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REPORT OF THE STAP BRAINSTORMING ON AGRICULTURAL BIODIVERSITY

BARBADOS
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(Prepared by the Scientific and Technical Advisory Panel)

Report of the STAP Brainstorming on Agricultural Biodiversity

Barbados
21-22 February 2000

Prepared by The Scientific and Technical Advisory Panel (STAP)
of the Global Environment Facility (GEF)

STAP SECRETARIAT
UNITED NATIONS ENVIRONMENT PROGRAMME

Preface

It is a pleasure to present the final report of the "*STAP Brainstorming on Agricultural Biodiversity*" convened in Bridgetown, Barbados in February, 2000 to you. This activity was undertaken as an integral part of the corporate preparation for an Operational Programme on Agricultural Biodiversity.

Even though the report is being submitted for your consideration at this Council Meeting, it has been used extensively in the preparation of the Operational Programme. I would like to acknowledge the constructive fruitful co-operation between the GEF Secretariat and STAP in the preparation of the Operational Programme.

This report was prepared by Dr. Christine Padoch with inputs from the STAP Ad-Hoc Working Group on Biodiversity and the STAP Secretariat.

Dr. Madhav Gadgil
STAP Chairman

Executive Summary

This report is the product of two major STAP activities, namely, the STAP Selected Review in "*Ethiopia: A Dynamic Farmer-Based Approach to the Conservation of African Plant Genetic Resources*" and the STAP Brainstorming on Agricultural Biodiversity convened in Barbados from February 21-22, 2000.

Both these activities were undertaken by STAP in response to the corporate priority for the preparation of an Operational Programme on Agrobiodiversity. The selective review was undertaken with the view of drawing out practical lessons which could assist in the design of the Operational Programme and was a major input to the Brainstorming Session which had, as its major objective, the identification of scientific and technical elements which should form the basis of the Operational Programme.

It was generally accepted that in order to conserve and sustainably use agricultural biodiversity, a number of component dimension of agricultural biodiversity must be integrated, namely, genetic resources, ecological services and biotic factors. Since agricultural biodiversity is shaped by human activities and management practices, socio-economic and cultural factors were identified as critical in addressing issues relevant to its conservation and sustainable use.

A number of critical issues were identified which should be taken into consideration in the final design of the Operational Programme. These are summarised under three broad headings, namely, linkages between diversity within species and evolution; economic, social and genetic benefits derived from in-situ conservation and strategic directions in collection and conservation.

In addition, based upon the findings of the selective review, a number of gaps were identified which should be taken into consideration in future initiatives in agricultural biodiversity. These may be summarised as ecological and plant genetic issues; local knowledge and farmers practices; agricultural policies and farmers' rights and benefit sharing and market and non-market incentives.

Finally, it was concluded that there is a need for a better understanding of the scientific and technical dimensions of agricultural biodiversity. As a consequence, targeted research initiatives should be used to clarify the impacts of interventions on diversity and genetic erosion. Topics which require particular attention are outlined in the report.

SECTION 1: INTRODUCTION AND BACKGROUND

1.1 Background

The Third Meeting of the Conference of Parties to the Convention on Biological Diversity (CBD/COP III) adopted decision III/II on the conservation and sustainable use of agricultural biological diversity. The decision established a multi-year programme of activities aiming at promoting the positive effects and mitigating the negative impacts of agricultural practices on biological diversity in agro-ecosystems and their interface with other ecosystems. The COP decision III/5 further called on the Global Environment Facility (GEF), in accordance with decision III/II, to provide financial resources to developing countries for country-driven activities and programmes, consistent with national priorities and objectives, for supporting efforts for the conservation and sustainable use of biological diversity important to agriculture.

To address the operational aspects of carrying out the COP guidance on agricultural biodiversity, the GEF formulated an operational framework for GEF agricultural biodiversity activities. In January 1999 a proposal was made to the GEF to consider the establishment of an Operation Programme on Agricultural biodiversity which would complement the CDB ecosystem programme in this area. This proposal was endorsed by the GEF and efforts are being directed to the preparation of an Operational Programme on Agricultural biodiversity. The Scientific and Technical Advisory Panel (STAP) of the GEF has been invited to participate in this process, with the view of providing the scientific and technical elements, which should underpin such an Operational Programme.[1]

STAP's input in the preparation process was structured in two main phases, namely:

(i) A selective review of a GEF pilot phase project "*Ethiopia: A Dynamic Farmer-Based Approach to the Conservation of African Plant Genetic Resources*" with the view of drawing out practical lessons which could assist in the design of the Operational Programme.
(ii) A Brainstorming Session on Agricultural biodiversity to review the various approaches relevant to the conservation and sustainable use of biological diversity important to agriculture and to provide guidance to the GEF on the various elements which could be included in the Operational Programme.

