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ORGANIZATION OF AFRICAN UNITY
Scientific, Technical and Research Commission
OUA/STRC.

DRAFT MASTER PLAN
FOR SAFGRAD

Semi-Arid Food Grain Research And Development.

1986 - 2000

The Coordination Office
OAU/STRC/SAFGRAD
BP 1783
Ouagadougou
Burkina Faso.

ORGANIZATION OF AFRICAN UNITY
Scientific, Technical and Research Commission
OAU/STRC.

THE DRAFT MASTER PLAN FOR SAFGRAD.
Semi-Arid Food Grain Research And Development.

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Coordination Office
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January 1986.

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ABBREVIATIONS

AGRHYMET	Regional Centre for Training and Application of Agricultural Metreology and Hydrology.
ACPO	Accelerated Crop Production Officer
CC	Consultative Committee
CDA	Cooperation for Development in Africa
CMPPD	Comprehensive Master Plan Project Document
ECA	Economic Commission for Africa
FAO	Food and Agriculture Organisation of the United Nations
FAC	Fonds d'Aide et de Cooperation
FSR	Farming Systems Research
FSU	Farming Systems Unit
IARC	International Agricultural Research Centre
ICRAF	International Council for Research in Agroforestry
IRA	Institut de Recherche Agricole
ICRISAT	International Crop Research Institute for the Semi-Arid Tropics
IDRC	International Development Research Centre
IFAD	International Fund for Agricultural Development
IITA	International Institute of Tropical Agriculture
ILCA	International Livestock Centre for Africa
IMPPD	Indicative Master Plan Project Document
INSORMIL	International Sorghum and Millet Cooperative
IRAT	Institute for Research in Tropical Agricultural and Food Crops
IVRAZ	Institut Voltaique de Recherches Agronomiques et Zootechniques
OAU	Organisation of African Unity
OAU/STRC	Organization of African Unity/Scientific, Technical and Research Commission
PID	Project Implementation Document
SADCC	Southern African Development and Coordination Conference

SAFGRAD	Semi-Arid Food Grain Research and Development
SCO	SAFGRAD Coordination Office
TAC	Technical Advisory Committee
USAID	United States Agency for International Development
ORSTOM	Office for Scientific and Technical Research Overseas (France)
ISANR	International Service for National Agricultural Research
CIMMYT	International Centre for Maize and Wheat Improvement
INSAH	Institute of the Sahel
CILSS	Permanent Inter-State Committee for Drought Control in the Sahel
SAT	Semi-Arid Tropics
PAM	World Food Programme
UNSO	United Nations Sahelian Office
LPA	Lagos Plan of Action

EXECUTIVE SUMMARY

Origin and Purpose

1. The initiative for the development of a SAFGRAD Master Plan Document was taken at the third meeting of the Consultative Committee (CC) of SAFGRAD in April 1984. At that meeting the OAU/STRC was mandated to prepare a Master Plan Document which would chart the course of development of SAFGRAD activities from 1986 and beyond.

2. The purpose of the Master Plan Document (MPD) is to present the detailed philosophy, goals and direction of development of SAFGRAD activities from 1986 towards years 2000. It conceives of SAFGRAD as an African Research Coordinating Agency under the umbrella of the OAU/STRC and focusses attention on the change in concept and methods of project implementation. Thus the Master Plan aims at guiding the activities of SAFGRAD over the immediate 10 to 15 years with a view to effectively strengthening existing national agriculture programmes in the 26 SAFGRAD member countries.

3. The Master Plan also gives detailed descriptions of proposed SAFGRAD priority activities in the immediate 5 years, indicating the components which could be financed by a group of donors.

4. Whereas the OAU/STRC is designated the Executing Agency, SAFGRAD Coordinating Office (SCO) will have the primary responsibility for project implementation.

Food Production in African SAT

5. The Semi-Arid Zones of Africa form major production areas for food and livestock products of the continent. However, the production potentials of this huge area are far from being realized; even worse,

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the resource base is subject to serious and continuous degradation as a result of recent droughts and rapidly growing populations. While the former has directly enhanced the desertification processes in the lowest rainfall zones, the latter leads indirectly to the same process under higher rainfall through overcultivation of a fragile resource base. While local farming technologies are often extremely sophisticated and contain valuable components for farming under high risk environments, these technologies also require important modifications to cope with the problem of sustained production under an increasingly permanent farming system (as compared to the earlier fallow systems).

6. For most African countries, these problems are compounded by poor marketing systems and poorly defined agricultural policies, infrastructures, as well as weak (in terms of trained manpower, facilities and funding) National Research programmes and Extension Services, which are receiving relatively little support from their Governments.

Awareness and Support

7. The increased international awareness of Africa's food problems has caused a drastic expansion of foreign aid over the last decade. A multitude of funding and implementing agencies operating at national and/or regional levels through bilateral and multilateral agreements, have subsequently become active. While these developments certainly have had positive effects, they have also contributed to increased fragmentation of national research efforts and to a large degree of overlap and duplication. Moreover, there will often be crucial differences between national programme research priorities and the priorities of international and/or regional, often commodity-oriented, research institutes and donors.

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Need for Research Coordination - Establishment of SAFGRAD

8. It was against this complicated background that SAFGRAD was created in 1977 as an OAU/STRC Project with mainly USAID support to reinforce and coordinate agricultural research and development for major staple food crops (maize, sorghum, millet, cowpea and groundnuts) on a regional basis; the ultimate goal being to increase the quantity and quality of these food crops available to the increasing populations of semi-arid sub-Saharan Africa.

9. Because of the geographical vastness of the area, the complexity associated with agricultural production in physically and politically very diverse environments, and the large degree of fragmentation in research as a result of many externally funded projects, an overall coordination effort from SAFGRAD, an African Agricultural Research Coordination Agency is vital.

10. The geographical mandate of SAFGRAD covers the Semi-Arid Zones of Africa and in particular the current 26 SAFGRAD member countries in West, Central, East and Southern Africa, namely Benin, CAmeroon, Cape Verde, Central African Republic, Chad, Ethiopia, Gambia, Ghana, Guinea, Ivory Coast, Mali, Mauritania, Niger, Nigeria, Senegal,Sudan, Togo, Burkina Faso, Botswana, Guinea Bissau, Kenya, Sierra Leone, Somalia, Tanzania, Zambia and Uganda.

11. SAFGRAD I was designed with the following objectives:

- establish the capability of African countries in the SAT to build and manage agricultural research networks for maize, cowpeas, sorghum, millet and groundnuts among participating countries;
- help the member countries to enhance the capabilities of their scientists and institutions to conduct agricultural research with broad applicability of results

to other participating countries for sharing through the interacting agricultural research networks.

. maximise contact between researchers so that the opportunity for beneficial cross fertilization of ideas leading to productive research methodologies and technology generation is achieved.

12. SAFGRAD I initiated programmes in many of its member countries in the following areas :

. strengthening national research programmes;

. research coordination and networking;

. establishing links between national/regional and international research and national extension services;

. training and research information exchange through symposia, conferences, workshops, monitoring tours, etc.

13. Over the nine years of its existence, SAFGRAD played a very positive role in institutional activities concerned with furthering of agricultural research in its mandated crops in Africa. In particular, it demonstrated, through its research coordinating mechanisms, that it is possible in Africa to achieve coordination between research, teaching, and extension interests so that research findings may be rapidly translated into practice in the farmers' fields. Therefore, the need to continue to strengthen the work of SAFGRAD, particularly in this area of widespread famine and hunger becomes even more important.

14. In the light of the achievements of SAFGRAD I and the recommendations of the 1984 USAID evaluation team, the consultative committee (CC) of SAFGRAD recognised the need for greater and more sustained efforts

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at both national and international levels for furthering the mandate and scope of SAFGRAD. In particular, SAFGRAD is expected to play a more effective role in the implementation of the "Five Year Special Programme for the Improvement of the food situation and Rehabilitation of Agriculture in Africa" adopted by the 1985 OAU Assembly of Heads of State and Government.

Future development plans

15. In the future development plans from 1986 to the years 2000, SAFGRAD has crystallised a number of key priority areas needing urgent attention to substantially improve the delivery capacity of agricultural research centres dealing with the mandated crops namely maize, sorghum, millet, cowpea and groundnuts.

16. In the domain of agricultural research the following orientations are recognised :

- research towards increased production of specific commodities in SAFGRAD mandate areas;
- research towards increased and more stable production of selected cropping systems presently used by small farmers;
- research towards sustained production at low levels of inputs (biological control of pests and diseases, resistant varieties, biological N-fixation by legumes) to prevent vast areas from going out of production in the very near future due to overcropping and soil degradation.

17. Furthermore, although the IARCs have the capacity to generate relevant agricultural technologies, this technology can only be successfully transmitted to the beneficiaries, namely the peasant semi-arid farmers,

through national agricultural research institutions which in turn should have the capability to receive and transfer these technologies. SAFGRAD future efforts will emphasize strengthening national agricultural research programmes of participating countries, concentrating on linkages within and between collaborating research institutions (IARCs) to promote the development and transfer of new technologies.

18. Based on the "Indicative Master Plan for SAFGRAD" which was approved and adopted at the extraordinary meeting of the Consultative Committee in August 1985 at Ouagadougou, the following priority programmes for the future activities of SAFGRAD have been identified :

i. Intensification of Research activities among member countries by responding to National Agricultural Research needs.

ii. On-Farm testing and Technology transfer (FSR and ACPP).

iii. Improvement of Research Management capability of national programmes.

iv. Research Coordination and Networking.

v. Collaborative Research with NARCs, IARCs including regional research programmes such as INSAH, SACCAR, etc.

vi. Training (short-term and long-term).

vii. Facilitation of the realization of cooperative National Research Centres links i.e. selected development of national agricultural experiment stations as centres of excellence for specific areas of research in order to serve satellite stations of participating member countries. For instance strengthening agricultural resource management research.

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viii. improving research communication;

ix. developing the SAFGRAD Coordinating Office as a long-term OAU Agency for the coordination of agricultural research.

19. SAFGRAD coordinated Networking programme activities in association with collaborating agencies will consist of the following :

i. West African Sorghum/Millet Network

ii. Eastern Africa Sorghum/Millet Network

iii. Maize Network

iv. Cowpea Network

v. Farming Systems and Technology Transfer (ACPP) Network

vi. Agricultural Resource Management Network

vii. Agricultural Research Management Network.

20. A major priority area of future development will be establishing the mechanisms for SAFGRAD to function as an African Research Coordinating Agency under the OAU/STRC. This would include strengthening SAFGRAD delivery and management capabilities to enable it evolve independently, functionally and financially. By this evolution, SAFGRAD would command the confidence and support of donors and participating African countries.

Funding

21. USAID funding to SAFGRAD in the next 2 years is planned to provide support for all the priority programmes except for Farming Systems Research and Long-term Training. AID will also concentrate its funding during years 3-5 on three programmes namely Research Networks, Short-term training and Response to National programme needs. There will also be some support for specific aspects of strengthening the capacity of the SAFGRAD coordinating office mainly through funding support staff positions.

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22. This definition of AID support to SAFGRAD thus gives room for other donor involvement in the following major areas :

- Farming Systems Research (IFAD already funding)
- Technology Transfer - Accelerated Crop Productinn Programme
- Long-Term Training, and
- Strengthening the training coordination capacity of the SAFGRAD Coordination Office.

CHAPTER I

INTRODUCTION

Origin

1. The initiative for the development of a SAFGRAD Master Plan Document was taken at the third meeting in April 1984 of the Consultative Committee (CC) of SAFGRAD. At that meeting the OAU/STRC was mandated to prepare a Master Plan Document which would chart the course of development of SAFGRAD activities from 1986 and beyond. The document, should be comprehensive and should reflect the philosophy, direction and goals of SAFGRAD.

2. The production of the Master Plan document started when SAFGRAD Coordination Office (SCO) commissioned a team of consultants in June 1985 to prepare a Framework for the long term planning of SAFGRAD. The report of the consultants was discussed at a Special workshop in July 1985, attended by African directors of research, scientists and the USAID. The views and recommendations which emerged from this workshop were contained in an "Indicative Master Plan" prepared by the SCO. This document, together with the Report of the consultants on SAFGRAD long range planning were exhaustively discussed and approved at a special meeting of the CC in August 1985 which was also attended by the USAID, SAFGRAD Project Paper design team.

3. At the August meeting in Ouagadougou, Burkina Faso, SAFGRAD priority programmes were redefined, classified and approved.

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As a follow-up to the adoption of the indicative master plan and the consultants' report, the CC called upon the OAU/STRC to translate the approved documents and recommendations into project ideas. In pursuance of the conclusions and recommendations of the August CC meeting, the OAU/STRC requested the assistance of the Secretariat of the United Nations Economic Commission for Africa (UNECA) to prepare a project document.

4. The UNECA project document was prepared in August 1985 and has been utilised together with a series of other reports and papers to prepare this Draft SAFGRAD Master Plan Document.

Purpose of the Master Plan

5. The purpose of this Master Plan Document (MPD) is to present the detailed philosophy, goals and direction of development of SAFGRAD activities from 1986 towards years 2000. It concieves of SAFGRAD as an African Research Coordinating Agency under the umbrella of the OAU/STRC and focusses attention on the change in concept and methods of project implementation. Thus the Master Plan aims at guiding the activities of SAFGRAD over the immediate 10 to 15 years with a view to effectively strengthening existing national agriculture programmes in the 26 SAFGRAD countries.

6. Furthermore, this Master Plan will give detailed descriptions of the proposed SAFGRAD activities and all the components which could be financed by a consortium of donors.

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7. Whereas the OAU/STRC is designated the executing agency, SAFGRAD Coordinating Office (SCO) will have primary responsibility for implementation of the projects.

8. USAID funding to SAFGRAD in the next 2 years is planned to provide direct support for all the priority programmes except for Farming Systems Research and Long-term training. AID will also concentrate its funding during years 3-5 on 3 programmes namely :

- Research Networks
- Short Term Training

and

- Response to National Programme Needs.

There will also be some support for specific aspects of strengthening the capacity of the SAFGRAD Coordinating Office mainly through funding for junior support staff positions.

9. This definition of the use of AID resources to SAFGRAD support gives room for other donor involvement in the following major areas -

- Farming Systems Research - for which IFAD is already providing some support.
- Technology Transfer. Accelerated Crop Production Programme (ACCP).
  - this programme would be modified to reduce its present level of costing and made more effective.
- Long Term Training - provision of core funding to SAFGRAD for Consultants Study of :

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(i) the immediate training needs of SAFGRAD member countries for agricultural research, management manpower and technicians;

(ii) identification of appropriate courses and African institutions for training;

(iii) development of evaluation and follow up, and research support system for trained agricultural scientists and technologists;

- Provision of support for strengthening the training coordination capacity for the SAFGRAD Coordination Office.

10. At the end of the 5th year, SAFGRAD would evaluate achievements, re-examine its priorities and seek further support for its programmes for the following 10-15 years.

CHAPTER II

BACKGROUND TO THE FOOD SITUATION IN THE AFRICAN SEMI-ARID TROPICS (SAT).

The African Food Problem

11. Africa is afflicted with a continuing food crisis which has assumed alarming proportions in recent times. The situation has resulted from several causes, two of the most important being the rapidly increasing human population and the unfavourable environmental conditions, especially drought, which seriously affects the reliable production of staple food crops. In the semi-arid zones of Africa which constitute the SAFGRAD mandate area, (see Figure 1) food production has consistently failed to keep pace with the rate of population growth and tradi tional food production systems are grossly inadequate to satisfy the food needs of the increasing rural and urban populations. This zone is the major production areas for grain and livestock in Africa, and food grains particularly sorghum, millet and maize constitute over 70 per cent of all cereals produced in the area. The net value of this production in 1974 was estimated at nearly US $2 billion (13,700,000 MT for sorghum and 3,623,000 MT for maize). Food production is however well below the needs of the rapidly increasing populations in the area.

12. For example, annual food production in the West African SAT increased by only 1.0 per cent from 1961 - 1980, while human populations increased by 2.6 per cent per year during

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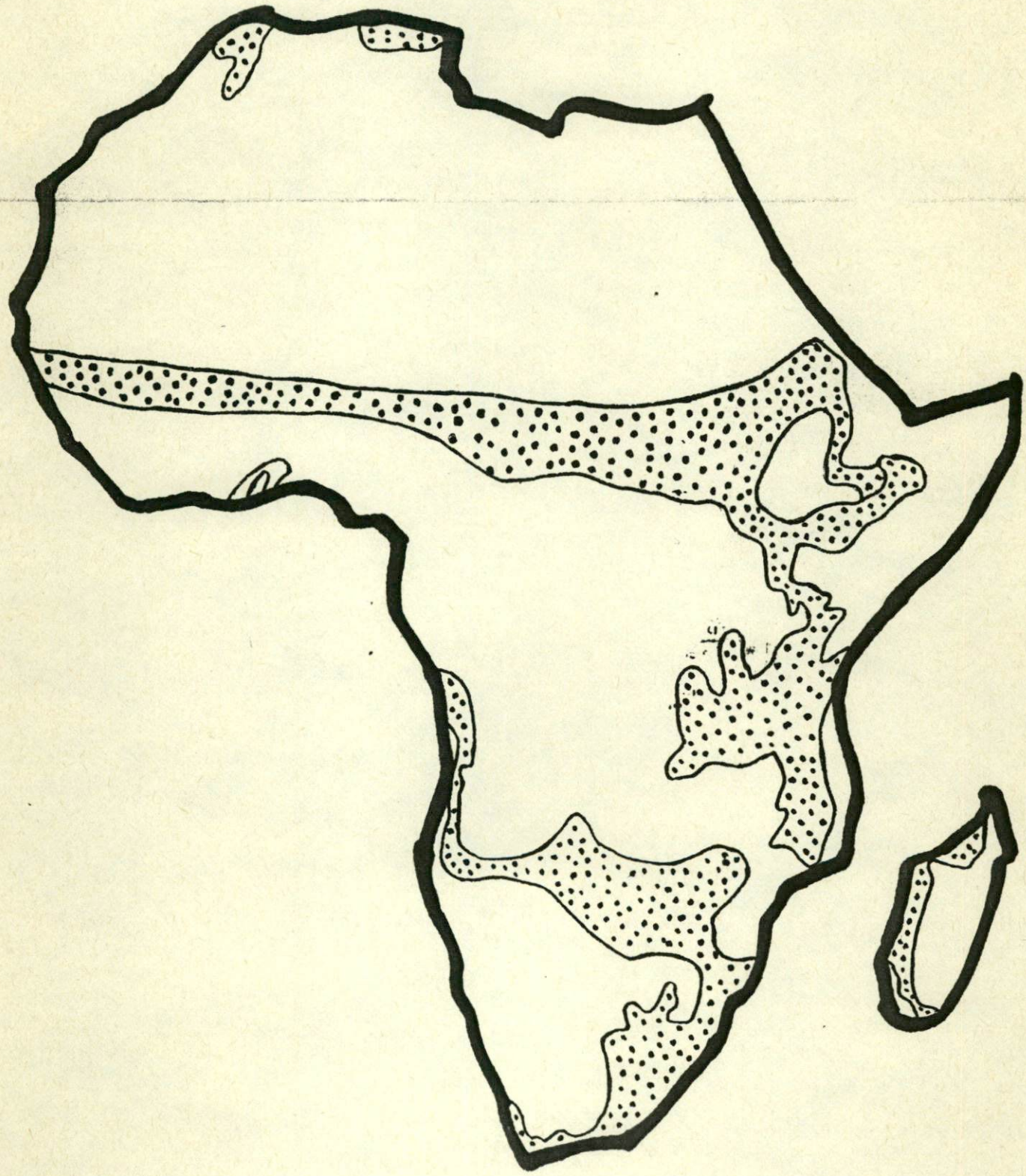
Fig. 1

SEMI-ARID ZONE OF AFRICA.

600-1000 mm rainfall year



that period resulting in a decline of 1.9 per cent per year in per capita food production. Food imports now account for over 20 per cent of total imports.

13. Food production in African SAT is largely in the hands of peasant small holders whose traditional farming methods are yet to be adapted to utilise improved methods of cultivation and external farm inputs. It is estimated that the 26 countries in the region together have 226 million farmers, with overall crop yields from their farms being not only far below potential yields but also remained unchanged or even declining over the past two decades. As a result, hunger with its human degradation, despair and suffering continues to threaten the very survival of nationhood of many countries in the region, which includes what is sometimes described as Africa's hunger belt shown in Figure 2.

