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Combating Land Degradation in Sub-Saharan Africa

International Crops Research Institute for the Semi-Arid Tropics

Abstract

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Over 80 participants in this Workshop from international, regional, national, and nongovernmental organizations met to discuss a Desert Margins Initiative aimed at developing sustainable natural resource management options to arrest land degradation in the desert margins of sub-Saharan Africa. This is a proposed addition to other ecoregional initiatives under the auspices of the Technical Advisory Committee of the Consultative Group on International Research. Development constraints in the desert margins of Botswana, Burkina Faso, Kenya, Mali, Namibia, and Niger are outlined. Following a statement of the goal and strategy, nine specific objectives and expected outcomes are given in detail. Agreed organization and management proposals for the Initiative are described.

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Combating Land Degradation in Sub-Saharan Africa

Summary Proceedings of the
International Planning Workshop for a
Desert Margins Initiative

23-26 Jan 1995, Nairobi, Kenya

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International Crops Research Institute for the Semi-Arid Tropics
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About ICRISAT

The semi-arid tropics (SAT) encompasses parts of 48 developing countries including most of India, parts of southeast Asia, a swathe across sub-Saharan Africa, much of southern and eastern Africa, and parts of Latin America. Many of these countries are among the poorest in the world. Approximately one-sixth of the world's population lives in the SAT, which is typified by unpredictable weather, limited and erratic rainfall, and nutrient-poor soils.

ICRISAT's mandate crops are sorghum, pearl millet, finger millet, chickpea, pigeon-pea, and groundnut; these six crops are vital to life for the ever-increasing populations of the semi-arid tropics. ICRISAT's mission is to conduct research which can lead to enhanced sustainable production of these crops and to improved management of the limited natural resources of the SAT. ICRISAT communicates information on technologies as they are developed through workshops, networks, training, library services, and publishing.

ICRISAT was established in 1972. It is one of 16 nonprofit, research and training centers funded through the Consultative Group on International Agricultural Research (CGIAR). The CGIAR is an informal association of approximately 50 public and private sector donors; it is co-sponsored by the Food and Agriculture Organization of the United Nations (FAO), the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), and the World Bank.

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Foreword

At this Workshop, agricultural scientists, research directors, and representatives of funding agencies from 51 international, regional, national, and nongovernmental organizations endorsed plans to launch research programs under the auspices of a collaborative Desert Margins Initiative for sub-Saharan Africa.

The goal of the Initiative—led by a consortium of six research centers within the Consultative Group on International Agricultural Research (CGIAR), the United Nations Environment Programme (UNEP), and other international, regional, and national institutes headed by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)—is to address problems of food security, poverty, and the sustainable management of natural resources. The 81 Workshop participants agreed on an overall objective: To promote innovative and action-oriented dryland management research to arrest land degradation' in sub-Saharan Africa. The Initiative will initially be implemented in the affected areas of Botswana, Burkina Faso, Kenya, Mali, Namibia, and Niger.

The aims of the initiative are supplemented by specific objectives proposed for future action. These concern:

- understanding the processes, extent, and causes of land degradation;
- assessing dryland management practices;
- evaluating the role of livestock in the rangeland/arable land continuum;
- designing policies, programs, and institutional options to create incentives for improved natural resource conservation and management;
- developing improved technology options for natural resource management;
- fostering the domestication of tree species of economic and environmental value;
- formulating drought management strategies;
- enhancing institutional capacities; and
- exchanging technologies and information.

Before concluding, the participants met in common-interest groups and nominated candidates for an Interim Steering Committee. Its task will be to maintain the impetus created during the Workshop by launching collaborative research programs involving all organizations with staff who can contribute effectively to this new Initiative. Funds are now being sought for the appointment of an Interim Coordinator, and the design and implementation of research activities. This research will be undertaken on behalf of the 400 million people who inhabit 1.3 billion hectares in Africa and whose livelihoods and food security are endangered by environmental degradation.

The Initiative arises from a sequence of international events which began in 1977 with the United Nations Conference on Desertification and the initiation of a Plan of Action. The 1992 United Nations Conference on Environment and Development (UNCED) gave the plan further impetus when it authorized the drafting of an International Convention to Combat Desertification.

Before 87 countries signed the Convention at a ceremony in Oct 1994, it became clear that research centers within the CGIAR have directly relevant skills and experience to offer the international development community. ICRISAT—with more than 20 years of experience of natural resource management research in tropical drylands—proposed that a Desert Margins Initiative be established as a component of CGIAR's plans for systemwide and ecoregional research initiatives.

J G Ryan

Director General, ICRISAT

March 1995

Description of the Workshop

Organization

Participants in the Workshop convened for the *Opening Session* at ICRAF House, Nairobi, in the morning of 23 Jan 1995. This began with an address of welcome by the Kenyan Minister of Research, Science, Technical Training, and Technology and ended with a detailed outline of the Desert Margins Initiative by the Director General of ICRISAT. Participants then transferred to more flexible meeting facilities at UNEP headquarters for the working sessions, which were concluded on 26 Jan. Anglophone and francophone, participants came from 8 CGIAR and associated centers, 7 international organizations and specialized agencies, 6 regional organizations, 6 NARS, 7 national environment departments (including meteorology, water, and forests), 4 NGOs, 9 mentor and research institutions, and 5 donor organizations. They were assisted by two Target-Oriented Project Planning (TOPP) consultants and an Interim Coordinator, making a total of 81 participants: see Annex 1.

The working sessions began with a consideration of national and regional perspectives of *Research Needs and Opportunities for Resource Management Programs to Arrest Land Degradation*, and Session 2 addressed *Generic Research Imperatives: International Perspectives*. These were followed by a day devoted to *Designing an Effective Research Approach: Target-Oriented Project Planning* (Session 3), in which the issues already raised were debated in two working groups and in plenary. This TOPP work continued, in Session 4, with *Institution Building and Enhancement of Human Resource Capacity*. Participants then focused attention, in Session 5, on a *Review of Objectives, Outputs, Collaborative Linkages and Project Formulation*, supported by descriptions of existing systemwide initiatives as examples for consideration in Session 6, *Institutional Mechanisms*. Before departing, participants met in common-interest groups to nominate candidates for the proposed Interim Steering Committee (being an expansion of the former Organizing Committee). The full program is shown in Annex 2.

TOPP approach and methodology

In order to adapt the proposed Desert Margins Initiative (DMI) to the needs, expectations, and potential of the prospective participants, it was decided to use an open, participative, multidisciplinary, and interactive approach.

Target-Oriented Project Planning (TOPP), based on the Logical Framework Method, was adopted because its logical structure permitted the adoption and sequencing of the following five elements:

- Goal
- Objectives (to be achieved)
- Results (to be produced)
- Activities (to be implemented)
- Inputs (to be allocated).

A short explanation of TOPP methods was given to participants at the beginning of the Workshop. Later, some elements of the TOPP method were used to identify the goal, the overall objective, the specific objectives, and the major outputs expected from the Initiative.

These different elements were widely discussed, first in groups and also during plenary sessions, in order to reach a consensus.

At an early date, it will be necessary to analyze in more detail some specific issues of importance. Then, clear and detailed planning can be undertaken concerning the activities necessary to achieve the specific objectives and generate outcomes. Finally, indicators and means of verification will have to be worked out, in order to include clear strategies and guidelines for monitoring and evaluating activities during the implementation phase.

Dynamics of the Workshop

The TOPP sessions were organized in three complementary stages:

Analysis—The background document (see p. 5), based on a document prepared by ICRISAT and submitted to the CGIAR's Technical Advisory Committee (TAC) in August 1994, was used to highlight the current understanding of the sustainable natural management options to arrest land degradation in the desert margins of sub-Saharan Africa. This document was adapted from a more detailed version prepared by the UNEP consultant, Dr Wolfgang Baier of Agriculture Canada, after extensive discussions with NARS, NGOs, regional organizations and associated international agricultural research centers (IARCs). The background document formed the basis for a review and articulation of the research objectives and expected outcomes of the Workshop. The presentation on the Convention on Desertification (by de Kalbermaten: see below) and several presentations from different countries and institutions, gave the participants an overview of the basic problems addressed by the DMI. The main constraints were thus identified and summarized.

Planning—In an interactive way, the first elements of the TOPP approach (goal, overall objective, strategy, specific objectives, major outcomes) were identified and linked together, in order to structure these these Proceedings.

Implementation—Several decisions were taken in following up the dynamics of the analysis and planning stages. These led to the implementation of the initial operational structures.

