Their economy, which is exclusively based on fishing is subject to the good will of Nouakchott or Nouadhibou buyers.

The goals of the Project should be:

- to bring in the vital minimum such as fresh water and salt in priority, these ice-blocks;
- to furnish them with teachers and nurses;
- to facilitate access to the region by improving the track from Nouakchott to Timiris or by improving access by sea.

5. Description

It is proposed that the project be attached either to the ADD or to the Office of Fisheries. It is above all necessary to first study the possibilities of the multiple uses of both solar and aeolian energies. It is therefore proposed to recruit a consultant a period of one month through the Institute of Regional and Environmental Planning of Montpellier, which has highly qualified research workers, mainly in the field of solar refrigeration. This consultant will examine the possibilities in the area itself. He will visit, among others, the Local Office of the FAO which already has a very interesting project to improve access to the southern part of the Imraguen Coast; of particular interest are the transportation of fish and of ice-blocks in an isothermal vehicle coming from Nouakchott. The consultant will also be in touch with the MAC, the Committee of the National Park of the Banc d'Arguin, the Franco-Mauritanian Ornithological Station in Iouik and with the local USAID office which is building a solar energy center. He will also be in contact with the architectural and urban services development services and with the Agrhymet Project of UNDP/WMO.

At the end of his visits and his field trips, the consultant will produce a first report in which he will study and evaluate the possibilities of:

- providing fresh water, salt, refrigeration and solar energy;
- providing energy and the pumping by harnessing the wind;
- constructing climate-controlled buildings using solar and wind power and taking advantage of cool underground humidity as well;
- methods of drying fish in the sun.

During his visit to Mauritania the consultant will visit the abandoned desalinazation plant in Nouakchott and will study the possibilities (which seem doubtful), of either re-opening it or of putting it to another use. If such possibilities exist, he may, if he wants, visit the company which drew up the plan for the factory. He will then write a second separate report, giving his opinion on the re-using this factory.

If, in a second phase, the GIRM, after having examined the consultant's reports, decides to continue, a second mission will be constituted. Its composition and duration may be definitely determined only after presentation of the consultant's first report and will include:

- the first consultant as Mission Head for a period of two months;
- an architect specialized in arid areas and of the use of solar and aeolian energies for a period of a month;
- a solar mechanic for three weeks;
- specialist in wind energy for three weeks;
- a specialist in traditional fishing and fish drying, for a period of two months;
- an agronomist or forester specialized in very arid coastal areas for a period of two weeks;
- an economist for one and half months;

- a sociologist capable of communicating with the Imraguen, for a period of two months (this post can be filled by a Mauritanian, for instance Mr. Abdel Wedoud Ould Cheik of the IMRS).

The sociologist will be especially concerned with the following issues:

- acceptability to the Imraguen of the development activities proposed.
- Imraguen participation in the proposed project;
- acceptability of the Imraguen's development by the rest of the population;
- the possibility of an Imraguen cooperative association for the transportation and direct sale of fresh and dried fish in Nouakchott, Akjoujt and Nouadhibou (the extension or localization of the cooperative founded with the support of the FAO);
- the possibility of specialized training for the Imraguen: for example, training in fish drying, a driver for the cooperative vehicle, a mechanic for small fishing boat engines, a nurse, a teacher for a technical literacy school;
- the possibility of improving child nutrition;
- the possibility of assisting women in areas such as health, nutrition, handicrafts, small fish processing operations, poultry raising.

The agricultural expert (or forestry expert) will particularly concern himself with the possibility of condensing the humidity of the air during the night (Chihuahua System), and with using the fresh water which may thus be obtained together with water which may be provided by the solar plant in order to grow vegetables or even various fruits. He will also propose possible means of stabilizing the sand dunes and establish vegetation, especially on coastal range of dunes. (Atriplex, Tamarix, Propsopis - Salvadora, Chenopodiacees; or even Acacia saligna, A. Cyclops, A. Melanoxylon,

A. laeta, A. Tortilis var. raddiana, etc.)Finally, he will examine the possibility of utilizing organic wastes (compost, fertilizers, farm-yard wastes or even biogas, etc.) and will find out if it is possible to produce material for weaving the mats for which the Imraguen women are noted.

The architect will be responsible for solving the problems of installing a solar and aeolian energy plant. In addition, he will study (in cooperation with the sociologist as well as with the energy specialists) means of constructing living quarters using at the same time:

- the wind, to ventilate the houses (as in certain Iranian houses, which have wind towers) and to provide energy;
- shade;
- the cooling qualities of deeper soil;
- and if possible, the use of local materials

The first buildings may be:

- a dispensary - infirmary
- a technical literacy center.