14. The poor performance of agriculture in the African SAT in the last two decades can be attributed to :

- inappropriate trade and pricing policies;
- poor input delivery and marketing systems;
- poor and inadequately developed rural infrastructures, e.g. roads, pipeborne water, electricity, communications facilities, schools, rural health centres, etc. In most cases these facilities are non-existent.
- lack of appropriate technologies for the resources and environments of African SAT farmers.

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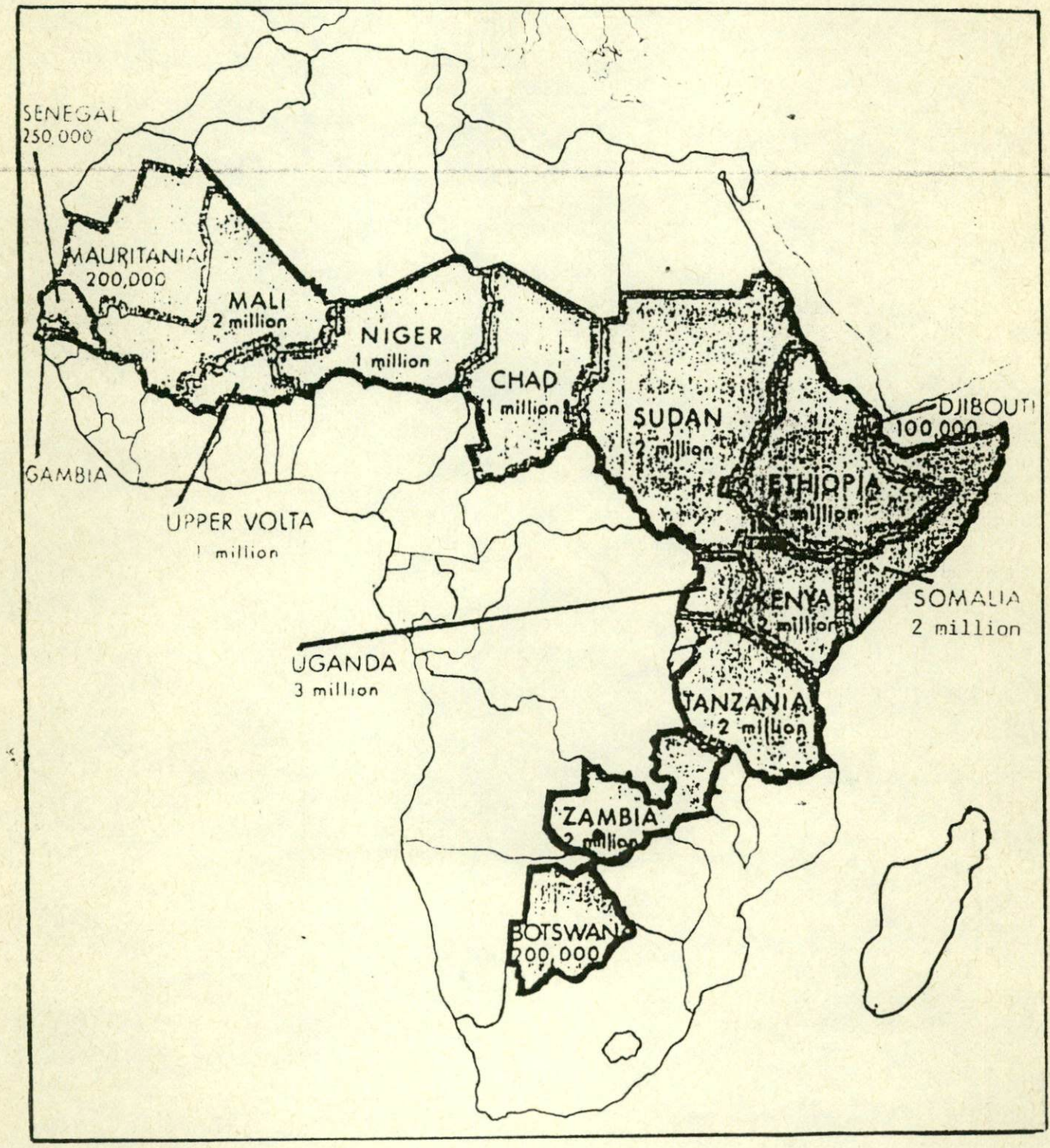
Fig. 2

AFRICA'S HUNGER BELT

ESTIMATED NUMBERS OF PEOPLE FACING FAMINE



SOURCE: SADCC AGRICULTURAL RESEARCH CONFERENCE 1984.

Constraints to Food Production

15. Considerations of the constraints to satisfactory food production in the African SAT have, among other issues, focussed attention on the analysis of the environmental, scientific, and institutional difficulties which are major barriers to rapid and steady production of the principal food crops of semi-arid Africa, namely the cereals Sorghum, Millet and Maize and the legumes Cowpea, Groundnuts and Bambara nuts.

Environmental difficulties

16. The environment of semi-arid Africa is characterised by high temperatures, low, highly variable and unpredictable rainfall patterns, fragile and mostly infertile soils. The area is subjected to serious and continuous degradation as a result of the recent series of droughts enhanced by rapid desertification processes. Rainfall and its distribution are also major critical factors in food production in the region. Average total annual precipitation ranges from 300 mm in the driest areas to 1000 mm in some areas, but throughout the SAT, there are wide seasonal fluctuations and great variations in the intensity of individual rains and intervals between rains. In areas with a higher rainfall, overpopulation leads to heavy cultivation and over exploitation, which also causes rapid degradation of the fragile resource base.

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Scientific difficulties

17. Rapid progress to substantially increase the food production capacity of semi-arid African countries can be made by improvements in local production systems developed by scientific research and effectively communicated by national agricultural extension services to the farmers. This has been well emphasized by the OAU Heads of State in the 1980 Lagos Plan of Action (LPA) which states as follows :

"Article 36

..... Science and technology have a pivotal role in the development of agriculture, especially in connection with agronomic research, training and extension. Within the context of agronomic research, special emphasis should be placed on improvement of selected seeds, fertilizers, pesticides and other chemicals suitable for African conditions.

"Article 38.

..... It is crucial that research findings be made available within minimum delay to the farming community. It is therefore recommended that :

- a closer link be established between research and extension services,
- the extension services should lay more emphasis on the spread of existing technologies ....."

18. In the semi-arid zones of Africa there is a shortage of well trained scientists and technologists for effective organisation and execution of agricultural research. In a few instances where trained manpower is available, there is often

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under-utilisation or misplaced deployment of trained personnel. Expertise in planning, implementing, and evaluating agricultural research is weak and there are hardly any serious links or effective communication between national agricultural research, extension services and the farming population. There is also very poor coordinatinn of agricultural research within the region and many research efforts are carried out in isolation; this has given room for duplication and overlap of research activities which tend to be counter-productive.

Institutional difficulties

19. Many agricultural research and training institutions have been established within the semi-arid zones of Africa. However, such institutions face many difficult problems including :

- shortage of indigenous research management personnel;
- acute shortage of funds for execution of research and development projects;
- lack of adequate equipment and facilities;
- lack of sufficient trained agricultural researchers , social scientists and technicians;
- sometimes inappropriate and poorly defined agricultural research policies;
- lack of effective mechanism for the distribution of improved technologies, and there is often no regional or national coordination of regular production and distribution of improved seeds to farmers.

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20. These difficulties, together with several others not cited here, remain major constraints to the mobilisation of science and technology to solve the food problem in Africa. Nevertheless conscious efforts are being made to overcome these difficulties through various research and development activities, Resolutions and proclamations by African Heads of State and Governments.

21. Realizing the recurrent food shortage problems that many member countries faced during this past quarter of the century, African Governments adopted a series of plans and declaration to stimulate an immediate improvement in the food situation and to lay foundations for the achievements of self-sufficiency in cereals, livestock and fish products. The Lagos Plan of Action (1980) which was closely linked with the regional Food Plan for Africa (1978) set a number of targets, including a growth rate of 4 per cent per annum for the agricultural sector which, if achieved, would eventually bring about food self-reliance on the continent.

22. Currently, almost half of the Member States of the Organization of African Unity (OAU), particularly those in semi-arid regions, have become increasingly vulnerable to drought stress and dependent on food aid. The Harare Declaration on Food Crisis in Africa, adopted during the 13th FAO Regional Conference for Africa (July 1984), further reaffirmed commitment to the Lagos Plan of Action which provides policy guidelines to alleviate the existing serious food crisis.

23. Furthermore, the Assembly of African Heads of State and Government adopted, inter alia, a Special Programme of Action for the Improvement of the Food Situation and Rehabilitation

of Agriculture in Africa. Concrete proposals, including correcting the inconsistency between the declared objectives of giving high priority to the food and agriculture sector and the official actions, were made in this report. This action is meant to induce agricultural policy changes in African governments in order to gradually increase national resources to agricultural development by 20 to 25 per cent by 1989. not yet achieved

24. It was stressed that the current extent of hunger and malnutrition in Africa calls for resolute actions and for effective mobilization and judicious exploitation of resources on the basis of well formulated development strategies and plans of actions that could lead to food self-sufficiency and self-sustained growth and development. The importance of research, training and moving research results to farmers to attain increased food production were dully emphasized by various regional plans and strategies. Unless immediate actions are taken towards the improvement in agricultural technology, food production could not keep pace with increasing human populations in Africa's SAT.

25. Considerable research efforts need to be oriented towards the needs of the small farmers since over 80 per cent of the working population force is in agriculture. Small farmers are generally at subsistence level, and do not produce marketable surpluses. In all countries, small farmers predominate in the production of traditional food grains. Technical solutions to on-farm problems and systems approaches are essential ingredients for improving the farm unit. Research and extension service activities need to concentrate on improving traditional systems of production.

Research and Development Activities in Africa

26. Agricultural research and development activities abound in semi-arid Africa. These activities may be grouped into:

- National Programmes;
- Regional Programmes; and
- Bilateral Programmes.

27. National Programmes are organised by the relevant government ministries and funded largely through annual government allocations. These programmes usually suffer from acute financial, administrative and manpower problems.

28. Regional Programmes include those research and development efforts funded by United Nations agencies and foreign donors like USAID, FAO, IFAD, UNDP, ECA, etc. Some of these activities are directed at strengthening national programmes through direct support of research and training, while others focus attention on development of regional research networks, which cover a number of countries.

29. Financial contributions by foreign donors to African agricultural research and training have been substantial in recent times. For example, for the 8 Sahelian countries alone, donors contributed an estimated 11 Billion US dollars in development assistance between 1975 and 1982, more than 30 per cent of which went to agricultural development. There are now over 50 agencies and organisations operating in the agricultural scene in the Sahel alone; these constitute a complex network with varying degrees of coordination of their activities in the different countries. They usually operate either directly or through national programmes.

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30. Bilateral Programmes involve direct assistance from foreign governments to a particular country. They usually operate through national programmes and may collaborate with a regional programme, focussing on specific national requirements.

31. Though it is recognized that considerable efforts are directed toward improving and developing agricultural research in Africa, little progress seems to have been made in providing adequate support for producers of major food crops. Indeed, no major breakthrough has been achieved in genetic improvement of rainfed millet and sorghum which account for 80 per cent of the cultivated land in the Sahel and other areas of low rainfall. Also, major advances like those which revolutionalized wheat and rice cultivation in Asia have not been made since the 1960s in Africa.

32. The weakness of agricultural research are not simply or even mainly a matter of staff and money but they are arising more from poor and ineffective agricultural research policies at national, subregional and international levels. At the national level, the lack of effective staff management and career development policies combined with the inadequacy of research operating funds had resulted in a disruption of even well designed research programmes and failure in building an effective indigenous national research capacity and extension systems.

Therefore Africa continues to rely heavily on the developed world for the generation and transfer of improved technologies to the ultimate users including small farmers. Because of the complexity of the environment and the magnitude of the

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agricultural research problems facing Africa, combined with excessive duplication of efforts and conflicting focus among donors, performance of outside assistance, including through the International Agricultural Research Centres (IARCs), has regrettably been far below expectation.

Need for Coordination of Research in Africa

33. Weaknesses of national agricultural research and extension programmes and the fragmentation and poor coordination of research activities in Semi-Arid Africa have directly and indirectly affected progress in agricultural development in the region. A multitude of funding and implementing agencies actively operate at national and/or regional levels through bilateral and multi-lateral agreements. While these activities have positively affected agricultural development to some extent, they have also increased fragmentation of national research efforts and to some degree caused overlap and duplication. In addition, there are usually fundamental and legitimate differences between the priorities of national programmes and those of International and/or regional agricultural research programmes which are mainly commodity oriented.

34. To reverse the unfavourable performance of agricultural research in Africa, there is an urgent need for greater and more effective cooperation and coordination among African countries so as to achieve greater individual and collective self-reliance in agricultural research and efficient allocation and use of outside assistance to research in Africa. The need therefore arises for an African Agricultural Agency which would play the vital role of coordinating research and organising networks between

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national, international and regional agricultural research and development efforts and encouraging the free exchange of materials, ideas and technical information throughout the Semi-Arid Zones of Africa.

This concept of a research coordinating organisation was translated into action by the establishment of the programme known as JP 31, Semi-Arid Food Grain Research and Development, SAFGRAD, Project through the initiative of donors, representatives of African member countries and research organisations at the Ouagadougou conference in 1976.
The history of SAFGRAD is given in Chapter III while its activities and achievements during the past 9 years of its existence are presented in Chapter IV of this document.

35, Specific experience of the Scientific, Technical and Research Commission (STRC) of the OAU, over the last ten years, through its Semi-Arid Food Grains Research and Development Project (SAFGRAD), has confirmed that subregional cooperation and coordination can greatly enhance the productivity as well as productive capacity of agricultural research, thereby bringing it more oriented toward the farmer for improved productivity and production. On-going efforts of OAU/STRC should be intensified in the semi-arid zones so as to help accelerate food production and agriculture rehabilitation in Africa.

CHAPTER III

HISTORICAL PERSPECTIVES

Establishment of SAFGRAD

36. The history of SAFGRAD dates back to USAID Project JP 26 which was developed in 1969 in collaboration with the OAU/STRC, Organisation of African Unity, Scientific, Technical and Research Commission. This project focussed attention on regional research for improvement of food crops mainly maize, sorghum and millet in West Africa and was based at the Institute of Agricultural Research (IAR) of the Ahmadu Bello University, Samaru, Zaria, Nigeria.

37. This project ended in 1976 and as a result of its success and in recognition that continued research and field testing were needed, another project known as Project JP 31 in OAU/STRC was initiated by USAID in 1977 with the title SAFGRAD, Semi-Arid Food Grain Research and Development Project. SAFGRAD was a multi-donor effort to develop and expand regional research coordination to accelerate the improvement of local production of Sorghum, Millet, Maize, Cowpea and Groundnuts in the Semi-Arid Zones of Sub-Saharan Africa.

38. Project JP 31 originally started with 18 member states but was later extended to cover 26 African States namely Benin, Cameroon, Cape Verde, Central African Republic, Chad, Ethiopia, Gambia, Ghana, Guinea, Ivory Coast, Mali, Mauritania, Niger, Nigeria, Senegal, Sudan, Togo, Burkina Faso, Botswana, Guinea Bissau, Kenya, Sierre Leone, Somalia, Tanzania, Zambia and Uganda.

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SAFGRAD can also be percieved as an informal association of 26 independent countries in Africa which have land areas that experience the harsh semi-arid agricultural production conditions. (See Figure 3).

Purpose

39. This purpose of SAFGRAD was to mobilize and coordinate scattered regional research resources including those of the International Agricultural Research Centres (IARCs) and national programmes and to develop improved cereal grain varieties and production technologies for the major food crops, sorghum, millet, maize, cowpea and groundnuts, appropriate for small farmers of the African SAT. The project was also to help national programmes improve their capacities to adapt and transfer technologies to farmers, overcoming the institutional barriers between research and extension that exist in most of the countries.

40. The project was also to facilitate exchange of materials and information between researchers in the region, to organise conferences, workshops, symposia and study tours, to train African agricultural scientists and technicians and to publish technical materials and reports.

41. To support the regional coordination of research, three research centres representing defined ecological zones within the region were developed at the Institute for Agricultural Research, Samaru, Nigeria, the Centre National de la Recherche Agronomique in Bambey, Senegal and the Kamboinse Research Station in Burkina Faso.

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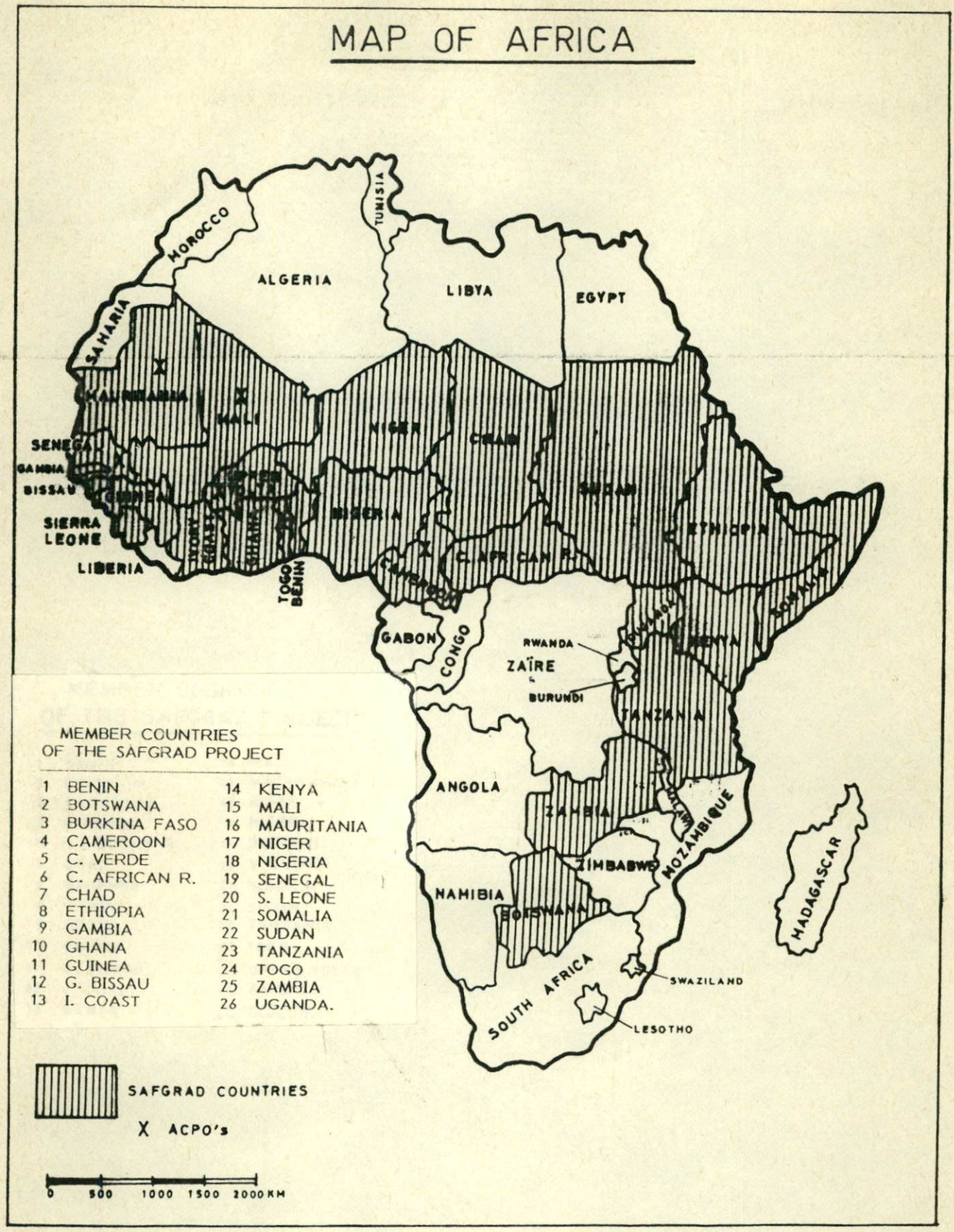

Fig. 3 African countries included in the SAFGRAD mandate.

42. Two international agricultural research centres, the International Institute of Tropical Agriculture (IITA) in Ibadan, Nigeria and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in Hyderabad, India were contracted to provide scientific and technical assistance to the project for commodity research. A third institution, Purdue University,USA, provided scientific research and technical support for the Farming Systems Research Programme.