The Workshop provided the first opportunity for individuals and institutions concerned with the DMI (see Annex 1) to establish direct contact, share their views, and initiate a positive dialog. In this open process, contributions from NARS and regional organizations were key elements. The gathering of actors with very different and complementary horizons, specialisms, backgrounds, and experience, seeking a common approach and practical objectives, can be regarded as the first step towards the effective building of the Initiative.

Setting the Scene: extracts from keynote papers

Presentation of the Background Document

(by M V K Sivakumar, Director, Soils and Agroclimatology Division, ICRISAT)

We started assessing the value and desirability of initiating a major research program related to the desertification issue in June 1993, just around the time negotiations for the International Convention to Combat Desertification (the UNICCD) got under way. Following our consultation with UNEP during preparations for the DMI, UNEP engaged Wolfgang Baier of Agriculture Canada as a consultant to prepare a background document based on extensive discussions with NARS, NGOs, regional organizations, and associated IARCs.

During Feb-Mar 1994, Dr Baier traveled to Kenya (for consultations with NARS, IGADD, UNEP, and ICRAF), Ethiopia (ILCA), Niger (ISC, INRAN), Burkina Faso (INERA, CNRST, NGOs), Botswana, and Namibia. He submitted his final report at the end of Apr 1994, which was modified in Aug 1994 after comments had been received from several partners interested in the Initiative. The purpose of this background document was to highlight the current understanding of sustainable natural resource management options to arrest land degradation in the desert margins of sub-Saharan Africa, and thus guide our discussions during this International Planning Workshop. (For the full text, see the companion volume.)

Desertification, according to the UNICCD, is defined as land degradation in arid, semi-arid, and dry subhumid areas resulting from various factors, including climatic variation and human activities. By land degradation we mean the loss of biological or economic productivity resulting from land use or a combination of processes, including those of human activities and habitation patterns, such as soil erosion caused by wind and water, deterioration of the physical, chemical, and biological or economic properties of soil, and the long-term loss of natural vegetation.

Hence, in combating desertification as per Article 1 of the UNICCD, we include activities that are part of the integrated improvement of land for sustainable development, which are aimed at preventing and/or reducing land degradation, rehabilitation of partly degraded land, and reclamation of desertified land.

The overall objective is to arrest land degradation by promoting improved and innovative technologies that are ecologically sound, economically viable, and socially acceptable to farmers and pastoralists in the dryland areas of sub-Saharan Africa. Through this objective we are also addressing Article 2 of the UNICCD, which emphasizes long-term integrated strategies that focus simultaneously on improved productivity of land and the conservation and sustainable management of land and water resources.

It is for this reason that this Initiative brings together NARS and NGOs from Botswana, Burkina Faso, Kenya, Mali, Namibia, and Niger along with IARCs, regional organizations such as CILSS, SACCAR (SADC), and IGADD, and others such as IBSRAM, IFDC, NERC (UK), WRS (USDA), etc. Such multi-institutional, multi-regional, and multidisciplinary collaboration is one of the principles of the UNICCD, in which emphasis is placed on improved cooperation and coordination at subregio-

nal, regional, and international levels and on a clear focus on financial, human, organizational, and technical resources.

The major outputs expected at the end of the DMI are:

- availability of improved, conservation-effective production technologies that are socially and economically acceptable to the indigenous population in meeting their food, fodder, and fuel needs;
- improved methods of sustaining long-term fertility; and
- improved soil and water management techniques for increasing water-use efficiency and for arresting land degradation.

Our activities should help improve our understanding of the impact of livestock production and cropping on soil erosion and vegetation composition and resilience, and of the economic and policy measures needed to improve the management of natural resources for livestock production.

Presentation from the Intergovernmental Negotiating Committee for a Convention to Combat Desertification

(by G de Kalbermatten, Coordinator for Policy and Programme Development, INCD)

The elaboration of the International Convention to Combat Desertification in countries experiencing serious drought and/or desertification, particularly in Africa, is meant to bring about a sort of 'new deal' between members of the international community, development practitioners, and the local population, to reverse land degradation in arid lands, particularly in Africa. I am pleased to report that 87 countries, mostly African and OECD countries, signed the Convention on 15 Oct 1994 in Paris. Today the number of signatories has reached 94. Gathering the statutory 50 ratifications for the Convention to enter into force may take 2 years. In other words, the first Conference of the Parties would take place in 1997.

The resolution on urgent action for Africa, however, reminds us that action cannot wait. The task ahead during the interim period is considerable, and the stakes are high. At the signing ceremony, donors indicated that at least US\$1-2 bn would be available for the implementation of the Convention during the interim period. Some of those resources could and should be devoted to sponsoring more innovative and participatory approaches in strengthening or launching integrated research on marginal drylands.

The ICRISAT proposal for a systemwide ecoregional Desert Margins Initiative can be seen as an early attempt to implement some key provisions of the Convention, such as Article 17 on research and development, Article 18 on technology, or Article 19 on capacity development, and would be of considerable interest for the Committee on Science and Technology, as foreseen in Article 24.

This is why we are grateful for the opportunity to participate in this Workshop and benefit from the collective wisdom of this group. Our Secretariat has a mandate for circulating information and facilitating the implementation process of the resolution on urgent action for Africa.

The Convention can be visualized as a five-storied pyramid. First, the ground floor, the local level, which is crucial for our purpose; then the national level; at the subregional level, it would be IGADD for eastern Africa; then the regional level, concerning the African continent; and finally the top of the pyramid, the global level, where the Secretariat of the Desertification Convention is located. The four top stories must be understood as a superstructure to serve the first one, the local level, the field in affected areas where the impact of all planned measures must ultimately be felt. The task before us is to take the action down there.

One might describe this Convention in various manners. It is the first significant multilateral instrument to be adopted after UNCED in Rio. It integrates environment protection with a more sustainable and human development. It balances the interests of the North and the South in meeting the expectations of the latter with respect to the global management of natural resources. It provides donor countries with an enhanced convergence of operational policies and the needed framework for integrated strategic planning. It identifies the primacy of the fight against poverty to restore degraded land. Without pretending to innovate in the technical aspects of the combat against desertification, the Convention draws the - sometimes bitter - lessons of past experiences to propose another way of managing natural resources. It anticipates the people-centered approach to development that will be one of the foci of the forthcoming World Summit for Social Development (Copenhagen, Mar 1995).

In a sense, the Convention is probably the first legally binding international instrument that replaces so clearly the notion of aid with the one of partnership. No more supply-driven initiatives down the one-way street of financial flows, but an exchange among all, which should maximize the potential of everyone. Early and consistent coordination of assistance is a direct consequence of the Convention's provision. This partnership, of course, associates the government, the NGOs, and the local communities with the international donors. We can summarize it in one sentence: no partnership in the outcome without a partnership in the process.

The key feature of the implementation of the Convention is the launching of a genuinely consultative and participatory process that gathers all concerned actors of the civil society in affected countries. The commitment of local populations and the granting of a greater decision-making power to decentralized authorities are considered to be necessary conditions for a more sustainable impact of planned action. The perception of the end users must be integrated up-front in the programming phase. Ideally, the Convention should be implemented through a multiplicity of integrated initiatives which firmly base at the local level all aspects of the combat against desertification, including, of course, needs assessment, identification of constraints, response strategies, training, and research.

It is of course important that we should not reinvent the wheel: the Convention builds on past experience and existing planning frameworks. Basically, as a first step, governments are expected to designate an appropriate national coordinating body to function as a catalyst at the national level in the preparation, implementation, and evaluation of the NAPD. The Secretariat of this body, functioning as a national focal point, is usually located in the Ministry of Environment, Rural Development, or Agriculture.

The national focal point will then be to:

- review in the light of the Convention the institutional and budgetary measures to be taken by the State;
- convene a broad-based consultative process with the civil society and international partners;
- undertake a participatory assessment of past and current action and proposed implementation strategies;
- organize a national forum to formalize the interactive process leading to the convening of a consultative group in which partnership agreements would be concluded.

These arrangements will determine the financing packages to fund the NAPD, including their research components.

In this research we should work together with those responsible for the DMI to better establish the interface between research in dryland degradation and investment programs that will be of interest to finance institutions such as the development banks, the FED, or IFAD. This is a task of overriding importance. We may think about targeted research projects, in-situ conservation programs, production of valuable dryland products (resins, gums, pharmaceuticals), or the selective support for dryland nature reserves, and view these activities as integral parts of dryland ecosystem conservation.

