



Report of the
Sixth External Review
of the Bioversity International

December 2009



Report of the
Sixth External Review
of the Bioversity International

Review Panel: Richard Flavell (Chair)
Tania Ammour
Richard Hannan
Jean-Yves Maillat
José Sarukhán Kermez
Carolina Berti (Consultant)

December 2009

The SC of the CGIAR encourages fair use of this material provided proper citation is made.

Correct citation: CGIAR Science Council (2009) *Report of the Sixth External Program and Management Review of the Bioversity International*. Rome, Italy: SC Secretariat.

THIS DOCUMENT CONTAINS:

- Endorsement by the Executive Council in 2009 of the Bioversity EPMR Recommendations.
- Science Council Commentary
- CGIAR Secretariat Commentary
- Transmittal Letter and Bioversity Response to the Sixth EPMR
- Transmittal letter and Report of the Panel on the Sixth Bioversity EPMR



Consultative Group on International Agricultural Research (CGIAR)

CGIAR Seventeenth Meeting of the Executive Council (ExCo17)¹

The 6th Bioversity EPMR report recommendations, Center Response and SC/CGIAR Secretariat Commentaries were discussed and approved by ExCo on November 3, 2009.

¹ The 17th Session of the Executive Committee (ExCo17) Meeting, was held in Rome, Italy on 3 - 4 November 2009

Science Council Commentary
Sixth External Program and Management Review (EPMR) of
Bioversity International

The Report of the 6th EPMR of Bioversity was discussed at the 12th Meeting of the Science Council (SC), held at CIFOR Headquarters in Bogor, Indonesia. Dr. Richard Flavel, Chair of the external review team presented the main findings and recommendations of the Report. The Director General of Bioversity, Emile Frison, responded on behalf of the Center. The SC thanks the Panel for its perceptive and compelling assessment of the Center and, in particular, for the forward looking perspective. This review is timely both for Bioversity as it comes four years into the expansion of the Center's mission and for the CGIAR as it comes at the beginning of a major restructuring exercise within the CGIAR and the creation of a Consortium with Megaprograms. In addition to the ten strategic recommendations, the panel has provided a number of critical observations and useful suggestions for the Center throughout the report. The Center has responded positively to the review report's findings and ten recommendations. *The SC endorses the report and its recommendations and encourages the Center to consider the analysis of the report in detail for additional evaluation and context for the recommendations.*

In summarizing the key developments since the last review the report indicates that, while retaining its mandate for advancing the conservation and use of genetic diversity, Bioversity has broadened its mission and its research profile, implemented major organizational and structural changes, and attracted more resources. In terms of achievements, the Center has generated a significant output of science, publications of various kinds, influenced the agendas of many organizations, trained many people, contributed to the development of effective global and regional collaboration on conservation and use of genetic resources and contributed to the overall goals of the CGIAR. The SC joins the panel in commending the Center for these major accomplishments.

At the same time, the report encourages the Center to plan and prioritize its activities, projects and partnerships more carefully to enhance its prospects for greater impacts, especially given the huge challenges facing the Center and the CGIAR. The panel has examined carefully a number of issues that are linked to the report's ten recommendations. These include maximizing the Center's comparative advantage, clarifying the underlying basis for choosing projects, strengthening cohesion between the various projects, enhancing communication -- both internally and externally, developing a publications policy, revisiting the organizational structure, deepening its investment in genetic resources informatics, addressing quality of partnership issues, and sharpening its focus vis-à-vis agro-biodiversity issues. Unfortunately the summary sections do not fully capture these issues, but a more comprehensive and critical treatment of them is found in the body of the report.

The Panel endorses Bioversity's decision to broaden its research agenda. Expansion from the previous crop genetic resources focus to the broader field of biodiversity in production systems responds to a challenge given at the last EPMR to explore new areas of research. Bioversity is proposing to address the research challenge of better understanding the role of biodiversity in enhancing sustainability and resilience at the level of genes and crops through to landscapes. This builds on the Center's earlier on-farm conservation of germplasm work. Bioversity and others have argued that maintaining biodiversity is a strategy to ensure stability, enhance livelihoods and improve nutrition. According to the Center, its comparative advantage is in

convening partnerships covering genetic resource, social/economic, and ethno-botanical/agronomic expertise to enhance this broad understanding of biodiversity management. The panel endorses this new area of research but encourages the Center to build on its existing work with carefully selected and well designed experiments to provide the tools and methods to explore the value of biodiversity.

The Science Council would caution that this is a very large area of research and that the broader roles of biodiversity may play out in quite different ways in different geographic and ecological regions. Favouring high levels of biodiversity is ideologically appealing to many interest groups but the empirical evidence to support its supposed benefits is weak. Enhancing the biodiversity of farming systems may incur costs and these will have to be assessed in relation to other tried and tested ways of achieving sustainability and resilience. There seems to be an implicit assumption in Bioversity's MTP that intensive high input agriculture is risk prone – lacking in resilience. However most of these agricultural systems involve measures such as improved water management, use of pesticides, insurance, price controls and buffer stock schemes which serve to enhance resilience. The role of biodiversity in relation to other options for achieving resilience is an important researchable issue that will require sustained resourcing and new partnerships. Agricultural biodiversity encompasses at least three levels of diversity: intra-species diversity, inter-specie diversity and system/landscape level diversity. Assessing the instrumental value of agricultural biodiversity will therefore be a very complex task, even for a single agro-ecosystem. Concepts like system resilience, for example, depend on numerous factors nested within each of the three levels of diversity. It is essential, therefore, to define from the outset a reasonable scope of enquiry and a clearer set of output targets over the medium term, e.g., in terms of understanding how agricultural biodiversity affects system resilience, appropriately contextualized. Choices will need to be made. For example, will the Center be examining the entire range of biotic and abiotic factors affecting the system's resilience, or only a selected few? The SC would encourage the Center to maintain a tight focus within this broad research agenda. Serious consideration should also be given to the choice of agro-ecosystems where it will focus its efforts, keeping in mind the need to generate information and knowledge of wide applicability.

Recommendation 3 urges the Center to undertake empirical research to examine the nutritional, health and income benefits derived from high levels of biodiversity and also examine the trade-offs with agricultural systems of lower diversity and higher inputs. The panel believes this will be of considerable value to the CGIAR in establishing optimum strategies for food production, improving the wellbeing of the poor in selected environments and optimizing the sustainable use of land. The SC agrees that there is good rationale for Bioversity to examine agro-biodiversity from this perspective provided its efforts are underpinned by carefully designed and sequenced empirical analysis and hypothesis testing. To address this complex issue in an effective way requires a sustained, long-term research effort. Much of the funding under Focus Area 1 appears to be from special projects, the panel considers that significant intensification of effort in this area will require new and sustained sources of funding.

In order for Bioversity to lead the debate about “where, when and how biodiversity does or could enhance human nutrition, well-being and environmental resilience” it will have to focus its efforts and plan its overall strategy with partners carefully, taking into consideration the many other global efforts underway with their associated expertise and competencies. As the panel rightly observes, the Center will not be able to do much alone and will have to exploit its proven role as a convenor and catalyst for the partnerships needed to work on these topics. In this light, recommendation 3 seems appropriate for the CGIAR system as a whole, and would require

Bioversity to engage many other Centers and outside suppliers of research on biodiversity in its implementation. The SC finds recommendation 3 compelling and strongly endorses it as this addresses the interface of agricultural biodiversity with the main agri-food systems to feed the poor. This is central to the CGIAR mission as it is directly relevant to the main global food systems which by their very success have reduced biodiversity at the farm level. The CGIAR must understand the loss associated with that reduced biodiversity and it must explore how to improve system resilience while maintaining the optimum “economic yield” of those systems. Thus, it is important for Bioversity to clearly define the scope of their planned research on agricultural biodiversity—presently targeted for poorer rainfed environments—in such a way that would allow for priority and choices to be made amongst the many hypotheses that could be tested.

The panel provides two recommendations (1 and 2) of a general nature to address the systemic concern for greater cohesion, synergy and focus within and across the research programs. This emerged from a sense that the panel sometimes found it difficult to know what the Center had produced, the outcomes it had helped achieve, and the impacts realized. These are strategic recommendations and speak to the need for setting well defined priorities and communicating this clearly to the Center’s own researchers and partners and clients. Indeed, the panel considered this the most important strategic message of the review: picking the right topics for research and communicating as broadly as possible the findings and knowledge, as it concluded: “Much more can and needs to be achieved” (p. 113). In this context, the SC would encourage the Center to re-assess its overall planning and priority setting processes. As suggested in various parts of the report, this would include giving more attention to choosing appropriate output targets and specifying critically important outcomes and impact pathways, choosing the best partners, improving learning and feedback mechanisms both within and outside the Center, and identifying specific areas where it hopes to build and maintain global expertise and credibility. This may mean defining fewer priority areas and establishing more focus and depth.

The panel concludes that Bioversity is a world authority in the conservation of crop germplasm, in developing capacity for germplasm conservation at the local level, and in making germplasm and the knowledge of it widely available as the building blocks for basic food supplies. The SC agrees with the panel that this work is central to the CGIAR’s goal of achieving food security for the poor and must continue. The new bioinformatics tools linking phenotype to genes opens up new avenues for Bioversity to further enhance the utility of this mainstream activity in bioinformatics. The SC concurs with recommendation 4 urging the Center to invest more in bioinformatics tools in order to fully capture and exploit the benefit from the *ex-situ* collections and the knowledge associated with them. These are essential services for the CGIAR that, in the SC view, must be of the highest priority in the new CGIAR research agenda. This effort is critical in helping push up crop yield barriers that have limited productivity gains over the last few years. It would also help to address the need for more resilience in the face of the expected adverse effects from climate change. The panel’s analysis and commentary is valid not just for Bioversity but for all of the CGIAR members – leaders, investors, and research partners.

The panel cautions the Center on its recent move to de-emphasize its conventional germplasm conservation work at the national and regional levels. One of the arguments for deciding to withdraw gradually from managing the regional networks was to allow the Center to put more of its resources into research instead of coordination. While the panel believes this may be a reasonable trade-off, it is not clear from the report the extent to which this has been achieved. The SC urges the Center to examine the trade-offs here carefully. The SC also underscores another

concern raised by the panel—that Bioversity should not overestimate the capacity of regional networks and national programs in the implementation of research projects.