43. The major components of SAFGRAD were outlined as follows:

- improvement of sorghum, millet and groundnuts, under research contract to ICRISAT;
- improvement of maize and cowpea under research contracted to IITA;
- Farming Systems Research contracted to Purdue University, USA;
- strengthening national agricultural programmes through training, workshops, seminars, monitoring tours etc.; and
- to establish close links between national research and extension through the ACPO Programme.

44. The management of SAFGRAD is undertaken by the OAU/STRC/SAFGRAD Coordination Office based in Ouagadougou, Burkina Faso which is headed by the International Coordinator, supported by a Director of Research and a Financial Controller. Overall programme directions are given by two management bodies namely, the Consultative Committee (CC) and the Technical Advisory Committee (TAC). The Executive Secretary of OAU/STRC Lagos is the Chairman of both the CC and TAC and oversees the general operations of the SAFGRAD coordination office.

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45. Principal funding for the project was provided by the USAID. The first phase of USAID support to SAFGRAD was authorised in 1977 for a US$ 13.9 million over 5 years. Funding was later increased to US$ 21.1 million and the project extended to March 31, 1986. FAC has supported one of the Accelerated Crop Production Officers (ACPO) and recently, the International Fund for Agricultural Development (IFAD) committed US $3 million for support of the Farming Systems Research Programmes in three countries. The OAU has also contributed to the project.

SAFGRAD Phase I had two principal components namely :

(i) regional coordination of research, and

(ii) strengthening of national agricultural research programmes and transfer of appropriate technologies to small farmers.

CHAPTER IV

SAFGRAD I

Objectives and Rationale

46. The Semi-Arid Food Grains Research and Development Project (SAFGRAD) is sponsored by the Organization of African Unity/Scientific, Technical and Research Commission (OAU/STRC) with the objective of (a) establishing the capability of African countries in the SAT to build and manage agricultural research networks for maize, cowpeas, sorghum, millet and groundnuts among participating countries and (b) in helping the participating countries to enhance the capabilities of their scientists and institutions to conduct agricultural research with broad applicability of results to other participating countries for sharing through the interacting agricultural research networks coordinated by the SAFGRAD project.

47. Rapid growth of human populations and prolonged, severe droughts in recent years have increased international awareness of food problems of the semi-arid zones of Africa. This has prompted a dramatic proliferation of bilateral and multilateral research and development projects for addressing the food problems. SAFGRAD I was conceived as a means for regional coordination of research to avoid waste and duplication and, through networking and exchange of information, a mechanism for making improved technology generated by the International Agricultural Research Centres (IARCs) and the better equipped national agricultural research centres more easily available to participating countries throughout the region.

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48. The project was designed to maximise contact between researchers so that the opportunity for beneficial crossfertilization of ideas leading to productive research methodologies and technology generation is achieved.

49. It is expected that an important spinoff of SAFGRAD would be assistance to African countries to mobilise political will and to make deliberate efforts to undertake major structural and administrative changes in their agricultural policies and programmes to enable them realise their agricultural development goals.

50. As an African agency for coordination of agricultural research, SAFGRAD operates under the umbrella of the OAU/STRC which lends credibility and legitimacy to its operations. OAU/STRC enables SAFGRAD to play a research coordinating role which regional institutes or international research centres cannot undertake.

Activities of SAFGRAD I

51. SAFGRAD started with a mandate covering 18 semi-arid African countries but by 1985 the number of member countries had been increased to 26, extending through West, Central, East and Southern Africa. The area is estimated to have a total population of 250 million people, a majority (about 80 per cent) of whom are small scale farmers producing most of the staple food items consumed in the region. SAFGRAD initiated programmes in many of its member countries in the following areas :

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- strengthening national research programmes;
- research coordination and networking;
- establishing links between national/regional research and national extension services;
- training and research information exchange through conferences, workshops, symposia, monitoring tours etc.

52. Strengthening National/Regional Research Programmes

This activity involved contract research with ICRISAT(for sorghum, millet and groundnuts) and IITA (for maize and cowpeas). SAFGRAD-funded scientists from these international research institutes were posted to national research/regional research centres where they conduct research on the improvement of crop varieties and production systems of the mandated food crops. Research is also undertaken on soil fertility, soil/water management and Farming Systems to support national FSR programmes of Burkina Faso, Cameroon and Benin Republic. Through this system SAFGRAD generated improved varieties of, and technologies for the production of sorghum, millet, maize and cowpeas. No work has yet been done on groundnuts.

53. Research coordination and networking

Regional research networks were organised to bring together scientists from different member countries to share their experiences and exchange materials and information. Networks were established for maize/cowpea, sorghum/millet and for Accelerated Crop Production Officers (ACPOs). Effective organisations of these networks reduced, to some extent, the amount of overlap and duplication of research between national and regional research institutions.(Figure 3).

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54. Linkage between Research and Extension

Effective transfer of new technologies from the research stations to farmers continued to be a major constraint to increased food crop production. SAFGRAD responded to this weakness by establishing the Accelerated Crop Production Officers (ACPOs) programme. An ACPO was attached to each of the five countries, Burkina Faso, Mali, Cameroon, Senegal and Togo to link research with extension. In farmers' fields, the ACPOs conduct trials on new crop varieties and technologies developed in national and regional research stations. When a new crop variety or technology is accepted by farmers, it is then passed on to the national extension service for distribution to other farmers. The reactions of farmers to the new crop variety or technology are fed back to national and regional scientists by the ACPO, thus serving as a vital two way link between research and extension.

55. Training and research information exchange

An important activity of SAFGRAD is training of research scientists and technicians. Training programmes involve long term degree training for higher university degrees, and short term in-service training for researchers and technicians arranged by the IARCs to provide opportunities for acquisition and improvements of competence in specific skills. The primary aim of training is to help build up the "critical mass" of well trained researchers and technicians for research in member countries. Information exchange is coordinated through the organisation of workshops, conferences, seminars, monitoring tours etc; an international symposium on drought in food grain production in semi-arid sub-Saharan Africa is scheduled for May 1986.

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56. The overall activities of SAFGRAD are summarised by the following illustration of the SAFGRAD strategy for development and transfer of technologies (See Figure 4). SAFGRAD core effort is an important and critical intervention in the technical process of development and transfer of appropriate technologies to the small farmers of the semi-arid regions of sub-Saharan Africa. Figure 4 is a visual representation of the SAFGRAD strategy which identifies the input and output functions in the technology development and transfer process involving strengthening of national programme activities to increase their receptivity to new technologies. The National research and extension activities thus strengthened become sensitised to pass on the technologies to farmers with the aim of increasing and stabilizing food crop production. The operational framework of the SAFGRAD strategy designed to achieve this objective can be conveniently divided into two components A and B as shown in the Figure 4.

Component A consists of the generation of technologies such as improved crop varieties and special crop production practices appropriate for the Semi-Arid conditions of sub-Saharan Africa. Technologies are generated through a regionally coordinated system of collaborative research conducted by scientists in international agricultural research centres, (IARCs) and through research networking. In the second component B, technologies which have been developed and found appropriate are passed on to the national agricultural research and extension programmes of SAFGRAD member states for adaptation and adoption, through a system of national adaptive trials conducted at national research stations and on farmers' fields. SAFGRAD makes a major input in

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this important activity by providing institutional research facilities, coordinating the national adaptive trials, regional collaborative commodity specific trials, training and information dissemination, Farming Systems Research activities and the Accelerated Crop Production Officers (ACPOs) scheme. All these SAFGRAD activities provide backstopping which strengthens national efforts and would enable them to absorb and transfer the new technologies to farmers. The ACPO programme of SAFGRAD serves as a vital link between national research, extension services, and the farmers; it thus provides inputs and methodologies necessary for farmers to successfully adopt new production technologies. A direct feedback mechanism is also established within this system whereby probelms of technology adaptation and/or adoption in farmers' fields are referred back to national research and if necessary to the SAFGRAD collaborative research network involving the appropriate IARC. The success achieved by the ACPOs in Mali and Cameroon provides convincing evidence that this SAFGRAD system of technology development and transfer has achieved its goal.

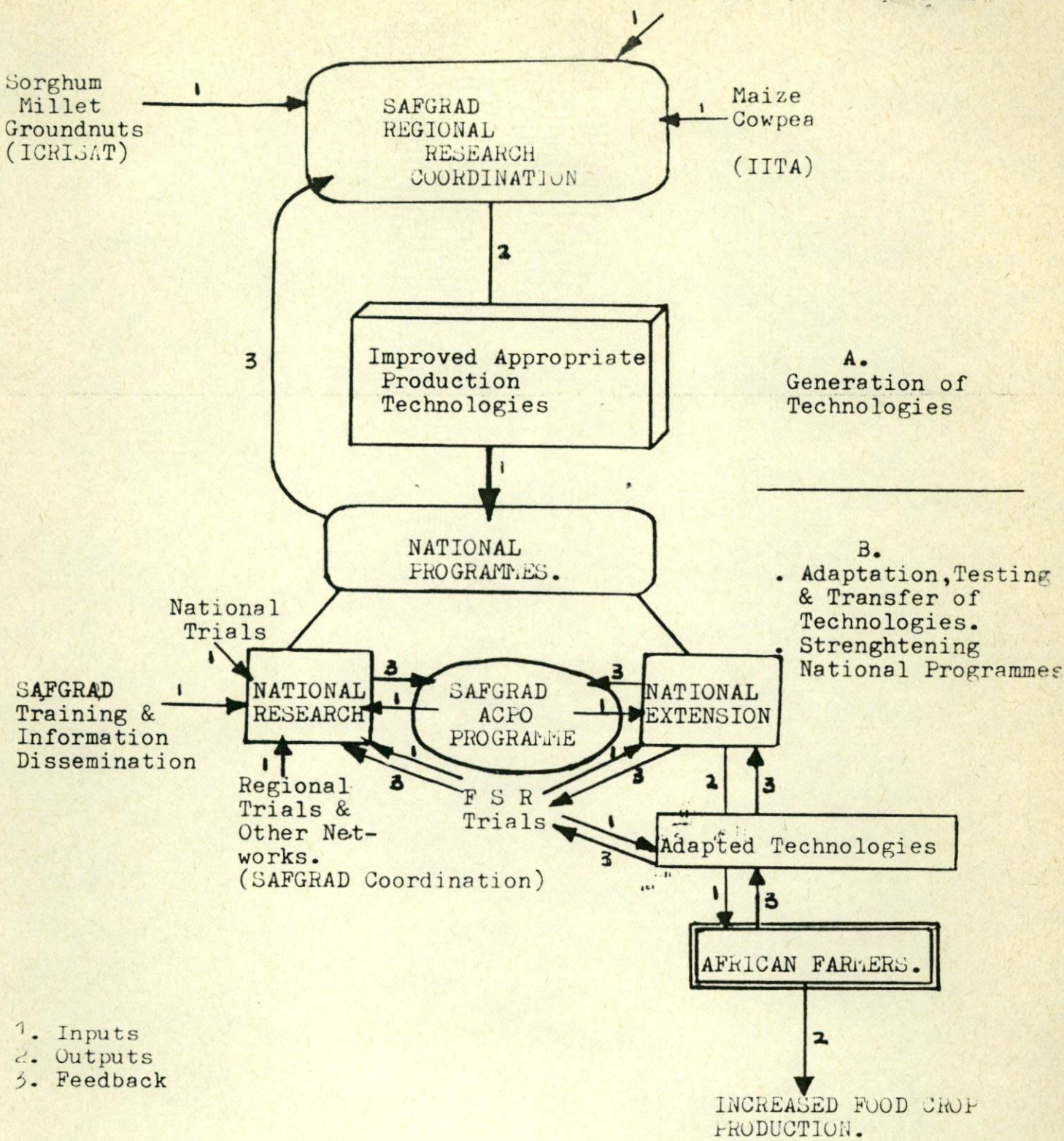

Figure 4. Flow chart of SAFGRAD Technical Input/Output functions to strenghten National programmes in member countries, leading to increased food production by African small scale Farmers.

Achievements

57. The thrust of SAFGRAD research and on-farm adaptive interventions is to remove the constraints which are barriers to improved production of food grains in semi-arid regions of tropical Africa. Coordination is the best alternative for improving the productivity of agricultural research in Africa.

58. Specific achievements of SAFGRAD since its inception in 1977 include :

i. the choice and support of key selected existing NARCs to serve as main stations for sub-regional activities in cereal, grain legume research and farming systems research compatible with the ecological zones they represent;

ii. the choice of selected countries as cases for testing the Accelerated Crop Production Programmes (ACPP) designed for strengthening the linkage and improving the communication between research, training, extension and farming community, thereby accelerating on-farm crop production;

iii. support of regional scientific conferences technical publications and information, training for African scientists and technicians and other forms of regional cooperation to facilitate the exchange of information and experiences between researchers in Africa;

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iv. development of dynamic collaborative research support programmes with key IARCs to foster joint actions among them and between them and the NARCs and extension services on SAFGRAD programmes. This has paved the way for improved efficiency in the performance of these institutions in terms of increased agricultural production;

v. establishment of Policy organs namely the Consultative Committee (CC) assisted by the Technical Advisory Committee (TAC). These organs establish policy guidelines for general planning, identification of research problems of a regional significance, monitoring progress towards their solution and establishing corrective courses of action where needed;

vi. establishment of a coordination office at Ouagadougou, Burkina Faso, under the umbrella of the OAU/STRC. This office, guided by its Policy organs is entrusted with research coordination management and therefore acts as a facilitator for research activities in SAFGRAD member countries. The headquarters and the sub-regional office for West and Central Africa are located in Ouagadougou while the Regional Office for East and Southern Africa is located in the OAU/IBAR office in Nairobi;

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vii. the sponsoring of 16 workshops attended by an average of 60 African scientists and other international crop breeders, agronomists and agricultural economists, to exchange ideas and information including planning and evaluation of regional trials;

viii. the organization of annual monitoring tours for small groups of scientists (8 to 12), to see on-going variety trials and other relevant research activities in 3 to 5 selected member countries; these tours encourage professional excellence;

ix. the establishment of regional research networks to bring together scientists from different member countries to share their experience and exchange planting materials and information. Networks have been established for maize/cowpea involving scientists from nearly all the member states, for sorghum/millet covering 12 countries in Eastern and Southern Africa sub-region. A third network involved mainly the Accelerated Crop Production Officers (ACPOs) of the five member countries in which the programme operates;

x. the establishment of Accelerated Crop Production Programme (ACPP) involving Burkina Faso, Cameroon, Mali, Senegal and Togo, has provided a bridge between training, research, extension and farmers. The ACPOs conducted trials in farmers' fields on new crop varieties and technologies developed in national, regional and international research stations;

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xi. farming systems (FRS) direct support to national programmes has influenced the following :

- the establishment of collaborative research support programme involving IARCs such as the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and the International Institute for Tropical Agriculture (IITA) and NARS, namely the Institute for Agricultural Research (IAR) at Samaru, Nigeria and the Kamboinse Research Station in Burkina Faso;

- considerable progress has been achieved in identifying and developing improved varieties of sorghum, millet, maize and cowpea which are comparatively early maturing, disease- and pest-resistant, drought-tolerant and high yielding. Some of these varieties have been released to several national programmes for further testing and use; also some progress has been noted in soil-water management research and farming systems research;

- the provision of support for the training of 30 scientists at higher degree (M.Sc and Ph.D) levels, in the fields of agronomy, plant breeding, agricultural economics, soil science, crop protection, plant nutrition and agricultural engineering, and training of 80 scientists for short-term training involving a few weeks to six months in laboratory methodologies and various aspects of field work.

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59. Despite some shortcomings, SAFGRAD has, over the last nine years of its existence played a positive role in institutional activities concerned with the furthering of agricultural research on its mandated crops in Africa. In particular, it has demonstrated, through its research coordinating mechanisms, that it is possible, in Africa, to achieve coordination between research, teaching and extension interests, so that research findings may be rapidly translated into practice in the farmers' fields. Therefore, the need to continue to strengthen and even duplicate for other ecological zones, the work of SAFGRAD particularly in this era of widespread famine and hunger, becomes even more important.

CHAPTER V

LONG TERM PLANS FOR SAFGRAD

Objectives

60. In the light of the achievements of SAFGRAD summarised in Chapter IV and the recommendations of the 1984 USAID/OICD Evaluation team, the consultative committee recognised the need for greater and more sustained efforts at both national and international levels, for furthering the mandate and scope of SAFGRAD. In particular, SAFGRAD was expected to play a more effective role in the implementation of the Five Year Special programme for the Improvement of the Food situation and Rehabilitation of Agriculture in Africa adopted by the 1985 OAU Assembly of Heads of State and Government.

61. Against the complex background of agricultural systems and their constraints in the semi-arid zones of Africa, SAFGRAD has a unique and important role to play in several vital areas, being concerned not only with agricultural research but also the transfer, and adoption of the results of this research as well as development in general. Its regional mandate allows therefore the following focus of activities :

a. Strengthening research capacity at the national and regional levels by providing support in identified needs.

b. Adjusting research and development programmes to assure a maximum of complementarity, thereby eliminating wasteful duplication.

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c. Strengthening of the technology transfer process at the National and Regional levels and information feed back process (ACPP and FSR activities).

d. Improving communication between researchers of national and regional programmes; exchange of materials and other information through meetings, training, publications, etc., and

e. Feedback of research results to national and regional (OAU) policy makers to influence the policy decisions affecting agricultural research and production in semi-arid sub-Saharan Africa.

62. Specifically, SAFGRAD would aim at more impact from both sub-regional and international cooperation through a stronger focus on key research and development issues. Greater emphasis is to be placed on the rationalization and coordination of agricultural research and development policies on mandated crops at sub-regional and regional levels; better management and coordination of resources including directing it on projects that stimulate growth of indigenous research capability and farmers' initiative for self-sustained and improved production and maintaining regular and constructive dialogue among all parties, especially Africans, so as to make them understand each others perspective and problems.

63. Although the IARCs have excellent capacities for generating technologies for increasing food production in Africa and they have taken the initiative and played a dominant role in the establishment of networks for the principal commodities, there

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are usually differences between national priorities and those of regional and international agricultural research programmes which need the involvement of an African agency for coordination of research and organisation of networks. The international agricultural research centres cannot assume this role. SAFGRAD serving under the umbrella of the OAU/STRC in a research coordinating capacity has creditably played this role and seeks to mobilise political support for agriculture in Africa.

Development Plans for 1986 to years 2000

64. In the future development plans from 1986 to the years 2000, SAFGRAD has crystallised a number of key priority areas needing urgent attention to substantially improve the delivery capacity of agricultural research centres dealing with the mandated crops namely maize, sorghum, millet, cowpea, and groundnuts.

65. In the domain of agricultural research the following orientations are recognised :

- research towards increased production of specific commodities in SAFGRAD mandate areas;
- research towards increased and more stable production of selected cropping systems presently used by small farmers;
- research towards sustained production at low levels of inputs (biological control of pests and diseases; resistant varieties;

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biological N-fixation by legumes) to prevent vast areas from going out of production in the very near future due to overcropping and soil degradation.

Basically, all three of these orientations play equally important roles in securing food production in the future, as well as improving rural living conditions thereby reducing the socially undesirable increased rural exodus and subsequent urbanisation, which occurs todate. The latter orientation is particularly relevant to the SAFGRAD mandate area in which marginal and fragile farming environments prevail. Consequently, land degradation processes associated with continued farming of predominantly rainfed food crops, form a much greater threat than occurs for the farming of more demanding commodities such as rice, wheat, maize, potatoes, etc., in potentially richer environments.

66. In the past, much research in Africa has been conducted in isolation from the real farming world and therefore research as a tool to accelerate development has not been exploited. However, even today with a greater appreciation of the potential benefits of research, the expectations are often unrealistic. Research aimed at improving African farming, will have to be based first of all on a proper understanding of the present systems and their various constraints. SAFGRAD's future research programme priorities would now emphasise and reflect farmer-felt constraints, which in the end, would lead to the acceptance of researcher proposed technologies.

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67. Research is often a slow process, of which the outcome may be unpredictable, and with results being different from expectations. In addition, research for rainfed agriculture in the semi-arid tropics poses the problem of huge environmental diversity and variability for the target area. Consequently, there is little ground for the belief that international or regional research could ever result in the development of a simple, generally acceptable and standardized technology, whether this is an improved variety or a cultural practice like tied ridges.

68. Owing to the cost and long-term nature of agricultural research, only a few countries in African can afford research strategies based on greater individual self-reliance and self-sufficiency. Moreover, there is growing recognition in the international community that efforts should be coordinated particularly at sub-regional levels if any tangible dividends are to be obtained from investments in research.