In the area of air conditioning, if there is enough electricity to run an electric fan and a little fountain, the possibilities of the following system will be examined:

- a fabric cover hung vertically in front of a window and whose lower end is in a basin of water inside the room.
- a little electric water pump in the basin that will send the water to the upper part of the cover;
- an exterior electric fan to pump water through the cover.

With this system, which consumes less energy than a standard air conditioner the result is a lower temperature and higher humidity in the room (Baumer experiment, 1962, in El Obeid, the Sudan) Although this system may prove useful in the Imraguen's houses where the humidity of the air is higher, it works best in a very hot and dry climate. The role of the mission will be to provide a detailed feasibility report on the integrated development of the Imraguen Coast.

The mission will have at its disposal:

- two Land-Rovers with electric pumps, hand pumps, extra gas tanks, jerrycan for water and fuel and roof galleries
- camping materials (tents, beds, tables, chairs, lamps, jerrycans, stoves, bedding , etc)
- apparatus for recording sounds and pictures;
- small topographic materials;
- instruments for measuring wind velocity, insolation and humidity , etc. . .

The government must be responsible for providing

Drivers:

counterpart interpreters, at least for:

- the Head of the Mission;
- the Fishing Expert and for
- the Agronomist; and it must try ot provide small topographical and meteorological materials as a loan.

It is important that the recruitment of the mission team be supervised by the Head of the Mission in order to insure homogeneity and harmonious working relations within the team. There will be a special allocation in the team's budget to enable the Head of the Mission to make the necessary contacts as soon as the second phase is approved.

It must be pointed out that the second phase will only follow directly the first phase closely if the vehicle and camping in materials and supplies are available and ready to be used in Nouackhott before the arrival of the second mission. That is the reason why the purchase of equipment is included in the financial estimate for Phase I In Phase II does not take place the equipment will be deposited at the UNDP, if it will accept it, the development will be used for various other projects.

It is therfore expected that UNDP may be the Administrative Agent of this project and financing for an Administrative Assistant needed to work for fifteen days is provided for this purpose in the budget in addition to compensation for administrative expenses.

6. Implementation Plan

The first phase may start immediately after financing is found.

The second phase will start only after the equipment has arrived in Nouakchott and is ready for service under UNDP supervision, the material should be delivered via Dakar to five months after the first phase.

Plans are threfore as follows:

The most Optimal Situation		The most Realistic Situation		
September-October	1981	March-April	1982	first mission and order of the equipment
March-May	1982	March-May	1983	second mission feasibility report
June	1982	August	1983	

7. Cost Estimate(in US$)

Phase I

Documentation (cards, reports, exchange of correspondence	250
one consultant for one month	6,600
Trips: one to Mauritania and on to the USA	2,500
Report and Secretariat	700
2 Land-Rovers	40,000
Camping meterials	3,000
	53,050
Contingency 10% 10%	5,305
	58,355
Administrative expenses 14%	8,170
Total Phase I	66,525

Eventual Project Follow-up and Relations with Other Proeject.

If the feasibility study yields positive results it will lead to an actual Project. This Project would have various implications on national level:

- the improvement of the quality of life of one of the most under-privilodged sub-group of the Mauritanian population ;
- the increase in the availability of fresh fish;

- experiments in the field of solar and wind energy as air conditioning aids;

- experiments with multiple use of both wind and solar energy.

These last two points are particularly important because they may eventually be extended all over the Mauritanian Coast and in the other Regions.

However, if it proves possible to provide water and energy at a relatively low cost, especially in Nouamghar, it may be possible to improve environmental conservation efforts in the " National Park of the Bank d'Arguin" and develop a very small tourist activity around the Park.

The project must work in close collaboration with the FAO project which is already operational and with the AID project, "Center for Alternative Energies."

Phase II

Head of Mission	2m/m	13,200
Architect	1m/m	6,600
Solar mechanic	3 weeks	4,000
Aeolian specialist	3 weeks	4,000
Fishing specialist	2m/m	10,200
Agronomist	2 weeks	4,000
Economist	1 1/2m/m	7,650
Sociologist	2m/m	10,000
Administrative Assistant	2 weeks	2,000
Recording aparatus, films and cassette - rental		2,000
Small topographic material		p.m.
Small meteorological material		p.m.
Supplies		500
Communication expenses		200
Compensation for Mauritanian staff		
2 drivers for 60 days		2,400
3 counterparts for 60 days		9,000
Report and secretarial expenses		5,000
		80,870
Contingency	10%	8,075
		88,825
Administration charges	14%	12,435
Total Phase II		101,260 USD
Grand Total (both Phase I & II)		167,785 USD