The Center’s work on collection, storage and use of wild crop relatives (WCR) is undertaken in Focus Area 4 together with the work on conservation and use of forest diversity. The panel notes that there seems to be little synergy between these two topics within the same program. Forests and WCR are placed together by Bioversity because both have been approached from the context of *in situ* conservation. The panel’s concern at the lack of cohesion and complementarity between the two areas has led to recommendation 5. There appears to be more complementarity between WCR in Focus Area 4 and enhancing the *ex situ* conservation and use of neglected and underutilized species in Focus Area 3, hence recommendation 6. While both these recommendations appear to be rather general, careful reading of the report reveals more nuanced concerns and suggestions. The importance of WCR to modern plant breeding is evident, as they continue to constitute an important source of resistance to biotic and abiotic stresses. The SC believes that the collection, conservation and use of WCR needs to be given greater attention and resources and urges Bioversity to take on this challenge fully.

The panel made a careful analysis of the scientific quality of staff and relevance of the research programs. It has highlighted the unevenness in the quality of science among the different research focus areas and amongst staff. The SC joins the panel in congratulating Bioversity for the high international recognition/esteem (invitations at international meetings, participation on editorial boards, supervising MS and PhD candidates, etc) in which some of its staff are held. The SC notes that the statistics on publications in peer-reviewed publications are greatly influenced by the “honorary research fellows” program. This is a commendable program but hides a lower level of achievement in producing peer reviewed publications by many other staff. The SC supports the panel’s recommendation to introduce a publications policy to address the three important objectives of publishing as articulated nicely by the panel in recommendation 7.

The different roles of Bioversity have been described and the unique partnership *modus operandi* commented on extensively in Chapter 3 of the report. The panel found that Bioversity carries out much of its research with partners around the world and is usually the initiator / leader / coordinator of the projects. The panel sees Bioversity as a “catalyst to many other scientists, agencies and NGOs” and, based on its many interviews and discussions, concludes that the Center is generally regarded very positively by its partners, which is commendable.

The many advantages of operating almost exclusively through partnerships are described (picking the best experts for the particular challenge, leveraging financial and in-kind resources, increasing the probability of achieving outcomes), but a particular disadvantage appears to be the higher risks associated with the inevitable loss of quality control of the projects. The Center recognizes these risks. While the relative merits and disadvantages of operating mainly through partnership mode are discussed in the report, the panel was not able to analyse the efficacy of the partnership model adequately, which is unfortunate as partnerships will constitute a major element within the operations of the new CGIAR. Partly, this is because the panel found it difficult to separate the performance of the Center staff from those of the partners with respect to scientific outputs. Also, Bioversity has not kept records on the level of contributions leveraged through partners, nor done formal assessments of the quality of the partners that would enable a quantitative analysis of the partnerships. This is something the CGIAR will want to consider as it engages with partners in the future, i.e., developing means to evaluate partnerships to guide future interactions. Bioversity certainly has a rich set of case studies of effective (and some less

effective) partnerships on which to draw and that merit closer analysis and, when relevant, replication.

Unfortunately, the issue of appropriate balance and relative effort (with possible tradeoffs) between Bioversity's research and other functions (catalyst, convenor, advocate, etc.) is not evaluated or addressed by the panel *per se*. This needs a dedicated analysis, perhaps as part of a Center-commissioned external review (CCER). The Center might also consider a CCER to look at the success and limitations of the current partnership model.

Bioversity's role in and contribution to various global processes (ITPGRFA, CBD, WIPO, CGRFA, GCDT, etc.) and hosted initiatives (SGRP, CAS-IP) are given considerable emphasis in the report. The SC commends Bioversity's work in these areas which is clearly highly effective and valued by the clients and peers, and hence appears to be an area of comparative advantage. It is important to note that much of Bioversity's involvement in these initiatives is demand-led, e.g., requests derived from intergovernmental bodies and various conventions.

An area given insufficient attention in the report is Bioversity's interaction and collaboration with its sister CGIAR centers. The work of IITA on *Musa* is only mentioned briefly at the very end of the report and some of the molecular work in relation to *ex situ* research no doubt involved the Generation CP to a significant extent, yet this is not mentioned. Some of the core collection work and recent mini-core collection work surely involves efforts at the other Centers. It was unclear from the report the extent of collaboration involved and how effective the collaborations are.

The SC had hoped the review would have included a more detailed analysis of the role and value of ILAC, a cross-Center program based at Bioversity, both from the Center and the System point of view. As a number of recommendations relate to the Center's need for more focus, better cohesion within and across projects, and better communication internally and externally, ILAC may want to re-assess its strategy and activities within the Center.

Recommendation 8 relates to the need for re-examining the organizational structure of the Center and strengthening the role of the Regional Directors. While the panel stopped short of recommending a DDG for research, the SC is pleased to note that the Center will consider this option as it considers how best to optimize the structure within the organization, including strengthening the roles of Regional Directors. While the report seems to indicate a trend towards increased centralization at HQ, away from the regions, the DG clarified during the SC meeting discussions that the figures in Table 7.1 are more an artefact than a deliberate effort to increase scientific capacity at HQs, relative to the regions.

CGIAR Secretariat Comments on the 6th EPMR of Bioversity

The CGIAR Secretariat recognizes the importance of this 6th EPMR of Bioversity which mandate is at the core of the CGIAR mission to sustainably increase food production and reduce poverty.

The Panel carried out a thorough review of the Center's work and its achievements and delivered a professional and independent report that provided valuable forward-looking recommendations and suggestions for a stronger Bioversity.

The CGIAR Secretariat is pleased to note that the transformation from IPGRI to Bioversity International has not impacted negatively the institutional and financial health of the center and that the Panel didn't find "any significant deficiencies in Bioversity resource management – financial or human".

We also want to recognize the substantial involvement and the performance of the DG of Bioversity in the CGIAR Change Management Initiative as Chair of the Alliance Executive during the last two years covered by the EPMR and the support he received from the Board and Senior Management Team (SMT) in this endeavor which was critical in ensuring that Center's operation was not adversely affected.

Governance and Management

We congratulate the Center leadership (Board and management) for a number of improvements in governance and management since the last review of IPGRI and we are particularly pleased with the Panel's judgment that the Board has operated efficiently and effectively. We noted that this was achieved in a number of ways starting with reorganizing the Board into a smaller governing body.

The high level of engagement of Board members which has been facilitated by the higher frequency of meetings (face-to-face and virtual) has contributed much to a more effective Board's oversight of the Center's operation, particularly in fulfilling its fiduciary obligations. However, the Panel pointed out that there is room for improvement in the Board's programmatic oversight.

The following are comments on specific recommendations that relate to management aspects:

- **Recommendation # 8:** The CG Secretariat is pleased that the Center has accepted this recommendation on improving Bioversity organizational structure and indicated that it will further assess the advantages and disadvantages of its current organizational matrix to ensure more effective interactions between Programs Directors and Regional Directors in the planning of its research portfolio. A greater use of Regional Directors inputs into the work of the Priority and Strategies Task Group would help in ensuring greater understanding and buy-in of NARS, other stakeholders and beneficiaries in their respective regions. We also recognize the Center's acceptance of the suggestion by the panel of the designation of a DDG Research "to promote greater cohesiveness, synergies and learning within and between Focus Areas, projects and geographical regions.....".
- **Recommendation #7:** Using the data available through the PMS, the panel viewed Bioversity scientists' performance in publications as relatively low. While recognizing the point made by the Center in its response that some of Bioversity work may have not been captured under the PMS (e.g. inputs in the preparation of international and national laws; or manuals and guidelines), the CG Secretariat fully supports the implementation of recommendation #7 which would ensure that

Bioversity remains highly visible in peer-reviewed publications recognized by the international scientific community as valuable references in today's competitive research environment.

Financial Management

- There is no specific recommendation on financial management. Financial performance indicators (short-term solvency/liquidity; indirect cost ratio; indirect cost recovery/overhead recovery), are sound and Bioversity has been in good financial health during the period in review. Findings of external and internal audits have been always satisfactory and found the center in full compliance with CGIAR guidelines and procedures.
- The Panel noted “the positive evolution of unrestricted funding during the review period in contrast to the decline, in absolute and relative terms across CGIAR centers during the period of the previous EPMP”. With the positive impact of two major donors’ decision to increase substantially their unrestricted funding to the Center, Bioversity share of funding in this category reached 45% making it today “the CGIAR center with the highest level and percentage of unrestricted funding”. However the Panel cautions about ample year-to year variations and that adjusted to inflation unrestricted funding has remained almost constant over the past 12 years. The CGIAR Secretariat supports this analysis and wants to encourage Bioversity to continue to work towards bringing greater stability to its funding in the context of the new CGIAR.

Partnerships

- Regarding Bioversity’s move towards a more global strategy, the Panel echoed “some concern that national programs and regional networks may not be receiving strong support as in the past, especially in terms of training and capacity building. The report cautions the center that it “should not overestimate the capacity of regional networks and national programs in the implementation of research projects”. The CG Secretariat recognizes that Bioversity cannot re-engage in supporting all the networks it helped to create and has to adopt a balanced but selective approach to that issue trying to ensure that hard choices do not translate in shortcomings for impact delivery.
- Bioversity has helped in developing and establishing the Global Crop Diversity Trust (GCDDT) and its Director General is currently representing the CGIAR in the GCDDT Board. In the course of the development of the various components of the CGIAR reform program, GCDDT expressed some concern about ideas on the funding arrangement for the conservation and utilization of genetic resources held in trust in the CGIAR center genebanks. We would like to suggest that Bioversity reinforce the dialogue on this issue with GCDDT to ensure complementarity between the Trust and the new CGIAR in funding genetic resource conservation and utilization activities/programs of member centers of the Consortium.