69. Furthermore, although the IARCs have the capacity to generate relevant agricultural technologies, this technology can only be successfully transmitted to the beneficiaries, namely the peasant semi-arid zone farmers, through national agricultural institutions which in turn should have the capability to receive and to transfer these technologies. SAFGRAD future efforts will emphasise strengthening national agricultural research programmes of participating countries, concentrating on linkages within and between collaborating research institutions to promote the development and transfer of new production technologies.

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70. Because of its regional coordinating and gap-filling roles in the agricultural research/development mandate area, strong linkages of SAFGRAD with National programmes and with other technical and funding agencies (bilateral and multi-lateral) are vital. In view of its mandate to strengthen National Programmes of member countries, SAFGRAD would endeavour to establish regular contacts and to build-up an information base. SAFGRAD would be sensitive to the fact that National research priorities may differ substantially from those considered desirable by regional, international and/or discipline/commodity oriented research institutions. Since the resources of National programmes are often very limited, special care would be taken to ensure that these are not blocked by projects of limited importance to national objectives. Thus SAFGRAD would eventually play an important mediating role between National Programmes and regional and international research institutions.

71. SAFGRAD already has well established links with IARCs, i.e. IITA and ICRISAT, which implement various critical research programmes through USAID funding as part of the SAFGRAD project. Within the framework of the SAFGRAD/IFAD-funded FSR activities, linkages with ICRAF on agro-forestry and with ILCA on a number of projects/networks on livestock related studies, would be developed in the very near future.

72. The mainly applied and production oriented research programmes of SAFGRAD should ensure that the results of more basic research, conducted on the soil-water balance by CIRAD, on agroclimatology and hydrology by ORSTOM and AGRIHYMET etc., are fully utilized in increasing the understanding of the SAT environment. SAFGRAD linkage to these research institutes (particularly through its FSR and ACPO programmes) would contribute to the wider utilization of

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their research results and to improved feedback about farmer level constraints associated with various improved technologies.

73. Linkages between SAFGRAD and United Nations agencies such as UNDP, FAO, UNSO and PAM which is at present not particularly strong, would evolve through increased contacts by participation in workshops and exchange of reports. Linkages with these United Nations agencies would be important for possible funding sources for regional projects (UNDP-UNSO); training fellowships and organisation of workshops/conferences, and for exchange of information about agriculture and its practical problems and research needs in the SAT (FAO, PAM).

74. In view of the present agreement about research coordination between IARCs under SADCC, SAFGRAD's role in Southern Africa would be developed in the following areas :

- Strengthening Research-Extension linkages through ACPO programmes, and
- Improved inter-regional communication between the different African SAT regions, through SAFGRAD-sponsored workshops, conferences, study tours, Group Training, etc.

75. Because of the crucial role of training in strengthening national and regional programmes and institutions, a formalised and expanded training component of SAFGRAD activities will be established in the years ahead, with a view to assisting SAFGRAD member states to increase their indigenous manpower research capabilities in all aspects of agricultural research and development, to strengthen agricultural training institutions through manpower development proposals, and to coordinate the training

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of persons capable of dealing with the problems of technology transfer to small scale African farmers.

76. Deliberate efforts will be made to establish formal working arrangements with selected African Universities and other African Institutions of higher agricultural education and IARCs in order to utilise them for specialised and relevant training of African agricultural researchers and technicians.

77. Specifically, long-term and short-term in-service training programmes will be organised in such a way that the schedules are not disruptive to on-going national programmes and over-burdening to the training institution.

78. Training needs of SAFGRAD member countries would be the basis for formulating SAFGRAD training programmes. Where assessment of training needs is lacking, SAFGRAD would arrange through consultants to undertake such studies.

African universities and other relevant institutions for short-term and long-term training will be identified to supplement overseas training at international centres.

Emerging Priorities of SAFGRAD

79. Based on the "Indicative Master Plan for SAFGRAD" which was approved and adopted at the extraordinary meeting of the Consultative Committee in August 1985 at Ouagadougou, the following priority programmes for the future activities of SAFGRAD have been identified :

i. Intensification of Research activities among member countries by responding to National Agricultural Research needs.

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ii. On-Farm testing and Technology transfer (FSR and ACPP).

iii. Improvement of Research Management capability of national programmes.

iv. Research Coordination and Networking.

v. Collaborative Research with NARCs, IARCs including regional research programmes such as INSAH, SACCAR, etc.

vi. Training (short term and long term).

vii. Facilitation of the realization of cooperative National Research Centres' links i.e. selected development of national agricultural experiment stations as centres of excellence for specific areas of research in order to serve its satellite stations of participating member countries. For instance, strengthening agricultural resource management research.

viii. Improving research communication.

ix. Developing the SAFGRAD Coordinating Office as a long-term OAU Agency for the coordination of agricultural research.

80. Following identification of these priority areas, attention will be focussed on gradually reducing support for IARCs and directing greater attention and support to National Agricultural Research programmes.

81. Teams of research scientists would be supported through provision of expertise and direct grants-in-aid for research on SAFGRAD mandate crops, and also for specific areas of need in national agricultural

research programmes.

82. Specific agricultural research institutions in African SAT will be identified as Main and Satellite Centres of excellence for specific crops research and technology delivery systems. SAFGRAD will strengthen such centres to enable them to effectively serve neighbouring SAT countries. SAFGRAD scientists would be located in NARCs identified as main centres where technology would be collated and developed as a means of strengthening national programmes. Members of the SAFGRAD Resource Management Teams in these stations would assemble data on resource management research and formulate programmes to fill gaps in this research. The technology which is developed would be tested in SAFGRAD member countries in identified satellite stations. In this way SAFGRAD will act as a coordinating body stimulating regional collaboration in agricultural research and development.

83. Farming Systems Research activities will be efficiently coordinated for planning and networking and criteria for choosing countries for location of activities will be clearly worked out.

84. Technology transfer system through the ACPO programme will be expanded and restructured to make it technically applicable and cost effective. Where FSR and ACPO programmes exist, the relationship and complimentarity of these two programmes would be closely examined in order to maximize on-farm testing and the technology transfer process. Additionally, the ACPO concept and facilities would be utilised as training foci for on-farm research and technology transfer. SAFGRAD will amass data to

provide relevant training in packaging of technologies and testing within national programmes. The Technology transfer approaches and adoption systems in operation in African SAT will be closely examined by group discussion of various approaches and case studies at regular workshops organised by SAFGRAD. In this way SAFGRAD would encourage free flow of ideas in agricultural technology transfer in order to develop more efficient systems within African SAT. To implement this a Feasibility Study of its modalities of operation would be undertaken jointly by the OAU/STRC and ECA.

85. Collaborative Research Networks have been an essential component of SAFGRAD activities. Existing networks will be strengthened and new ones established. The purpose of the networks is to strengthen national agricultural research programmes. Each participating country will develop a better research system and improved food production capability. Trained scientists, especially from Anglophone and Francophone African countries would share their experiences and expertise. Furthermore, SAFGRAD networks would link scientists and institutions in order to develop more effective and collaborative research and to disseminate research results to keep scientists abreast of agricultural research and development. Linkages of scientists involved in dryland crop research will be created among institutions within SAFGRAD participating countries, international agricultural research centres (IARCs) and other research agencies.

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An important feature will be greater involvement of key policy makers of participating countries in activities that give higher priorities and larger national budgets for agricultural research. Workshops, conferences, publications, monitoring tours, uniform trials, short-term (growing season) hands-on experience and expert consultative assistance will be emphasised in planning, conducting and interpreting research.

SAFGRAD Coordinated Networking programme activities in association with collaborating agencies will consist of the following :

i. West African Sorghum/Millet Network

ii. Eastern Africa Sorghum/Millet Network

iii. Maize Network

iv. Cowpea Network

v. Farming Systems and Technology Transfer (ACPP) Network

vi. Agricultural Resource Management Network

vii. Research Management Network.

86. Establishing the mechanisms for SAFGRAD to function as an African Research Coordinating Agency under the OAU/STRC. This would include strengthening SAFGRAD delivery and management capabilities to enable it evolve independently, functionally and financially. By this evolution, SAFGRAD would command the confidence and support of donors and participating African countries.

87. Further details of these priority programmes are given in Chapter VI.

CHAPTER VI

SPECIFIC PROJECT PROPOSALS

A. Explanatory Notes Relating to the Projects

88. The project proposals, which are based on the ideas developed in the Master Plan are presented in a summarized form. Also the cost estimates remain indicative. In particular, personnel cost for international staff would be changed to conform to the SAFGRAD standards. An estimate has been made for a training component in many of the subcomponents of the project. However, definite costing would depend on where the training would take place. Estimates of costs including equipment, materials and supplies do not take into account inflationary factors which will be accommodated when preparing detailed project documents. Administrative costs would depend on decision regarding the execution and location of each project. However, every effort would be made to make maximum use of existing facilities and research institutions or centres to minimize cost and increase efficiency. Provision of 13% of the budget is made to cover project servicing cost.

89. Although the Master Plan is looking towards years 2000, costings shown for the projects never exceed a period of five years which is considered to be reasonable for the purpose of this document. Also, the assistance of USAID, the major donor, is planned for five years. Finally, prudent management of long-term research projects requires a thorough review after four or five years, both to assess work done and to reconsider objectives in view of the results achieved and of new knowledge available.

90. Owing to the importance of the Master Plan for the development of agricultura in the semi-arid zones, the Executive Secretary of OAU/STRC

had preliminary contacts with various governments and organizations, including USAID, United States Department of Agriculture (USDA), Cooperation for Development in Africa (CDA), World Bank, UNDP to request their support for the Plan. Interests were expressed by many of them to support the Plan. Also, actions are under way to induce member countries and OAU to increase their support to the activities of the Agency. IFAD and France pledged to continue and expand their support. A USAID team has prepared the Project document to extend its assistance to the Agency over the next 5 years.

91. Although this Master Plan would serve the purpose of attracting more donors and funds for the Agency, elaborated document would be required once the final project document of USAID support to SAFGRAD is made available and when interests for a specific component of the project is shown by a particular donor.

B. List of Projects

92. The total project budget includes the following major components :

1. Technical Assistance - The major long-term technical assistance is to be provided for research support and networking activities while the short-term assistance includes consultants for research programme development, and programme design, monitoring and evaluation design, special problems and evaluation.

2. Training - The project would support long-term (degree) and short-term (non-degree) training programmes. It will include US$ 20,000 man/year for long-term training and US$ 1,000 man/month for short-term training. Every effort will be made to ensure training within the continent. Appropriate training institutions will be identified in Africa.

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3. Commodities - The principal commodity in the budget is vehicles and also includes motorcycles, word processors, mini-computers and other research equipment.

4. Scientists' Programme Support normally includes farm operations, supplies for farm, laboratory and office vehicle operation and maintenance and travel. Research associate or assistant, Administrative Assistant and secretarial support as support for the scientist programme, and the scientific conference and workshops, are also included in the operating cost.

5. Grants-in-Aid - Funding is provided for grants to scientists at selected NARCs for research of regional significance to the semi-arid areas of Africa. The individual grants to NARCs are in amount of about US $250,000 per year.

6. Evaluation - A mid-term evaluation and a second evaluation near the termination date of the project are planned.

7. Project servicing cost is set at 13 per cent of the total budget and should serve to cover other expenses including administrative , management and financial control expenses. Also some international staff are to be supported by the overhead budget.

93. For the purpose of contacting various donors some of the components of the project are individually presented; these are put under the identified priority areas and include :

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		US $ million
1.	Strengthening the Coordination Capacity of SAFGRAD Agency.	to be worked out
2.	Strengthening Selected National Agricultural Research Centres to serve as Regional Research Centres in the Semi-Arid Zones of Africa.	8.0
3.	Strengthening Collaborative Research with International Agricultural Research Centres for Increased and effective Support to National Agricultural Research Centres.	2.0
4.	Resource Management Research Programme	9.0
5.	Strengthening the Accelerated Crop Production Programme.	11.8
6.	Strengthening the Farming Systems Research Programme.	8.0
7.	Collaborative Research Networks	to be worked out
8.	Training.	to be worked out

94. The various components of the Project are mutually supportive and every effort would be made to mobilize the required resource for its full implementation over the period 1986-1990. Subject to the findings of the Evaluation of the Project by 1990, SAFGRAD intends to phase out its direct support of research on crops through CRSP with IARCs and to concentrate its efforts on networking and

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strengthening of the supportive role of IARCs to NARCs. After 1990 technical assistance will therefore be reduced to commodity coordinator.

95. The direct assistance to NARCs through ACPP and FSRP should also be reduced in intensity after 1990. At that period, it is expected that considerable progress would have been made in defining and executing programmes based on collective self-reliance through Project No.2, and that it would be possible for individual NARCs to release more resources for activities that are country specific in scope. SAFGRAD would still help to mobilize resources to support national programmes but it should not be involved in direct management of these. Therefore SAFGRAD would only finance the positions of FSRP and ACPP coordinators after 1990, so as to help organize the respective networks and to ensure coordination and integration.

96. During the next 15 years, every effort would be made to mobilize resources to build up the coordination capacity of SAFGRAD and the indigenous capacity of NARCs for greater collective self-sufficiency and self-reliance in agricultural research. The biannual meeting of the decision makers in research and development for the semi-arid zones should be promoted and given adequate support. They should provide advisory services, including on the management of the grants-in-aid.

97. To sum-up, SAFGRAD after 1990, should be able to concentrate its efforts on the following :

- rationalization and coordination of agricultural research and development policies in the semi-arid zones;

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- mobilization, management and coordination of resources to help accelerate the attainment of greater self-reliance in agricultural research; and

- maintaining constructive dialogue between all parties so as to achieve more impact from horizontal and international cooperation.

98. The magnitude of the interventions of SAFGRAD in the implementation of the various components of the Project is shown in the following Table :

Priority Areas/Project clements	Planning periods		
	1986-1990	1991-1985	1996-2000
1. Strengthening the Coordination Capacity of SAFGRAD Agency	xxx a/	xxx	xxx
2. Strengthening Selected NARCs to serve as Regional Research Centres in the Semi-Arid Zones.	SNA b/	SNA	SNA
3. Strengthening CRSP for increased and effective support to NARCs.	SNA	NA	NA
4. Resource Management Research Programme	SNA	NA	NA
5. Strengthening the ACPP	SNA	NA	NA
6. Strengthening the FSRP	SNA	NA	NA
7. Collaborative Research Network	xxx a/	xxx	xxx
8. Training	xxx a/	xxx	xxx

a/ Continuous support throughout all phases.

b/ S Stands for direct financial support of SAFGRAD to the programme.

c/ N is support for networking, while A means advisory services to be provided by SAFGRAD on request.

PROJECT NO. 1

Title: Strengthening the Coordination Capacity of the SAFGRAD Agency

99. Background and Justification:

Experience under Phase I shows that SAFGRAD, guided by its Policy Organs, fostered subregional cooperation among participating countries and effectively coordinated the efforts among donors and African Governments to substantially improve the delivery capacity of both national and international institutions working on mandated crops in the semi-arid zone of Africa. Therefore the strengthening of SAFGRAD Agency including its headquarters and subregional offices in Western, Central and Eastern and Southern Africa as well as that of the Policy Organs are among the priorities retained by the Consultative Committee.

To reduce costs, the subregional offices for West, Eastern and Southern Africa are to be located respectively in the offices of the Agency headquarters in Ouagadougou, and of the OAU/Inter-African Bureau for Animal Resources in Nairobi; the Central African subregional office will be located in the office of the OAU/Inter-African Bureau for Soils in Bangui.

100. The terms of reference of the Policy Organs and the Agency are as follows :

1) Policy Organs

The Consultative Committee (CC) assisted by the Technical Advisory Committee (TAC) constitute the Policy Organs of the SAFGRAD Agency. These organs will provide a structure for representatives of member countries , International Agricultural Research Centres, Inter-governmental Organisations and donors

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to influence programme contents and to establish policies and mechanisms for carrying out their decisions. The role of the Policy Organs will be that of establishing policy guidelines for general planning, identification of research problems of a regional significance, monitoring progress toward their solution and establishing corrective courses of action where needed. The terms of reference for the CC are :

- to review overall SAFGRAD project and make recommendations on policy matters.
- review management, organisation, or technical problems and make recommendations for donors, implementors and participating cooperating countries to follow in seeking solutions to problems.
- facilitate project implementation and assure sound administrative management and technical practices.
- serve as a receiving and reviewing body for questions or suggestions from any participating or cooperative party.

101. Composition of the CC

OAU/STRC	Executive Secretary	(Chairman)	1
Donors:	USAID		1
	IFAD		1
	FAC		1
International Agricultural Research Centres			
	IITA		1
	ICRISAT		1
	ILCA		1

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Representatives of SAFGRAD African countries	
West Africa	1
Central Africa	1
East Africa	1
Southern Africa	1
SAFGRAD Host Country	1
SAFGRAD International Coordinator (Secretary)	1
SAFGRAD Director of Research	1
Total membership	14

102. The CC will meet once a year to consider recommendations from the TAC and to formulate policies. Emergency meetings may be called by the chairman if necessary.

103. Terms of Reference of the TAC

- to review annual research work plans and submit recommendations to the CC;
- review other research work plans/documentation related to SAFGRAD in the Sudan Sahelian Zone and submit recommendations to the CC on approaches for improvement or coordination of food crop research;
- review annual research work plans for ACPO and submit recommendations to the CC, National Officers and ACPOs;
- furthermore, based on the OAU/USAID and international institute, consultative meetings in Ouagadougou and Brussels, the TAC will review Farming Systems Research results and advise the CC on coordination and approaches of FSR.

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104. Composition of TAC

Chairman - To be appointed from the senior scientists representing SAFGRAD member country regions on a year to year basis.

SAFGRAD International Coordinator 1

Representatives from Regions

West Africa	1
Central Africa	1
Eastern Africa	1
Southern Africa	1
SAFGRAD Host Country	1

Research Network Coordinators

IITA	1
ICRISAT	1
INSAH	1
SADCC	1
SAFGRAD Director of Research(Secretary)	1

105. TAC will meet twice a year to review research programme activities. A Research Grants Sub-Committee of TAC will implement the SAFGRAD Grants-in-Aid programme for national scientists in SAFGRAD member countries.

106. 2) SAFGRAD Agency

The Policy Organs would be serviced by a well-staffed secretariat and a number of standing and ad-hoc research committees. The secretariat or SAFGRAD Agency, will play a central role in the development of sustainable maize, millet, sorghum, cowpea and groundnut research programmes in the semi-arid zones of Africa through :

- overall planning and programming of research to ensure that research activities are consistent with agricultural

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priorities, farmers' needs, prevailing economic conditions and institutional capacities. SAFGRAD will, in particular, continuously review research work programmes.

- coordination to reduce wasteful duplication of efforts, to develop research leadership particularly at sub-regional levels and to derive more impact from horizontal and international cooperation so as to accelerate the development of food self-sufficiency in Africa. SAFGRAD would be a true catalyst of national, subregional and international efforts and policies for research and development of mandated crops in Africa.

Coordination of training would be given priority attention.

- Commodity research networking including workshops, conferences and dissemination of information to ensure greater complementarity and cooperation between all involved in research and development of mandated crops - in particular SAFGRAD, would help to expand the pool of knowledge, to contribute to the improvement and timely issue of research reports and encourage their dissemination to a wider audience;

- delegation of research activities for production support to existing research institutions including IARCs and NARCs selected as subregional centres. However, the activity of the Agency would be minimal in this area. It would limit its action to the mobilization of resources for these institutions and foster joint actions among IARCs and between them and the NARCs. SAFGRAD will, in particular, influence the research plans of the IARCs to ensure that they are consistent with the guidelines defined by the Policy Organs;

- mobilization and allocation of resources for research - SAFGRAD would aim at 2 to 4 per cent of national total public investments to be allocated for research. Also by preparing

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- comprehensive research programmes at subregional level, SAFGRAD would be able to attract more funds from the international community to complement Africa's own resources;

- advisory services to member states, intergovernmental organizations, international agencies including financial and development agencies particularly in the areas of planning, programming and implementation of research programmes in the semi-arid zones. SAFGRAD would help to develop national research leadership for its members. SAFGRAD would maintain a roster of African scientists and foreigners having experience in research in the African semi-arid zone.