1.2 Aims and Objectives

The aims and objectives of the STAP Brainstorming Session on Agricultural biodiversity were as follows:

(i) Review the various approaches relevant to the conservation and sustainable use of biological diversity important to agriculture.
(ii) Review practical lessons drawn from the STAP Selective Review of "*Ethiopia: A Dynamic Farmer-Based Approach to the Conservation of African Plant Genetic Resources*" and their implication for the proposed Operational Program on Agricultural biodiversity.
(iii) Identify the key scientific and technical elements which should form the basis of the Operational Program

[1] GEF Council. 1998. A Framework for GEF Activities Concerning Conservation and Sustainable Use of Biological Diversity Important to Agriculture. October 14-16, 1998

(iv) Identify research priorities that could contribute to the strengthening of GEF projects and programs in Agricultural biodiversity.

1.3 Participation

The meeting was attended by experts from various countries, four members of STAP, representatives from the GEF Secretariat, the Implementing Agencies, the Convention on Biological Diversity Secretariat (CBD), the Food and Agricultural Organization (FAO) and the International Plant Genetic Resources Institute (IPGRI). (See Annex I1 for the list of participants).

1.4 Structure of the Meeting

The meeting was structured in such a way to focus on four broad themes, namely Approaches to the Conservation and Sustainable Use of Biological Diversity Important to Agriculture as well as field experiences; lessons learnt from the GEF Project "*Ethiopia: A Dynamic Farmer-Based Approach to the Conservation of African Plant Genetic Resources*"; Scientific and Technical Issues Surrounding Agricultural Biodiversity and Potential Targeted Research Opportunities.

A combination of scientific presentations; panel discussions and working group sessions were employed.

1.5 Conservation and Sustainable Use of Biodiversity Important to Agriculture and the GEF

As a context for the discussion, Dr. Walter Lusigi of the GEF Secretariat provided an overview of the overall aim and purpose of the proposed Operational Programme on the Conservation and Sustainable Use of Biological Diversity Important to Agriculture.

It was highlighted that the proposed Operational Programme is intended to provide an operational framework for GEF agrobiodiversity activities. It aims to respond to COP decisions III/5 and IV/5 within the GEF mandate, which is to operate as a mechanism for the purpose of providing new and additional grant and concessional funding to meet the agreed incremental costs of measures to achieve agreed global environmental benefits. The overall goal of the Operational Programme is to promote the objectives of the Convention, in the area of agricultural biodiversity in line with the relevant decisions of the Conference of the Parties notably, III/II (Buenos Aires, 1996) and IV/6 (Bratislava, 1998).

The objectives of the Operational Programme are to promote the positive impacts and mitigate the negative impacts of agricultural systems and interface with other ecosystems; the conservation and sustainable use of genetic resources of actual and potential value for food and agriculture and the fair and equitable sharing of benefits arising out of the use of genetic resources. These objectives, if achieved, would indirectly contribute to poverty alleviation while maintaining biodiversity.

The meeting was reminded that GEF activities in the area of agrobiodiversity derive from its overall operational strategy in biodiversity. In accordance with the strategy, all GEF-funded activities in biodiversity will be in full conformity with the guidance provided by the COP to the CBD. The main strategic considerations guiding GEF financed activities to secure global biodiversity benefits are:

- Integrating conservation and sustainable use of biodiversity within national and as appropriate, sub-regional sustainable development plans and policies;
- Helping to prevent and sustainably manage ecosystems through targeted and cost effective interventions;
- Integrating efforts to achieve global benefits in other focal areas like climate change and international waters, where feasible, and in the cross-sectoral area of land degradation, primarily desertification and deforestation;
- Developing a portfolio that encompasses representative ecosystems of global biodiversity significance; and
- Targeted and designing GEF activities to help recipient countries achieve agreed biodiversity objectives in strategic and cost-effective ways.