Bioversity under the New CGIAR

- The Bioversity EPMP differs from the other recently conducted EPMP in that the review not only took cognizant of the on-going change process in the CGIAR but also took time to consider the potential implications on the Center and develop a couple of recommendations (recommendations 10 and 4) on what actions it might/should consider. The recommendations focused more on aspects of its mandate, its strengths and competencies, that in the panel’s view should be maintained; and where future investments relating to germplasm conservation and use should be made under the new CGIAR. The panel also suggested that Bioversity “should help

lead and develop the conceptual framework for addressing short- and long-term needs of the planet based on biodiversity” in the context of the strategy that is currently being developed and will be implemented by the Consortium of CGIAR Centers. We are pleased to know from the Center’s response that steps have been taken by Bioversity to work with other Centers through SGRP to develop a “coherent strategy on agrobiodiversity conservation and use”. It would be interesting to know if the strategy considers the development of a mega-program on genetic resources conservation and use, e.g. one that could evolve from SGRP as suggested by the panel.

- In the Panel’s view, the new Grants Office has performed well in managing a large number of grants”,benefitting from successful investment in resource mobilization by the Assistant DG under which it operates. Notwithstanding the success of this current resource mobilization strategy, the CG Secretariat would like to draw the Center’s attention to an implication of the CGIAR Reform in this domain. In the future, Bioversity, like all other CGIAR centers will have to ensure that resource mobilization strategies are coordinated with the responsibilities of the new Consortium of the centers, and are consistent with the overall CGIAR Strategy and Results Framework.



Office of the Director General
Tel: +39 06 6118202 Fax: +39 06 6118405

*Improving lives
through
biodiversity
research*

30 July 2009

Dr Rudy Rabbinge
Chair, CGIAR Science Council
c/o FAO, Room C6-2
00153 Rome
Italy

Dr Ren Wang
CGIAR Director
The World Bank
1818 H. Street, N.W.
Washington, DC 20433
United States of America

Dear Rudy and Ren,

Please find attached the response of the Board and Management of Bioversity International to the centre's 6th External Programme and Management Review.

We would like to thank the Panel for producing a thorough and forward looking review. We appreciate the rich advice included not only in the recommendations, but also in the many suggestions throughout the report.

At a time when the CGIAR is redesigning itself, we welcome the Panel's recognition of the extreme importance of biodiversity to the sustainability of the planet. We are also strongly encouraged by the Panel's recognition of both the quality of our research and the value of our partnership-based *modus operandi*.

Bioversity stands ready to play a strong role in a revitalized CGIAR and to work with partners to mobilize agricultural biodiversity to deliver income, food and nutrition security to the poor of this world.

With our best regards,

Tony Gregson
Chair, Board of Trustees

Emile Frison
Director General

Bioversity International is the operating name of the International Plant Genetic Resources Institute (IPGRI).
Headquarters: Via dei Tre Denari, 472/a, 00057 Maccarese, Rome, Italy
Tel.: (39) 0661181 Fax: (39) 0661979661 Email: bioversity@cgiar.org www.bioversityinternational.org

Bioversity Response to the Sixth External Programme and Management Review

Introduction

Bioversity International greatly appreciates the highly constructive manner in which the EPMR Panel carried out its critical review of our organization and the thoroughness of its findings.

Most encouragingly, we have taken note of the EPMR panel's strong endorsement of the quality of our research and the fundamental value of our work to the poor and to the planet as a whole.

Bioversity welcomes the recommendations. Moreover, the highly pertinent and independent character of the recommendations further strengthens our resolve to accelerate the implementation of current and new initiatives, as indicated in our various responses below.

The unambiguous validation by the Panel of our *modus operandi*, our enlarged global mission, and our sound governance over the last few years are equally encouraging.

The Panel's conclusions that "the skills, experience and outputs of Bioversity are extremely relevant to the mission of the CGIAR" and that "the role of Bioversity in the new CGIAR vision needs to be articulated and championed" are very important and will undoubtedly be a source of even greater motivation to all of Bioversity's staff and partners worldwide.

Response to the EPMR Recommendations

1. The Panel recommends that the Center ensure as far as possible that it chooses its research activities to maximize the probability of generating relevant outcomes and impacts and to gain maximum synergy within the Center.

Accepted

This is a key recommendation and is central to Bioversity's effectiveness. The strategic move towards implementing a smaller number of larger projects with well-defined impact pathways, which started in 2006, will be further pursued. We will retain "likelihood of generating successful outcomes and impacts" as one criterion for the selection of projects, and add another on "maximizing synergies". Greater attention will be given to the role of the Priorities and Strategies Committee (PSC) in contributing to addressing this Recommendation.

Looking ahead, Bioversity anticipates that the formulation and implementation of impact-oriented megaprogrammes, as foreseen in the CGIAR change process, will also contribute to generating more relevant outcomes and greater impact.

2. The Panel recommends that the Center promotes greater cohesiveness, synergies and learning within and among Focus Areas, projects and geographical regions, so as to use its resources more efficiently and enhance the value of its investment.

Accepted

A major function of the PSC, which meets three times a year, is to ensure cohesion and synergies among the different components of Bioversity's research agenda. In addition the monthly Programme Directors' meetings are designed to ensure coordination between Programmes. Nevertheless, Bioversity recognizes that yet more can be done, for example in further strengthening the role of the PSC in aligning the programmes and fostering interdisciplinary research across the organization.

Bioversity has already started to improve internal communications (see response to Recommendation 9). In addition Bioversity will also review the roles and responsibilities of its Senior Management Team, including re-evaluating the need for a mechanism (e.g. a DDG for Research) to provide greater cohesiveness within Bioversity's research agenda.

3. The Panel recommends that research and analysis be undertaken to examine the nutritional, health and income effects on poor farmers derived from agricultural production systems based on high biodiversity, and to evaluate the tradeoffs with agricultural systems of higher external inputs and lower biological diversity.

Accepted

Bioversity particularly appreciates this recommendation. We intend to demonstrate even more clearly that appropriate management and use of agricultural biodiversity is an important and often neglected component of solutions to many of the planet's most pressing challenges. We will collect and test the evidence for this role of agricultural biodiversity to contribute to food and nutritional security, for adaptation to climate change, and for the design of sustainable agricultural systems. Bioversity is already undertaking research to measure the impact of high diversity systems on the nutrition, health and incomes of poor people, especially, but not only, in marginal areas where poverty prevails. We are keen to greatly expand this work and to evaluate the tradeoffs as compared to higher external inputs and lower biological diversity systems in similar landscapes.

4. The Panel recommends that as bioinformatics needs and opportunities expand further, the Center step up its investment to ensure that the global community gains maximum benefit from the *ex situ* collections and the knowledge associated with them.

Accepted

Bioversity recognizes that the needs and opportunities of bioinformatics are likely to continue to grow rapidly and that Bioversity and, thus the CGIAR, has a clear comparative advantage in providing leadership to facilitate access to the full range of relevant information associated with *ex situ* collections for the benefit of the global community. We recognize that tremendous power will emerge from integrating diverse genomes and diverse sources of information; however, enabling and facilitating access to information and materials will require considerable additional investment. Bioversity welcomes the opportunity to embrace this far-reaching recommendation and will aggressively seek funding and partners.

5. The Panel recommends that the work in Forests and Wild Crop Relatives is re-formulated and managed under a project coordinator to correct what now appears to comprise an unconnected list of species, localities and approaches.

Accepted

Bioversity recognizes that the lack of a long-term Project Coordinator for its Project on forests and crop wild relatives, has delayed the formulation of a new strategy for this area of work. Efforts have already been made in this regard, and a suitable Project Coordinator is expected to be recruited very shortly. With a

Project Coordinator in post, a coherent strategy for this work will be developed as a priority, in collaboration with relevant Centres of the CGIAR and other partners.

6. The Panel recommends that greater cohesion is established between the studies on wild crop relatives in FA 4 and the neglected and under utilized species in FA3.

Accepted with reservations

Bioversity agrees that it has a special responsibility with regard to neglected and underutilized species and that the characterization and conservation of the wild relatives of these species is of particular importance. Bioversity also recognizes its role in informing international agendas of the importance of these groups of species.

We point out, however, that while there is cohesion within each Focus Area, there are also differences between them. The ex-situ conservation activities in Focus Area 3 encompass all types of diversity, including Crop Wild Relatives of neglected and underutilized species. In Focus Area 4, Crop Wild Relatives and Forest Genetic Resources are managed in-situ in similar ways, that is with conservation in protected areas and sustainable management practices. Nevertheless, in the overall effort to increase the cohesion within Bioversity's agenda, particular attention will be given to opportunities for synergies between these two Focus Areas.

7. The Panel recommends that the Center creates, implements and monitors a publication policy that: (a) encourages evaluated publications to aid career development, (b) meets the needs of targeted clients and (c) embodies assessment of how the scientists and the Center are performing.

Accepted

Bioversity agrees that its record of peer-reviewed publications can be improved. We appreciate the Panel's acknowledgement that many of our most useful publications (such as Manuals and Guidelines) do not receive much recognition in the CGIAR's publications performance indicator, although they are much appreciated by our partners and clients. In addition, some of our work does not result in traditional publications, but rather in international and national laws and policies and informatics tools, which are not captured at all in the publications indicator.

We will develop a policy that includes greater emphasis on peer-reviewed publications in staff performance agreements, and ensuring that staff receive appropriate support and recognition.

8. The Panel recommends the Board and Senior Management further pursue examination of the organizational structure of the Center to ensure optimization of research management, paying particular attention to the responsibilities and roles of the Regional Directors such that they can play a stronger role in the delivery of outputs and outcomes from the programs.

Accepted

Bioversity is pleased to note that the EPMR Panel sees the value of the organizational matrix to enhance synergies and maximize the ability to address problems globally and not just locally.

However, Bioversity recognizes that the current structure is not yet operating as effectively as it could. This was the subject of a management workshop in November 2008 in which the roles and responsibilities of the different managers were discussed and action points agreed upon. Bioversity will further analyze its organizational structure so as to optimize the functioning of the organization to ensure effective interactions

among Programme Directors/Unit Heads and Regional Directors. In particular this will allow Regional Directors to play a more active role in the planning of research and the delivery of the outputs and outcomes of Bioversity's work.

9. The Panel recommends that Bioversity better define, express and evaluate its outputs, outcomes and impacts and communicate effectively internally and externally the value of Bioversity and its partners' work.

Accepted

The EPMP report recognizes the difficulty of measuring outcomes and impacts of Bioversity's work. However since 2008, Bioversity has developed tools for monitoring outcomes and impacts, for capturing and documenting them, for ensuring that they are promoted and that the lessons from them are fed into current activities. The first fruits of these efforts were seen in the 2008 CGIAR Performance Measurement System report, in which Bioversity significantly improved its performance over previous years.