Systemwide Ecoregional Initiatives of the CGIAR: Role of the Desert Margins Initiative (by J G Ryan, Director General, ICRISAT)

Genesis of ecoregional concepts in the CGIAR

The ecoregional concept was first made explicit by the Technical Advisory Committee (TAC) of the CGIAR in their *Expansion Paper* written in 1990. Although concerns about the conduct of research on natural resources was evident much earlier in the history of the CGIAR, it was only in the *Expansion Paper* that TAC coined the word 'ecoregion'. The ecoregion was characterized as a regionally defined agroecological zone.

TAC proposed an ecoregional approach to the conduct of research on sustainable increases in agricultural production and the conservation of natural resources in order to help focus and coordinate the research expertise of CGIAR centers on these twin goals.

Because the approach encourages research to alleviate constraints at various levels that include the field, farm, community, watershed, and region, TAC also considered it important to undertake ecoregional research initiatives with a strong sense of partnership amongst collaborating institutions at local, national, regional, and international levels.

The ecoregional approach

In the early days of the CGIAR, 'Food First' was the primary objective. This was against the background of the famines that were prevalent in many developing countries, especially those in Asia, during the early to mid-1960s. Today it is well recognized that whilst the challenges of ensuring future food security loom as large now as they did then, future food productivity increases will have to be achieved while at the same time conserving and enhancing the natural resource base on which they depend. Hence, future commodity improvement research must be balanced by an increased effort on natural resource management research. This will require a new spirit of partnership amongst all groups engaged in these research issues. There must be a closer integration across local, country, regional, and international levels to ensure that the global research system is both more efficient and more coherent.

The concern about widespread land degradation in recent years has centered around such issues as the loss of genetic diversity, depletion and pollution of water sources, soil erosion, salinization, waterlogging, deforestation, desertification, and general environmental pollution. These are seen as threats to the sustainability of the agricultural resource base. The CGIAR defined sustainable agriculture as: 'The successful management of resources for agriculture to satisfy changing human needs while maintaining or enhancing the quality of the environment and conserving natural resources'.

Because the ecoregion, as defined by TAC, combines physical, biological, and socioeconomic dimensions of agricultural production environments, TAC saw it as a logical component of a hierarchical system that would enable international agricultural research centers (IARCs) to deal more effectively with resource management challenges, than would a concern only with the farm level. Research at broader levels of the hierarchy such as the catchment area, the community, and the agroecological zone was seen as enabling more equal and explicit partnerships with the policy formulation that is so necessary to promote technological change. Ecoregional mechanisms and initiatives were seen as a way to help IARCs understand and coordinate the needs of NARS within the IARCs' mandate regions to ensure that IARC interactions are better tailored to NARS capacities, and to reduce duplication among IARCs in their relationships with NARS.

TAC envisaged the ecoregional approach to research as having three ingredients:

- Applied and strategic research on the foundations of sustainable production systems in the ecoregions;
- Improvement of productivity in the ecoregion by drawing on appropriate global research activities; and
- Strengthening cooperation with national partners and the development of transnational mechanisms of collaboration.

Hence the ecoregional approach was seen as a way of enabling novel approaches to future collaboration with various stakeholders in the R&D continuum, in order to achieve sustainable increases in food and agricultural productivity in the years ahead. The CGIAR acknowledged that the complexity of the challenges ahead will require a much greater range of expertise than presently exists in the IARCs, and that new

partnerships on an agreed research agenda will be necessary. Ecoregional mechanisms involving consortia of institutions was seen as one potential mechanism to achieve this. The ecoregional approach was seen as not only providing a vehicle for enhancing collaboration between NARS and IARCs, but also as an important way to strengthen cooperation and reduce duplication amongst IARCs operating within ecoregions. It was recognized that overlapping mandates and competition among IARCs have created an additional burden on NARS that has sometimes impeded their capacity to be responsive as equal partners.

Objectives of the Workshop

- Assemble those institutions and individuals interested in collaboration in a Desert Margins Initiative.
- More precisely define and characterize the 'desert margins' for the purpose of the Initiative.
- Design an effective experimental approach and research agenda tailored to the target agroecological zones of the desert margins, and to the socioeconomic conditions of the participating countries.
- Discuss the proposed Initiative and develop effective collaborative arrangements that include interested NARS, NGOs, regional institutions, IARCs, and other institutions.
- Formulate workplans leading to specific project proposals that can be used to solicit appropriate funding.
- Establish a governing mechanism to provide policy guidelines and to set priorities.
- Identify the training needs and support required for the enhancement of human resource and institutional capacity in the NARS.

Special role of NGOs

I am particularly keen to ensure that we have direct and extensive involvement of nongovernmental organizations in the proposed research consortium. NGOs offer the advantage of being closer to the beneficiaries, and hence able to engage people in participation in the development process by creating new social organizations for coordinated action and empowerment. Cernea (1991) maintains that creating social organizations is equivalent to creating new social capital, which is a strategic resource for development. Because NGOs also have special concern for the poor and the environment, they have increasing influence on development policy, programs, and projects.

In a review of the Ford Foundation's association with the Intensive Agricultural Districts Programme (IADP) in India, Staples (1992) found that all-India solutions to development challenges are not appropriate. It was concluded that sustainable development is crucially related to the participatory nature of the process. People will conserve forests, maintain irrigation systems, and innovate in farming systems if they are actively involved in, and have full rights to, the product of their energies.

To quote from Staples: 'the first two decades of development in India showed that national approaches like the IADP, or indeed most centralized, national-wide devel-

opment schemes run into difficulties as they confront specific problems of local populations. NGOs often can demonstrate how best to organize people and deploy funds for poverty alleviation and resource management in the complexity and diversity of the Indian countryside.'

It would seem desirable for national and international R&D agencies to more explicitly involve themselves with NGOs in their future natural resource management research. This view was shared by the participants in an International Development Research Centre (IDRC) Workshop entitled 'Listening to the People: Social Aspects of Dryland Management' held in Nairobi in Dec 1994.

However, there is growing unease in some quarters about the replicability and sustainability of some NGO-sponsored activities, and about their limited scientific and technical capabilities. The proliferation of NGOs in recent years is of concern, as are the difficulties in appropriate accountability. The dependency of NGOs on government support and, in turn, of the poor on NGOs for their livelihoods, is also cited as leading to dependency which may not be sustainable.

It would seem there are strong mutual advantages in terms of replicability, accountability, and sustainability for NGOs to come alongside IARCs, NARS, and regional institutions as full collaborative partners as we move ahead on the proposed research agenda of the Desert Margins Initiative. Indigenous knowledge and empowerment of people are necessary, but not sufficient, ingredients for success in the challenge of ensuring future food security and the sustainability of the natural resource base in the desert margins. Modern science must complement these, as the pressure of population on natural resources is unprecedented.

The Systemwide Soil, Water, and Nutrient Management Research Initiative

There are 12 CGIAR ecoregional initiatives that are either under way or planned for the future. The CGIAR Technical Advisory Committee (TAC) recognized that, especially at the most strategic end of the research continuum, there will be a number of generic research themes that cut across these various ecoregional initiatives. This offers opportunities for research spillovers to be exploited within and among agroecological zones, and will result in further economies in research investments. Research in different ecoregions will increase our understanding of climate, soils, water, and biological interactions and will contribute to a global research model. The Alternatives to Slash and Burn Initiative led by ICRAF provides a good example of how these scientific synergies can be identified and promoted.

TAC listed the following examples of strategic research areas where scientific synergies might be relevant:

- land resources and land use;
- soil fertility and management;
- soil and water conservation;
- pest biology and ecology;
- social science; and
- biodiversity.

A recent paper by Greenland et al. (1994), commissioned by the International Board for Soil Research and Management (IBSRAM), made a strong case for a global soil, water, and nutrient management research initiative aimed at exploiting the complementarities that exist between current or planned ecoregional initiatives and strategic research issues in the soil, water, and nutrient continuum. After a meeting at Zschortau, Germany, and discussions at International Centers' Week 1994 followed by a meeting held recently in Rome, it was concluded that there are at least six major research themes that cut across the various ecoregional initiatives currently under way or planned in the CGIAR. Table 1 contains a list of the suggested generic research themes, possible initial target zones, and potential co-convenors. The suggestion is that the co-convenors would represent mechanisms for ensuring that a global synthesis of research and knowledge on the themes was made available to all ecoregional players and others who were interested.

As can be seen from Table 1, all six proposed research themes would be of some relevance to the proposed Desert Margins Initiative. Hence it is anticipated that the institutions collaborating in the Initiative would be able to benefit significantly from the cross-cutting research knowledge and synthesis that would be undertaken in the proposed SSWNMRI.

