

Consortium for International Crop Protection

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PROJECT
JOINT FAO/DONOR REVIEW
OF THE 1986
GRASSHOPPER CAMPAIGN IN THE SAHEL

Team Report
for
Mauritania

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I. ACKNOWLEDGEMENTS

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The Ministry of Rural Development was most helpful and freely gave us needed information and documents.

Those contacted in the donor community also gave us needed information and their views on the campaign which proved valuable in preparing this report.

II. INTRODUCTION

The favorable rains in 1985 resulted in a notable increase in Grasshopper populations, particularly Oedaleus senegalensis in the southern part of the country between latitude 15 and 16 north. Concurrently, other pests progressively increased in number: such as the Millet Head Worm (Raghuva sp. and the Stem Borer (Acirone ignifugalis.) Crop losses of over 20 percent as determined by the Crop Protection Service aggravated the food deficit for the country.

Although rains came late in 1986, they were well-spaced and conducive to a rapid increase in grasshopper populations. This was predicted by the Integrated Pest Management Project (IPM) and monitoring was carried out early in the season.

Without exception the FAO/Donor Team heard favorable reports on the campaign from donor and Government of Mauretania personnel. The FAO Representative and staff were instrumental in organizing the donor community and developing the Steering Committee to successfully undertake the ground and aerial spray campaign.

This report evaluates the 1986 Grasshopper Campaign and formulates future planning for the 1987 cropping season and the years beyond.

ACRONYMS

FAO	Food and Agriculture Organization
MRD	Ministry of Rural Development
EEC	European Economic Community
GRIM	Government of the Islamic Republic of Mauritania
FRG	Federal Republic of Germany
FAC	French Assistance Fund
MCPS	Mauritania Crop Protection Service
IPM	Integrated Pest Management
OCLALAV	Organisation Commune de Lutte Antiacridienne et de Lutte Antiaviaire
CILSS	Comité Inter-Etats de Lutte contre la Sécheresse dans le Sahel
USAID	United States Agency for International Development

LIST OF PERSONS CONTACTED

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DONOR SUPPORT
SUMMARY FOR MAURITANIA
IN U.S. DOLLARS

FAO		166,000
FAC	Pesticide & aircraft	68,500
MOROCCO	Vehicles	150,000
EEC	Pesticides (Diazinon) (Fenitrothion) Aircraft	600,000 1,000,000
ITALY	Pesticide (synthetic pyrethroids)	40,000
ALGERIA	Aircraft	50,000
U.S.	Thru FAO	270,000
FRG	Pesticide 50 MT Propoxur	625,000
CARE	Ground crew support	13,000
U.K.	Pesticide	7,500
	TOTAL	<u>\$2,390,000</u>

III. THE CAMPAIGN

Survey and Reporting

Survey efforts by the MCPS are an ongoing activity. Monitoring of grasshoppers for the 1986 cropping season began at the end of 1985 when areas with high residual populations were identified. Survey operations in Mauritania are implemented by the CILSS/FAO/USAID IPM project, which works in very close cooperation with the MCPS, and MCPS crop protection teams. At the beginning of the 1986 rainy season there were 13 IPM observation posts in operation and 11 mobile crop protection survey/intervention teams. The IPM observers work in a more limited area and do intensive type surveys, whereas, the CPS teams are mobile and surveys tend to be more extensive.

Both IPM observers and MCPS team leaders are trained to conduct surveys using standardized methodologies. Survey results are communicated from the field to MCPS headquarters in Nouakchott via a radio network. IPM radios are located in each observation posts. MCPS teams have vehicle mounted radios using the same frequencies as IPM radios. These radios also allow for communications with the OCLALAV radio network.

Prior to, and during the period of aerial application operations, survey efforts were reinforced by the use of a helicopter to identify zones of high grasshopper density. This proved to be an effective part of the EEC financed aerial control operation.

Appraisal of System

The survey system in place appears to have worked quite well in detecting grasshopper infestations. Ground treatments were initiated early in the season in response to the hatching of grasshoppers after the first rains in July. A long dry period followed (July-August) which contributed to grasshopper mortality. Rains resumed in September and grasshopper populations began once again to increase. The identification of zones for aerial application relied to a great extent upon results of the ground survey network. This effort was complemented in the western part of the country by the survey work conducted by the Alouette helicopter.

Problems with the survey network, as identified by the MCPS service, include breakdown of radios and vehicles during the season. Difficulties seem to be minimal and can easily be rectified with the infusion of spare parts and repair during the dry season.