107. Organisation of SAFGRAD Coordination Office

Competent and well dedicated staff would form the secretariat of the Agency. The International Coordinator would be assisted by a Director of Research, Director of Training and Information (new) and an Administrative Officer (new). Three Regional Coordinators respectively for West, Central, Eastern and Southern Africa will be under the supervision of the International Coordinator who will be responsible for the execution of their respective regional work programmes. Seven bilingual senior secretaries preferably locally recruited will be attached to the International Coordination Office, one for each division and one for each Regional Coordination Office. Also, one secretary/typist for each 2 professional staff will form the pool under the supervision of the administrative assistant. The General Service Officer, receptionist, renotypist/messenger Watchmen/janitor and drivers for the liaison vehicles would be under the supervision of the administrative assistant who will be under the Administrative Officer. The Administrative Officer will be primary responsible for

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personnel matters and other administrative duties relating to SAFGRAD member countries' operations.

As far as the Division of Research is concerned, the regular staff will include all the coordinators of the networks; the work of project staff will be coordinated by the Director of Research assisted by the coordinators of networks. The Research Grants Officer will be supervised by the Director of Research.

The Division of Training and Information will have in addition to its Director, two professionals , one for each section; the Conference Services/Information Officer and the Manpower Training Officer. The Translator, Editor and Documentalist would work under the conferences and information officer.

Figure 5 gives the Organogram for the SAFGRAD Coordination Office.

108. The staffing proposed is the minimum needed for the Agency to carry out its proposed functions efficiently. Whenever appropriate, consultants can be hired and/or staff could be recruited an overhead budget to carry out specific assignments.

This structure has taken into account the recommendations and proposals from USAID Project design team and the proposals of the consultants from ECA and the long-range plans for SAFGRAD.

109. The overall objective of this structure is to ensure an orderly development and coordination of the research activities among the various national, subregional and international institutions operating in the Member States and working on the major crops of the semi-arid zones including millet, sorghum, maize, cowpeas, groundnuts, so as to increase the quantity and quality of staple food crops effectively available to the increasing population of Africa.

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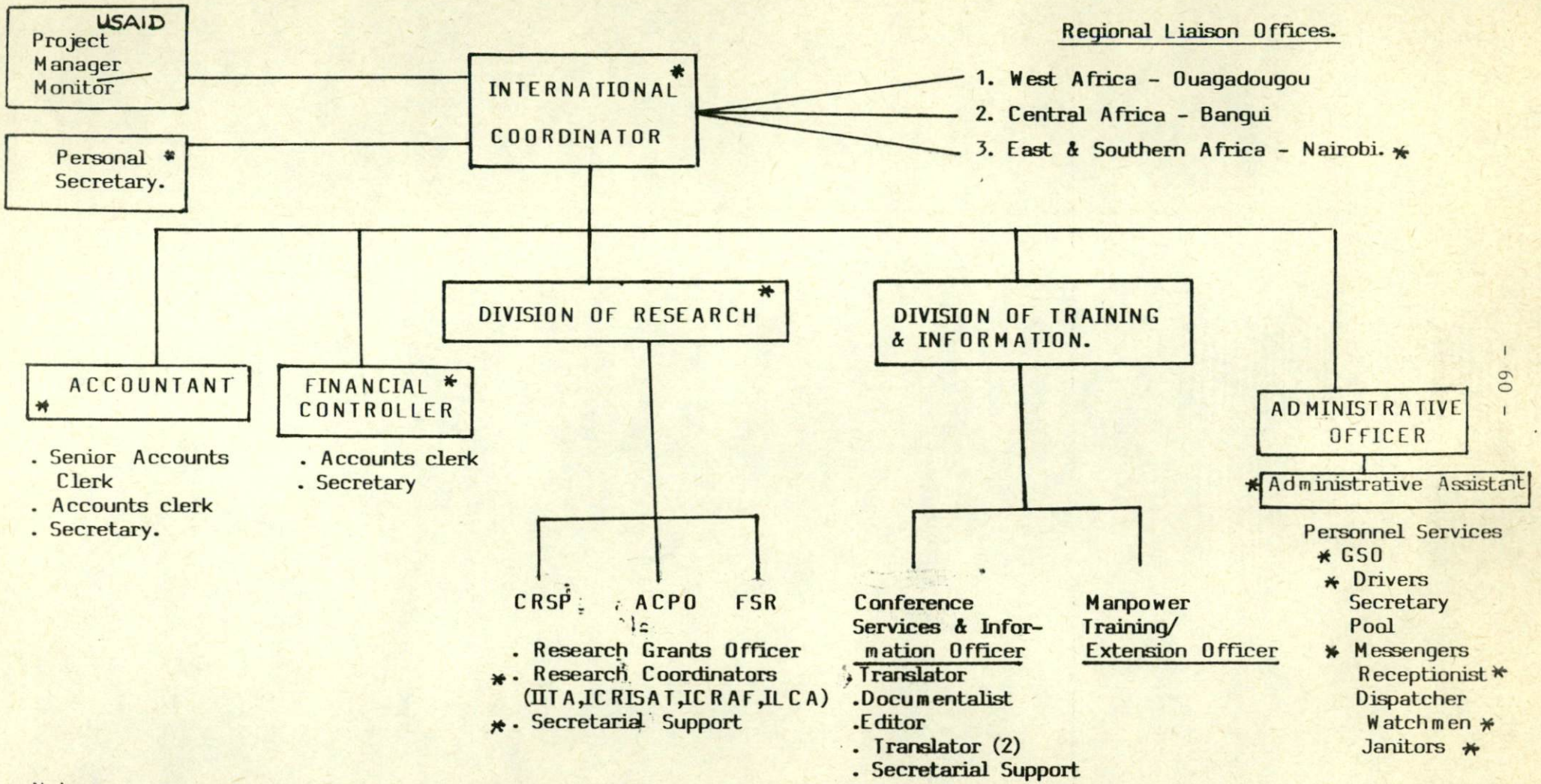
FIGURE 5. ORGANOGRAM FOR SAFGRAD COORDINATION OFFICE.



Notes.

1. Asterisk (*) denotes existing staff positions
2. Project manager/Monitor to be provided by USAID on lines contract basis.
3. Director of training & information to be internationally recruited.

110. The immediate objectives are to strengthen the implementation capacity of the Agency and to improve the effectiveness of its Policy Organs by providing additional and adequate resources including financial, human and material

111. Regional Offices

The vastness of the SAFGRAD mandate area covering 26 countries in semi-arid Africa, together with the problems of easy and effective communication within the zone, present major difficulties of coordination from the SAFGRAD headquarters in Ouagadougou. There is a crucial need to establish and maintain strong SAFGRAD presence throughout the mandate area, especially for its long-term activities. In order to undertake effective coordination of agricultural research and development throughout semi-arid Africa, the CC, at its August meeting approved the establishment of 3 SAFGRAD Liaison Offices, as follows :

i. Regional Office for West Africa located within the Headquarters of SAFGRAD in Ouagadougou. A liaison officer will be appointed to support the coordination of SAFGRAD activities in West Africa.

ii. Regional Office for East and Southern Africa: To be located at the OAU/IBAR office in Nairobi and to be fully responsible for coordinating SAFGRAD activities in East and Southern African countries and to report to Ouagadougou.

iii. Regional Office for Central Africa to be located in the OAU Office at Bangui, Central African Republic.

The Regional Liaison Officers will report directly to the International Coordinator in Ouagadougou.

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112. Channels of Communication

SAFGRAD Agency as a permanent African organisation of the OAU/STRC, will be primarily concerned with encouraging high and stable production of important food crops of semi-arid Africa. This is a matter of deep concern not only to the OAU Heads of State and the Council of Ministers responsible for Agriculture and Rural Development but also to the international community. The unique position of SAFGRAD under the umbrella of the OAU would be fully exploited for the successful implementation of SAFGRAD programmes. An open channel of communication to the OAU Heads of State and Council of Ministers for Agriculture and Rural Development exists (Fig. 6) through the Scientific, Technical and Research Commission for SAFGRAD to draw the attention of the OAU to pressing technical problems which are barriers to efforts by SAFGRAD member countries to achieve accelerated food crop production for self-sufficiency and food security. There is an urgent and important need for many African Governments, especially those in the Sudan Sahelian region, to reorientate their agricultural research policies in order to give greater financial and other resource allocations to agricultural research and extension, food crop pricing policies and to the development of rural infra-structures. The field experience accumulated by SAFGRAD through its Research Coordination and Networking, ACPO, Linkages, and Training and Information exchange programmes would be made readily available to the OAU Headquarters through the Lagos Office of the OAU/STRC. This channel of communication will be fully utilised by SAFGRAD in its long-term and permanent operations.

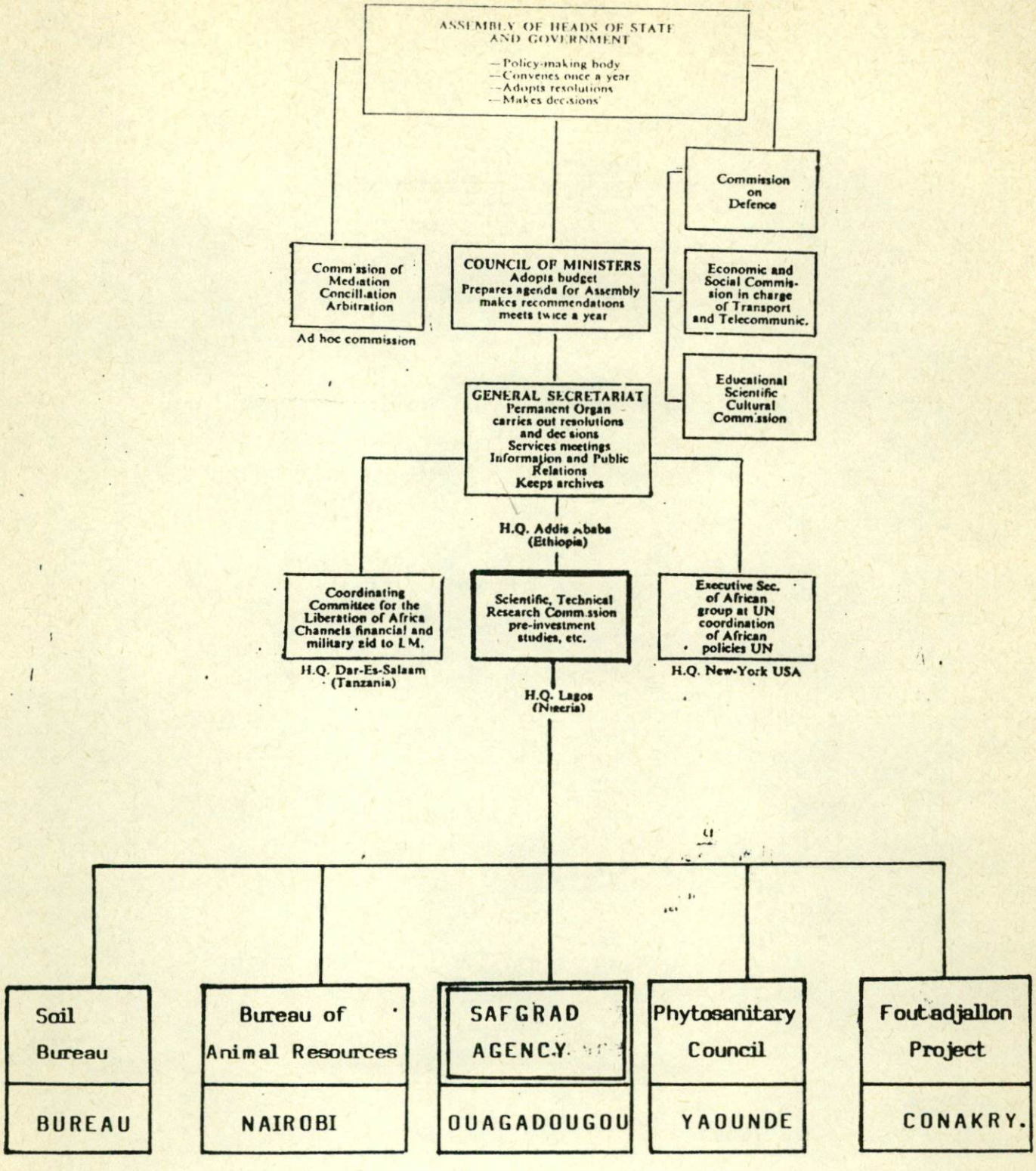

Figure 6 : Structure of OAU showing the regional projects of the STRC and their direct line of communication through the STRC to the OAU Council of Ministers.

PROJECT NO. 2

Title: Strengthening of Selected National Agricultural Research Centres to aerve as Regional Research Centres in the Semi-Arid Zones of Africa.

113. Background and Justification

The lack of productive research institutions in most African countries has resulted in a dearth of farmer-acceptable improved technologies required to increase agricultural production and productivity. With the exception of few, the bulk of African countries cannot afford research strategies based on total individual self-reliance and self-sufficiency in agricultural research. Even those which have the potentials to do so failed to build an effective indigenous capacity for productive and reproductive research. Also, owing to the magnitude and complexity of the demand for outside assistance to research, the interventions of the international community had often resulted in a duplication of efforts and misallocation of scarce resources among African countries. Indeed these efforts failed not only to build adequate African agricultural research capacity but also to generate the needed farmer relevant technology. There is a need to bring about improvement in the planning of research and thereby in the allocation of resources particularly from outside sources. Also the need to promote and achieve self-sustained progress and development in agricultural production through greater collective self-reliance in agricultural research and better use of outside assistance cannot be over-emphasized.

114. The approaches initiated by SAFGRAD include the strengthening of selected NARCs to serve as :

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1) main stations for screening and borrowing technology from the global agricultural research system and adapting it to local conditions and developing technologies for wider adoption in a given ecological zone. Such NARCs may include, subject to further assessment, the Institute for Agricultural Research in Nigeria for Sorghum and Millet, Centre National de Recherche Agronomique (CNRA) in Senegal for millet and groundnut; selected stations in Burkina Faso for cowpea, sorghjm, and soil water management, selected stations in Mali for bambara nut, Nyankpala Research Station in Ghana for maize; selected stations in Ethiopia for high and low altitude sorghum and selected stations in Kenya for maize.

2) satellite stations for developing models which can best achieve the effective transfer of improved technologies particularly developed by the regional and international research centres. It is expected that this programme will lead to the building of strong and self-sustained indigenous capacity of research at national and subregional levels.

Objective

115. The overall objective of the project is to develop the productive indigenous capacity and leadership among NARCs for greater individual and collective self-reliance and self-sufficiency in agricultural research. The achievement of this objective will require a redefinition and reorientation of research policies and strategies of the member countries and a concrete translation into actions of the commitments of OAU member governments for greater collective self-reliance. The immediate objective include:

the preparation of a study including pertinent and detailed recommendations on how best to translate into concrete actions

and plans the principle of collective self-reliance as it applies to agricultural research for the major crops of the semi-arid zones of Africa. The preparation of such document will require the services of a team of consultants for two months whose terms of reference and composition are as follows :

116. 1) Terms of reference

- to critically assess the research policies and strategies of the NARCs with a view to identifying strengths and weaknesses , and areas of possible intervention and subregional cooperation;

- to identify NARCs which have the potential and willingness to serve as main and/or satellite stations with a view to improving the use of existing research capacities and resources and of mobilizing the required resources based on greater collective self-reliance;

- to identify additional sources of assistance for supplementing own resources;

- to prepare programme and activities to be implemented by each main or satellite station.

117. 2) Composition of the team

The team may include :

1 agro-economist as team leader

1 farming systems research specialist

2 research scientists

1 training extension specialist

1 management specialist

Additional experts may be requested from FAO, ECA/MULPOC, ECOWAS, ECCAS, SADCC, PTA and/or other relevant IGOs. /...

118. The report will be discussed first by the Policy Organs of SAFGRAD. The conclusion and recommendations of the Policy Organs will be presented to the FAO Regional Conference of the Ministry of Agriculture, the ECA Conference of the Ministry of Planning and finally, to the OAU Assembly of Heads of State and Governments to ensure its acceptance and increase the change of implementation and success of the agreed programmes.

- the provision of grant-in-aid administered by SAFGRAD to the NARCs selected as main and satellite stations.

119. Estimated Cost

Item	Year 1	2	3	4	5	Total
	(U S $1000)					
I. Technical Assistance	100	20	20	60	20	220
Short term Consultancy/Evaluation Senior Scientists	100	20	20	20	20	180
Evaluation	-	-	-	40	-	40
II. Operating Cost	1,430	1,250	1,430	1,250	1,450	6,810
Grant-in-aid[a/]	1,250	1,250	1,250	1,250	1,250	6,250
Scientific Conference[b/]	180	-	180	-	200	560
Base Cost subtotal	1,530	1,270	1,450	1,310	1,470	7,030
Project servicing cost(13%)	228	190	216	196	220	1,050
Grand Total	1,758	1,460	1,666	1,506	1,690	8,080

a/ Assumes 5 NARCs receiving annually US $250,000 as grant-in-aid.

b/ Includes bi-annual meeting of directors of NARCs to ensure appropriate research management especially as it relates to programme on research management, allocation of resources and prioritization of research programme.

PROJECT NO. 3

Title : Strengthening Collaborative Research with International Agricultural Research Centres for Increased and Effective Support to National Agricultural Research Centres.

120. Background and Justification

With the exception of maize, African agriculture has probably been less affected by technology change in the past twenty-five years than agriculture in any other continent. This is partly due to the failure of research institutions especially IARCs whose focus is on food crop research to make any major breakthroughs in food crop technology suitable to the farming conditions of a given African subregion. Moreover, the lack of effective coordination among the research institutions resulted in many instances, to a misallocation of scarce resources through wasteful duplication of efforts.

121. The need for greater cooperation, integration and coordination of activities through mechanisms by which, where duplication exists, concerned parties meet to work out differences and where deficiency or gap exists attempts be made to develop joint programmes to fill this void, is widely recognized and supported. As far as the semi-arid zone is concerned, SAFGRAD has been active in developing Collaborative Research Support Programme (CRSP) by which contracts are granted to selected IARCs, namely ICRISAT and IITA to direct individually or jointly, part of their activities on specific SAFGRAD development objectives.

122. The current CRSP includes improvements of maize and cowpea with IITA and those of sorghum and millet with ICRISAT. These two IARCs have had some success in developing improved grain varieties which are being tested or used

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by some NARCs, mainly through the Accelerated Crop Production Programme (ACPP) of SAFGRAD. Experience to date shows that the CRSP is perhaps the most appropriate way of improving the performance of the IARCs in terms of supporting effectively and efficiently national programmes thereby addressing the problems of research relevant to the farmers including small farmers.

123. The evaluation of SAFGRAD CRSP shows that corrective measures such as entrusting OAU/STRC with the responsibility of negotiating and administering the contracts to the IARCs are required to ensure an effective monitoring of the performance of these by SAFGRAD Agency. These measures were in fact approved by the Extraordinary meeting of the Consultative Committee, along with the proposals for strengthening and expanding the collaborative Research Support Programme of the Agency.

Objective

124. The overall objective is to generate broadly based genetic materials for semi-arid environments focussing particularly on the development of drought resistant and short cycle varieties and efficient soil-water management systems and other suitable agronomic practices so as to sustain and accelerate on-farm crop production. The immediate objective is to provide :

- grants to OAU/STRC which in turn will contract to relevant IARCs particularly ICRISAT and IITA to strengthen their abilities of generating technologies identified as priorities by SAFGRAD;

- support to SAFGRAD Agency to enable it to monitor and provide the necessary backstopping for the CRSP including networking and dissemination of information among all parties.

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125. Estimated Cost

Support to the two IARCs (IITA and ICRISAT) for carrying out research and networking required about 60 per cent of SAFGRAD's total budget, and was highly effective in initiating studies and varietal improvement of food crops in the semi-arid zone. Subsequently, ICRISAT is in the process of establishing core funded major projects on semi-arid commodities (millet and sorghum), and farming systems research in three major regions of Africa. Therefore, SAFGRAD will support 4 scientists in the first two years and thereafter 2 network coordinators, namely West African Sorghum Coordinator and East African Sorghum and Millet Coordinator.

126. Since IITA programmes on semi-arid maize and cowpeas have not yet been transferred to core funding, SAFGRAD should continue to support the SAFGRAD/IITA improvement programmes of maize and cowpea until 1990 or until these are transferred to core funding. Additional funding would be required as of 1988 to complement that provided by USAID, as shown in the following table :

Additional Funding Requirement
(US $ 000)

	Year					
	1	2	3	4	5	
Maize Agronomist a/	-	-	100	100	100	300
Maize Breeder a/	-	-	100	100	100	300
Cowpea Breeder a/	-	-	100	100	100	300
Cowpea Agronomist a/	-	-	100	100	100	300
Entomologist	100	100	100	100	100	500
Soil Fertility & Management Expert b/	-	-	100	100	100	300
Maize Coordinator c/	-	-	-	-	-	-
Cowpea Coordinator for Eastern & Southern Africa c/	-	-	-	-	-	-
Total						2,000

a/ to be supported by USAID for two years.
b/ to be supported by IFAD for two years.
c/ to be supported by USAID.