SECTION 2: THE SCIENTIFIC AND TECHNICAL ISSUES SURROUNDING AGRICULTURAL BIODIVERSITY: AN OVERVIEW

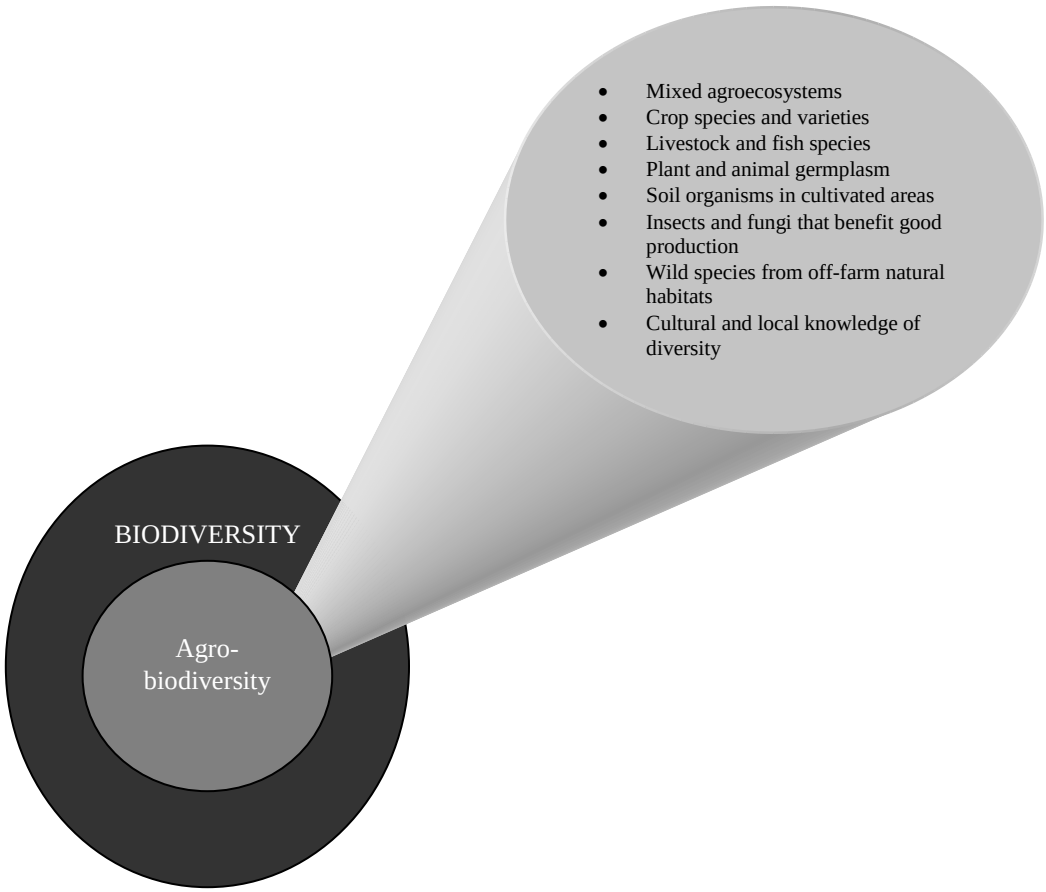
2.1 Introduction

Biodiversity is of major significance to the health and prosperity of mankind. It is the backbone of animal, crop, forage, forestry and aquaculture production systems. It is essential to maintain the biosphere as a functioning system; to provide the basic materials for agriculture and other services such as fibre for clothing, materials for shelter, transport, medicine, fertiliser and fuel, and to provide ecosystem services such as pollination, soil formation and fertility and pest control.

2.2 The Scope of Agricultural Biodiversity

Agricultural diversity as a component of biological diversity (see Figure 2.1) includes all components of biological diversity of relevance to food and agriculture; and those aspects that constitute the agro-ecosystem, that is the variety and variability of animals, plants and micro-organisms, at the genetic, species and ecosystem levels, which are necessary to sustain key functions of agro-ecosystems, its structure and processes.

Figure 2.1: CONCEPTUAL VIEW OF AGROBIODIVERSITY
Source: L.A. Thrupp, World Resources Institute



To conserve and sustainably use agricultural biodiversity, a number of component dimensions of agricultural biodiversity must be integrated; namely:

- Genetic resources, the basic units of agricultural production which comprise genetic resources of cultivated species, domesticated species and managed wild plants and animals. These include:

  - Plant genetic resources including pasture and rangeland species and forest genetic resources;

  - Animal genetic resources, including fishery genetic resources; and

  - Microbial and fungal genetic resources.

- Ecological services which are provided by biological diversity in production ecosystems:

  The diversity of organisms that contributes, at various scales, to ecosystem functions such as nutrient cycling, decomposition of organic matter, pest and disease regulation, pollination, maintenance of the hydrological cycle and erosion control.

- Abiotic factors which have a determining effect on these aspects of agricultural biodiversity. These include the land and water resources and climatic conditions, which determine the nature of the environment or habitat; thus determining the range of biological species, varieties and races that can be sustained in an ecosystem.

In addition, agricultural biodiversity is largely shaped by human activities and management practices. Thus, socio-economic and cultural factors are important, including (for example) traditional and local knowledge, cultural factors and participatory processes, and tourism associated with agricultural landscapes.

The dramatic losses in agricultural biodiversity have been well documented in recent years and have demanded the attention of the international community. Many past attempts to curb these losses tended to deal inadequately with the complexity of factors that play a role in the erosion of agricultural biodiversity. Political, corporate, economic, legal, social, developmental, ecological, and many other pressures have converged to create a global trend towards the depletion of agro-genetic resources. Research and analyses must address this web of factors and clarify the issues and entry points to halt this global crisis, which threatens our food security. In addition, the loss of agricultural biodiversity has been linked to increased demands for food production, market pressure, economic and agricultural development policies, and shifts in trade, environmental, and demographic patterns.

2.3 Critical Issues for Consideration

The confluence of issues referred to above were highlighted in the discussions which should be taken into consideration in the final design of the Operational Programme. The most important are summarised below.