Table 1. Initial targets for research theme consortia in the Systemwide Soil, Water, and Nutrient Management Research Initiative (SSWNMRI).

Research themes	Initial target zones	Suggested co-convenors
Nutrient depletion/ replenishment	Sub-Saharan Africa	IFDC, TSBF, KARI
Optimizing soil water use	Sub-Saharan Africa	ICRISAT, IER
Managing acid soils	Latin America	CIAT, EMBRAPA
Controlling soil erosion	Southeast Asia	IBSRAM, PCARRD
Carbon sequestration	Southeast Asia	IRRI, CAAS
Soil-quality indicators	Southeast Asia	CIFOR, ??

One issue, which I would like to raise for consideration by the participants in this Workshop, is whether they agree with the initial priorities for the proposed SSWNMRI and, if so, how the Desert Margins Initiative might be linked to this proposed systemwide initiative? A related issue is whether proposed collaborators in the DMI would have any interest in being co-convenors of one or more of the research themes in Table 1. Before we disperse I would request that the Workshop agree to formally nominate convenors or co-convenors of the SSWNMRI Research theme 'Optimizing soil water use'. The initial suggestion was that ICRISAT and IER, Mali, play this role on behalf of the DMI: but there may be other suggestions.

Terms of reference for research theme convenors

- Articulate fully a conceptual framework for the research theme.

- Prepare an inventory of present and past research conducted on the research theme. Such an inventory will concern not only the initial target zones, but also other potential research areas within the theme.
- Identify gaps and areas that require strengthening.
- Develop a liaison with ecoregional programs and other research themes.
- Plan research activities through the organization of ad-hoc planning workshops, if possible in conjunction with ecoregional program meetings.

Issues for decision at the Workshop

Assuming that there is general agreement with the need for a Desert Margins Initiative, I thought that it might be helpful if I listed (not necessarily in order of priority) the issues which need to be deliberated before the end of the Workshop. There may of course be others.

- Decide on the value and desirability of a Desert Margins Initiative which emphasizes research and related activities.
- Establish priorities and the research agenda.
- Decide on notional resource allocations for the various activities, and potential collaborating institutions.
- Identify roles and responsibilities of participants including those for convenors, leaders, coordinators, and reporters.
- Establish decision-making mechanisms.
- Develop a plan to gain the commitment of stakeholders, especially of the senior management of the institutions represented at the Workshop.
- Establish a governance mechanism and the accompanying organization and management arrangements. Some guidance on this is available from on-going Initiatives including the Alternatives to Slash and Burn, the Rice-Wheat Consortium in South Asia, and from the meeting held in Rome that discussed the management of systemwide and ecoregional initiatives.
- Draft a project document that can be used to further the process of dialog and negotiations with potential funding agencies and TAC.
- Agree on a clear articulation of goals, milestones, methodologies, activities, and timetable for components of the Initiative that can be used to guide further development and assist in monitoring and evaluation after the project begins.
- Decide whether the Initiative is best described as a single ecoregional initiative, or whether it is best structured as an ecoglobal project similar to the Alternatives to Slash and Burn Initiative, that encompasses several ecoregional elements linked together by a global set of working groups and an associated mechanism.
- Decide on accountability for program areas and financial aspects,
- Define responsibilities for mobilizing funding and for representation.

- Decide on the value and desirability of linkages between the DMI and the proposed SSWNMRL

If endorsed, nominees for convenor roles would be sought.

The next steps

ICRISAT has an obligation to report on the outcome of this Workshop to TAC at their meeting to be held in Mar 1995 in Lima, Peru. In particular ICRISAT is expected to indicate the extent of commitment of collaborators to the Initiative, to provide a description of the proposed project milestones, to indicate which institutions have responsibility for the various proposed activities, and to submit an indicative budget. What we require is that a sufficient degree of commitment be evident by the end of this Workshop for us to propose to TAC the next steps in the process, in order to gain their approval for releasing funds to move the process forward. This is the reason why we decided to invite two consultants who are familiar with TOPP techniques. They have been asked to assist us in developing a draft project document which we could use as the basis for our submission to TAC, and subsequently to donors.

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Some Development Constraints in Desert Margin Areas of Sub-Saharan Africa

National and regional perspectives presented and discussed in Session 1

Rapporteurs: S V R Shetty, ICRISAT; D Rohrbach, ICRISAT

In the Sahelian zone of western Africa the resource base, farming systems, and development constraints are similar throughout. The major crops are millet, sorghum, cowpea, and groundnut, which are associated in all areas with animal husbandry. The NARS have developed short- and long-term research strategies to alleviate the principal constraints to sustainable production. But, in discussion, the view was expressed that research on individual crops had advanced, while that on livestock and forestry

had lagged behind. There appeared to be a lack of coordination among donors, NGOs, and within NARS and, indeed, several *real* research needs remained to be addressed. Though farmers are aware of land degradation, changes in degradation over time have not been well documented.

There is also a need to study the effects of marketing on production. Technologies to be developed should be market-oriented and focus on specialized agriculture relevant to desert margins, addressing improved crop production and its diversification in this harsh environment. For such work to be effective, more adaptive and participatory research was considered necessary.

Main constraints identified

Based on the background paper and presentations from the various countries and institutions, the following constraints were identified. They were taken into account when the specific objectives of the Initiative (see below) were identified.

- Climatic—irregular and/or insufficient rainfall, drought, . . .
- Soil-water-nutrients—poor soil management, N and P deficiencies, soil (wind and water) erosion, . . .
- Land use—including soil-water-nutrient, vegetation, and livestock management: overgrazing, deforestation, land clearing, urbanization, extensive production, production systems, mobility/multidisciplinarity, crop diversification, . . .
- Socioeconomic (internal and external)—land property, markets, nutritional conditions, demography, . . .
- Political, administrative, and institutional—weaknesses of support services, farmers' organization, gaps in regulations and/or policies, decentralization, failure of reforms, . . .
- Exchange of technology limitations and the nonintegration of approaches and solutions.

Summary of perceived constraints at national level

Botswana

Presented by G S Maphanyane, Acting Chief Agricultural Research Officer (Crops), Department of Agricultural Research

- Climate variation and drought
- Soil erosion and poor soil management in crop production resulting in overworked soils and low fertility
- Deforestation aggravated by veld fires and the collection of fuelwood and other veld products
- Overgrazing/overstocking by livestock and wildlife

- Fragility of the sand veld environment and its susceptibility to wind erosion and dune formation
- Genetic erosion through the indiscriminate introduction of exotic crops and livestock
- Land use conflicts, dual grazing rights, and spreading urbanization

Burkina Faso

Presented by F Lompo, Chef de Programme de recherche sur les relations eau-sol-plante, Institut National d'Etudes et de Recherches Agricoles

- Poor or unavailable water resources
- Soil degradation
- Degradation of the vegetation
- Low level of agricultural productivity
- Weak agricultural support services
- Malfunction of farmers' organizations
- Marketing difficulties
- Low level of farmers' incomes
- Diminishing game and fish stocks

Kenya

Presented by R M Kiome, Assistant Director, Kenya Agricultural Research Institute

- Migration from high-rainfall areas to semi-arid and arid zones, which comprise 80% of the country
- Inadequate road and housing infrastructures
- Erratic rainfall and poor rainfall infiltration
- Soil erosion by wind and water
- Fuelwood exploitation in excess of natural regeneration
- Land degradation accelerated by decreasing fallow periods and increased livestock herding
- Inadequate research
 - paucity of meteorological data and knowledge about the realities of climate change
 - little understanding of indigenous methods for survival in a degraded environment in which biodiversity is under threat
 - lack of appropriate technologies for managing natural resources based on a holistic research approach: ecology, socioeconomics, institutions, culture, etc.
- Conflict between agricultural development, natural resource conservation, and biodiversity preservation

Mali

Presented by M Djiteye, Ecologue a l'ESPGRN de Satuba, Institut d'Economie Rurale

- Climate
 - insufficient rainfall
 - maldistribution of rainfall
 - short rainy season (2-3 months)
 - rapid runoff that reduces infiltration
 - strong wind erosion that reinforces runoff and contributes to dune instability and the silting of the river Niger
- Soil fertility
 - nitrogen deficiency
 - phosphorus deficiency
- Land tenure
 - the land belongs to the State: everyone has the right to use it, but no-one is responsible for its upkeep or its improvement
- Traditional methods
 - subsistence cropping (little or no use of fertilizer)
 - open-range herding (vegetation browsing without rehabilitation) and rapidly growing herds leading to an imbalance between available fodder and livestock
 - uncontrolled use of resources (vegetation, soil, water)
- Technology
 - farms underequipped with machinery
 - difficulty in obtaining inputs (related to farmers' creditworthiness)
 - insufficient technical training
- Socioeconomics
 - inadequate or nonexistent organized market economy, such that farmers and pastoralists do not benefit financially from their work
 - inadequate or nonexistent village-based self-help organizations

Namibia

Representatives were invited, but no-one was available to participate. Expressions of interest in the Initiative, however, have been received from J de Klerk, Director of Agricultural Research and Training, Ministry of Agriculture, Water, and Rural Development, and E N Hainana, Agriculture Development Division, Namibia Development Corporation.