The additional funding is about US $2 million based on an annual budget per scientist of US $100,000 including operations.

PROJECT no 4

TITLE: AGRICULTURAL RESOURCE MANAGEMENT RESEARCH NETWORK

127 Executive Summary

Agricultural Resource Management Research Network (ARMRNW)

Past trends in agricultural research and development must be changed and alternative paths to increase food production will have to be taken. A long-term serious commitment to agricultural resource management research is crucial. Studies in soil-water plant relationships, soil fertility, agro-climatology, agroforestry, agricultural engineering, crop and livestock production systems and socio-economic would form the core activities of an integrated resource management research system. The ARMRNW core team would establish a vital link to national agricultural research system and provide backstop services to SAFGRAD regional networks in agri-resource management. In addition to regular annual workshop to make available technological information, training (both short and long-term) would be carried out. Scientists of participating countries would also gain practical field experience by working at main and satellite research stations of resource management attached to the selected national research stations. The information centre for ARMRNW would provide technical backstopping to proposed network.

AGRICULTURAL RESOURCE MANAGEMENT RESEARCH NETWORKS PROJECT

INTRODUCTION

128 With increasing world population, our knowledge of the limits of our finite resources becomes ever clearer. According to United Nations

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projections, world population could reach a stable level of 10.5 billion by 2110, compared with 4.4 billion now (1985) and 6.2 billion projected for the year 2000. The bulk of this population increase is to take place by the middle of the 21st century with world population reaching 9.25 billion. Therefore, world demand for agricultural production will increase by 50% in the next 20 years and double again during the 21st century. As most of the population increase will occur in developing countries, the outcome of this dilema of too many people and not enough food, by conservative estimates, will not only be unsatisfactory but alarming. Increased agricultural production is expected to come from the development of arable land (26%), increase in cropping intensity (14%), and higher yields (60%). Therefore, past trends in agricultural development must be changed and alternative paths to increase food production will have to be selected.

129 A long-term, serious commitment to agricultural resource management research is crucial. Studies in soil-water plant relationships, soil fertility, agroforestry, agricultural engineering, crop and livestock production systems and socio-economics would form the core activities of an integrated resource management research system.

The decline in fertility of semi-arid soils due to the removal and destruction of vegetative cover and high demographic pressure, erosion; lack of water and adverse weather conditions have become major constraints to increasing food production. The situation is worsening from year to year due to increased desertification.

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130 The research results thus far obtained also suggest that crop yield is influenced to a greater degree by availability of soil moisture and by improved management of related resources than genetic improvement of crops alone. The management of the soil and water resources need to be given greater emphasis in order to sustain high stabilized crop yields in the semi-arid regions of sub-saharan Africa. The core research team currently proposed is expected to strengthen agricultural resources management, regional research networks among member states of SAFGRAD. Furthermore, the programme would provide backstop support to the SAFGRAD Accelerated Crop Production Programme functionally integrated into national research and extension systems.

131 Major Constraints

a) Inappropriate soil management system

The African continent, although endowed with immense natural resources, has faced serious food crises since the last two decades. The continuous decline in per capita food production have been attributed variously to the drought, rapid population growth and degradation of the resource base for productive agriculture. Although these factors may have exacerbated the food crisis, deep at the root of the problem lies in the neglect of the environment in general and improvement of the soil fertility, conservation, water management in particular. Soil degredation has consequently become a major constraint to food production in the semi-arid tropics. Technology and methodology for improved soil fertility, and conservation and water management are therefore, urgently needed. In addition, development of

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integrated production systems which recycle resources, and consequently conserve and optimize available soil resources are required.

b) Drought The drought that destabilized food grain production in many countries of Africa is not unique to the region. Although the droughts of the 1960s and 1970s of the Sahel received world-wide attention, it was reported that more than 20 droughts did occur since the 16th centure in the same region. Previous pattern of climate seem to suggest that droughts occur in one or more regions of Africa every year. Two or more droughts affect large areas of the continent every decade while extremely protacted and widespread droughts occur about three times in a century, although the precise geographical area of incidence is not predictable. In general the erratic pattern of rainfall distribution, as well as poor soil management techniques to conserve moisture, have also contributed to poor food grain production.

c) Lack of sufficiently trained agricultural research workers, particularly in soil science and water management.

d) Inadequate research and extension infrastructures. Only half to 8% of government financial resources of most African states are allocated to agriculture, whereas 80% of the workforce depend for its stay primarily on agriculture in

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most sub-Saharan African countries.

132 The problems of erosion, dessertification and deforestation have further exarcerbated the dwindling of food production in many sub-saharan African countries. Increased food production to cope with the rapid population growth could not be attained without effective and self-sustaining agricultural production systems.

133 General Objectives of the Project are:

. to systematically collect, assess and synthesize relevant available information to establish a broad data base for multi-disciplinary research in resource management.

. to identify research gaps in the National Agricultural Research Systems (NARS) of different countries (including manpower and research infrastructure) and develop collaborative research projects in various countries;

. to facilitate the efficient dissemination of research results, communication, methodologies and technologies to different member countries;

. to establish dynamic operational linkages among institutions in order to integrate their efforts for more effective use of existing research resources, both at national and regional levels;

. to coordinate regional research;

. to develop and carry out short-term training courses in resource management.

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134 THE PROBLEM

Soil and water are often seen as natural resources to agriculture which are uncontrollable whereas they should, in fact, be considered finite resources which can be modified, conserved and managed. In most sub-saharan regions, average annual rainfall can vary from 400 mm to 1200 mm. However, the estimates of surface runoff could up to 40 to 80 per cent. Effectively, farmers are losing more than half of the rainfall that reaches their plot of earth. Source should be refunded as much as 8 tons of soil could be lost from a cultivated hectare and 20 tons/ha from bare soil, attributable to the forces of erosion. The potential for implementation of agricultural resource management technology is challenging. Through the use of conservation techniques the soil can replenish its storage reservoir for better plant growth, reducing the damaging effects to erosion.

135 Nutrient requirements must be determined for all soils, particularly those of West Africa, before recommendations may be made on the type of fertility management required. Soil testing and laboratory analyses are needed, with on-site yield trials of the various crops and soil types within the ecological environment of the vegetative zones. All elements essential for the growth of plants are involved in the fertility management of soil. The maintenance of soil fertility at a satisfactory level, while at the same time attempting to increase production, is a complex problem. There are also important interactions between soil nutrients and soil water.

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136 The maintenance of optimal amounts of nutrients can only be realized by keeping a favourable balance nutrient gains and losses. Continual crop removal depletes the soil of nutrients, but replenishment by organic additions such as farm manures and green manures, crop rotation and intercropping and the addition of inorganic fertilizer, are some of the methods employed to maintain a balance. In West Africa, phosphorus is the major limiting element; However, yields cannot be substantially without the addition of nitrogen and a supply of water for root development and eventual nutrient uptake. Nitrogen deficit, generally caused by leading and volatalization crop removal and soil erosion can be met by incorporating farm and organic matter and by the addition of commercial fertilizers.

137 Woodlot farming, with controlled cutting and harvesting of trees, needs to be started to ensure a continuous supply of trees for fuel, soil erosion control, and for the protection of the landscape. The removal of trees for fuel has been occurring at an accelerated rate throughout Africa. Traditional cooking is done over an open wood fire. With expanding population, the cutting of trees near population centres has increased and land clearing has progressed steadily. Land clearing leaves the soil bare and unprotected from the ravages of water and wind erosion which occur at an alarming rate. Often, production losses are only reflections of soil losses, and few controls or corrective measures are implemented throughout the region.

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Research Objectives

Although soil and water management research was a component of SAFGRAD Phase I, no expanded network of research activities was launched on a regional basis except as a component of agronomic trials. The objectives are:

1. To develop and improve techniques of water use efficiency, water harvesting technology appropriate cropping systems and soil conservation practices.

2. To implement and evaluate supplemental irrigation, to restrict surface water losses (zero-runoff concept) prevent soil erosion.

3. To delineate tillage problems employing animal-drawn implements for the most effective use of draft animals in preparing field designs, including seedbed preparation, seed and fertilizer application, construction of water harvesting facilities, weeding and harvesting equipment and earth moving projects to improve production agronomy.

4. To assess the capacity of soils in semi-arid tropical Africa to supply higher plants with essential elements which are fundamental to crop production. To determine and identify nutrient deficient areas within the programmes international network where the concentration of available nutrients could be adjusted by applying fertilizer required for increased crop production. To select methods and management alternatives so that farmers can provide an adequate quantity of each nutrient to increase and maintain a high level of agronomic output.

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5. To develop agricultural forestry techniques which can reduce runoff and erosion on depleted soils. To establish forestry projects at the village level supportive of woodlot management as an integral part of the farming systems programme. To identify and test various trees and brush systems for use as windbreaks to reduce wind erosion and crop damage in the sand blowing areas.

6. To improve the fertility of soil through integrated cropping and livestock production systems.

139 Areas of Research Emphasis

Field studies emphasizing soil, water and nutrient conservation practices for rainfed agriculture would be the major thrust of research in the project.

140 Tillage studies

Energy efficient and conservation effective tillage systems which improve soil structure, reduce weed growth, labour and fertilizer inputs would be studied at the village level with appropriately designed on-farm trials. Concurrently similar trials would also be run at the research station level. The role of crop residues in improving the productivity of such tillage systems would be scrutinized in the above trials.

141 Water conservation studies

Water is the most important constraints to crop production in the semi-arid zones of africa. Conservation and efficient use of water are consequently, critical to the development of a rational agricultural resource management system. Management

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systems which minimize runoff and erosion, and maximize water infiltration into the soil profile would, therefore, be given a high priority. Possible techniques for study would include 'digettes', tied ridging, zing terraces and water spreading. Other related topics of study would include interaction of nutrients and various soil and water conservation systems in the Savanna soils of Africa, efficiency in terms of water storage of terraces, tied ridges and contour ridges constructed by animal traction. Appropriate socio-economic studies of the above soil-water conservation systems would also be undertaken at the village level. Design and construction of rainfall collection systems for domestic and farm use in collaboration with the animal-traction and agro-forestry programmes is also enviaged. Demonstration projects would be implemented at the village level in areas representative of given agro-ecological zones.

Greater emphasis would be placed on drought tolerance of various crops and trees and their capacity to adjust to different forms of soil-water and fertility management practices such as various timing and type of mulche application, seedbed shapes, planting patterns, cultivation methods, cropping systems and supplemental irrigation. These studies would involve measurement of soil-water in situ (ie soil water content, hydraulic conductivity and water potential), soil fertility, soil and plant microclimate (ie. temperature, relative humidity, wind speed, net radiation etc.), plant water status (ie. leaf water potential, leaf diffusive resistance), plant growth characteristics (ie

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photosynthesis rates leaf, area index) and crop water and nutrient use studies (with lysimeters and under open field conditions). Under no conditions should lack of equipment be permitted to constrain urgently needed studies of soil water and fertility management.

Agro-Forestry Project

143 Establishment of nursery stock and selection of suitable trees and shrubs for woodlots and alley-cropping system, with the emphasis being on leguminous species such as Acacia, Casuarina and Prosopis spp. The implication of introducing trees and shrubs into the farming systems of a given area would be studied in terms of soil-plant relationships (ie. water use, nutrient cycles, competitive relationships with annual crops etc.) and socio-economics.

144 Soil Fertility

The process of diagnosing plant nutritional problems is based upon on-going fertility evaluation programmes which can be grouped according to the principal techniques used. The main ones are soil testing, plant analysis, missing element techniques, and simple fertilizer trials. These emphasize the central concept that fertility evaluation is a site-and crop-specific undertaking. The purpose of a soil fertility evaluation project is that it must be correlated with growth response under field conditions. There is a need to identify soil fertility problem areas within the vegetative zones, develop field plot studies at the village level and, when

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possible, offer remedial solutions for fertility management.

Severe soil erosion cuts and gullites can be seen throughout the landscape in Africa which represents alarge percentage of land not in production. These areas have been denuded of grasses and trees for fuel. As bushes and trees in sufficient abundance to anchor the soil. To stabilize the scars of human destruction, trees can be planted and with minimum maintenance regain the loss, stabilize the area, improve the soil and in time create an area supportive of agro-forestry.

Usually the first method suggested for the control of wind erosion is establishment of a permanent windbreak by planting trees and shrubs. Windbreaks are intended to reduce wind erosion and crop damage, Semi-porus windbreaks are more effective than impervious types because of diffusion and eddy effects on the downwind side. The usual design has several rows of trees in combination with shrubs and bushes to reduce wind speed at the soil surface. These types are usually most

145. Livestock like soil, through crops, is the other important natural resource on which the livelihood of the people of the semi-arid region have been, and still are, harvested with very little input injected back into the system of their tuilization. This has been followed by a continuous decline in their productivity.

The declining crop yield accompanied with the increased requirement for cereal production in the heavily cropped area is demanding for

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more land to be cultivated at the expense of grazing. As a result, the capability of the farmers to maintain the keeping of cattle, despite the many benefits they are gaining from the integration, has continued to be jeopardized. Inorder to achieve an increase in the production of food under the objective conditions of the semi-arid regions the possible maximum use of the locally available resources is an inavoidable necessity. A research policy that is deliberately liaised in favour of utilization of such resources needs to be adopted as a conceptual framework.

146. In many parts of the world the integration of livestock has always served as a strong back-up for the increased production of food crops. It has allowed the expansion of cultivated land while permitting intensification of crop production through draught power, recycling of nutrients and reinvestments of livestock generated income. This, not only is sound conceptually the chances of it being adopted or strengthened by the farmers could also be high for.

a) the practice of recycling and utilization of the locally available resources through the system of integration is already existing although not to a great enough extent.

b) the system could be within their economic reach, thus fitting into the objective conditions of the farms.

Therefore, inorder to increase the efficiency of recycling and utilization of natural resources through the integration of crops and livestock a thorough study that will allow the injection of

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scientific knowledge is an immediate requirement. The following aspects could be considered for study:

147 Research

1. Research on Animal draught power

Use of animal draught power is a technological improvement that could allow eliminate the drudgery of labour, increase the efficiency of use of available labour and gradual intensification of the production system. Draught power is required for the various activities of soil and water conservation, drawing of water for consumption by humans and animals, etc.

Most of the soil and water conservation activities are expected to occur before the rains, ie. during the dry season when the animals are usually in poor condition for draught work. The available basic feed resources to the animals for the major part of the year are mainly the crop residues and the dry-nature natural pastures. These materials, although rich in cellulosic energy, are poorly consumed due mainly to their low nitrogen content. It is recognized that the physiological demand of nutrients by the animal for body maintenance, work, growth. calf and milk production can only be satisfied when the nutritional factors limiting intake are removed and adequate levels of nutrients are supplied.

Therefore investigation on the nutrition of draught animals to establish a feeding system suited to the requirements of draught work using the locally available feed resources will be necessary.

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The possible means of increasing the feed resources is discussed in (2).

For the further improvement in the efficiency of utilization of naimal energy, improvements in ploughs and implements will be expected to develop too. Such improvements in addition to improved tillage operations will also encourage the use of cows for draught purposes.

Cows could serve as multi-purpose animals contributing to the draught power requirement of the farm while producing milk and calves as sources of income to help reinvest in the cropping system for further intensification. To exploit such possibilities investigations on the added effects of draught power, fertility and lactation performance of cows vis-a-vis the draught power of oxen need to be conducted under the specific conditions of the farms.

2. Research on Feed Resources

Crop residues and dry/mature natural pasture on the fallow and wasteland constitute the basal diet of the animals during the dry season (7-9 months). These are low quality roughages. An attempt to increase the utilization of such materials demands the availability of nitrogenous sources. Of special interest under the existing objective conditions is the need to exploit the potentials of tropical leguminous forages and browses.

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The incorporation of forage legumes and browses could serve as a vital link between the crop and livestock production systems. The supply of nitrogen to the animals could allow the maximization of digestion of cellulosic materials by the microbes in the rumen. Leguminous forages are known to contribute to the fertility and structure improvement of soil through nitrogen fixation and organic matter supply. The legume forages and browses could be incroporated in various ways:

a) Using fallow and wasteland: In quite a number of places fallowing after a number of years of cereal production appears to be the only means of restoring soil fertility. Fallow fields are also used for grazing. These abondoned fields can be used for:

i) the introduction of annual and drought resistant perennial forage legumes directly cultivated or oversown in the fallow pasture for conservation for dry season feeding. If the legumes are annuals the regrowth after the harvest for conservation could be ploughed under to increase the nitrogen, mineral and organic matter contents of the soil.

ii) planting leguminous browses as alley crops for a cut-and-carry feeding system as a source of nitrogen and energy to supplement the crop residue feeding in the dry season. This system also allows the use of the

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branches of the browse to mulch the soil. The pasture between the alleys could be harvested for conservation and the regrowth grazed by sheep. After the termination of the fallow period the legume trees could continue to serve as alley crops.

b) Using contour ridges: contour ridges on the arable land could be planted with browse species for conservation of soil and mulching while providing feed as a cut-and-carry system to supplement the crop residues. Conserved forage and the cut-and-carry system will encourage the feeding of animals in enclosures where feeding could be controlled and manure output and management improved.

c) Allocation of arable land: Establishment of a permanent perennial legume and grass forage production on part of the arable land in the absence of fallow might have a substantial contribution to the feed budget of the farm.

d) Intercropping of legumes with cereals: This could also serve as a source of nitrogen and energy when conserved for the dry season feeding.

The above points might indicate the possibility of increasing the resources of feed to combat the problems of nutrition for the integration of livestock with the crop system.

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3. Research on Animal productivity

The improvement in the quantity and quality of feed resources could lead to an improvement in the productivity of the animals. That is, the alleviation of the feed constraint could open the way for research in the genetic improvement of the animals for:

- milk production
- meat production
- draught power through increased size
- growth
- fertility.

With the possible use of cows for draught purposes studies to monitor their breeding performance and adjusting the times of service and calving according to the periods of draught power requirement are necessary.

Studies on the fattening of young male animals born on the farm and draught oxen after the work season geared for the meat market could encourage farmers to integrate livestock with crops. Because of the low demand for feed and the minimum management required the farmers tend to keep small ruminants such as sheep and goats. With adequate nutrition these animals could perform to an acceptable level. The additional

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income earned from the above could be reinvested to intensify the production system further.

4. Organic Manure management

It is known that animal manure could make partial contribution to the improvement of fertility and structure of soil. With improved animal husbandry the output of manure could be raised. It is worthwhile, therefore to aim for the best possible utilization of the nutrients depends on the type of feed consumed by the animal and the method of storage.

As a source of microbial population for fermentation manure is a good resource for biogas development. This could be a Key component in the use of renewable energy source. Part of the crop residues could also be incorporated to add the level of cellulosic energy for fermentation. The high digestion of cellulosic energy by the fibre digesting microbes usually is accompanied with high rate of methane production. The process also produces a residue, slurry, which could serve as a rich source of microbial nitrogen to be used for fertilization. With the appropriate design of digesters for biogas fermentation the manure could be processed further into fuel gas as a source of energy, thus reducing the pressure on firewood.

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148. Approach

One of the major activities of the programme is to coordinate research activities in order to strengthen on-going research programmes and to utilize existing information resources through collaborative research with national research institutions, International Agricultural Centres (ICRISAT, IITA, ILCA, ICRAF, etc.) and with other bilateral and regional organizations (INSAH, SACCAR, CIRAD, etc.). The major activities of SAFGRAD's core inter-disciplinary team for resource management research could be as follows :

- Collate , assemble and document available data from scattered research activities of past and current programmes in soil fertility, water and soil conservation management and related fields and thus maintaining a documentation service for participating countries;

- Initiate zonal agricultural resource management networks, related to soil-water management, agroforestry and crop livestock interactions and facilitate collaborative research activities with on-going research programmes;

- Establish main and satellite research stations to strengthen resource management research networks;

- Disseminate technological information on agricultural resource management to scientists of member countries through field demonstrations, seminars, workshops and technical publications and literature services;

- conduct short-term training and also prepare promising scientists for long-term training;

- Improve and strengthen research facilities of selected national research stations through direct research support. /...

149. The core scientific staff required are :

- Soil Fertility/Plant Nutrition Specailist
- Agricultural Economist
- Livestock and Forage Specialist
- Agricultural Engineer - with emphasis on farm power and implements.