The recently recruited Director for Communications is developing a new Communications Strategy which will ensure that our outcomes and impacts are well documented and leveraged widely with our partners, clients and supporters. Bioversity will also make greater use of its intellectual capital in order to demonstrate the contribution of agricultural biodiversity to important global debates, such as those on food security, climate change and economic development.

10. The Panel recommends the Board and Senior Management do everything possible to ensure a smooth transition into the new CGIAR, and that the precious scientific strengths and competencies of the Center, including *ex situ* collections and conservation competencies, are maintained for sustaining the mission of Bioversity.

Accepted

Bioversity appreciates the EPMP's endorsement of its strengths, competencies and comparative advantage. Bioversity, as leader of the System-wide Genetic Resources Programme (SGRP), has worked with partners to develop a coherent strategy on agrobiodiversity conservation and use for consideration by the new CGIAR. Bioversity will continue to play an active role in the various teams, committees and task forces that are planning the "new CGIAR". A special session at the PSC meeting in June 2009 focused on preparing the organization to sustain its mission in the new CGIAR.



July 22, 2009

Prof. Roelof Rabbinge
Chairman, CGIAR Science Council
University Professor
Wageningen University
Lawickse Allee 11
6701 AN Wageningen
The Netherlands

Mr. Ren Wang
Director, CGIAR
The World Bank
1818 H Street, N.W.
Washington, DC 20433

Dear Drs. Rabbinge and Wang,

On behalf of the Panel, I am pleased to transmit to you the Report of the Sixth External Programme and Management Review (EPMR) of Bioversity International.

The EPMR Panel was very conscious of the role of biodiversity for survival of the planet and the ability to produce, sustainably, enough food, feed, fibre and energy for mankind. The missions of the CGIAR and Bioversity International create major responsibilities here for provision of the knowledge of how these needs can be met before too many decades pass by and too much biodiversity is irretrievably lost. Thus the Panel put a lot of weight on the extent to which Bioversity is organized to maximize the likelihood of stimulating valuable outcomes and impacts, even though these will largely be delivered by others.

The Panel took note of the items of special concern and interest regarding Bioversity International, provided by the Science Council and we hope that you will find our assessments of these within the various chapters of the Report.

The Center has changed considerably from when the last EPMR was carried out. Many developments have occurred, some prompted by external events but many others from internal initiatives. There are many indicators that the Center is being successful, undertaking projects that donors wish to see implemented. Its budget has gone from almost \$28M in 2003 to \$38M (uncorrected for inflation) in 2009. Its unrestricted budget is high relative to other Centers. The Panel found no significant deficiencies in its Resource Management- financial or human. The Panel commends the Center for making many needed improvements in management systems since the last EPMR.

The Panel noted many significant outcomes from the work over the past years including ones of high impact such as: policy development in connection with the International Treaty on Plant Genetic Resources for Food and Agriculture; development of Material Transfer Agreements to enable germplasm covered by Annex 1 crops of the Treaty to be exchanged between countries and hence breeding programs;

ex situ conservation in gene banks; bioinformatics developments to help make information on seed holdings in gene banks readily available; new seed preservation including cryopreservation and regeneration technologies; development of tools for the assessment and management of crop diversity in agricultural production systems; important participation in the creation of the Global Crop Diversity Trust; enhancement of knowledge on banana from gene to marketplace; and, much teaching and training of personnel in the field. The Panel believes that the Center should plan for, monitor and disseminate its outputs, outcomes and impacts in better ways to increase the value of its investment. This should also result in more and larger impacts.

Because Bioversity works mainly through partnerships it was not easy to evaluate separately the roles played by Bioversity International staff and those played by other organizations. Overall it was a demanding assignment because of the complexity of the Center, the width and breadth of its activities and the way it operates. The Report contains the usual formal, high level Recommendations, but there are a large number of suggestions throughout the report that are, in the view of the Panel, exceptionally relevant to making the work of Bioversity and its partners more valuable. We hope the readers will take the time to learn the plethora of these assessments of the Panel.

All concerned with the Center and the Panel members are very conscious of the yet-to-be-decided changes within the CGIAR that could affect Bioversity International and the work it represents. We hope that the Report will be useful to Bioversity International and the CGIAR as they embark on any new strategies and activities in the light of establishing the new CGIAR and its Programs.

The Panel wishes to thank the Board, Management, and Staff of Bioversity International for their complete co-operation throughout this review and the excellent organization and hospitality the Panel enjoyed.

Finally the Panel members join me in expressing our appreciation to the Science Council for the opportunity to participate in the challenging task of conducting the review and to the Science Council and CG Secretariats for their excellent guidance and assistance.

Sincerely,

A handwritten signature in cursive script that reads "Richard Flavell". The signature is written in dark ink and is positioned above a long, thin horizontal line that extends across the width of the signature.

Richard Flavell, FRS, CBE
Chair,
External Review Panel

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL
RESEARCH
SCIENCE COUNCIL AND CGIAR SECRETARIAT

Report of the
Sixth External Program and Management Review (EPMR)
of Bioversity International

Review Panel: Richard Flavell (Chair)
Tania Ammour
Richard Hannan
Jean-Yves Maillat
José Sarukhán Kermez
Carolina Berti (Consultant)

SCIENCE COUNCIL SECRETARIAT
JUNE 2009

CONTENTS

SUMMARY AND RECOMMENDATIONS	1
1 GLOBAL NEEDS FOR UNDERSTANDING, MANAGING AND CONSERVING BIODIVERSITY	5
1.1 Introduction.....	5
1.2 Biodiversity in focus.....	6
1.3 Germplasm conservation and use in the CGIAR	7
1.4 Challenges for the world and CGIAR.....	8
1.5 The review process	10
2 BIOVERSITY INTERNATIONAL: HISTORY, MANDATE, VISION, STRATEGY AND ORGANIZATION	13
2.1 History, mandate, vision and strategy.....	13
2.2 Changes within Bioversity since the last EPMR.....	14
2.3 Financial resources and allocation over Focus Areas	16
2.4 Major external events that have influenced the shape of Bioversity and its strategy	17
2.5 Evaluation of the Mission and Focus Areas by the EPMR.....	18
2.6 Some major strategic issues considered in the EPMR	20
3 MODUS OPERANDI.....	23
3.1 Varying roles of Bioversity	23
3.2 Collaborative partnerships for projects' and initiatives' implementation.....	24
3.3 Regional networks on plant genetic resources	26
3.4 Commodity networks	27
3.5 Overall Assessment of modus operandi	29
4 RESEARCH PROGRAMS	31
4.1 Focus Area 1. Managing agricultural biodiversity for nutrition, improved livelihoods and more sustainable production systems for the poor.....	31
4.2 Focus Area 2. Conserving and promoting the use of diversity in selected commodity crops of special importance to the poor.....	39
4.3 Focus Area 3. Enhancing the ex situ conservation and use of diversity	48
4.4 Focus Area 4. Conservation and sustainable use of forest and other wild species	55
4.5 Focus Area 5. International collaboration on conservation and use of agricultural biodiversity	63
4.6 Focus Area 6. Monitoring the status and trends of useful diversity and valuation of Agro-biodiversity	74
4.7 System-wide programs and hosted initiatives	81
5 RESEARCH MANAGEMENT	85
5.1 Bioversity's asset base	85
5.2 Research leadership and management	90
5.3 Processes for ensuring the relevance and quality of Bioversity's activities	92
6 GOVERNANCE AND MANAGEMENT	97
6.1 Governance.....	97
6.2 Management and administration.....	104

7	RESOURCE MANAGEMENT.....	109
7.1	Human resources management.....	109
7.2	Financial management.....	117
8	OVERALL ASSESSMENT AND RECOMMENDATIONS.....	127
8.1	Introduction.....	127
8.2	Bioversity’s comparative advantage and assessment of attributes and activities.....	127
9	CHALLENGES FOR BIOVERSITY AND THE NEW CGIAR.....	139

FIGURES

1.1	Linkages between aspects of biodiversity.....	6
2.1	The organizational chart of Bioversity management, May 2009	15
2.2	Potential for many projects to be within a Focus Area and their potential to progress alone or with the outputs of others to make impact in the world.....	18
2.3	Evolution of Research to Impacts.....	19
3.1	Elaboration of Bioversity’s partners by type	24
7.1	Objects of Expenditure	123

TABLES

2.1	List of Focus Areas and corresponding F-series Projects and programs.....	16
2.2	Budget by Focus Area (Million US\$)	17
2.3	Share of Budget of each Focus Area	17
3.1	Bioversity Role by Commodity Networks.....	28
4.1	Total Resources for Focus Area 1	33
4.2	Analyses of publication productivity for Focal Area 1	34
4.3	Total Resources for Focus Area 2	43
4.4	Analyses of publication productivity for Focal Area 2	44
4.5	Total Resources for Focus Area 3	50
4.6	Analyses of publication productivity for Focal Area 3	50
4.7	Total Resources for Focus Area 4	57
4.8	Analyses of publication productivity for Focal Area 4	58
4.9	Total Resources for Focus Area 6	78
4.10	Analyses of publication productivity for Focal Area 6	79
4.11	Activities related to ILAC support to Bioversity 2004 and 2009.....	85
5.1	Bioversity Research Staff by Discipline in each Focus Area.....	87
5.2	Research Staff Quality Analysis by Focus Area (source: Staff CVs).....	88
5.3	Proportion of staff publishing in Peer-reviewed journal articles by staff category	88
5.4	Proportion of staff publishing in peer-reviewed journal articles by Focus Area and Unit.....	89
5.5	Peer-reviewed publications productivity by Focus Area, 2003-2008.....	89
5.6	Citation analysis for publications (2003-2008), by Focus Area.....	90
5.7	Publications related PMS Results for CGIAR Centers 2004-2008.....	91
6.1	Members of the Bioversity International Board of Trustees 2003 - 2008	100
7.1	Staff by Duty Station and Organizational Unit.....	112
7.2	Bioversity Staffing 2005 - 2008.....	113
7.3	Bioversity Funding, Expenses and Balance Sheet 2003-2008	120

7.4 Bioversity - Main Financial Indicators 2003 - 2008 122

7.5 Objects of Expenditures by year..... 123

7.6 Expenditures by region 2003 – 2008..... 124

ANNEXES

Bioversity International EPMR Panel CompositionA-1

Terms of Reference for External Program and Management Reviews.....A-5

Itinerary of the EPMR PanelA-8

People Consulted by the Panel A-9

List of Documents Reviewed by the Panel A-13

5th Bioversity International (IPGRI) EPMR Recommendations: Bioversity’s response and
Panel comments.....A-16

AcronymsA-23

SUMMARY AND RECOMMENDATIONS

The Panel sought to conduct a comprehensive review of the management and scientific programs that would complement the Center Commissioned External Reviews (CCERs) that had been carried out during the previous six years, 2003 to 2008. Many questions and issues were on the agenda. These included the significance and appropriateness of the implemented mission changes, the new research agenda that focuses on the role of agro-biodiversity in enhancing human nutrition and well-being and the resilience of the agricultural environment, the organization of the Center, Bioversity's modus operandi of working in networks and with partners to carry out research, the global roles of the Center and its outcomes and impacts.