Control Operations

Ground control operations were implemented by 11 MCPS mobile intervention teams. These teams were responsible for survey and reporting, farmer training, distribution of pesticides to farmers, and intervention with pesticide applications when infestations became generalized and surpassed farmer means.

Farmer training began as early as December 1985 when 437 farmers in the Brakna and Hodh el Chargui regions (Boghé & Nema) received training from crop protection personnel. This was reinforced in June and July with training taking place in all agricultural regions. The national radio station was also used to sensitize farmers to crop protection issues.

Pesticides were distributed to farmers in all regions (618 MT of 2% Propoxur dust) prior to the rainy season. Together farmers and teams treated approximately 100,000 hectares with this material. No exact figures are yet available on ground treatments as the season has just now ended.

Aerial Treatments

<u>Zone</u>	<u>Aircraft Type</u>	<u>Donor</u>	<u>Date</u>	<u>Area Treated</u>
West	Piper PA 28	EEC	12/9 - 03/11	52,000
	Alouette (helicopter)	EEC	13/9 - 25/10	62,500
East	2 Bell 47G2 (helicopters)	USAID	19/9 - 24/9	21,500
	Piper PA 25	USAID	19/9 - 26/9	9,000
	1 DC7	USAID	10/10	20,500
	3 Antonov	Norway	10/10	27,600
TOTAL				<u>193,100</u> ha

Aerial treatments in the west were conducted by a team of 2 airplanes (one for liaison) and one helicopter (for treatments and survey) financed by the EEC. This team treated a total of 114,600 hectares during the course of the season. Post treatment surveys indicate that applications were very effective killing 90-100% of all grasshoppers. Difficulties during this operation included lack of sufficient airplane fuel in Kaedi, and the sporadic lack of sufficient quantities of pesticides due to transportation problems between Nouakchott and Kaedi.

The aerial treatments in the western zone were conducted out of Mali. Treatments were also highly effective in this area killing 95% of the grasshopper population. A major difficulty encountered during this operation was a delay in receiving written authorization for the Norwegian planes to enter Mauritania airspace. Another constraint was the lack of usable landing strips.

Conclusions

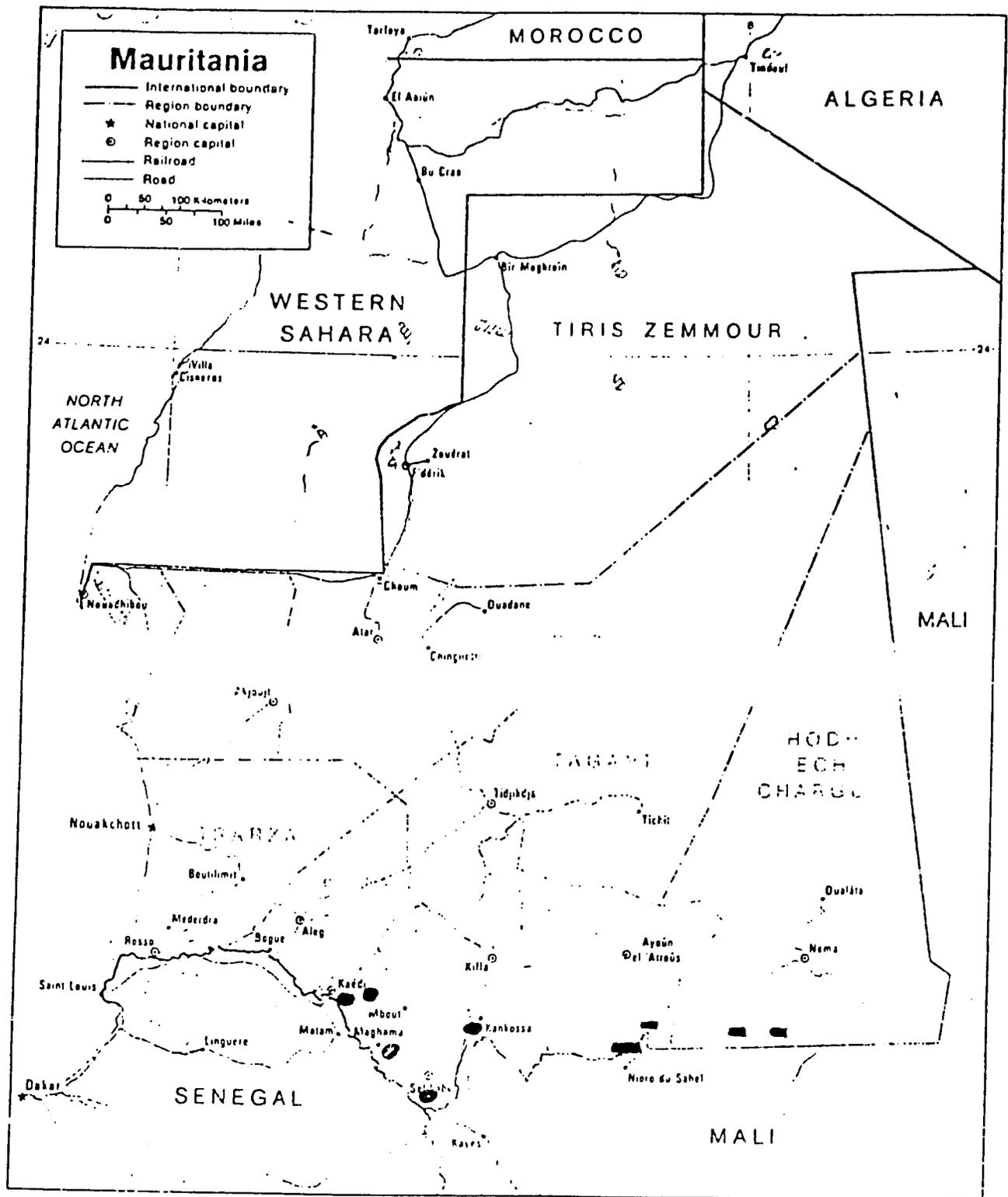
The grasshopper control operations in Mauritania appear to have been conducted in an organized and professional manner. Having taken into consideration higher than normal grasshopper densities in 1985, the Mauritanian CPS planned a rational control strategy for 1986. The plan was sufficiently flexible to allow for change in accordance with the evolution of the grasshopper problems.