150. Their research projects will include the following :

(1) Soil Fertility and plant nutrition specialist

a) Phosphorus studies

Characterization of soil-P status, crop P responses, P removal and balance in different cropping systems, residual P effects efficient use and effectiveness of different P sources (with particular emphasis on local phosphatic rocks), role of mycorrhyzas genotype x P level interactions, drought stress x P level interactions.

b) Nitrogen studies

Characterization of soil-N status, crop N responses, N removal and balance in different cropping systems, residual N effects, efficient use and effectiveness of different N sources, role of leaching and volatilization losses on the N balance, genotype x N level interactions, drought stress x N level and timing of application interactions.

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c) Biological N fixation systems

Contribution of locally grown legumes in the N balance under traditional and improved cropping systems, role of non-traditional legumes (e.g. soybeans) for improving the soil N balance, evaluation of Rhizobium strains for efficiency of N fixation, development of agroforestry systems and, in particular, alley-cropping systems involving legumes, legume genotype x N fixation studies.

d) Soil Organic matter studies

Characterization of soil organic matter under different soils and traditional cropping/farming systems; maintenance and improvement of soil organic matter studies; effect on soil organic matter of traditional and improved management systems, involving burning, residue management, use of animal manure, fertilizer use, agro-forestry systems, improved soil-water management techniques.

e) Studies on secondary and minor elements and other deficiencies or toxicities. Sulfur status and management, deficiencies of Zn, Boron, etc and correction, Aluminium toxicity and management, etc.

151. Agricultural Economist

1. Collaborate with other team members in conducting baseline studies of current production systems in representative benchmark sites: Accent in the baseline surveys would be placed on :

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- farmers' current resource management practices (soil fertility management, erosion control, livestock management, tree management, etc.).

- socio-cultural factors related to resource management (land tenure, herder/farmer relations, common properties such as woodlots, etc.).

- nature and rates of environmental degradation by zone.

- farmers' management responses to the environmental decline.

2. Work in collaboration with other team members to conduct ex ante assessment of costs and benefits of alternative technical interventions to improve resource management.

3. Collaborate with other scientists to test the most promising technical interventions in operational scale researcher-managed and farmer-managed tests. The economist would provide an economic assessment of the costs and benefits in both the short and long-run, and assess the compatibility of the new techniques with socio-cultural factors.

4. Monitor the adoption and subsequent modification of new techniques tested by farmers.

5. Provide technical assistance and training to national scientists to enable them to conduct similar research within national programmes.

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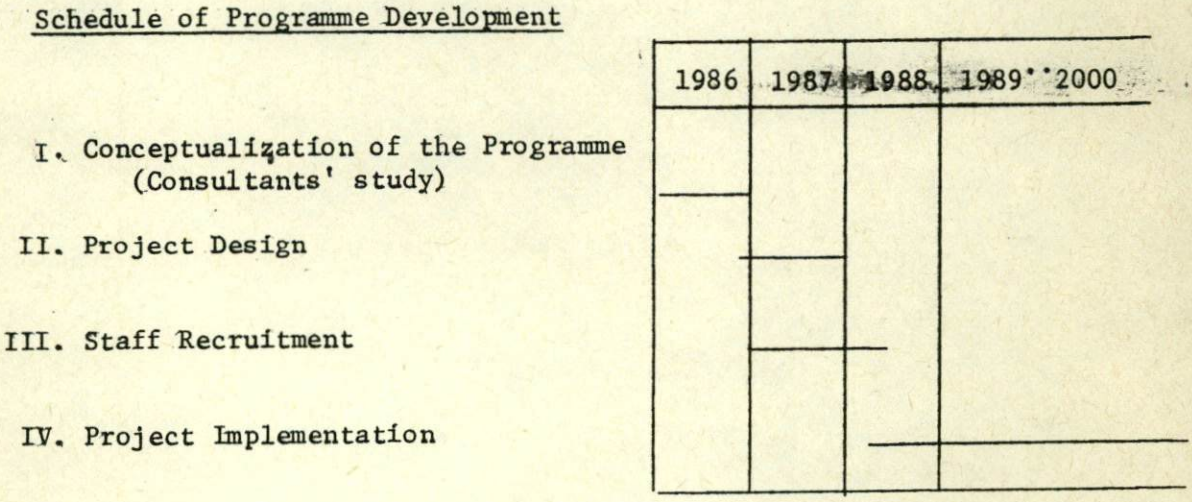
152. The Agricultural Resource Management team will not be expected to initiate and undertake research in most related fields but will however utilise on-going research and other institutional resources through its coordination activities by complementing related research for example in Agroforestry with ICRAF, NARS; Agroclimatology with AGRHIMET, NARS, ACAR; Land use and Water Management , Ecology and Cropping Systems with NARS, ICRISAT, IITA, CIMMYT and various other institutions.

153. The core interdisciplinary team will first identify research gaps and conduct research in deficient areas at a central research station and at satellite stations in different member countries. The core research programme would establish a vital link to national agricultural research systems (NARS) and provide back-stop services to regional networks. To initiate the resource management research programme, at least four professional staff of a relevant disciplinary combination would be required.

Schedule of Programme Development



154. AGRICULTURAL RESOURCE NETWORK

Concept

Technological change in agriculture is partially impeded due to lack of communication among research workers and research institutions. Effective networking among researchers is one way of overcoming the constraints to carrying out and delivering effective research which derives from presently limited number of highly qualified soil and water management researchers in the region. Networking would help to optimize human and natural resource utilization by more closely linking national, regional and international agricultural research and training institutions and efforts. Intellectual interchange among resource management researchers in their respective fields stimulates new ideas and creative solutions to difficult and complex problems and avoids pitfalls already encountered. Networking also can enhance professional development by facilitating contacts among more junior and senior professionals. Networking can ensure continuous flow of technical information and enhance the dissemination and adaption of research results.

155. Networks programme component

The management of soil, water in relation to food grain production would be the thrust of network activities. Some of the programme components of the agricultural resource management network are :

(a) Restoration of the fertility of the soil, e.e. soil amelioration, conservation, etc., studies;

(b) Other agronomic practices, i.e. tillage;

(c) Water harvesting and prevention of run-off;

(d) Integrated activities - establishing resource recycling food production systems;

(e) Research on irrigated crops.

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156. Objective

The objective of the network would be to enhance the efficient use of the soil and water resources including fertilizers to increase food grain production.

157. Approach

The core research team would establish a vital link to national agricultural research system and provide backstop services in soil-water management research networks. Scientists of participating countries would be able to gain practical field experience by conducting research at the main and satellite research stations in resource management.

The network would consider both high and low potential agro-ecological zones. Whereas the coordinating team of the agricultural resource management team would be based at conducive sites of a host country, six satellite stations would be established at selected national research programmes. To inventory on-going research activities in resource management, the core research team would conduct through survey to systematically synthesize and document relevant research works to establish data base for the network. Initial regional workshop would be organized involving several institutions and scientists associated with research on soil fertility, fertilizer use, and soil-water relations. From such meeting collaborators for the networks would be identified.

158. Research Information

From its data base, the agricultural resource management team would publish newsletters, technical practical bulletins and would also organize annual monitoring tours in order to enhance better understanding and exchange of experience among scientists. The findings

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of each network workshop would be published and disseminated to all participants and other interested agencies.

159. Expected Results

The expected result of the networking activities would be increase in food production with concurrent improvement of the resource base for productive agriculture. The network would also enable soil scientists, ecologists, foresters, agronomists, etc., to focus the attention of policy makers on long-term effects of neglecting the basic factor for food production that is the biological quality of soils, and total management of the soil-water resources.

160. Training

In the areas of agricultural resource management very limited training both of short and long-term were carried out. During the first phase of the SAFGRAD project, major emphasis on training has been on the improvement of varieties and agronomic practices. The core team would develop both formal and informal type of training. In cooperation with national, international and regional coordination the agricultural resource management team would have the following regular training activities :

- short-term production oriented courses for researchers currently working on soil fertility, conservation and soil-water management;
- specialized training in water harvesting, irrigation under small farm conditions;
- occasional agro-forestry courses of applied nature to enhance agroforestry interactions;

. regional field activities through field trials and demonstrations in cooperation with national programmes;

. long-term training in soil-water management for promising scientists.

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BUDGET SUMMARY

(US $'000)

ITEM	YEARS					TOTAL
	1	2	3	4	5	
1.0 Personnel						
1.1 Scientific Staff (4)	300	300	350	350	350	1,650
1.2 Technical Staff (10)	80	80	80	100	100	440
1.3 Other Service Staff	50	50	50	60	60	270
Sub-total	430	430	480	510	510	2,360
2.0 Travel						
2.1 Scientific Staff	80	80	80	40	35	315
2.2 Other Staff	10	15	15	15	10	65
Sub-total	90	95	95	55	45	380
3.0 Equipment						
3.1 Field Laboratory	100	150	80	100	-	430
3.2 Vehicle	60	-	21	-	-	81
3.3 Office	20	10	10	-	-	40
Sub-total	180	160	111	100	-	551
4.0 Supplies & Materials						
4.1 Office	15	15	22	20	20	92
4.2 Publications	10	20	25	25	15	95
Sub-total	25	35	47	45	35	187
5.0 Research Networks						
5.1 Workshops & conferences	60	60	70	70	70	330
5.2 National programmes Research support	500	550	600	600	600	2,850
Sub-total	560	610	670	670	670	3,180
6.0 Training						
6.1 Short-term	150	200	100	100	200	750
6.2 Long-term	-	200	300	300	-	800
Sub-total	150	400	400	400	200	1,550
7.0 General operating costs	160	180	200	200	200	940
GRAND TOTAL	1,595	1,910	2,003	1,980	1,660	9,148
8.0 Project Servicing Costs: 13%	1,189					

PROJECT NO. 5

Title: Strengthening the Accelerated Crop Production Programme (On-farm Testing and Technology Transfer).

161. Background and Justification

Throughout the 80s it became evident that the link between experimental station work and technology transfer activities to research was weak. Therefore it was generally agreed that this link should be strengthened if we were to derive the expected dividends from investments in research.

SAFGRAD has responded to this critical weaknesses by designing Accelerated Crop Production Programme (ACPP) through which the adaptation of research results to farming conditions and their adoption by the farmers are accelerated. The ACPP is operational in five countries with four supported by USAID (Burkina Faso, Cameroon, Mali and Senegal) and one by the French (Togo). The ACPP is country specific and fully integrated in the national research and development programme and also closely linked to the Collaborative Research Support Programme and the regional research support programme of SAFGRAD. Experience to date shows that the ACPP has tailored research and extension activities to the needs of the participating country and made a major contribution in meeting SAFGRAD objectives by getting research results quickly disseminated, tested, adapted and to the farmers.

162. Owing to the success of the ACPP, the Policy Organs of SAFGRAD decided to strengthen the existing ones and to expand it to cover some of the countries which showed interests or requested it. These countries include Benin, Botswana, Central African Republic, Ethiopia, Ghana,Guinea, Mauritania,Niger, Somalia,Tanzania and Tchad./...

163. Objectives

The long-term objective is to accelerate crop production through the establishment of effective and practical working linkages among national, regional and international research scientists, extension workers and farmers of a given country or area.

The immediate objective is to provide supplementary support to twelve ACPP including the existing five.

The main activities of a given ACPP may include :

- field trials and studies under various conditions to test the adaptability, deficiencies and potential of various recommended crop varieties and practices;

- coordination with national research, extension and development agencies in arranging for broader national testing and demonstration of those varieties and cultural practices that appear superior and otherwise suitable;

- liaising with other national, regional and international programmes to enable the recipient country to benefit from and contribute to regional progress and common endeavours.

164. Approach and Work Plan

Using the various technologies available on semi-arid agriculture in the IARCs, NARCs private and government agencies, SAFGRAD would promote the application and adoption of technologies in various member countries. The following work plan will be adopted:

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. detailed project formulation will be produced by a consultant study which will develop the details of the SAFGRAD ACPP training programme.

. utilising the existing ACPP facilities in Mali and Cameroon as Nucleus Training Centres, two types of training will be conducted:

(a) Leaders training (8 weeks duration)

(b) Technical Staff (i.e.operators) Training (2-6 months duration)

Training will involve subject matter and practical technology transfer systems.

Leaders will be experienced National professional agronomists and extension staff, or new graduates in agriculture.
Operators will be diploma in agriculture and other technical level staff.
Training Ratio would be about 1 Leader to 10 operators.

165. Following training of the Leaders and operators in each member country, specific pre-extension technology transfer courses would be developed for the particular needs of SAFGRAD member countries. These national training courses will then be organised with technical, management and financial support from SAFGRAD. The Leaders would take full responsibility for establishing these national technology transfer courses.

166. SAFGRAD would then establish a Network of ACPP Leaders starting with pilot projects in collaboration with regional institutions in selected countries as follows :

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West Africa	5	in collaboration with INSAH
Central Africa	3	in collaboration with INSAH
Eastern Africa	5)	) in collaboration with SACCAR
Southern Africa	3)	

These ACPP Networks would facilitate exchange of ideas and information between national ACPP training programmes and assist with evaluation of the technology transfer systems in African SAT.

167. Schedule of Programme Development

Activity	Years 1	2	3	4	5	6	7	8	9	10
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Programme Formulation (Consultant study)	———									
Training Leaders		X		X		X		X		X
Training Operators			X		X		X		X	X
National ACPP Training			X		X		X		X	X
Establishment of ACPP Networks				———	———	———	———	———	———	———
Evaluation										

Staff requirement of an average ACPP

- a team leader, preferably an African not a national of the host country, who will be responsible for the overall planning and implementation of the programme at least for the first three years. Thereafter, he might be replaced by his local counterpart who is a civil servant;

- a senior local professinnal who will act as counterpart to the team leader.

- 5 local staff who are civil servants and holding at least a B.Sc. degree. Each will be responsible for multilocational testings in 1 or 2 areas.

These local staff are civil servants and therefore supported by the host government. They only receive, from the project, lump sum allowance for being in the ACPP.

- 1 accountant supported by the ACPP
- 1 secretary supported by the ACPP
- 3 drivers supported by the ACPP.

168. Estimated Cost

The cost can be only indicative at this stage, since the activities to be included are a function of the crop research and development conditions, priorities and the extent of its participation in terms of finance, human and material.

Therefore the indicative estimated cost which is based on the assumptions below, is as follows :

169. Planning of ACPP over the five years

	Year				
ACPP	1	2	3	4	5
New	1	3	3	-	-
Cumul(new + 5 on-going)	6	9	12	12	12

By the third year, all 12 ACPP should be operational.

170. Funding Requirement for ACPP over the five years.

	Year				
ACPP	1	2	3	4	5
On-going a/	-	-	4	4	4
New	1	4	7	7	7
Cumul (old + new)	1	4	11	11	11

a/ They are currently 5 on-going ACPP and USAID pledged to continue its support for two years to four while France pledged to continue its support for five years to the Togo programme. Therefore funding is as shown under the line Cumul.

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ITEM	YEAR (US $1,000) 1	2	3	4	5	TOTAL
I TECHNICAL ASSISTANCE	325	360	360	340	160	1545
Accelerated Crop Production Officers [a]	275	350	350	300	150	1425
- 5 on-going programmes	250	250	-	-	-	500
- 7 new programmes	25	100	350	300	150	925
Short term Consultancy/Evaluation	50	10	10	40	10	120
Senior Scientists	50	10	10	10	10	90
Evaluation Team	-	-	-	30	-	30
I CAPITAL COST	210	105	105	237	119	779
Vehicules [b]	180	90	90	207	104	671
Motorcycles [c]	30	15	15	30	15	105
I OPERATING COST	764	1121	1469	1472	1481	6307
ACPO support [d]	480	720	960	960	960	4080
Senior Local Staff [e]						
- On-going programmes	15	15	30	30	30	120
- New programmes	3	12	21	24	33	93
Local Research Assistants [f]	30	45	60	60	60	255
Administrative Assistant [g]	66	99	120	120	120	525
Secretariat [h]	54	81	108	108	108	459
Divers/Mechanic [i]	66	99	120	120	120	525
Scientific Conference (network)	50	50	50	50	50	250
PARTICIPANT TRAINING	192	252	292	242	182	1160
Long-term (degree)	120	180	220	170	110	800
Short term (non degree)	72	72	72	72	72	360
ACPO REGIONAL COORDINATOR (plus operation)	100	100	100	100	100	500
ase Cost Substotal	1591	1938	2326	2391	2042	10288
roject Servicing Cost (13 %)	238	290	347	357	305	1537
GRAND TOTAL	1829	2228	2673	2748	2347	11825

NOTES:

a) For on-going programmes, the ACPO who is an African senior scientist but no local staff will be replaced by his local senior counterpart by the third year of the Project. The technical assistance is therefore for two years and at a cost of $50,000 per man and year. For new programmes, the technical assistance will be provided for three years before the local senior counterpart takes over.

b) Assumes 3 vehicules per ACPP and a renewal period of 3 years. Also it is assumed that the vehicules of the on-going programmes will be renewed in the first year of the Project.

c) Motorcycles will be provided to the 5 local research assistants and will be renewed every 3 years. The average cost per motorcycle is about US $1,000 over the life of the Project.

d) Includes farm operation, supplies for farm vehicules, operation and maintenance and travel.

e) Senior local staff will be paid lump sum allowance of US $3,000 per year when he is counterpart to the technical assistant and US $6,000 when he will be in full charge of the programme.

f) Assumes 5 local research assistants for each ACPP who receive each annually, US $1,000 as lump sum allowance.

g) Assumes US $11,000 per year.

h) Assumes US $9,000 per year.

i) Assumes US $3,600 per year.

PROJECT NO. 6

Title : Strengthening Farming Systems Research Programme

171. Background and Justification

Until recently it was assumed that advanced technology was neutral in terms of the production scales in which it was applied. This fact ignored the structural differences in the rural sector of Africa in types of farms, tenancy, size of holding and access to complementary inputs needed with this technology. Clearly, the emphasis was on the increase of physical yields rather than on economic profitability. Therefore, the investment in research did not often yield the expected dividends in terms of productivity and production, since the research results lack relevance to the vast majority of the farmers. Corrective measures including those which take fully into account the farming systems, especially the farmers' decision-making process with respect to the allocation of scarce resources among competing activities and the production constraints , were required. It was particularly stressed that the physical/biological and social scientists should collaborate as in a Farming Syst ems Unit, in all phases of the implementation of the research programmes including design and evaluation. Where such modifications took place, the introduction of appropriate technological packages led to significant and self-sustained increase in productivity and on-farm production.

172. The development of FSR in the semi-arid zones is considered vital for the improvement of food production. Currently IFAD is supporting FSR programmes in Benin, Burkina Faso and Cameroon and the Policy Organs of SAFGRAD have approved the extension of the programme to three new countries which have requested it. The potential candidates for the programme include Central Africa Republic, Chad, Ethiopia, Ghana, Tanzania, Togo and Uganda.

Scientific conferences and training are major components of the project. These two should help to build the indigenous capacity of NARCs in farming systems.

It is assumed that one new programme will be launched in the first year and the remaining two in year 2. In year 3 which will coincide with the end of the current assistance of IFAD to the 3 FSRP, provisions were made for their continuation throughout the year 5. However, only two out of three scientists are retained for each country.

The project budget is estimated at US $8 million and details are as in the table below :

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173. Objectives

The overall objective is to ensure that the farming systems, which research is intended to benefit, are more fully understood and taken into account so as to create conditions which stimulate the farmers' initiative for production, and induce them to learn and use advanced agricultural science and technology and to adopt better management methods for increasing production and improving cost-effectiveness.

The immediate objectives are :

- to develop FSR methods which would serve as regional models and for wider application. To this end selected NARCs which already have national FSR programme will be provided additional support by SAFGRAD to strengthen their programme and to contribute to the development of regional models;
- to develop FSR network design to link scientists and institutions involved in FSR activities in the semi-arid zones of Africa, for effective coordination and cooperation among them.

174. Work Plan

Detailed Work Plan will be prepared during the first six months of the project for each programme.

175. Estimated Cost

Technical assistance will be limited to two scientists preferably including one Agricultural economist as team leader. Short-term consultancy will be provided as requested. Lump sum allowance will be paid to local counterpart staff working in the FSR team. A FSRP regional coordinator will be stationed in the Headquarters of the Agency to ensure the supervision of the programme and its integration with the other components of the project.