The Panel undertook the review noting the extreme importance of biodiversity to the sustainability of the planet as we know it, the future of plant breeding and the sustainability of agriculture in times of climate change, coupled with the necessity to provide adequate food, feed, fiber and energy for an increasing population of mankind. The Panel considers the mission of the Center to be consistent with that of the CGIAR.

There are many indicators that the Center is being successful, undertaking projects that donors wish to see implemented and showing accomplishments. Its budget has gone from almost \$28M in 2003 to \$38M (uncorrected for inflation) in 2009. Its unrestricted budget is high relative to other Centers. The panel found no significant deficiencies in its Resource Management- financial or human. Its new grants office has performed well in gaining and managing a large number of grants. The Panel commends the Center for making many needed improvements in management systems since the last EPMR.

The Panel noted many significant outcomes from the work over the past years including ones of high impact such as: policy development in connection with the International Treaty; development of Material Transfer Agreements to enable germplasm covered by Annex 1 crops of the Treaty to be moved between countries and hence breeding programs; *ex situ* conservation in gene banks; bioinformatics developments to help make information on seed holdings in gene banks readily available; new seed preservation including cryopreservation and regeneration technologies; development of tools for the assessment and management of crop diversity in agricultural production systems; stimulation of the birth of the Global Crop Diversity Trust; enhancement of knowledge on banana from gene to marketplace; and, much teaching and training. However, it was hard for the Panel to uncover many of the large number of outcomes – harder than it should have been. The Panel believes that the Center should plan for, monitor and advertise its outputs, outcomes and impacts more extensively to increase the value of its investment. This should also result in more impact.

The new organizational structure of the Center reflects the strengthening of the science base at its headquarters in Maccaresse, just outside Rome, with the consequence that there are fewer internationally recruited staff members in the regions. In this scheme the scientific staff in the regions report to the Program Leaders in Rome and Montpellier while the Regional Directors play a more policy advisory and ambassadorial role, seeking project ideas and ensuring that Bioversity's knowledge is known in the regions. The Panel received many comments from staff about the new structure which suggests that it does not yet operate efficiently enough or that the staff did not understand its merits for achieving the goals of the Center. The Panel is recommending that the Center reassess the effectiveness of the organization in achieving its goals and consider strengthening the role of the Regional Directors. With staff organized into Programs

and projects and distributed across the Regions, there are communication deficiencies. The Panel believes there is merit in reducing such deficiencies to enhance the sharing of knowledge and experience across the Center staff and partners and so increasing the value of the investment.

The Board of Bioversity is functioning well and carries out its fiduciary duties well. It has reduced its size to make cost savings and is currently addressing a gender imbalance. The Board is well-served by Management

of the Center. Their oversight of the science program has improved recently. The Board will need to make some important decisions with the changes taking place in the CGIAR.

The performance of the staff in terms of peer-reviewed publications of all kinds is similar to or below other CGIAR centers, but the Panel views the publications in peer reviewed journals to be too low in today's competitive research environment. The Panel also concluded that the Center needs to define much more precisely what publication outputs are required to serve its various clients and enhance the profile of the Center. It should therefore create, deploy and monitor a comprehensive publication policy. This policy would cover all forms of publications and not only peer-reviewed outputs.

Bioversity carries out much of its research with partners around the world and is usually the initiator/leader/coordinator of the projects. This approach has many advantages such as being able to pick the best experts for the particular challenge. It occasionally results in additional financial and in-kind resources being leveraged by the Center that should be measured more systematically at the project level. It also should increase the probability that the outputs are converted into outcomes since local organizations have been involved in the research. But there are also some disadvantages: it carries higher risks such as the potential loss of quality control of the projects and the way they are carried out. Overall this modus operandi has much to commend it if the projects are properly inspired, designed and managed. All should note, however, that it is difficult to separate the performance of the Center staff from those of the partners in any review when considering the scientific outputs.

The Center's research program is divided into six Focus Areas, each of which has one or more Projects. This organization is new. The titles of each of these Focus Areas imply that projects fitting into them are quite diverse yet within the mission of the Center and of the CGIAR. The Panel found that in many instances the projects were not closely related to one another and thus there was concern that this reduces the synergies between Projects and programs of the Center and reduces the probability that outputs from the research would become significant outcomes and generate impacts. The Panel believes that the choice of projects/grants is crucial as it defines the profile of the Center and affects the probabilities of impact and therefore needs more careful attention to maximize the value and outcomes of the Center and its partners.

The Panel concluded that it was reasonable for the Center to explore, in line with its enlarged mission, the value in using agro-biodiversity to enhance human nutrition and environmental resilience, given that it is no longer acceptable to simply conserve germplasm. However, there needs to be a better appreciation of where, when and how it can be used to achieve these goals. It is proposed that the Center examines the nutritional, health and income benefits coming from use of high levels of agro-biodiversity and also examines the trade-off with agricultural systems of lower diversity and higher inputs. The Panel believes this will be of considerable value to the CGIAR in establishing optimum strategies for food production, improving the well-being of the poor and optimizing the sustainable use of land.

Bioversity has maintained its distinguished history for enhancing *ex situ* germplasm collections within the CGIAR and beyond through research, teaching and advocacy under its previous names of International Board for Plant Genetic Resources (IBPGR) and International Plant Genetic Resources Institute (IPGRI). Its own commodity crops where it supports conservation and use through networks are *musa*, cacao and coconut. Its profile in *musa* research is noteworthy. Cacao and coconut germplasm conservation needs further strengthening. During the past six years Bioversity has moved its research to dealing with the species that are more difficult to conserve and regenerate, in line with its motivation to address bottlenecks in conservation procedures.

The comparative advantage of the Center is focused around germplasm conservation and use in ways that do not include plant breeding. The Center seeks to operate globally where possible but this is not always possible where local agro-ecological conditions dominate a particular research scenario. It has embraced work on wild crop relatives and neglected and under-utilized species. Its policy-oriented work related to its close links with FAO is distinctive. It leads the very important Systemwide Genetic Resources Program (SGRP) of the CGIAR and several other overarching bodies such as the secretariat of the CGIAR Genetic Resources Policy Committee. Its new work that seeks to define when, where and how agro-biodiversity benefits human nutrition, well being and the resilience of the environments provides a new dimension to the CGIAR.

Bioversity like many of the CGIAR institutes is concerned about its future in the reorganization of the CGIAR and its component parts, as it forms a consortium and devises how best to organize its agenda. The overall topic of the conservation and management of agro-biodiversity is so important to the CGIAR and the planet that Bioversity and the CGIAR should consider carefully how to preserve and augment aspects of its program. This is not to preserve the status quo but to ensure that attributes that have been built up over many years are not lost inappropriately. The Panel believes the Board and Management of Bioversity must do all they can to preserve critical assets from loss during the changes in the CGIAR and to seek to maintain staff confidence during these times of ensuing uncertainty.

The Panel concludes that the skills, experience and outputs of Bioversity are extremely relevant to the mission of the CGIAR and can continue providing useful knowledge and progress. The extreme urgency associated with the loss of biodiversity and the need to conserve and use agro-biodiversity efficiently to combat the stresses on the planet and its populations mean that the CGIAR and Bioversity need to be optimizing their outcomes and searching for breakthroughs to deal with the impending crises that will come from increasing populations, climate change and the need to sustainably manage the environments around the world.

List of Recommendations

1. The Panel recommends that the Center ensure as far as possible that it chooses its research activities to maximize the probability of generating relevant outcomes and impacts and to gain maximum synergy within the Center.
2. The Panel recommends that the Center promote greater cohesiveness, synergies and learning within and between Focus Areas, projects and geographical regions, so as to use its resources more efficiently and enhance the value of its investment.
3. The Panel recommends that research and analysis be undertaken to examine the nutritional, health and income effects on poor farmers derived from agricultural production systems

4. The Panel recommends that as bioinformatics needs and opportunities expand further, the Center step up its investment to ensure that the global community gains maximum benefit from the *ex situ* collections and the knowledge associated with them.
5. The Panel recommends that the work in Forests and Wild Crop Relatives be re-formulated and managed under a project coordinator to correct what now appears to comprise an unconnected list of species, localities and approaches.
6. The Panel recommends that greater cohesion be established between the studies on wild crop relatives in FA 4 and the neglected and under utilized species in FA3.
7. The Panel recommends that the Center create, implement and monitor a publication policy that: (a) encourages peer reviewed publications to aid career development, (b) meets the needs of targeted clients and (c) embodies assessment of how the scientists and the Center are performing.
8. The Panel recommends that the Board and Senior Management further pursue examination of the organizational structure of the Center to ensure optimization of research management, paying particular attention to the responsibilities and roles of the Regional Directors such that they can play a stronger role in the delivery of outputs and outcomes from the programs.
9. The Panel recommends that Bioversity better define, express and evaluate its outputs, outcomes and impacts and communicate effectively internally and externally the value of Bioversity and its partners' work.
10. The Panel recommends that the Board and Senior Management do everything possible to ensure a smooth transition into the new CGIAR, and that the precious scientific strengths and competencies of the Center, including *ex situ* collections and conservation competencies, are maintained for sustaining the mission of Bioversity.