The donors, coordinators, and implementors involved in the 1986 grasshopper campaign should be congratulated. The major participants include:

- The Chief of MCPS who took charge of the situation and made operational decisions without undue hesitation.
- The Senior technical expert of the CILSS/FAO/USAID IPM project who worked in close collaboration with the crop protection service throughout the cropping season.
- The donors for their rapid response to requests for assistance from the GRIM. In particular, the EEC should be singled out for their foresight in making funds available for crop protection very early in 1986.
- The steering committee under the direction of FAO for coordinating donor assistance in an effective and timely manner.
- The MCPS ground intervention teams and IPM observers for their dedicated field work conducted under the often harsh conditions encountered in the interior of Mauritania.

The major difficulties encountered during control operations include:

- Transportation of pesticides both from outside Mauritania to Nouakchott and from Nouakchott to points of utilization in the interior.
- Transportation of fuel to the interior. The lack of a well developed road network often leads to fuel shortages in the interior of Mauritania during the rainy season.



The areas indicated are the approximate locations of aerial spraying operations.

IV. INSECTICIDES USED, EFFICACY AND SIDE EFFECTS

Ground Operations

Ground treatments of infested areas were conducted in 1986 with 618 tons of propoxur dust 2%, used at a rate of about 10 kg/ha. The area treated by farmers and the MCPS together is estimated at 100,000 ha. The insecticide had been distributed throughout the major production regions before the campaign (June). Efficacy was estimated to be near 100% in most cases; these treatments enabled an effective protection of the first plantings. Data on side effects of any kind are not available.

Aerial Operations

Aerial treatments in the western part of the country covered a total area of 114,600 ha. For insecticides used see table 1. Apart from those, 20 tons of dust were used in the operations (propoxur 2% and fenitrothion 1.8%).

In the eastern part of the country (Hodh Chargui and Hodh El Garbi), 78,544 ha were treated. Insecticides used were fenitrothion 96 ULV and malathion 50 ULV. No data on quantities and dosage rates are available other than for areas treated by the American DC7's. The DC7's covered 20,500 ha with malathion 90 ULV at a dosage rate of 0.58 l/ha. The dosage rate is low compared to the dosage of the same pesticide registered for use in temperate countries. Efficacy was observed to be more than 90%.

Side Effects

Storage facilities for pesticides at several observation posts were inadequate and some weathering damage occurred. Small storage buildings are required.

Intoxication of humans or cattle was not observed. Clear symptoms of phytotoxicity were found in a single case after spraying fenitrothion 96 ULV on sorghum. Data on other side effects (non-target organisms) have not been collected.

Table 1 Insecticides Sprayed in the Western Region

<u>Insecticide</u>	<u>Quantity (l)</u>	<u>Dose (l/ha)</u>
Fenitrothion 50 ULV	8305	0.5
Fenitrothion 96 ULV	10430	0.3
Malathion 50 ULV	4160	0.5
Diazinon 90 ULV	9960	0.3

Although the arguments for selecting the insecticides used are not known, the selection made and the dosage rates were adequate. Efficacy was good, and efficacy evaluations were made consistently. Evaluation of side effects on the environment is completely lacking; available manpower was insufficient. It appears that accidents of intoxication have been prevented by a careful spraying practice and timely information of the population by radio, and by the low mammalian toxicity of the products.