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	Item	Year (US $1000) 1	2	3	4	5	Total
I.	Technical Assistance	130	340	670	670	670	2,480
	Agronomist	55	165	330	330	330	1,210
	Agricultural Economist	55	165	330	330	330	1,210
	Short-term Consultancy/ Evaluation	20	10	10	10	10	60
II.	Capital Cost	42	84	34	68	-	228
	Vehicules	30	60	30	60	-	180
	Motorcycles	4	8	4	8	-	24
	Microcomputers	8	16	-	-	-	24
III.	Operating Cost	161	393	741	741	741	2,777
	Scientist Programme support	80	240	480	480	480	1,760
	Administrative	11	33	66	66	66	242
	Secretariat	9	27	54	54	54	198
	Drivers/mechanic	11	33	66	66	66	242
	Local Staff Research Assistants[a/]	5	15	30	30	30	110
	Scientific Conference/ networking	45	45	45	45	45	225
IV.	Participant training	126	198	296	186	116	922
	Long-term (degree)	120	180	260	150	80	790
	Short-term (non-degree)	6	18	36	36	36	132
V.	FSRP Regional Coordinator	100	100	100	100	100	500
	Base Cost Sub-total	559	1,115	1,841	1,765	1,627	6,907
	Project Servicing cost (13%)	83	167	275	264	243	1,032
	Grand Total	642	1,282	2,116	2,029	1,870	7,939

a/ Includes National FSR Coordinator - Local staff of the FSR team will receive lump sum allowance.

PROJECT NO. 7

Title: SAFGRAD COLLABORATIVE RESEARCH NETWORKS

176. Background and Justification

Research networking among member countries of SAFGRAD has gained momentum during the last five years. This regional research cooperation enables researchers and institutions not only to exchange improved research material and technical information but also to forge good working partnership in order to minimize duplication of efforts, and accelerate the transfer of research results to farmers. Crop commodity oriented and related research networks are effected through the technical backstop and assistance of international agricultural research centres (IARCs) and through the coordinated efforts of regional and sub-regional African organizations (SAFGRAD, INSAH, SACCAR, etc.) which were established by the OAU or respective regional member states.

Research networking activities in sub-Saharan Africa is influenced by a series of research and coordination activities. The important elements for effective collaborative research and technology transfer networking activities are briefly discussed below.

177. Research Policy is an important initial consideration. Several research networks have become operational without the existence of conducive agricultural research policies both at regional and national levels. However, such policies could greatly enhance regional research cooperation. Responsive policies could improve the allocation of resources to agricultural development in general and research in particular. Poor infra-structures, and under-utilization of qualified researchers are among the major constraints of National Agricultural Research Systems (NARS) which impede the full development of their research capacities and management. For example, less than 7% of financial resources of most African countries is reported to be allocated to agricultural development whereas 80% of the workforce depends primarily on agriculture.

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The second important element is Viable Collaborative Research. As depicted in Fig.1, collaborative research with IARCs, NARS and other regional research agencies is necessary in order to ensure the generation of relevant technologies. For example, SAFGRAD collaborative regional research programme focuses on developing high yielding, short-cycle cultivars (of maize and cowpea with IITA and sorghum and millet with ICRISAT) that could also withstand environmental, disease and pest stresses.

178. The third consideration in realizing research networks is the assessment of available regional germplasm and related technologies that complement on-going research of various national research programmes. It is important that national scientists of participating countries play the major role both in assessing available technologies and identification of major constraints to accelerate improvement and production of food grains. Through the SAFGRAD networking system, inter-country research link is facilitated. This could lead to broader research cooperation and eventually to the development of stronger national programmes. Such programmes could then be able to assist weaker national programmes by providing elite germplasm to pursue applied research and verification trials. Such an activity would enhance regional collaborative effort among participating countries.

179. Another important consideration for regional research cooperation is to identify priority areas of research sub-components of each major research commodity network; for example, of sorghum, millet, maize, cowpea, etc. (Fig.1 cons. 4), that are of regional significance. It should be emphasized that the improvement of food grain, regional variety trials of elite materials, selection for drought, disease and pest tolerance, tillage practices to conserve moisture, etc., are also important elements of research networks. It is

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obvious that the choice of the type of research activity by each participating country would depend on the availability of adequately trained researchers, appropriate resources and magnitude of particular constraints to food grain production in that country.

180. The fifth important consideration is to establish data base in each NARS in order to sub-group and intensify research cooperation at different levels of research interactions (Fig.1, cons.5). The success of research networks, therefore, depends on national research capability as well as dedicated participation of research scientists themselves.

Training and technology transfer are important considerations for successful research networking activities. Both short and long-term training is necessary to fill research gaps within the national research programmes. Unless the NARS are continuously enriched and staffed with adequately trained scientists, it is unlikely that research networking could benefit participating countries since the few scientists that may be available are over-burdened with too many responsibilities. Concurrently, functional linkage of NARS and the National Extension System (NES) is of paramount importance. SAFGRAD's approach to bridge the gaps between national research and extension systems is the Accelerated Crop Production programme that focuses on pre-extension, multi-locational trials. On-farm testing both at the preliminary level as well as using appropriate farming systems research (FSR) methodologies could provide feedback to improve research priorities and strategies.

181. Existing Networks

In collaboration with various agencies, IARCs (IITA and ICRISAT) and NARS, SAFGRAD has succeeded in establishing the following research networks :

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182. Maize and Cowpea

Regional cooperative networks were established since 1979. The SAFGRAD/IITA research network on maize and cowpea involves more than 23 member countries. In the case of maize, the thrust of SAFGRAD/IITA research has been to enhance the development of short-cycle, disease and pest resistant cultivars, including improving agronomic practices in order to minimize risks to farmers. Similarly, the focus of the cowpea research and its network activities has been to develop early maturing cultivars resistant to drought stress and striga. Breeding for insect resistance and integrated pest control are important components of the cowpea research network activities. Regional trials and evaluation of elite germplasm and improved agronomic practices, soil and water management techniques also constitute the research cooperative activities of maize and cowpea. Training of scientists and technicians has also been an important activity of SAFGRAD since the success of regional research cooperation depends on the level of training and experience of participating national scientists that could eventually direct the networking activities by themselves. The maize and cowpea network is further strengthened through the annual monitoring tour that involves a team of scientists from selected member countries and SAFGRAD/IITA scientists.

183. The Eastern Africa Sorghum/Millet Research Network

ICRISAT/SAFGRAD jointly initiated this programme in 1982. About 12 countries including North and South Yemen are participating in the Eastern Africa regional cooperative research. The programme has succeeded in bringing together various national programmes through scientist to scientist interactions. The main focus of the Eastern Africa regional research network has been the evaluation of elite materials made available from four ecological zones (high and intermediate elevations, low elevations and dry lands). Initially, elite germplasms were identified from participating countries, ICRISAT and /...

other sources. Since 1984 the Eastern Africa Cooperative Sorghum Screening Nursery (EACSSN) was set in motion. The Coordinator of the network received entries from diverse sources and screened several lines before making selected lines and entries available to participating member countries in the region.

184. Regional workshops for discussing cooperative research trials have been held in different countries on a rotational basis. Four annual regional workshops were held in Ethiopia, Rwanda, Tanzania, and Uganda, respectively, since 1982. These rotational workshops have enabled the sorghum and millet researchers of the region to effectively share their experiences and further improve linkages among member countries of SAFGRAD which facilitated the flow and exchange of technical information and germplasm. During the annual workshop, the main centre of attraction is usually the sorghum and millet research programme of the host country, covering research activities in breeding, agronomy, inter-cropping, plant protection and utilization of these crops. One full day of the workshop is fully devoted to field visits of sorghum and millet research. Furthermore, the results of the regional cooperative trials are discussed after presentation of a summary report by the regional coordinator.

185. Sorghum Research Networks of West Africa

Sorghum improvement in West Africa at large has been strengthened since the last two decades. Regional cooperative research was initiated since the JP26 Project of USAID and OAU/STRC that was based in Samaru, Nigeria at the Institute for Agricultural Research of Ahmadu Bello University. Since 1975 the ICRISAT West African Sorghum Improvement Programme has provided germplasm to participating national research programmes. SAFGRAD collaborates with ICRISAT and INSAH to strengthen

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the West African Sorghum Research Networks. In addition to evaluation of elite materials and identification of suitable varieties for the Guinean, Sudano-savanna and Sudano-Sahelian ecological zones, scientists of member countries will be participating in screening materials for drought and striga resistance, and related agronomic studies. SAFGRAD plans to provide direct research and training support to participating countries so that they can fully participate in regional research cooperation. In order to further improve the coordination of sorghum improvement research networks in West Africa, an advisory committee was established during the recent meeting of ICRISAT and SAFGRAD joint Sorghum Workshop that was held from 22 to 24 September, 1985 in Bamako, Mali.

186. Technology Transfer

Diffusion of research results and linkages to national extension systems is one of the major constraints to increased agricultural production. SAFGRAD's response to facilitating the transfer of technology is its Accelerated Crop Production programme (ACPO) currently operational in five countries. The programme focuses on pre-extension multi-locational trials of improved varieties and agronomic practices. As an integrated unit of the national programme, its success has variously influenced the quality of collaborating extension services. The purpose of the ACPO networking activities is to share experiences in the approach of disseminating research results and alleviating both technical and institutional constraints. The technology transfer networking phase is the most crucial in speeding up the process of delivering research results for wider adaptation through continuous interaction and complimentary activities of the national research and extension systems. Since 1984 SAFGRAD started

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the technology transfer networking activities using its core ACPO-programmes. The first workshop that was held in Bamako, Mali brought together scientists from various member countries, extension workers and farmers. This greatly stimulated exchange of views on problems related to developing relevant technologies for direct use by the farmers.

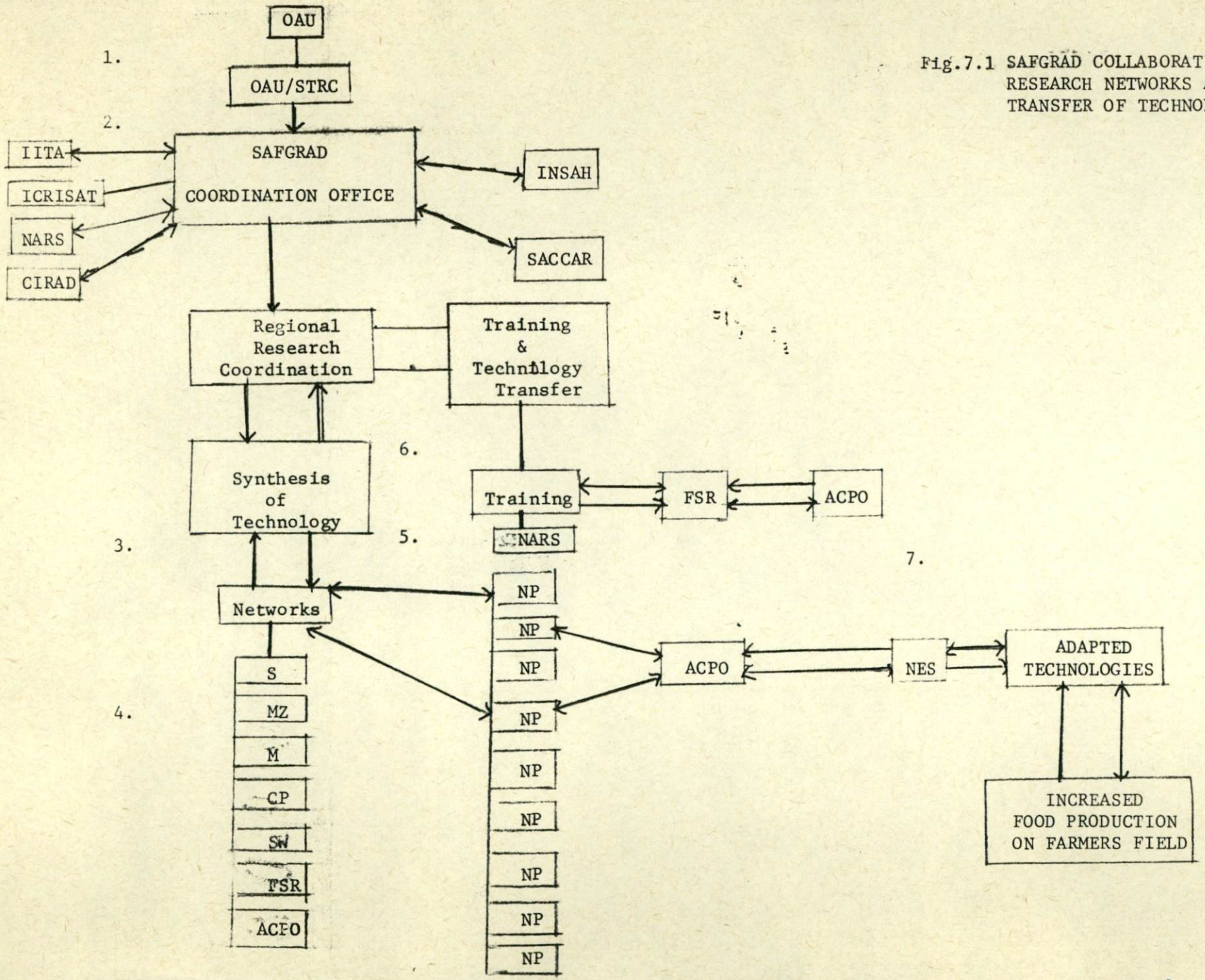

Fig.7.1 SAFGRAD COLLABORATIVE RESEARCH NETWORKS AND TRANSFER OF TECHNOLOGY.

IITA	- International Institute of Tropical Agriculture.
ICRISAT	- International Crop Research Institute for the Semi-Arid Tropics.
INSAH	- Institute of Sahel
SACCAR	- Southern Africa Coordinating Centre for Agricultural Research.
NARS	- National Agricultural Research Systems.
CIRAD	- (International Centre for Agronomic Research and Development)
NP	- National Programmes.
NES	- National Extension System.
ACPO	- Accelerated Crop Production (Officer) Programme
S	- Sorghum
MZ	- Maize
M	- Millet
CP	- Cowpea
FSR	- Farming Systems Research
SW	- Soil and Water
SAFGRAD	- Semi-Arid Food Grain Research and Development Project.
OAU/STRC	- Organization of African Unity's Scientific , Technical and Research Commission.

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Consideration 1. - Conducive Agricultural Research Policy at national and regional levels.

Consideration 2. - Viable collaborative research.

Consideration 3. - Assessment of available technologies and organizing network activities.

Consideration 4. - Identification of global research constraints and network sub-components.

Consideration 5. - Compiling and establishing data base on each national research programme.

Consideration 6. - Uninterrupted training, seminars and workshops.

Consideration 7. - Technology Transfer programmes linking NARS and NES to obtain feedback on adoption.

PROJECT NO. 8

Title: Training

187. Background and Justification:

Various studies and reports on the problems of agricultural research and development in sub-Saharan Africa have consistently identified the acute shortage of well trained manpower as a major constraint to effective execution of agricultural research and the delivery of new technologies to the intended beneficiaries. Even where some manpower has been trained there is inappropriate deployment of staff within national programmes or scientists are poorly directed, supported and motivated. In other cases the scientists simply leave to work elsewhere, thus they are lost to national agricultural research and development activities.

188. A second and related constraint which has been identified is the lack of agricultural research management capability in sub-Saharan African countries. Data from the study by Devres Inc. for the 8 Sahelian countries for example, show that in 1983 there was a total of only 634 professional researchers and 1261 professional personnel engaged in agricultural extension. The study concluded that

> "there is not yet a 'critical mass' in any one place adequate to carry out the type of comprehensive programme of agricultural research that is needed for national or regional purposes".
>
> ..."In general , it appears that in most Sahelian countries there are still inadequate members of national agricultural researchers available to meet national needs".

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A similar study by Devres Inc. for the SADCC countries in 1984 showed that over 25 per cent of the professional agricultural research staff are expatriates. The 75 per cent professional staff who are nationals lack higher training and experience.

189. Clearly then there is an urgent need to assist all these African countries to build their human resources and capabilities in agricultural research and extension. An effective way to do this would be to develop a coordinated regional approach and collaboration among African institutions to fill the gaps at national levels and to ensure that the limited resources available are brought to bear on key national and regional agricultural problems.

190. Since the inception of SAFGRAD, training has been one of the important components for strengthening the indigenous capability of national programmes. A number of recommendations have been put forward from different sources for SAFGRAD's Coordination Office to implement. Among the major recommendations made by the 1984 SAFGRAD evaluation team were :

> " OAU/STRC Coordination Office should conduct a training needs assessment to identify the type and the level of training requirements to strengthen food grain crops research networks. The needs assessment should include identifying disciplines in which additional research and extension capability is needed to support SAFGRAD programmes. Conduct short-term training in the language of participants, not through translation. Channels for identifying and implementing long-term training should be strengthened. Use short-term training programmes to screen for potential long-term training candidates. Develop an internship programme in both research and extension to complement academic programmes".

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Although SAFGRAD considers assessment of training needs a priority, the Coordination Office lacks both the professional manpower and resources to undertake this important activity.

191. SAFGRAD I training accomplishments have been detailed in the 1984 evaluation report. As of March 1985 , the project has succeeded in training nearly thirty scientists at advanced degree levels in various disciplines relevant to food grain research and production. With regard to short-term training lasting a few weeks to six months, more than 80 candidates have been trained in research methodologies and management, farm management and production oriented training programmes.

192. In its future efforts, SAFGRAD will place more emphasis on strengthening the capabilities of national research programmes to develop improved technology and adapt technology generated elsewhere, including IARCs to local farmer environments. Where national programmes lack the appropriately trained "critical mass" of manpower it will be difficult for such national programmes to be receptive and respond to SAFGRAD efforts to strengthen their research programmes. Capability strengthening should therefore begin with appropriate human resources development at all levels not only in agricultural research but also in agricultural research management. Furthermore, directed and well-coordinated human resources development in SAFGRAD member countries will be fully supportive of the proposed Grants-in-aid programme being funded by AID.

193. Objectives

The major objectives of SAFGRAD training are as follows:

. to assist SAFGRAD member states to increase their indigenous manpower research capabilities in all aspects of agricultural research and development.

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group training for 5 years while they are working within their national agricultural research programmes.

196. Priority areas for training would be :

- resource management, with major focus on soil conservation, soil fertility, soil-water management, etc.;
- improvement and production of food grains;
- farming systems integration (crop and animal production interactions, animal traction, etc.);
- approaches to technology transfer;
- agricultural economics and statistics;
- extension agronomy and seed production technology;
- agroforestry and forage agronomy;
- post-harvest losses of food grains.

197. SUPPORT

Although USAID is planning on a continuation of some future support for SAFGRAD, additional donor support is required in order for SAFGRAD to implement both its long-term and short-term training activities.

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. to contribute in consultation with member countries, to strengthening of agricultural research and training institutions through manpower development;

. to establish formal working relationships with selected African Universities and other African agricultural training institutions of higher education in order to utilise them for training of African agricultural researchers and technicians;

. coordinate the training of persons capable of dealing with the problem of technology transfer to small scale African farmers;

. contribute to the development of African research capacity to formulate, implement, organise and manage and to evaluate applied research programmes.

194. Goals

The goals to be achieved by a well coordinated SAFGRAD training programme are outlined as follows :

. accumulation of reliable data on the actual manpower situation and subsequent training needs of SAFGRAD member countries. This would form a data-base for agricultural development planning for increased food crop production.

. establishment of an appropriate procedure for the effective selection of potential candidates for training;

. effective coordination and monitoring of progress in training and appropriate placement of trained researchers and technicians in national and regional programmes;

. establishment of a mechanism of follow-up action to evaluate the impact of trained personnel on the performance of

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national and regional agricultural programmes;

. development of adequate resources in national and regional African institutions to provide local and relevant training to African researchers, technicians and extension personnel;

. build up of indigenous African capabilities in the formulation, organisation and successful management of agricultural research in the semi-arid zones of sub-Saharan Africa.

195. Approach

. The training programme activity will start with a consultants study of the immediate human resources development needs of SAFGRAD member countries. The consultants study will also identify appropriate African institutions for long-term training. This would result in a detailed project document.

. Implementation will begin in the second half of year 1 in association with collaborating IARCs for short-term training.

. Identified African agricultural institutions and relevant overseas institutions will be utilised for long-term higher degree training.

. Support for training would be sought from donor agencies and bilateral programmes.

. SAFGRAD Training Division will monitor and evaluate the trainees throughout their training. On completion of training, they would continue to receive support from SAFGRAD through the grants-in-aid programme, study workshops, monitoring tours and

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DRAFT MASTER PLAN FOR SAFGRAD

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