2.3.1 Linkages Between Diversity within Species and Evolution

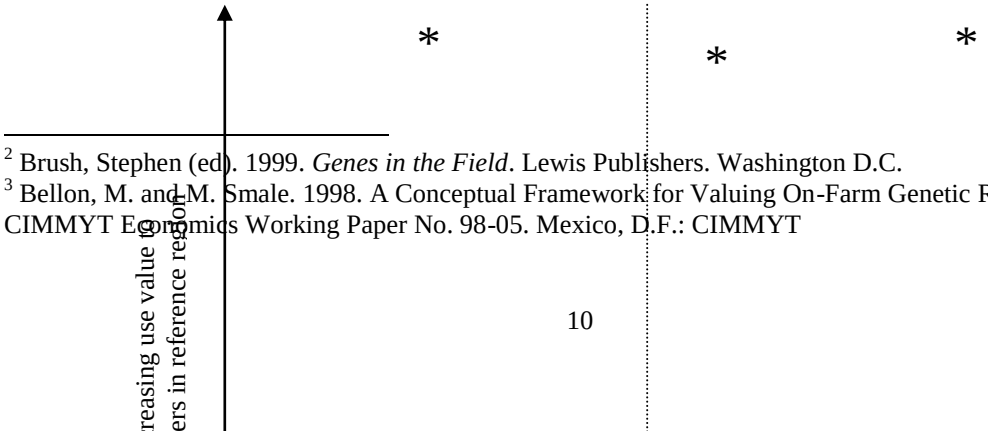
The link between diversity within species (intra-specific) and evolution was highlighted as an important issue in the consideration of biodiversity important to agriculture. It was however pointed out that many ex-situ projects fail to maintain this vital relationship. The primary benefit of in-situ conservation over ex-situ conservation is that both plants and farming systems can evolve with the neighboring environment. In-situ projects should never attempt to isolate or freeze a particular farming system. The goal of in-situ conservation is to preserve the cultural, ecological and technological relationships that maintain diversity. For this reason in-situ conservation projects should not overlook the importance of wild and weedy relatives, predators and diseases, and local knowledge.[2]

2.3.2 Economic, Social and Genetic Benefits Derived from In-Situ Conservation

Discussion centered on the economic, social, ecological, and genetic benefits derived from in-situ conservation and suggested activities to curb the rapid loss of agricultural biodiversity. Possible entry points for socioeconomic augmentation which are highlighted included improving farmers' access to materials through seed networks, diversity fairs and the sharing of information. Other recommendations for socioeconomic initiatives included the integration of locally adapted crop varieties and farmer preferences into national and local development and extension projects. Recommendations for ecological approaches included the identification of farming practices and systems where the use of local crop diversity improves ecosystem health. For example, genetic resources that are adapted to environmental conditions can reduce the dependency of agricultural systems on pesticides, herbicides and fertilizer. Genetic research can assist in identifying the primary regions for in-situ conservation and can identify farmers and communities to link with national/provincial plant genetic resource management systems. In addition, in-situ conservation was highlighted as a means for economic and social development to improve the livelihood of resource poor farmers and as a means to maintain or increase farmers' control over access to crop genetic resources.

2.3.3 Strategic Decisions in Collection and Conservation

In the consideration of strategic decisions in collection and conservation, a method for determining appropriate sites for in-situ conservation initiatives was highlighted. Reference areas can be assessed based upon two questions: (i) the probability that farmers will maintain the population and (ii) the contribution of the population to the overall genetic diversity in the area (see figure 2.2). Within a reference area the collection of associated populations of a target species can be defined as a metapopulation. The x-axis represents the importance and uniqueness of a single population in comparison to the metapopulation. On this axis populations of "high-value" are most important to the maintenance of diversity within the metapopulation. The y-axis is a measurement of the value of a particular species to the farmer. This economic model provides a strategy for determining the most appropriate method of conservation (in-situ or ex-situ) for a target species within a reference area.[3]



[2] Brush, Stephen (ed). 1999. *Genes in the Field*. Lewis Publishers. Washington D.C.
[3] Bellon, M. and M. Smale. 1998. A Conceptual Framework for Valuing On-Farm Genetic Resources. CIMMYT Economics Working Paper No. 98-05. Mexico, D.F.: CIMMYT

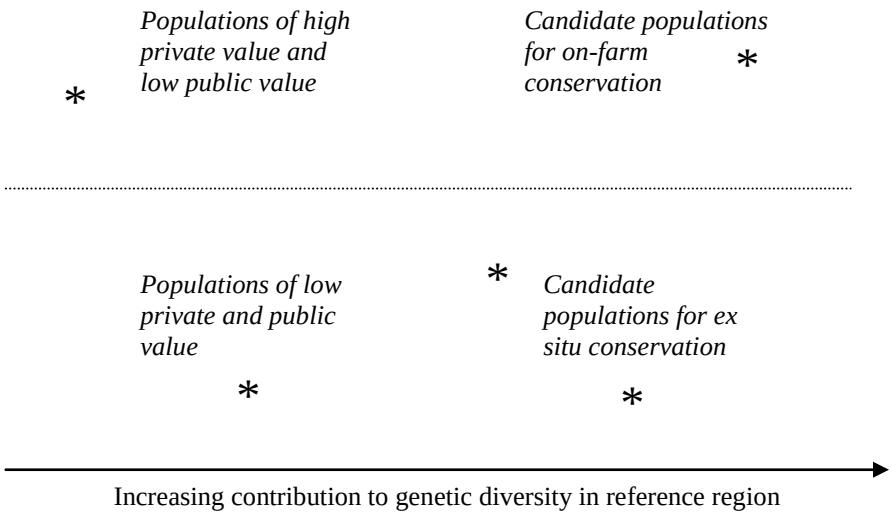


Figure 2.2. Framework for choosing crop populations to conserve on-farm and ex situ, in a given reference area