V. COST/BENEFIT ANALYSIS

The 1986 growing season in Mauritania was favorable. Data on crop losses due to grasshopper attack are not available. Crop losses caused by pests in previous years are estimated to be more than 20%. Observations on crop injury in 1986 showed that even though there were heavy grasshopper infestations little damage was experienced except in the regions of Touil and Koboni (Eastern part).

Mauritania has about 200,000 ha of arable lands, with millet, sorghum, corn, rice, and beans as the main crops. Donor support for grasshopper control operations amounted to approximately \$2,390,000 or \$12 per hectare of cultivated land.

At a productivity of 500 kg/ha, a market price of \$120/ton and cultivated area of 200,000 ha, the value of the whole cereal production of Mauritania would be around \$12,000,000. It is concluded that roughly the donor contributions to the control operations had a value of about 20% of the agricultural production.

VI. RECOMMENDATIONS

1. Reinforcement of the crop protection service. Mauritania already has the framework of an efficient crop protection service which should be built upon to increase their capabilities to deal with crop protection problems. Assistance should be continued to provide:

- training of personnel, long and short term.
- material assistance for purchase of new equipment and repair of old. In particular, there was real need for large trucks to transport pesticides and fuel to strategic locations in the interior.

2. Funds should be made available as soon as possible to purchase the necessary quantities of pesticides for the 1987 season. This would allow for shipment of pesticides by sea, thereby avoiding expenses associated with airfreight. If, by chance, additional pesticides are needed just prior to or during the 1987 cropping season these can be ordered by airfreight.

3. The CILSS/FAO/IPM project will be terminated in March 1987. This project has been extremely effective in Mauritania, due in a large part to close collaboration with the MCPS. An effort must be made to insure the continued operation of the 13 observation posts installed by this project. Also, the expertise and direction provided by the senior technical advisor of the IPM project cannot be ignored. This type of technical expertise should be continued if at all possible.

4. Landing strips in the interior of the country should be repaired to facilitate future aerial interventions if necessary. This would allow a better coordination of east-west aerial operations in the future.

5. In view of the migratory nature of the major grasshopper species (Oedaleus senegalensis), it is recommended that the governments of Mali, Senegal, and Mauritania work out agreements which would facilitate movement of air and ground teams involved in grasshopper or locust control activities.

Desert Locust (Schistocerca gregaria)

Immature desert locust bands are currently located in the Tagant region of central Mauritania between 18.04 and 18.50 North latitude and 12.15 and 12.20 West longitude. Three OCLALAV survey/intervention team and three MCPS teams are currently operating in this area. The Piper PA 28, which was working in western Mauritania during the grasshopper operations, has been moved to the Tagant to assist with locust control. In addition, 2 Algerian planes were expected to arrive on November 19 to assist with operations. The evaluation team emphasized the need to conduct locust control operations with a minimum of 2 airplanes due to dangers associated with operations in desert zones.

VII. GENERAL RECOMMENDATIONS FOR GRASSHOPPER CONTROL STRATEGY FOR NATIONAL CROP PROTECTION SERVICES

Grasshoppers are an endemic problem common to all Sahelian countries. In order for grasshopper populations to be controlled, a well organized strategy must be developed. Following is a brief outline of the steps which the evaluation team feels must be included in a general strategy for combatting grasshopper populations.

1. Farmer Intervention: Soon after the first rains grasshoppers begin to hatch from eggs laid at the end of the previous season. These early populations are a threat to newly planted crops. During this period, emphasis should be placed on treatment of localized populations by farmers. Only farmers are able to detect these localized populations. Treatments should be made with simple equipment such as dusting sacks. In order for this initial control operation to work, the farming community must be sensitized to the potential threat of grasshoppers, and trained in the management of grasshopper populations. The Crop Protection Service, along with the extension services, must be responsible for the early distribution of pesticides to farmers, and the training of farmers in the use of these chemicals.

2. Ground Treatment by CPS Teams: During the entire cropping season the Crop Protection Service must have a sufficient number of teams in the field for grasshopper survey and eventual intervention if necessary. These teams should be led by agents adequately trained in pest detection and management. Survey must necessarily be conducted in a systematic and standardized manner with results reported on a regular basis. The team must also have sufficient autonomy and decision making responsibility to allow for intervention without waiting for a decision from headquarters. Intervention decisions must absolutely be based on thresholds elaborated by experts prior to the season.