Niger

Presented by I M Magha, Directeur Scientifique p.i, Institut National de Recherches Agronomiques du Niger

- Pressure on land ownership
- Effects of climate (drought, erosion)
- Low productivity and inadequate management of arable and grazing land
- Diminishing wood resources
- Soil degradation
- Lack of appropriate technologies and/or insufficient technical knowledge (of livestock production and land management)

Summary of perceived constraints at regional level

Association Internationale Six 'S', Ouagadougou, Burkina Faso

Presented by G Gasana, Secrétaire Exécutif

- Structure of rural organizations
- Aspirations of rural organizations
- Current challenges
- Assets or strengths for meeting challenges
- Weaknesses of rural organizations
- The need for support
- Types or styles of support

Intergovernmental Authority on Drought and Development (IGADD), Djibouti, Republic of Djibouti

Presented by M Karaba, Programme Manager, Agriculture/Rangeland

- Drought and its impacts seen as periodic occurrences: responses not institutionalized
- Development of drylands is difficult:
 - response to the wrong signals
 - 'fighting the wrong battle'
- Information when required
- Communications: physical and others (telephone, modems, etc.)
- Upsurge of networks, institutions, NGOs:
 - duplication of efforts
 - thin spreading of resources
 - confusing the policy-makers

- Donor noise that:
 - discolates policy orientation
 - intensifies dependency
- Absence of peace and security:
 - frustration of all efforts
 - refugees and displaced people
- Donor 'regionalization' of issues:
 - Horn of Africa Initiative
 - Desert Margins Initiative
 - Others

Institut du Sahel (INSAH), Bamako, Mali

Presented by G Traore, Analyste-gestionnaire des ressources naturelles

- Climate
 - great cyclical variability in annual rainfall and its spatial distribution
 - frequent pest attack on crops
- Soils
 - nutrient deficiencies, particularly in nitrogen and phosphorus
 - fragility derived from wind and water erosion and crusting
- Socioeconomics
 - farming systems with low productivity in their use of natural resources, with resulting poverty for most of the population
 - high mortality (18/1000) related to a very high infant mortality of 120/1000
 - high birth rate (6.7 children per woman)
 - high overall population growth of 3.1%/annum
 - high level of urbanization—all leading to:
 - problems of education, health, employment, immigration, emigration, strife, etc.
 - food insecurity for humans and livestock
- Technical training
 - gaps in basic knowledge, particularly in understanding relations between physical, biological, and socioeconomic factors
 - low level of achievement in adaptive ecological research that is culturally and socioeconomically acceptable
 - low level of transfer of research results
 - weak synergistic exchange of experience between research and development staff

- Government policies
 - disinclination by legislators and administrators to encourage individual and community initiatives or changes in behavior, particularly regarding land ownership, price controls, and decentralization
 - lack of a effective incentives
 - resistance to reforms
- Global environment
 - strong dependence on external factors
 - very unfavorable international economic situation
- General consequence: continuing land degradation remains to be addressed

Southern African Centre for Cooperation in Agricultural Research (SACCAR), Gaborone, Botswana

Presented by J J Woodend, Senior Programmes Officer (Training)

The following SACCAR programmes are a response to the constraints perceived regionally in southern Africa:

- Sorghum and Millet Improvement
- Grain Legume Improvement
- Land and Water Management
- In-Service Training in Reseach Management
- Regional Programme for Strengthening Faculties of Agriculture, Forestry, and Veterinary Medicine
- Agroforestry Research
- Plant Genetic Resources Centre
- Maize and Wheat Network
- Vegetable Research
- Root Crops Research Network
- Agricultural Information Network

Generic Research Imperatives

Summary of discussions on international perspectives in Session 2

Rapporteur: C Ong, ICRAF

Paper by M A J Williams

Interactions of desertification and climate: present understanding and future research imperatives

The question of a uniform method for assessing land degradation was discussed.

This might be desirable, but was clearly difficult to achieve in practice. Similarly, satellite imaging of vegetation cover to assess degradation is not yet completely satisfactory. Other methods suggested are albedo and dust-storm occurrence. Mechanisms of desertification appeared to be more closely associated with the surface temperature of oceans (e.g., the El Nino effect) than with radiation changes due to deforestation, which has a significant influence on sedimentation load and the recharge of aquifers. Suggested responses to recurrent drought include use of appropriate cultivars, employing the traditional but conservative approaches of farmers and, especially, of pastoralists who have to move around to exploit new pastures.

Paper by A Bationo, M V K Sivakumar, K Acheampong, K Harmsen

Technologies for combating land degradation in the Sudano-Sahelian region of West Africa

More integrated management of nutrients is recommended, including crop rotation, intercropping, and the use of natural P sources. These increase biomass production and crop residues, which are much needed to enhance the low level of soil organic material found in desert margin areas.

Paper by S Fernandez-Rivera; P Hiernaux, M D Turner, T O Williams

Ecological and economic linkages between arid and semi-arid zones: the role of livestock

Discussions centered on management strategies, such as burning, which is not as prevalent as in the wetter part of the semi-arid tropics, on how to manipulate stocking rates during wet or dry years, and additional sources of fodder, e.g., from shrubs and trees.

Paper by PRE Hazell, J C Hopkins

Household and community resource management and investment decisions and impact of policy in the desert margins

Decisions taken at international level can have a significant impact, and major donors such as the World Bank should be involved at the beginning of new projects. Although it is desirable to establish the financial and societal cost of land degradation, suitable methods are not yet available.

Paper by EG Bonkougou

Traditional agroforestry methods and natural resource management in semi-arid zones of West Africa

The parkland system of scattered trees is important because it provides a diversity of products, e.g., fruits, fuel, and fodder, and it is a source of income. If parklands are deteriorating, what new systems or strategies are required?

Workshop Outcomes

The significant end result of the Workshop was a consensus among the participants that there is considerable value in pursuing the DMI and that it is an important ecoregional initiative. Major outcomes are presented as follows:

- preamble
- goal
- overall objective
- strategy
- specific objectives
- provisional expected outcomes
- agreed organization and management outcomes.

All the above, with the exception of the project outcomes, were presented and discussed in a plenary session of the Workshop and reflect the consensus of the participants. The expected project outcomes, which were discussed separately in two working groups, were presented in the plenary session. But time did not permit extensive discussion, and they should therefore be considered as provisional at this stage. The session on institution building and capacity enhancement also provided priorities for the enhancement of human resources, which are presented in Annex 3. Activities submitted by some participants have not been included here as these will be further developed at national and regional levels for consideration by the Interim Steering Committee.

Preamble

- The Convention on Desertification and its Implementation Annex for Africa provide the frame of reference for the Desert Margins Initiative.
- The DMI responds to the need to implement such key provisions of the Convention as Article 17 (Research and development) and also Articles 16 (Information collection, analysis, and exchange) and 18 (Transfer, acquisition, adaptation, and development of technology).
- It also reflects the priority TAC and the CGIAR have accorded to the challenges of food security, poverty alleviation, and the conservation and management of natural resources in the arid and semi-arid tropical ecoregion of sub-Saharan Africa.
- ICRISAT has been assigned the convening role for ecoregional initiatives in this region, and the DMI represents an appropriate response to this assignment.
- To the extent possible, the implementation of the DMI will be coordinated with the consultative process leading to national and subregional action programs to combat desertification with a view to ensuring:

- better coordination of strategic frameworks to combat drought and desertification;
 - improved complementarity between research and development activities at the local level;
 - consequent development of incentive systems to secure longer-term sustainability of field-level multisectoral research programs;
 - enhanced resource mobilization for the DMI within the framework of the partnership arrangements foreseen in the Convention.
- Appropriate interactions with the Committee on Science and Technology under the Convention (Article 24) will help ensure that the DMI is compatible with the priorities of the Convention.

Goal, overall objective, strategy

Goal—To contribute to sustainable food security and poverty alleviation.