2.3.4 STAP Selective Review: Lessons Learnt

The result of the STAP Selective Review of the GEF project "*Ethiopia: A Dynamic Farmer-Based Approach to the Conservation of Crop Genetic Resources in Africa*" was presented with particular emphasis being placed on gaps which will be very useful for future GEF interventions to be cognizant of. The project is regarded by STAP as an innovative and pioneering initiative in agricultural biodiversity, which has and will continue to provide important information and lesson for future projects to build and learn from. Many positive aspects of the project, including (i) its pioneering efforts to initiative activities in in-situ conservation and linking them with existing ex-situ resources; and (ii) promoting productive communication between the scientists and farmers working on the project were highlighted.

The major gaps identified from which a number of lessons can be drawn fell generally into four main areas; namely:

i) benefit sharing and market and non-market incentives.
ii) ecologically and plant genetic issues;
iii) local knowledge and farmers practices
iv) agricultural policies, and farmers' rights; and

2.3.4.1 Market and Non-Market Incentives

Market and Non-Market Incentives were highlighted as an important area of focus in interventions aimed at facilitating the sustainable use of biodiversity important to agriculture. Such incentives schemes could serve as motivators to farmers and communities interventions with built-in substantive system of awards and social recognition stood a better chance of having substantive results. For example, in the Ethiopian experience, the view was advanced that

farmers' varieties could potentially be favoured through the emergency of and access to markets willing to pay a premium for products derived from farmers' varieties. It was however, recognised that addition information would be necessary to explore its feasibility. Access to such information would be best achieved by searching out and forming ties with researchers and others specializing in these areas. This underscored the need for targeted research in this area to provide answers to such questions as the nature and extent of incentive schemes necessary to motivate farmers.

In addition, it was also emphasised, that in this context, it is essential to appreciate the behaviour of other actors who are important in trade in agricultural products such as local, national and foreign traders and consumers. For instance, it is necessary to ask: when are consumers willing to pay higher prices for produce of genetically diversified, organic agriculture?

2.3.4.2 Local knowledge and farmers' practices

The utilization of farmers' knowledge and techniques is essential in agrobiodiversity interventions. Farmers necessarily take a holistic view of the system; their livelihoods are affected by integral outcomes. They also have considerable experience with the behaviour of the system at least over recent history and therefore have an appreciation of consequences of relatively rare events. The farmers have an understanding of how the traditional varieties perform under different soil and rainfall regimes; they have effective and very specific techniques of selecting seeds and of storing seeds in ways that resist rodent depredation.

Farmers, herders, fishers, herbal medicine men and women have important knowledge and insights that complement the areas of competence of scientifically trained experts. Careful documentation of farmers' knowledge and technologies in ways that could promote its use side-by-side with scientific knowledge and technologies.

The Ethiopian experience highlighted the need for more emphasis to be placed on ethnobotany, particularly those having to do with local knowledge of cultivation systems and seasonal variation and the use of various technologies. It also highlighted the need for targeted research into locally developed ways of conserving farmers' crop varieties, including the social and market networks through which such varieties are acquired, disseminated and reacquired following crop failures.

2.3.4.3 Agricultural Policy, Farmers' Rights and Benefit Sharing

The Ethiopian experience underscore the importance of agricultural policy, farmers' rights and benefit sharing as an important consideration in addressing agrobiological concerns. Issues such as the impact of liberalization on the continued production of land races, the implications of pricing and marketing policy on the sustainable production of land races and the seeming contradiction between augmenting productivity, which is usually a goal of most agro-ecosystems and maintenance of diversity were highlighted as important considerations which the new Operational Progamme should be cognizant.

2.3.4.4 Ecological and Plant Genetic Issues

The Ethiopian case study highlighted the need for a stronger ecological perspective. Elements of such a perspective which could have been addressed related to the application of the analysis of crop genetic diversity into constituent components such as α - diversity (packing of varieties in one locality), β - diversity (turnover of varieties along environmental gradients), μ - diversity (mosaic distribution of diversity within a landscape; an analysis of how farmers view

environmental heterogeneity and crop genetic diversity; analysis of the broader issues of resources in landscape where local varieties are planted and conserved, the conservation of medicinal plants as part of small holders ' heritage, and the reconstruction of ecological and resource use histories in terms of changes in landscape, in agricultural and animal husbandry practices and in mixed of crops and their varieties under cultivation.

2.4 Appropriate Focus of Agricultural Biodiversity Conservation

In addition, the discussion centered on the scope and level of conservation activities that fall under the definition of agricultural biodiversity. In this regard, three distinct arguments were made regarding the appropriate focus of agricultural biodiversity conservation:

a) Agricultural biodiversity conservation should focus on intra-specific diversity (within species) of crops and their wild relatives. The Vavilov centers of crop diversity should be the primary target for conservation;

b) Agricultural biodiversity conservation should also focus on inter-specific diversity (diversity between species). Agricultural systems high in species diversity should be a primary target for conservation;

c) Agricultural biodiversity conservation should focus on quantifying and mitigating the harmful effects of agriculture on natural ecosystems. The primary regions of major importance to agricultural biodiversity programs should be natural ecosystems that are threatened by agriculture.