1 GLOBAL NEEDS FOR UNDERSTANDING, MANAGING AND CONSERVING BIODIVERSITY

1.1 Introduction

Biological diversity, within and between species is essential for the survival of the planet as we know it and all of life on it. Among other services, it enables and sustains the vital carbon and nitrogen cycles and the attributes of the atmosphere and climates of the planet. It is therefore perhaps one of the most precious of things to understand and manage, not only for the near future but for ever.

Genetic diversity is the foundation of all plant, animal and fish-based food production and is the basis of good soil quality. It enables biological evolution, both natural selection and plant breeding by man. Biological diversity is constantly changing. Species have always been lost and new ones evolved as environments and climates change and new biological interactions and stresses emerge. During the last few thousand years, agriculture and the civilizations that it has spawned have been the biggest drivers of change and loss of biological diversity on land, especially over the past 200 years. This is simply because so much land has been transformed by the plough and become devoted to the propagation of a few species for food, feed and fiber, replacing the much more diverse natural vegetation. This is in addition to all the biological diversity lost due to the building of cities and to climate changes.

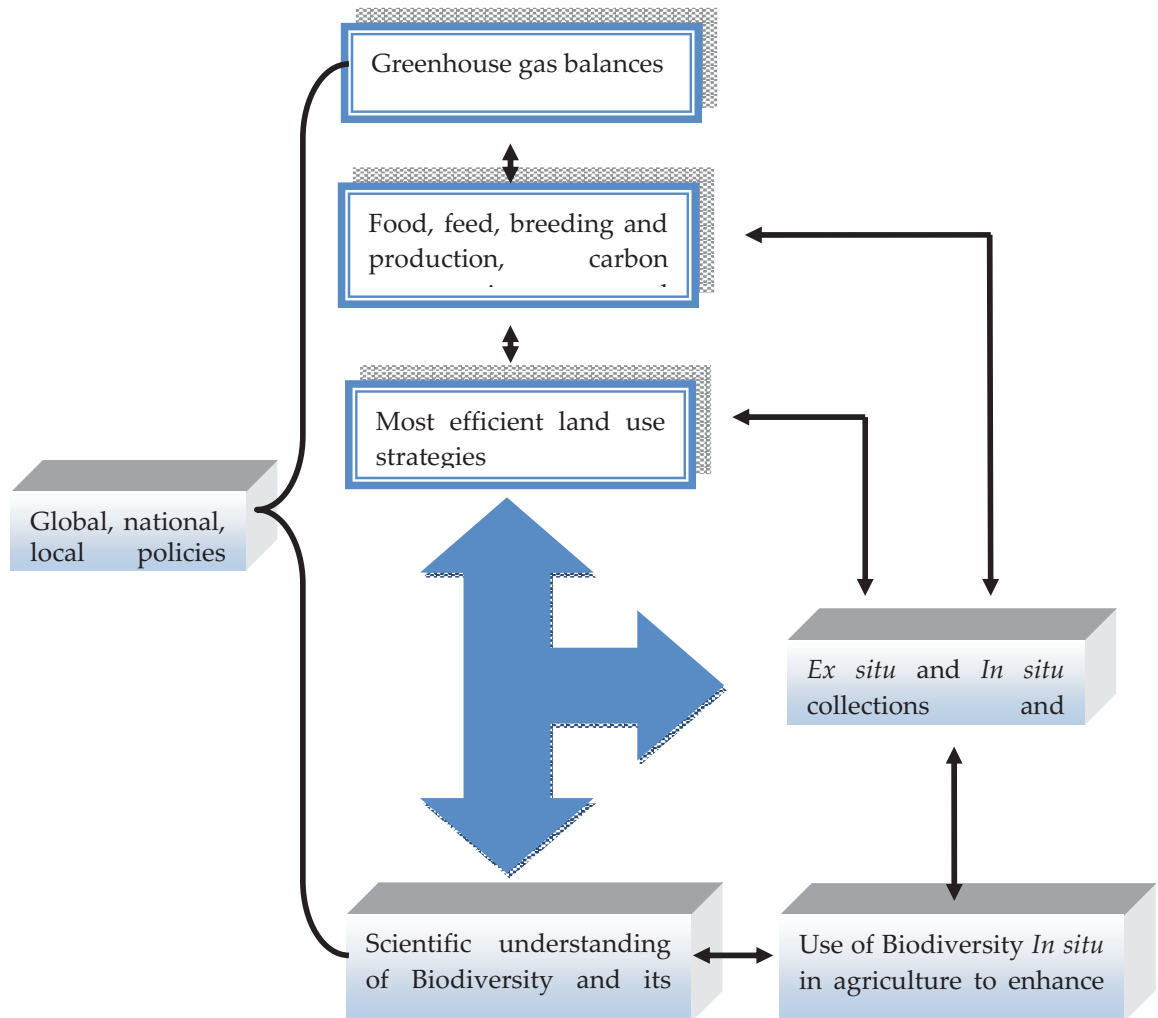
On the other hand, countless generations of farmers have developed and nurtured, along millennia, particular strains of crops and livestock, including fish and other animals, to provide superior livelihoods and at the same time contributed to the enhancement of biodiversity. Thus agriculture has enhanced and conserved biological diversity preferred by farmers. All modern plant breeding programs contribute inevitably to loss of biodiversity in agriculture locally, if not in an absolute sense, when very successful varieties are adopted on large acreages displacing many older strains. Agriculture also leads to changes in the demographics of other species that are influenced by agricultural practices such as soil microbes, flora and fauna, including plant pollinators. There is therefore an urgent need to understand the scientific facts of biodiversity and the roles/importance of different species on the planet and come to conclusions on the relative values of different species and variants within species to mankind and the planet. The CGIAR has been contributing to this, especially the biodiversity intimately involved in agriculture.

In Figure 1.1 we present a synthesis of the linkages between aspects of biodiversity, understanding it in detail, conserving it in situ and *ex situ* and using it to enhance livelihoods and well being. In addition, and importantly, its links with land use, plant breeding, agricultural production and greenhouse gases management are also shown. The needs to have overarching, integrated policies to manage and monitor all these are also illustrated. The panel believes a review of Bioversity and its place in the CGIAR consortium needs to be seen in this broad context.

Clearly the generation of scientific understanding of the biodiversity which exists on the planet, what to collect and conserve and what is useful now and in the future to enhance livelihoods are linked and vital. Plant breeding requires genetical diversity for direct sources of genes and for generating knowledge of what useful genes and combinations of alleles are available. As more ecosystems are transformed for agriculture and urban development, more biodiversity is at risk. Failure to meet production targets per hectare to feed the world leads to use of more land and

therefore increased loss of biodiversity. Thus successes in plant breeding, agronomy, better use of water and fertilizer resources and controlling diseases play a large part in ensuring the optimum use of land and better natural ecosystem conservation. These successes also help management of greenhouse gas emissions, carbon sequestration in agriculture and forestry and global warming. The Panel has kept in mind this synthesis in analyzing the role of Bioversity International in the current CGIAR as well as in the new CGIAR consortium going forward.

Figure 1.1 Linkages between aspects of biodiversity



1.2 Biodiversity in focus

The issues of biodiversity in general and agricultural biodiversity in particular are so important that they need to be addressed at every level. There is the need for the issue to be continually addressed at the highest levels of governments, collectively and separately, along with all the issues, such as climate change, pertaining to the survival of the planet and societies. Policies need to be continually addressed at national and local levels all the way down to individual farms where quality of life of families and small societies are involved. The Convention of Biological Diversity in 1992, besides focusing on the fundamental role of biological diversity and its importance for human life and the ecological stability of the planet, set the basis for a new

awareness about the value of germplasm. The desire of various countries seeking ownership of the accessions found within their borders and arrangements by which they could control the collections and their subsequent exploitation created difficulties for the agricultural research community, including the CGIAR, because it undermined the flow of germplasm utilized by the plant breeding communities since the inception of modern plant breeding.

From this hiatus, the FAO led a process that resulted in the International Treaty on Plant Genetic Resources for Food and Agriculture, which came into force on 29 June 2004, creating a Multilateral System of Access and Benefit Sharing under which those species listed in Annex 1 to the Treaty are to be shared using a Standard Material Transfer Agreement that covered their use and arrangements for a return to be made to the Multilateral System. Bioversity International was very active and effective in aiding the formation of the Treaty. Although the Treaty is in place not all countries have signed it and to date the developing countries have not received much in return. This makes implementation of the Treaty somewhat fragile and there is a need to make it work so that germplasm flows around the world and the benefits from plant breeding can be gained.

The topics of climate change and the effects of increasing greenhouse gases on the planet and societies have recently gained recognition at the highest levels in virtually every country. Also, partly in connection with this, the topic of plant genetic resources, their conservation *ex situ* and *in situ*, and their exploitation to serve people and the sustainability of environments has swelled and is found in daily papers in many countries of the world. The value of conserving biodiversity and within it germplasm for humankind and the planet, is now much more widely appreciated than three decades ago when IBPGR was started.

The world therefore has gone through a significant transformation with regard to plant germplasm in the past two decades. This change has and will continue to have a profound effect on the CGIAR, its germplasm conservation efforts and its breeding programs and the clients whom it seeks to serve. Bioversity International has been monitoring, interacting with and influencing the external environment and the CGIAR Centers with respect to this major issue.

1.3 Germplasm conservation and use in the CGIAR

There are many thousands of species of higher plants worldwide which are used by people. A smaller number of species has been cultivated at one time or another but there are many more that are utilized for all kinds of purposes, from food to medicine. Yet fewer than 100 species contribute over 90% of the world's *per capita* supplies of food plants. Not surprisingly in the conservation of plant genetic resources, most attention has been paid to food and industrial crops such as cacao, coffee, rubber, oil palm, jute, cotton, tobacco, sugarcane as well as forages, green manures and timber trees. The CGIAR is concerned mostly with agricultural crops, forestry, livestock and fish germplasm. *Ex situ* collections of all the major CGIAR crops exist and these are a vital part of its own breeding programs and also the CGIAR's mission for the world. This mission is not just for the poor but for the whole planet. The collections are part of networks such as the Nordic, USDA and Vavilov collections, etc. In addition the world's needs are broader than what these species offer and so the role of the CGIAR in *ex situ* and *in situ* conservation in general needs to be continuously considered and defined as the broader scientific, cultural and political systems for biodiversity, *ex situ* collections and their use evolve. The CGIAR and Bioversity International have interests in land races, i.e. plants that have been developed under cultivation by people in previous eras but now have been displaced or their use has dwindled.