Overall objective—To promote innovative and action-oriented dryland management research to arrest land degradation.

Strategy—The research strategy will follow a participatory and multidisciplinary approach, with an emphasis on on-farm research, gender issues, needs, and means.

The overall research strategy may be summarized as follows:

- Review and analysis of the extent and nature of the problem and its causes (socioeconomic, biophysical).
- Identification and testing of available solutions (indigenous, new technologies, and policy and institutional changes) through participatory research (farmers, NGOs, NARS, etc.).
- Development of improved solutions (technologies, policies, institutions) through participatory research (strategic, on-farm, etc.) for testing.
- Assessment of the likely impact of solutions in solving problems and designing monitoring systems for measuring impact.
- Collaboration with researchers, farmers, communities, NGOs, policymakers, and donors in implementing and monitoring the findings and recommendations from the Initiative.

Specific objectives

- I To develop a better understanding of the causes, extent, severity, and processes of land degradation in traditional crop, tree, and livestock production systems in the desert margins, and the impact, relative importance, and relationship between natural, human, institutional, and policy factors, with particular attention to zones susceptible to frequent droughts.
- II To evaluate, with the participation of farmers, NGOs, and NARS, past and current indigenous and improved soil, water, nutrient, and vegetation management practices for arresting land degradation, and to identify socioeconomic constraints to adoption of improved management practices.
- III To evaluate the role of livestock in the social, economic, and ecological linkages between the arid rangeland and semi-arid/dry subhumid cropping zones and their impact on vegetation productivity and biodiversity.
- IV To evaluate the impact and assist in designing policies, programs, and institutional options that influence the incentives for farmers and communities to adopt improved resource management practices.
- V To develop and foster improved and integrated soil, water, nutrient, and vegetation management technologies, strategies, and policies to achieve increased above- and below-ground biomass production through research, and elaborate activities to test options for enhancing ecosystem resilience in the desert margins.
- VI To develop and foster strategies for the domestication of tree species as new crops that address the specific needs of local people through the provision of food security and income generation.
- VII To promote more efficient drought-management policies and strategies.
- VIII To enhance the institutional capacity of countries participating in the Initiative to undertake land degradation research and the extension of improved technologies, with particular regard to multi-disciplinary and participative socioeconomic research.
- IX To facilitate the exchange of technologies and information among farmers, communities, scientists, development practitioners, and policy-makers.

Provisional expected outcomes

These expected outcomes were discussed by the working groups, but time did not permit an extensive discussion in plenary. The following list is therefore indicative of the range of outcomes that could occur from the Initiative, without representing a consensus of the Workshop. Hence it should be regarded as provisional.

Specific objective I—Understanding land degradation

- 1.1 Improved understanding of the relative contributions of climatic and human activities to dryland degradation.
- 1.2 Insight into the impact of livestock production and cropping practices on soil erosion, vegetation composition, and resilience of dryland ecosystems.
- 1.3 A better understanding of the temporal and spatial variability of climate, and implementation of improved methodologies for weather monitoring and forecasting of seasonal rainfall.
- 1.4. A set of consistent and objective criteria to evaluate and monitor the present status and severity of land degradation in dryland areas.

Specific objective II—Assessing dryland management practices

- 2.1 Inventory of soil and water conservation and nutrient management practices in traditional systems that integrate trees with crops.
- 2.2 A review of work done on the conservation of useful biodiversity in the drylands.
- 2.3 An assessment of the need for further collection, evaluation, and documentation of dryland biodiversity.
- 2.4 Increased availability and use of the most promising tree and plant species.
- 2.5 An inventory and evaluation of traditional and modern practices for natural resource management and their effectiveness in arresting land degradation, as well as their impact on the resilience of dryland ecosystems.
- 2.6 An understanding and inventory of the constraints to adoption of existing technologies.

Specific objective III—Evaluating the role of livestock in the rangeland/arable land continuum

- 3.1 Policies and institutional innovations to facilitate local and regional livestock mobility and reduce herder/farmer conflicts, thereby reducing risks and land degradation.
- 3.2 A set of economic and policy measures aimed at improving management of natural resources for livestock production.
- 3.3 Strategies for livestock feed and water resource use.

- 3.4 Strategies and technological packages (feed production, supplementary feeding, seasonal breeding) appropriate to regional stratification of livestock production.
- 3.5 Livestock management practices (timing, duration, intensity of grazing, herd composition) that conserve plant biodiversity and enhance ecosystem resilience in the arid rangelands and minimize land degradation in semi-arid and dry sub-humid production systems.
- 3.6 Institutional arrangements that clarify land tenure issues and establish user-group rights of access to fodder and water resources.
- 3.7 Policies and institutional arrangements (stocking/destocking, credit, insurance, etc.) that reduce livestock producers' vulnerability to drought and shorten the recovery time after a period of crisis.

Specific objective IV—Designing policies, programs, and institutional options

- 4.1 Improved understanding of why farmers and communities degrade resources.
- 4.2 Guidelines for policy and institutional changes to improve incentives for the adoption of sustainable technologies and farming practices, and investments in improving and conserving resources.
- 4.3 Methodologies and models to assess the impact of policies on natural resource management.
- 4.4 Appropriate indicators of land degradation, and methods for assessing the economic costs of degradation to farmers and communities.
- 4.5 Improved market opportunities for the products of drylands.
- 4.6 Policies to promote appropriate collective action by local communities for investment in sustainable resource management.
- 4.7 An understanding and analysis of the role of women in natural resource management and policies for capitalizing on their role in attaining more sustainable practices and in enhancing their welfare.
- 4.8 Policies and institutional arrangements to promote technologies and resource management practices that are more drought-resilient and to help rural households better to cope with droughts.
- 4.9 Priorities for a long-term growth strategy for the drylands, including an assessment of nonagricultural opportunities that can help relieve the human and climatic pressure on dryland areas.

Specific objective V—Improving natural resource management

- 5.1 Improved methods for sustaining the long-term fertility in the dryland areas, to effectively combat land degradation.
- 5.2 Improved soil and water management techniques for increasing the water-use efficiency and for arresting land degradation.

- 5.3 Improved technologies for integrated soil, water, and nutrient management in the dryland areas, and strategies for creating an enabling environment for their adoption.
- 5.4 Strategies for enhancing ecosystem resilience through optimization of biodiversity and use of improved soil, water, and nutrient management/conservation techniques.
- 5.5 Sustainable production technologies that conserve the environment, are socially and economically acceptable, and meet the food, fodder, and fuel needs of local populations in the dryland areas.
- 5.6 Efficient utilization of stover and other vegetable matter from food crops and tree species as animal feed, compost, and mulch.

Specific objective VI—Fostering domestication of tree species

- 6.1 A well conserved germplasm collection of local and exotic multipurpose trees, which have one or more of the following characteristics:
 - improved yield/quality of economically or socially beneficial products;
 - enhanced ability to ameliorate soil;
 - better compatibility with companion crops.
- 6.2 Identification of tree species and agroforestry systems that use limited water resources efficiently.

Specific objective VII—Formulating drought management strategies

- 7.1 A rational, systematic, coordinated process among donors and development agencies in cooperation with international institutes, regional associations, national governments, and NGOs to establish policies to plan and prepare for future droughts.
- 7.2 A critical analytical study of how African farmers and rural communities have historically prepared for and responded to agricultural drought stress.
- 7.3 Availability of food crop genotypes and phenotypes tolerant of drought with acceptable functional and food properties.
- 7.4 Determination of the biochemical and physiological characters that influence drought resistance at different stages of plant growth.
- 7.5 Assessment and improvement of early-warning systems and of biogeophysical models relevant to climate in the ecologies susceptible to drought.

Specific objective VIII—Enhancing institutional capacities

- 8.1 Availability of opportunities for institutional and human resource capacity building.
- 8.2 Availability of training opportunities and training manuals on improved land management practices for farmers, technicians, and scientists.

- 8.3 Effective partnership of international, regional, and national institutions to create a continuum from strategic, applied, and adaptive research to extension and adoption of technologies for arresting land degradation.
- 8.4 Harmonization and rationalization of the land degradation programs of relevant international, regional, and national institutions to ensure complementarity and optimal use of the available capacity.
- 8.5 Strengthening governmental and nongovernmental agencies for effective mediation between researchers and farmers to facilitate the exchange and adoption of technologies.