SECTION 3. SUGGESTIONS FOR THE IMPLEMENTATION OF AN AGRICULTURAL BIODIVERSITY PROGRAMME AND OPPORTUNITIES FOR TARGETED RESEARCH

3.1 Introduction

Agricultural biodiversity projects should emphasize the maintenance of evolutionary and ecological processes recognizing and conserving the flow of goods and services provided by agricultural diversity that are both valued by and essential to society. To achieve this goal the scope of this multidisciplinary programme should include: (i) genetic resources for food and agriculture (crop, animal, etc.); (ii) aspects of agricultural biodiversity that provide goods and services necessary for agricultural production; (iii) the social systems that maintain and promote diversity; and (iv) the interactions between (i), (ii), and (iii).

The CBD work program as recommended by SBSTTA to COP provides a good framework, but criteria for prioritization within these elements could be further developed. Criteria for prioritization should be based upon targeted research that covers (i) socioeconomic issues such as identifying policies and market incentives which promote agricultural biodiversity; (ii) genetic issues such as the interaction between landraces and improved varieties; (iii) ecological issues such as the impact of various agricultural systems on the surrounding environment; and a host of other issues from both social and natural science disciplines.

Many GEF activities will focus on approaches such as: (i) removing barriers through institution building, (ii) linking, global and local goods, (iii) strengthening both supply and demand for agricultural biodiversity and (iv) linking conservation, sustainable use, and benefit sharing.

3.2 Prioritization

- **Criteria to Assess Levels of Agricultural Biodiversity**

  Different sets of criteria are necessary to address the numerous levels of agricultural biodiversity conservation. For example:

  (a) There is a direct global interest in the conservation of the genetic resources of major food crops. The rationale for this initiative should concentrate on the conservation of both primary and secondary centers of diversity (not limited to Vavilov centers).
  (b) The rationale for the conservation of minor crops should recognize the dynamics of complex environments. Prioritization must recognize this distinction, which requires conservation on a wider scale and a focus on a diversity of crops.
  (c) The conservation of the agricultural biodiversity that provides ecological services requires yet another set of rationales.

- **Guidelines for Equity of Benefits and Intellectual Property**

  Sharing of information, equity of benefits, and intellectual property rights are sensitive issues that must be a priority in an agricultural biodiversity program. Clear and fair guidelines must be created with respect to these issues, which should be integrated into every part of the program.

  A multidisciplinary initiative is required to clarify priorities and criteria for prioritization. Socio-economic and political changes are required to create a positive environment for

conservation. It is imperative that national agricultural systems address agricultural biodiversity issues through appropriate internal adjustments in policy and management. In many instances governments may not be able to provide financial resources for community based conservation. In some cases continuing support may be required to sustain conservation efforts. This support, however, should not be regarded as a subsidy, but as a payment for goods and services.

There are many approaches possible for the improvement of biodiversity friendly agriculture, which include the promotion or support of integrated intensive farming systems, forest-gardens, shade plantations, etc. With regard to traditional systems, maintaining agricultural biodiversity and mitigating the effects of agricultural transformation are important. The goal, however, is not to "freeze" existing agricultural systems. Instead, the goal should be to help them develop and adapt to changing circumstances while maintaining their diversity.

Promotion of diversity through markets is extremely complex. A focus on promoting the supply of agricultural biodiversity may be easier to address than promoting demand. Comparative analysis of the supply and demand of agricultural biodiversity is necessary. Also, sustainable use can be promoted along with intensification in cases associated with high biodiversity levels.

Beyond the identification of the root causes of agricultural biodiversity loss it was agreed that more proximate causes should be addressed, especially given that (i) many root causes may be intractable and (ii) it may be difficult to achieve consensus on the true root causes. The complexity of these issues makes it extremely difficult to identify clear and simple solutions. As mentioned above, prioritization should build upon current scientific knowledge and targeted research.

3.3 Targeted Research

There is obviously a great need for a better understanding on the scientific and technical dimensions of agricultural biodiversity. Targeted research initiatives should therefore clarify the impact of interventions on diversity and genetic erosion. Prior GEF agricultural biodiversity projects included such interventions as (i) participatory improvement of genetic material, (ii) conserving/establishing seed networks, and (iii) promoting green or organic markets. While these efforts are steps in the right direction, other factors/interventions need to be researched.

A major multi-disciplinary initiative is therefore necessary to understand the processes that maintain and impact diversity over space and time. Topics that require particular attention include:

(i) **Measuring the impact of interventions on diversity and/or genetic erosion** (including participatory improvement of genetic material, seed networks, green and organic markets, PPB and seed networks on diversity Green and organic markets, and release of transengenic plants/animals on ecosystems - natural and agroecosystems).