The extent to which these exist in collections and are used in agriculture today are significant issues.

Germplasm is collected for the purpose of conserving the products of natural selection and those forms selected under the process of domestication by different human groups. These represent useful phenotypes for particular regions and environments. They also represent useful combinations of alleles-specific variants of genes. These alleles and combinations of alleles have been used since the beginning of plant domestication thousands of years ago and it is the process that underlies modern plant breeding. From the assumption that it is the specific combinations of alleles that enable different variants of species to perform better in specific environments comes the argument for conservation of a wide spectrum of germplasm collected from a large number of environments. The diversity of such environments is so large and the number of possible combinations of alleles is so vast that the issues underlying conservation have seemed daunting. Today it is possible to assay genetic variants not only at the phenotypic level but also at the molecular genetic level. Thus it is possible to assess the similarities and differences of accessions in a very large number of chromosomal positions and so conclude the evolutionary relationship of one accession to another and work towards understanding the role of specific chromosomal segments in determining specific phenotypes. Thus today compared with a few years ago the goals, assays and use of germplasm conservation can be defined in more precise terms and rationalized better in practical terms. This enables the so-called core collections to be assembled with greater precision. The CGIAR has initiated the molecular genetic characterization of its germplasm collections, but most of the task remains to be done.

The CGIAR has historically considered the collections it has made and conserved as international public goods and has made them available to all who sought them. In order to make this point clear and enable as much germplasm as possible to be managed as public goods, Bioversity International, as the lead Center for the SGRP has prompted the placement of the collections of the CGIAR Centers as held in trust under the auspices of FAO and in 2006, under the International Treaty. Bioversity International and FAO also stimulated the formation of the Global Crop Diversity Trust to support the long-term conservation of the world's most important collections. This is an important step forward and is considered very helpful for maintaining as much germplasm as possible as a public good in a transparent way.

1.4 Challenges for the world and CGIAR

The requirements and challenges for improving agriculture on the planet are immense. As outlined in Figure 1.1, the activities of food, feed and fiber production are highly interconnected with biodiversity. Biodiversity provides on the one hand the stability and resilience of agricultural production systems offering a suite of options to farmers that provide benefits for ecological to medicinal and nutritional needs. On the other hand it drives plant breeding and offers different cropping regimes to optimize the use of sunlight, water and soil structure. The recent interest in using land for the large-scale production of energy and biofuels has heightened interest in the best use of land. It has drawn attention of the need to produce the highest yields on the least amount of land to feed populations. If this is not adopted then more biodiversity will get eroded and land will be used unnecessarily.

The world demands that sufficient food will be produced, without significantly more land being used, without increasing greenhouse gas levels and without the ecological impacts of food production that result in the loss of biodiversity in ways that will undermine the future of the planet. The mission of the CGIAR is to develop and introduce major changes for improvement of

the quality of life, health and well-being of all humankind, specially the poor. It therefore carries a major responsibility for understanding and managing biodiversity associated with and in the context of being affected by food production (Figure 1.1). Hence, due to the importance of the topics that Bioversity International encompasses, this Panel believes that the assessment bar of the strategies and outputs must be high. Seeing the CGIAR activities in an integrated way as in Figure 1.1 is essential to attain the correct goals.

The tasks of feeding the world, managing the use of land and minimizing both the loss of further natural biodiversity and the effects on global warming, is the responsibility of every nation and society. Thus the CGIAR needs to be working as part of the same agenda as many others-at the highest levels of policy making and at the most local of levels where poor people live day by day. This is an impossible task without the CGIAR having an optimal strategic position, working with partners everywhere in the world. Bioversity International has a highly developed decentralized *modus operandi* and so analysis of this way of working is particularly relevant.

In a research organization such as CGIAR it is essential not only to see the goal but also to define how to reach the required goals. In this regard it is noteworthy that major private breeding companies have pledged to double the yields of crops by 2030 while using 30% less water and fertilizer per unit of yield compared with 2008. No doubt that has come from careful analysis of how this will be done. How will CGIAR achieve similar goals and what is the role of biodiversity and Bioversity International in this? The Panel believes “business as usual” will not achieve the necessary goals. “Disruptive technologies” and other breakthroughs will be essential, just as comprehensive marker assisted breeding, transgenes and large IT and trialing systems have been and will be essential. What could these be for CGIAR in the context of biodiversity?

We can confidently predict that the understanding of the allelic contents of ex-situ germplasm collections could be revolutionized by the application of next generation marker and sequencing technologies. Large-scale phenotyping of germplasm in many locations could be made much more efficient and useful by digital photographic recording of results in the field and direct transfer to databases. *In situ* conservation could be aided by real-time GIS systems. IT systems will transform the knowledge base of biodiversity and enable scientists to use it more powerfully. Knowledge of which genes contribute to which traits will be emerging rapidly over the coming years, and will help breeders pick which gene combinations to fix into germplasm. How will the ability to assess hundreds of drought-specifying gene systems in germplasm collections be brought into breeding programs? In around 2030, will much plant breeding be done with a computer because databases will exist that carry information on how every segment of a genome in the accessions held in genebanks contributes to yield of a plant? Will CGIAR breeders be able to synthesize better genotypes and predict yields better given climate data using computer-based systems? How will synthetic biology developed from information on germplasm change plant breeding?

To make agriculture sustainable, in all its diverse forms, it will surely take greater understanding of how biological diversity can help increase resilience of agricultural systems, encompassing the ecological, economic and social factors. There is the challenge to understand the tradeoffs between high input, low diversity systems and high diversity, low input systems to define optimum ways of carrying out sustainable agriculture in different locations while also providing sufficient products. What legislation would drive better use of land and biodiversity? Which social policies will change adoption of new technologies more easily? How will major mistakes such as wrong decisions about adopting GMOs be avoided in future? How will findings in one society be more easily diffused into other societies?

All these are important issues and questions relevant to biodiversity today but will perhaps become increasingly important in the decades ahead. The scale of the needs and the new opportunities provoke the question what is the CGIAR's strategy in relation to agro-biodiversity? Does it envisage there are sufficient accessions in collections or are more required? Are sufficient species in the collections or does it appear that future generations will require additional species for its agriculture and well being? Who is assessing what biodiversity the future of agricultural research will require? Does the CGIAR see it as its mission to conserve *in situ* and in agricultural use biodiversity that can make a special contribution to human nutrition?

In the search for and implementation of the needed breakthrough technologies and policies where will CGIAR lead and where will it follow or partner? The Panel has looked carefully for outputs to see where Bioversity International is playing a key role and seeking the breakthroughs in its programs that the world requires.

1.5 The Review Process

The composition and short biodata of the members of the Panel conducting this sixth EPMP of Bioversity International are found in Annex 1. The standard terms of reference for EPMPs and the strategic issues specific to this Review are given in Annex 2. The Panel's main charge was to assess the performance and institutional health of the Center, i.e. its mission, strategy and priorities, the quality and relevance of its science, the effectiveness and efficiency of its management and its accomplishments and impact with respect to CGIAR goals. In this Report, the Panel has made every effort to analyze Bioversity International's research programs and its governance and management, both in retrospect and in terms of how it is positioned for the future, and offer a considered evaluation of the Institute and make constructive recommendations.

The entire Panel met at Bioversity Headquarters in Maccaresse, Italy from 9-14 February 2009 for the first phase of the Review. During that time the Panel had frequent discussions with the DG and members of the Management Team and interacted extensively with other Bioversity staff, primarily through presentations covering Bioversity's six focus areas of research and other research-support and management units. Bioversity's annual planning week meetings also took place during that time. The Panel had an opportunity to meet with staff in small group settings and individually. The Panel Chair and the Member covering governance and management attended Bioversity's Board meeting at the Center's HQ in late March and interacted with Board members there, collectively and individually.

Panel Members visited Bioversity Regional and Country Offices in the Philippines (23-26 March), Peru and Bolivia, (31 March – 4 April), and Kenya and Malawi (20-25 April) (see Annex 3) and had extensive interactions with both Bioversity staff and their R&D partners in the field. The Panel contacted and had discussions with numerous Bioversity's stakeholders—major National Agricultural Research System (NARS) partners, clients, competitors, peers, CGIAR centers and donors (Annex 4). Prior to, during and after its first visit to HQ, the Panel received and read a number of documents and supporting material from the Center and the CGIAR and Science Council Secretariats (listed in Annex 5). The Panel visited Bioversity HQ again during the Main Phase of the review, from 21 May to 2 June. During that time individual draft chapters and sections of the report were developed and integrated into a draft Panel report that was subsequently finalized after leaving the Center. Both during and after the Main Phase, final draft sections of the Report were shared with the DG and relevant senior staff for factual corrections

and general feedback. On 2 June, the Panel Chair made a presentation of the major findings and recommendations of the Report to Bioversity's Management and staff.

2 BIOVERSITY INTERNATIONAL: HISTORY, MANDATE, VISION, STRATEGY AND ORGANIZATION

2.1 History, Mandate, Vision and Strategy

Bioversity International is a CGIAR Center and thus a member of the Alliance of CGIAR Centers. It is based outside Rome, Italy, with 5 regional offices (but reduced temporarily to 4 in 2008) and has about 225 staff operating from nearly 20 locations around the world. Bioversity evolved from the IBPGR into IPGRI in 1991 and into Bioversity International in 2006. The latter name change was meant to reflect an expanded vision of IPGRI's role in the area of agro-biodiversity research for development. From its outset the center has focused on the conservation and use of germplasm and served the CGIAR and the world in this capacity. In 1994 IPGRI assumed a responsibility for banana and plantain improvement via International Network for the improvement of Banana and Plantain (INIBAP) and subsequently assimilated INIBAP formally into its research structure. It has also assumed responsibility within the CGIAR for coconut and cacao. These three species form its commodity responsibilities.