Specific objective IX—Exchanging technologies and information

- 9.1 Community-based groups involving local farmers, pastoralists, and extension officers focused on improving land management practices.
- 9.2 Natural resources councils at national and regional levels involving representatives from ministries and other relevant government agencies, and officials from implementing agencies including the private sector, to create an enabling policy environment for the generation, exchange, and adoption of technologies for arresting land degradation.
- 9.3 Availability of relevant information including training manuals, the conduct of workshops, conferences, and symposia aimed at various audiences (policy-makers, scientists, development practitioners, farmers, NGOs) which contribute to a better understanding of the processes of land degradation and of ways and means of arresting it.

Agreed organization and management outcomes

Governance mechanisms—A lengthy discussion during the last plenary session led to a consensus concerning what should be the governance mechanisms, as follows.

- The DMI must be organized with structures and decision-making and monitoring mechanisms that are efficient and operational.
- These structures and mechanisms should be simple, nonduplicatory, and linked with the existing coordination structures.
- The mechanism should be organized according to four distinct and complementary levels concerned with the DMI:
 - national level;
 - subregional level (eastern, southern, and western Africa);
 - regional level (Africa);
 - global level, e.g., UNEP, Systemwide Soil, Water, and Nutrient Management Research Initiative (SSWNMRI), INC D.
- Links and collaborative processes should be established with thematic subregional initiatives and institutions. The participants endorsed the idea of linking the DMI to the proposed SSWNMRI.

Interim Steering Committee—The principle of an Interim Steering Committee (InSC) was adopted, to:

- continue the planning process;
- prepare a more detailed document for submission to donors;
- organize regular discussion of some specific and general issues; and
- implement an effective consultation process between relevant countries and institutions.

The proposed composition of the InSC (16 members) was representatives from:

- NARS (Burkina Faso, Kenya, Botswana)
- Regional organizations (INSAH/CILSS, IGADD, SACCAR) .
- NGOs (Association Six "S", Canadian Hunger Foundation, ENDA-Zimbabwe)
- UNEP
- ICRISAT (as convenor/facilitator)
- ICRAF
- ILRI
- IFPRI
- IFDC
- ORSTOM (representing other institutions).

In order to facilitate various tasks and to keep the momentum, it was agreed that the InSC will recruit an Interim Coordinator, to be located at the ICRISAT Sahelian Center, Niamey, Niger.

Annex 1—Participants

Organizations represented

The 81 participants in the Workshop came from the following organizations. (Numbers in parentheses indicate participation by more than one representative.)

CGIAR and associated centers—IBSRAM, ICARDA, ICRAF (7), ICRISAT (7), IFDC (2), IFPRI (2), ILRI (3), IPGRI.

International organizations and specialized agencies—FAO, INCD, UNDP, UNEP (4), UNESCO/TSBF, UNSO (3), WMO.

Regional organizations—ACMAD, AGRHYMET (Niger), CILSS (Burkina Faso), IGADD (Djibouti), INSAH (Mali), SACCAR (Botswana).

National agricultural research systems (NARS)—Department of Agricultural Research (Botswana), IER (Mali), INERA (Burkina Faso), INRAN (Niger), KARI (Kenya: 2), NARO (Uganda).

National environment departments—Direction de l'Environnement (Niger), Direction des Eaux et Forêts (Mali), Direction de la Meteorologie (Niger), Institut de la Recherche en Biologie et Ecologie Tropicale (Burkina Faso), Kenya Meteorological Department, National Conservation Strategy Agency (Botswana), National Environment Secretariat (Kenya).

Nongovernmental organizations (NGOs)—Association Internationale Six "S" (Burkina Faso), Canadian Hunger Foundation (2), ELCI (Kenya: 2), ENDA-Zimbabwe.

Mentor and research institutions—CINADCO (Israel), CIRAD (France), CSIRO (Australia: 2), Institute of Hydrology/NERC (UK), ORSTOM (France), University of Adelaide (Australia), University of Copenhagen/SEREIN (Denmark), University of Wageningen/LAWOO (Netherlands), World Soil Resources (USDA).

Donor organizations—ACIAR (Australia), DANIDA (Denmark), GTZ (Germany: 2), IDRC (Canada), USAID.

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Annex 2—Workshop Program

Monday 23 Jan

Opening Session

Chair: C G Ndiritu, KARI

Welcome Addresses:

Government of Kenya Hon. Dr Z Onyonka, Minister of Research, Science,
Technical Training and Technology

ICRAF B Scott, Deputy Director General

UNEP R Olembo, Deputy Executive Director (Ag.)

ACIAR B Keating, CSIRO, Queensland

Press Conference (with the Information/Public Affairs Unit, UNEP)

Systemwide ecoregional initiatives of the CGIAR: J G Ryan
role of the desert margins ICRISAT

Discussion

Session 1: *Research Needs and Opportunities for Resource Management Programs to Arrest Land Degradation: National and Regional Perspectives*

Chair: T Darnhofer, UNEP; Rapporteur: S V R Shetty, ICRISAT

Les ressources naturelles au Niger: situation M I Magha
et besoins en recherche INRAN

La recherche sur la gestion des ressources naturelles: F Lompo
perspectives pour les zones arides du Burkina Faso INERA

Agriculture pluviale, productions animales, M A Djiteye
et degradation au Sahel IER, Mali

L'Institut du Sahel: deux programmes sous-regionaux G Traore
pour la lutte contre la degradation des terres au Sahel INSAH, Mali

Presentation de l'Association Internationale Six "S" G Gasana
Burkina Faso

Introduction methodologique a la methode TOPP D Kohli
Cove Consultants

Cocktails at ICRAF House, at the invitation of the Organizing Committee

Tuesday 24 Jan

Session 1: continued

Chair: G Traore, INSAH; Rapporteur: D Rohrbach, SADC/ICRISAT

Presentation from the Intergovernmental Negotiating Committee for a Convention to Combat Desertification	G de Kalbermatten INCD
Overview of crop and animal production and land degradation in Botswana	G S Maphanyane Dept of Agric. Research
Desert margins in Kenya: definition and characteristics in the context of agriculture	R M Kiome, C G Ndiritu KARI
Subregional efforts in developing arid and semi-arid lands of eastern Africa	M Karaba IGADD, Djibouti
SACCAR: an overview of the organization and its activities	J J Woodend SACCAR, Botswana
Will this Convention make a difference and how can NGOs contribute to this?	H Greijn ELCI, Kenya
Alleviating the consequences of agricultural drought	B H Moore Canadian Hunger Foundation
TOPP activities	D Kohli, P-Y Suter

Session 2: Generic Research Imperatives: International Perspectives

Chain R R B Leakey, ICRAF; Rapporteur: C Ong, ICRAF

Presentation of the background document	M V K Sivakumar ICRISAT, Niger
Interactions of desertification and climate: present understanding and future research imperatives	M A J Williams University of Adelaide
Technologies for combating land degradation in the Sudano-Sahelian region of West Africa	A Bationo et al. IFDC, Niger
Ecological and economic linkages between arid and semi-arid zones: the role of livestock	S Fernandez-Rivera et al. ILRI, Niger
Household and community resource management and investment decisions and impact of policy in the desert margins	P R B Hazell, J C Hopkins IFPRI, USA
Pratiques agroforestieres traditionnelles et gestion des ressources naturelles dans les zones semi-arides de l'Afrique de l'Ouest	E G Bonkougou ICRAF, Mali
Discussion and synthesis	D Kohli, P-Y Suter

Wednesday 25 Jan

Session 3; *Designing an Effective Research Approach: Target-Oriented Project Planning*

Facilitators: D Kohli; P-Y Suter

This 1-day interactive session used Target-Oriented Project Planning (TOPP) techniques to assess the needs and perspectives of national, regional, international programs, and NGOs interested in the Desert Margins Initiative.