(ii) **Assess and monitor the amount/quantity and distribution of biodiversity important to agricultural at different spatial and temporal scales**;

(iii) **Research into understanding the processes that maintain and impact on diversity over space and time with particular focus on**:

- Seed/germplasm systems (exchange/storage) under normal and crisis conditions;

- Farming systems and cultural management practices that maintain and promote animal and plant diversity;

- The influence, both positive and negative, of policy on the promotion and destruction of agricultural biodiversity (including legal issues, trade and access);

- Geneflow between natural and agricultural production systems.

(iv) **Identify diversity, and practices that use diversity, that can be used to improve ecosystem/agroecosystem sustainability, maximize production and maintain ecosystem services** (e.g. disaster relief/avoidance or risk, nutritional needs and human health, animal health? Microbial?, decrease the need for herbicide and pesticide use? Increasing the adaptation to stress environments, soil formation processes, nitrogen fixation, pollination, reduce ground water loss, reduce the need for non-renewable inputs into marginal environments).

(v) Creating/Strengthening frameworks, institutional management, equity issues for sustainable management

- Scale of management – linking farmers to national institutes – those in between (middle level institutes/universities) – institutes that mediate between farmers and the national system – where is agricultural biodiversity best managed?

- Capacity building in terms of linking institutions and disciplines, equity issues and training. Capacity to create a framework to implement and manage agricultural biodiversity;

- Networks – between countries/regions/species;

- Information management and access – procedures for brining together and accessing relevant information held by different partners;

- Benefit sharing.

(vi) Sustainability of diversity maintenance – linking methods to maintain diversity

- When diversity *in-situ* is not sustainable? – Linking *in-situ* with *ex-situ* conservation.

(vii) **Adaptive management practices and technologies**: More understanding is required of the multiple functions of biodiversity in production systems (i.e. the relationship between diversity, resilience and production in agro-ecosystems). Targeted research initiatives in this area should seek to identify management options that promote the positive and mitigate the negative impacts of agriculture on biodiversity, enhance productivity and the capacity to sustain livelihoods.

(viii) **Assessment of the status and trends of agricultural biodiversity**: Despite the availability of much information on agricultural biodiversity, particularly about resources that provide the basis for agriculture, land cover and use, climate and agro-ecological zones, there is need for an integrated assessment of agricultural biodiversity on the whole.

In such an assessment particular emphasis should be placed on country-level assessment and on issues such as ecosystem services provided by agricultural biodiversity, social and economic aspects related to agricultural biodiversity and microbial genetic resources.

Annex I

STAP Brainstorming on Agrobiodiversity:
Considerations for the Global Environment Facility
21-22 February 2000
Bridgetown, Barbados

Draft Programme

DAY 1: Monday, 21 February, 2000

10.00 a.m. – 10.10 a.m. Welcome and Introductory Remarks: Prof. M. Gadgil

10.10 a.m. – 10.30 a.m.	Aims and Objectives of the Brainstorming Session: Dr. C. Padoch
10.30 a.m. – 11.15 a.m.	Agrobiodiversity within the GEF Context: Towards the Development of An Operational Programme: The GEF Secretariat and the Implementing Agencies
11.15 a.m. – 1.00 p.m.	Panel: Approaches to the Conservation and Sustainable Use of Biological Diversity Important to Agriculture.
	Discussion
1.00 p.m. – 2.30 p.m.	Lunch
2.30 p.m. – 4.00 p.m.	STAP Selective Review *"Ethiopia: A Dynamic Farmer-Based Approach to the Conservation of African Plant Genetic Resources"*: Implications for the GEF Operational Programme in Agrobiodiversity: Prof. M. Gadgil, STAP Chair and Dr. C. Padoch, STAP Vice Chair.
4.00 p.m. – 6.00 p.m.	Panel: Experiences from The Field.

DAY 2: Tuesday, 22 February, 2000

9.00 a.m. – 10.00 a.m.	Overview of the Draft Operational Programme – GEF Secretariat
	Discussion
10.00 a.m. – 3.00 p.m.	Working Group Sessions: Working Group 1: Key Scientific and Technical Elements which should form the basis of the Operational Programme. Working Group 2: Targeted Research Priorities in Agrobiodiversity.
3.30 p.m. – 4.00 p.m.	Coffee Break

4.00 p.m. – 6.00 p.m.	Presentation of Working Group Reports
	Discussion and Final Conclusion

Annex II

STAP Brainstorming on
Agrobiodiversity: Considerations for the
Global Environment Facility
21-22 February 2000, Barbados

List of Participants

Invited Experts

1. Prof. Stephen Brush
   Human and Community Dev.
   University of California
   One Shields Ave.
   Davis, CA 95616,
   U.S.A.
   Tel: (1 530) 752 4368
   Fax: (1 530) 752 5660
   Email: sbbrush@ucdavis.edu

2. Dr. Enrique Mayer
   Department of Anthropology
   Yale University
   51 Hillhouse Avenue
   New Haven, CT 06511
   U.S.A.
   Tel: 1 203 432 3674/432 3700
   Fax: 1 203 432 3669
   Email: enrique.mayer@yale.edu