Team operations must be coordinated on a national basis by the director of the service along with his technical advisors. Decisions on movement of pesticides, teams, and other resources must be swift and based on up-to-date reliable field data.

A strategy with a well defined calendar of activities must be elaborated at the end of each season to ensure that preparations are made for the upcoming year. Pesticides must be ordered on time and distributed in the country. Vehicles and other equipment must be repaired and/or replaced. Training of crop protection agents and farmers must be scheduled and conducted. All of these activities necessitate a well organized management system that depends to a very large extent on the competency of national crop protection service directors.

3. Aerial Pesticide Application: The use of airplanes to rapidly treat heavily infested areas should not be excluded from the arsenal of crop protection tools. This type of intervention should be kept to an absolute minimum and initiated only in response to sound field data. This will allow for "spot" treatments in areas of heavy grasshopper densities.

Preparations for the possible use of aircraft in grasshopper control operations should be made during the period between cropping seasons. Landing strips should be built or repaired to allow for multiple centers of operation. Arrangements should be made in advance to allow for rapid arrival of aircraft if aerial treatment are deemed necessary. The Sahelian states must attempt to arrive at agreements to facilitate the movement of aircraft and pesticides from one country to another.

As was the case in 1986, aerial application of pesticides in the foreseeable future, will depend on donor financing. Donors should remain as flexible as possible to provide rapid assistance if needed in the context of a well planned strategy for control of grasshoppers. Contacts and mutual preparations should be initiated as soon as possible to facilitate mobilization of resources if grasshopper populations in 1987, once again, reach levels that cannot be properly managed by ground application methods.

4. Evaluation of the efficacy and environmental impact of pesticide applications, whether by ground or air, should be conducted until it is clear that efficacy is optimal and that negative effects are acceptable. This is especially important with large scale aerial treatments which could have a widespread negative environmental impact. Recently developed pesticides, especially synthetic pyrethroids, should be routinely tested for possible incorporation into Sahelian grasshopper control operations.

5. Intervention thresholds both for aerial and ground application must take into account grasshopper population dynamics, phenological stage of crop development and a technically based evaluation of risk for crop damage. Definitions of such thresholds could be worked out with assistance by PRIFAS.

VIII. CONSIDERATIONS FOR REGIONAL ORGANIZATIONS

There are two areas in which Sahelian countries could benefit from a regional crop protection organization.

- a. Survey and preventive control operations against the migratory locusts.
- b. Assistance in aerial control operations against agricultural (and possibly public health) pests when infestations surpass national crop protection service capabilities.

The evaluation team believes it is important to deal with these two pest situations on the regional level. Up to the present, OCLALAV has been responsible for preventive operations against the Desert Locust. OCLALAV has also assisted Sahelian countries in grasshopper control operations to a limited extent (1974-75 in Senegal, Mali, Mauritania, and Niger).

OCLALAV has many well-trained and experienced agents, but no longer has the financial means necessary to respond to locust or grasshopper problems. They currently have only one usable aircraft in the western sahelian zone (which was repaired with donor assistance for the 1986 grasshopper control efforts). Salaries of OCLALAV personnel cannot even be assured at this time.

There appear to be several possibilities for dealing with regional pest control problems. These include 1) revitalization of OCLALAV, 2) creation of a new organization(s) or 3) reinforce national crop protection services to such an extent that they are able to deal with these types of problems.

Due to the complexity of this problem, the evaluation team recommends a separate study to consider the cost/benefits of these alternative possibilities.

Some of the issues which should be considered in this type of study are:

- As presently structured, OCLALAV depends on its member countries for funding. This funding has not been sufficient in the past to assure operations. Member countries also have an influence on personnel management within OCLALAV. This has created situations in which ineffective personnel could not be eliminated from the organization. In order for a regional crop protection organization to be effective, it must have financial and administrative autonomy.
- A revision of the current survey/control strategies must be made. This should take into account modern advances in technical tools which could be adopted to pest problems (computers, remote sensing, mathematical models of population dynamics, biological control, modern insecticides).

- It is essential to continue "OCLALAV TYPE" ground survey operations, in particular for Desert Locust and other migratory acridiens.
- It would be beneficial to have aerial control capabilities based in the Sahel for locust and other pest situations. In order for this to be more cost effective, operations could be envisioned in both the agriculture and public health sectors.

Any eventual projects developed by a study team should be with the agreement of all concerned parties (Sahelian and Northern African countries, donors, international organizations). A guaranteed source of long-term funding is essential to assure smooth operations.

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