Planning overall Objectives and Strategy in plenary

Division into two groups to formulate Specific Objectives

Plenary discussion of Specific Objectives

Division into two groups to formulate Outcomes from the Specific Objectives

Final plenary reassessment of the Outcomes

Thursday 26 Jan

Session 4: *Institution Building and Enhancement of Human Resource Capacity: TOPP*

Chair: J J Woodend, SACCAR; Facilitators: D Kohli, P-Y Suter

Training needs of national programs

G S Maphanyane, Dept of
Agric. Research, Botswana

Discussion

Session 5: *Review of Objectives, Outputs, Collaborative Linkages, and Project Formulation*

Chair: J G Ryan, ICRISAT; Rapporteur: M V K Sivakumar, ICRISAT

Review of Objectives and Outputs

Collaborative linkages

Project formulation plans

Session 6: *Institutional Mechanisms: TOPP*

Examples of institutional mechanisms in ecoregional initiatives:

The Consortium on Alternatives to Slash and Burn

M J Swift, TSBF, Kenya
D E Bandy, ICRAF, Kenya

Rice and Wheat Consortium for the Indo-Gangetic
Plains

J G Ryan
ICRISAT

Discussion, leading up to endorsement of the Desert Margins Initiative

Vote of thanks and Workshop closure

Annex 3—Enhancement of Human Resources

The discussion, in plenary session, on enhancement of human resources led to a consensus on the following issues:

1. Training is understood to be a vital tool for the institutional enhancement of national institutions involved in the DMI
2. The following generic training needs were identified:
 - Acquisition of knowledge and methodologies
 - Tools for planning, monitoring, and evaluation
 - Introduction of new approaches, methods, and technologies
 - Exchange of experience
 - Initiation of global, systemic, and multidisciplinary approaches.
3. Some specific training needs were also identified:
 - Communication techniques
 - Data/information management
 - Monitoring/evaluation/impact assessment
 - Modeling
 - Land degradation and resource management for extension staff.
4. Target-groups involved in training activities are:
 - Researchers
 - Technicians
 - Partners in the development sector
 - Producers
 - Women
 - Senior environmental managers (decision-makers, policy-makers).
5. The following guidelines were identified:
 - Programs established according to a global vision as well as for middle- and long-term planning
 - Partnership, leading to an interactive dialog
 - Action-oriented training, if possible in the field, linked with projects and demonstrations
 - Training integrating biophysical and socioeconomic disciplines
 - Strengthening the capacity to train others.
6. Several schemes were proposed:
 - Short-term and advanced training
 - Alternate training combining activities in training centers (IARCs, universities) as well as in the home-country
 - Exchange, visits, study tours.

7. The following problems were clearly identified:
- Management of human resources, combined with the frequent lack of motivation/incentives often mean that trained persons do not remain in the area or post for which they have been trained
 - The collaboration of several actors - particularly women - from the conception to the effective realization of training programs is often hampered by psychological as well as institutional and organizational problems
 - There are usually great differences in technologies/equipment used during the training and those effectively available in the field
 - Too often there is no scientific, neutral evaluation of the needs for and/or of the impact of training

Annex 4 - Glossary of Acronyms and Abbreviations

ACMAD	African Centre of Meteorological Applications for Development Centre africain pour les applications de la meteorologie au developpement (ACMAD)
ACIAR	Australian Centre for International Agricultural Research Centre australien pour la recherche agricole internationale (ACIAR)
AGRHYMET	Centre regional de formation et d'application en agrometeorologie et hydrologie operationnelle [Niger]
ASBI	Alternatives to Slash and Burn Initiative
CAAS	Chinese Academy of Agricultural Sciences
CGIAR	Consultative Group on International Agricultural Research [USA] Groupe consultatif pour la recherche agricole internationale (GCRAI)
CIAT	Centro Internacional de Agricultura Tropical [Colombia]
CIFOR	Center for International Forestry Research [Indonesia]
CILSS	Comite permanent inter-Etats de lutte contre la secheresse dans le Sahel
CINADCO	Centre of International Agricultural Development Cooperation (Israel)
CIRAD	Centre de cooperation internationale en recherche agronomique pour le developpement (France)
CNRA	Centre national de recherches agricoles (Niger)
CNRST	Centre national de la recherche scientifique et technologique (Burkina Faso)
CSIRO	Commonwealth Scientific and Industrial Research Organization (Australia) Organisation de la recherche scientifique et industrielle du Commonwealth (CSIRO)
DMI	Desert Margins Initiative Action dans les zones limitrophes du desert
EDF	European Development Fund Fonds europeens de developpement (FED)
ELCI	Environmental Liaison Centre International [Kenya]
EMBRAPA	Empresa Brasileira de Pesquisa Agropecudria (Brazil)

ENDA	Environment and Development Activities (Zimbabwe)
FAO	Food and Agriculture Organization of the United Nations [Italy] Organisation des Nations Unies pour l'alimentation et l'agriculture (FAO)
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
IADP	Intensive Agricultural Districts Programme (India)
IARC	international agricultural research center
IBSRAM	International Board for Soil Research and Management [Thailand] Conseil international de recherche et de gestion pédologiques (IBSRAM)
ICARDA	International Center for Agricultural Research in the Dry Areas [Syria] Centre international de recherche agricole dans les zones arides (ICARDA)
ICRAF	International Centre for Research in Agroforestry [Kenya] Centre international de recherches agroforestières (ICRAF)
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics [India] Institut international de recherche sur les cultures des zones tropicales semi-arides (ICRISAT)
IDRC	International Development Research Centre (Canada) Centre de recherches pour le développement international (CRDI)
IER	Institut d'économie rurale (Mali)
IFAD	International Fund for Agricultural Development [Italy] Fonds international de développement agricole (FIDA)
IFDC	International Fertilizer Development Center [USA] Centre international de développement des engrais (IFDC)
IFPRI	International Food Policy Research Institute [USA] Institut international de recherche sur les politiques alimentaires (IFPRI)
IGADD	Intergovernmental Authority on Drought and Development [Djibouti] Autorité intergouvernementale sur la sécheresse et le développement (IGADD)
ILRI	International Livestock Research Institute [Kenya] (formerly ILRAD/ILCA) Institut international de recherche sur l'élevage (ILRI)

INCD	International Negotiating Committee for a Convention to Combat Desertification [UN, Switzerland] Comite intergouvernemental de negociation d'une convention de lutte contre la desertification (CIND)
INERA	Institut d'etudes et de recherches agricoles (Burkina Faso)
INRAN	Institut national de recherches agronomiques du Niger
INSAH	Institut du Sahel [Mali]
IPGRI	International Plant Genetic Resources Institute [Italy] Institut international des ressources phyto-genetiques (IPGRI)
IRBET	Institut de la recherche en biologie et ecologie tropicale (Burkina Faso)
IRRI	International Rice Research Institute [Philippines] Institut international de recherche sur le riz (IRRI)
ISC	ICRISAT Sahelian Center [Niger] Centre sahelien de l'ICRISAT (ISC)
KARI	Kenya Agricultural Research Institute
KEFRI	Kenya Forestry Research Institute
LAWOO	Land and Water Research Group (University of Wageningen)
N	nitrogen
NARO	National Agricultural Research Organisation (Uganda)
NARS	national agricultural research sytem(s)
NERC	National Environmental Research Council (UK)
NGO	nongovernmental organization
OECD	Organization for Economic Co-operation and Development [France] Organisation de cooperation et de developpement economiques (OCDE)
ORSTOM	Institut francais de recherche scientifique pour le developpement en cooperation (France)
P	phosphorus
PCARRD	Philippine Council for Agriculture and Resources Research and Development
R&D	research and development
SACCAR	Southern African Centre for Cooperation in Agricultural Research [Botswana] Centre de cooperation en recherche agronomique pour l'Afrique australe (SACCAR)

SADC	Southern African Development Community
SAFGRAD	Semi-Arid Food Grain Research and Development Projet de recherche et de developpement des cultures vivrieres dans les zones semi-arides (SAFGRAD)
SALWA	Semi-Arid Lowlands of West Africa
SEREIN	Sahel-Sudan Environmental Research Initiative (Sweden)
SPAAR	Special Program for African Agricultural Research Programme special pour la recherche agricole en Afrique (SPAAR)
SSWNMRI	Systemwide Soil, Water, and Nutrient Management Research Initiative
TAC	Technical Advisory Committee (CGIAR) Comite consultatif technique (TAC)
TOPP	Target-Oriented Project Planning
TSBF	Tropical Soil Biology and Fertility Programme (UNESCO)
UNCED	United Nations Conference on Environment and Development [1992]
UNDP	United Nations Development Programme [USA] Programme des Nations Unies pour le developpement (PNUD)
UNEP	United Nations Environment Programme [Kenya] Programme des Nations Unies pour l'environnement (PNUE)
UNESCO	United Nations Education, Scientific and Cultural Organization [France] Programme des Nations Unies pour l'education, la science et la culture (UNESCO)
UNICCD	United Nations International Convention to Combat Desertification
UNSO	United Nations Sudano-Sahelian Office [USA] Bureau des Nations Unies pour la region soudano-sahelienne (BNUS)
USAID	United States Agency for International Development Agence des Etats-Unis pour le developpement international (USAID)
USDA	United States Department of Agriculture Ministere de l'Agriculture des Etats-Unis (USDA)
WMO	World Meteorological Organization [Switzerland] Organisation meteorologique mondiale (OMM)
WRI	World Resources Institute [USA]
WSR	World Soil Resources (USDA)