3. Prof. Edwin Gyasi
   Head,
   West African PLEC Group
   Ghana
   Tel/fax: 233 21 773899
   Email: plec@ug.edu.gh

4. Dr. Mauricio Bellon
   Natural Resources
   International Maize and Wheat
   Improvement Center (CIMMYT)
   Mexico
   Tel: 52 804 2004 ext 2120
   Fax: 52 804 7558/59
   Email: mbellon@cimmyt.org
   m.bellon@cgiar.org

5. Prof. Leonard W. O'Garro
   Co-ordinator
   Microbial Pathogenicity Res.Group
   Dept. of Biological & Chemical Sciences
   University of the West Indies
   Cave Hill Campus,
   Barbdos, West Indies
   Tel: (246) 417 4334/5/6/8
   Fax: (246) 417 4597/425 1327
   Email: logarro@uwichill.edu.bb

6. Dr. P. Balakrishna
   Regional Biodiversity Programme
   IUCN – The World Conservation Unit
   48, Vajira Road, Colombo 5
   Sri Lanka
   Tel: 94 1 584 402; 94 74 510 517
   94 1 501 642
   Fax: 94 1 580 202
   Email: pbala@sltnet.lk

CBD/SUBSTTA

7. Dr. David Cooper
   Programme Officer
   Agricultural Biodiversity
   Secretariat of the CBD
   Montreal,
   Canada
   Fax: 1 514 288 6588

Institutional Experts

8. The Director
Caribbean Agricultural Research
And Development Institute (CARDI)
C/o University of the West Indies
Cave Hill Campus,
Barbados
Tel: (246) 425 1334
Fax: (246) 417 4597/425 1327

9. Dr. Devra Jarvis
Senior Scientist, IPGRI
Via delle Sette Chiese 142,
00145 Rome,
ITALY
Tel: (39) 0651892
Fax: (39) 065750309
Email: ipgri@cgiar.org

Food and Agricultural Organization

10. Dr. Linda Collette
Sr. Officer
Environment & Natural Resources
Services, Sustainable Dev. Dept.
Food and Agricultural Organization
Room F-805,
Viale delle Terme di Caracalla,
I-00100 Rome,
Italy
Tel: 39 06-570-52188
Fax: 39-06-570-53369
Email: Linda.Collette@fao.org

11. Mr. Random Dubois
Food and Agriculture Organization
Viale delle Terme di Caracalla,
I-00100 Rome
Italy
Tel: 39 065 7052188
Fax: 39-06-570-53369
Email: Random.Dubois@fao

World Bank

12. Dr. Kathy MacKinnon
Biodiversity Specialist
The World Bank
1818 H Street, NW
Washington, DC 20433
U.S.A.
Tel: 1 202 458 4682
Fax: 1 202 5223256
Email: Kmackinnon@worldbank.org

GEF Secretariat

13. Dr. Walter Lusigi
Program Manager
Land Resources Management
GEF Secretariat, 1818 H Street, NW
Washington, DC 20433,
U.S.A.
Tel: 1 202 458 2715
Fax: 1 202 522 3240
Email: wlusigi@worldbank.org

14. Dr. Colin Rees
Team Leader
Biodiversity & International Waters
GEF Secretariat, 1818 H Street, NW
Washington, DC 20433,
U.S.A.
Tel: 1 202 473 1077
Fax: 1 202 522 3240
Email: crees@worldbank.org

STAP

15. Dr. Madhav Gadgil
Chair of STAP
Professor, Centre of Ecological Sciences
Indian Institute of Science
Bangalore 560012
India
Tel: 91 80 331 5453
Fax: 91 80 334 1683/5453
Email: madhav@ces.iisc.ernet.in

16. Dr. Christine Padoch
Vice-Chair of STAP
Senior Curator
Institute of Economic Botany
The New York Botanical Garden

Bronx, New York, 10458-5126
U.S.A.
Tel: (1 718) 817 8975
Fax: (1 718) 220 1029
Email: cpadoch@aol.com

17. Prof. Paola Rossi Pisa
Full Professor
Agricultural Faculty of the University of Bologna
Department of Agronomy, via Filippo Re, 6 40126 Bologna, Italy
Tel: 39 051 209 1510
Direct Tel: 39 051 209 1526
Email: ppisa@pop.agrsci.unibo.it

18. Prof. Jose Sarukan
Instituto de Ecologia
UNAM, Cd. Universitaria
Mexico 04510 D.F.
Mexico
Tel: 525 5507470/622 9009/622 9014
Fax: 525 622 9018
Email: sarukhan@servidor.unam.mx

19. Dr. Mark Griffith
STAP Secretary/STAP Secretariat
GEF Coordination Office
United Nations Environment Programme
P O Box 30552
Nairobi
Tel: 254 2 623424/624164
Fax: 254 2 623140
Email: Mark.Griffith@unep.org

20. Ms. Anne-Marie Verbeken
Programme Officer
STAP Secretariat
GEF Coordination Office
United Nations Environment Office
P O Box 30552
Nairobi, Kenya
Tel: 254 2 623250/623429
Fax: 254 2 623140
Email: Anne-Marie.Verbeken@unep.org