Over the years it broadened its activities in areas of use of genetic resources and in 2004 more formally adopted a broader strategy. Bioversity's latest vision and strategy entitled "Diversity for Well-being: Making the most of agricultural biodiversity" was published in 2004, following almost two years of consultation and analysis. The mandate of Bioversity within the CGIAR remains:

"The advancement of the conservation and use of genetic diversity for the well-being of present and future generations".

The *broadened* mission of Bioversity (IPGRI) adopted in 2004 was stated as: "Bioversity undertakes, encourages and supports research and other activities on the use and conservation of agricultural biodiversity, especially genetic resources, to create more productive, resilient and sustainable harvests. Our aim is to promote the greater well being of people, particularly poor people in developing countries, by helping them to achieve food security, to improve their health and nutrition, to boost their incomes, and to conserve the natural resources on which they depend. Bioversity works with a global range of partners to maximize impact to develop capacity and to ensure that all stakeholders have an effective voice".

To achieve this mission Bioversity proposed to carry out a range of activities to meet six broad objectives. These sets of activities are:

- Demonstrating the social, economic, and environmental benefits of agricultural biodiversity;
- Ensuring that agricultural biodiversity is conserved, characterized and used to improve productivity;
- Generating knowledge about agricultural biodiversity through research and making knowledge available;
- Developing human and institutional capacity to conserve and make effective and sustainable use of agricultural biodiversity;
- Analyzing policies and fostering an environment that supports the conservation and use of agricultural biodiversity;
- Raising awareness of the values of agricultural biodiversity and the importance of the conservation of genetic resources.

This EPMR has taken place nearly five years after adoption of this broadened mission and set of activities and the Panel considers that this is sufficient time for Bioversity's performance against this mission to be meaningfully evaluated. The review has also taken place immediately before the expected reorganization of the CGIAR and the formation of a consortium between all the CGIAR Centers. This latter issue, with respect to Bioversity, has been of special interest to the review Panel.

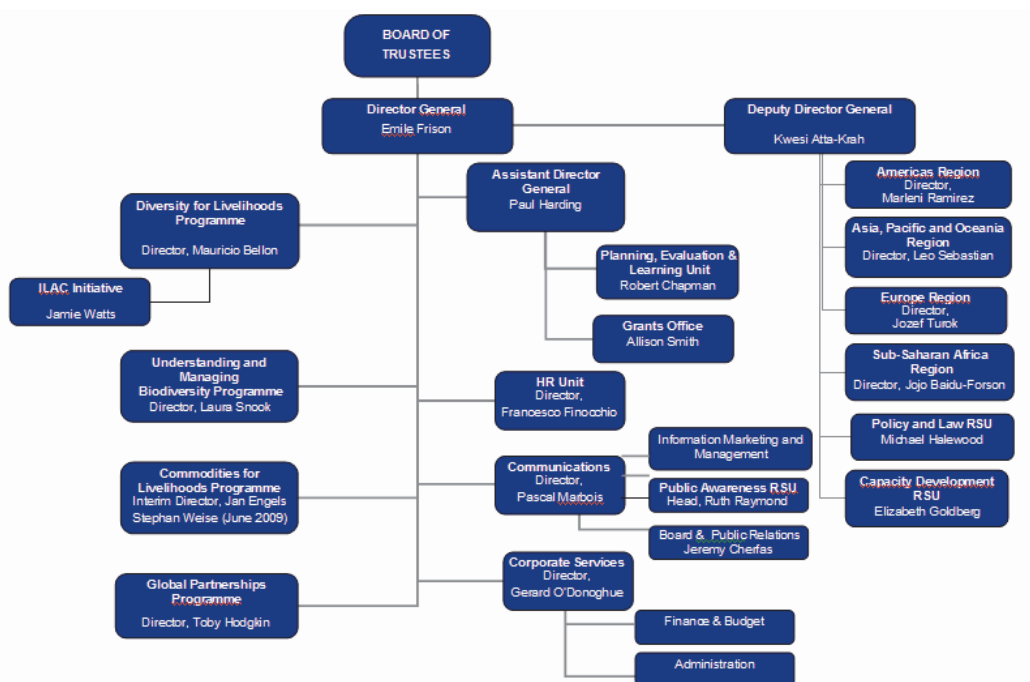
2.2 Changes within Bioversity since the last EPMR

Since its previous EPMR in 2003, Bioversity International has undergone wide-ranging changes. The Bioversity of 2009 is very different to the IPGRI of 2003 when the last EPMR was carried out and endorsed. Its scientific agenda has evolved substantially to address the activities listed above with different types of outputs, outcomes and impacts.

Noteworthy is that the Director General Geoff Hawtin left Bioversity after 12 years, and the new DG, Emile Frison was appointed 1 August 2003. In 2005 the implementation of Bioversity's new Strategy commenced. The new strategy facilitated and drove many changes. Being a highly decentralized Center using partners in the regions to fulfill its mission, Bioversity decided that while keeping a decentralized mode of operation for delivery of specific outputs of national and regional projects it was necessary to have a better focused and coordinated agenda to be more conducive to overall efficiency and more consistent with the ability to design and transfer results efficiently to many global locations. Thus the decision was taken to redesign the organization and management of the science through four programs operating in a decentralized way. This had many organizational consequences which are summarized in the organizational chart in Figure 2.1 and discussed in more detail in Chapter 5.

A new group of four Program Directors (three of which are based in Rome and one in Montpellier) was appointed to manage the science globally. This global responsibility of the Program Directors for essentially all projects changed the roles of the Regional Offices and Regional Directors. The regional offices became hubs from which program staff implements projects and the role of Regional Directors became associated with learning the needs, challenges and opportunities in the Regions and making sure that the outputs of Bioversity became known in the Regions, to stimulate uptake. The Regional Directors therefore became focused less on the management of science projects and their role was elevated to focus more on policy and advocacy, interacting with high level policy makers and Government Officials and being ambassadors and stimulating information flow between Bioversity and its partners in the Regions.

Figure 2.1 The organizational chart of Bioversity management, May 2009



A decision was also made to gradually withdraw from managing the regional networks. These had historically been a major activity of Bioversity. The argument was that others should take over this role to allow Bioversity to put more of its resource into research instead of co-ordination. Thus Bioversity favored working with networks through projects rather than being mainly a network coordinator.

The large number of grants that were being sought, won, managed and reported was putting stress on the organization. Consequently, a Grants Office was formed. Other appointments were made to also improve financial management, fund raising, project reporting etc.

All these strategic changes and others have resulted in many new staff organizational changes as shown in the new staff organizational chart in Figure 2.1. In 2005 several new senior staff were recruited between March and June (DDG, ADG, two Program Directors, Director of Corporate Services, Director of Human Resources). Two existing staff were assigned as Program Directors and three as Research and Support Units (RSU) Heads. The new organizational structure was thus established with four Research Programs, three RSUs, and redefined roles for Regional Offices and Regional Directors. New reporting lines were established with Program Directors reporting to the DG; and RSU Heads and Regional Directors reporting to the DDG. A new series (the E series) of fifteen institutional Projects was launched. The Projects Office (now the Grants Office) was opened.

In 2006 Bioversity undertook a priority setting exercise, following which it was decided to focus its research into six Focus Areas (Table 2.1). These six Focus Areas are implemented through the four Programs and the RSUs as shown in Table 2.1. In December, IPGRI and INIBAP changed their name to Bioversity International. The new name reflects an expanded vision of its role in the area of biodiversity research for development.

Table 2.1 List of Focus Areas and corresponding F-series Projects and programs

Focus Area		Project	Relevant Program
1	Managing agricultural biodiversity for nutrition, improved livelihoods, and sustainable production systems for the poor	F01 F02	DfL: Diversity for livelihoods
2	Conserving and promoting the use of biodiversity in selected commodity crops of special importance to the poor	F03 F04	CfL: Commodity for livelihoods
3	Enhancing the <i>ex situ</i> conservation and use of diversity	F05	UMB: Understanding & managing Biodiversity
4	Conservation and sustainable use of forest and other wild species	F06	
5	International collaboration on conservation and use of genetic resources	F07 F08 F09	GPP: Global Partnerships Program PLU: Policy and Law Unit
6	Status, trends and valuation of agro-biodiversity	F10	DfL (valuation), UMB (trends)

In January 2008, a new series of ten institutional Projects (the F series) commenced within a framework of six Focus Areas (see below), and the new Planning, Evaluation and Learning Unit was launched.

Based on Bioversity’s online MTP tool, ICT-KM launched EasyMTP, a system-wide online tool linked to a database for developing Centers’ MTPs; and CGMap, a tool for analyzing Centers’ MTPs across the system. Bioversity’s Grants Office launched the Grants Database; and the Bioversity Research Manager database was launched (enabling Annual Project Workplans (APWs) and Annual Project Reports (APRs) to be completed online with the MTP Outputs and Output Targets automatically integrated), The CWANA Regional Office was closed temporarily in December of 2008, an event that understandably created some internal controversy.

In 2007-8 the Director General became the Chair of the CGIAR Alliance Executive, and was a member of the Scoping Team that designed the CGIAR Change Management recommendations. The Director General, as Chair of the Alliance Executive, was a member of the Change Steering Team that guided the change management process and finalized the recommendations adopted by AGM08.

2.3 Financial Resources and Allocation over Focus Areas

The financial resources over the past 4 years are given in the Tables below by Focus Area (FA). The table shows that in the past few years the overall budget has been increasing. For FA 1 the increases in funds used and the proportion of the total they represent reflect the broadening of the mission. The increases in FA 3 reflect the continuing emphasis on investing in their principle commodity crop—Musa. In contrast there have been small reductions in their international

collaborations work (FA 5). Further details of these budget figures and staff numbers are given in the project descriptions in Chapter 4.

Table 2.2 Budget by Focus Area (Million US\$)

Focus Area	2006	2007	2008	2009 projection
FA 1	5.1	7.4	6.9	8.6
FA 2	10.2	9.9	10.9	10.7
FA 3	3.2	4.3	4.6	4.8
FA 4	2.7	3.7	3.1	2.7
FA 5	13.2	10.8	11.6	11.1
FA 6	0.4	0.4	0.4	0.6
Total	34.9	36.5	37.6	38.5

Table 2.3 Share of Budget of each Focus Area

	2006	2007	2008	2009 projection
FA 1	0.147	0.202	0.184	0.223
FA 2	0.293	0.272	0.291	0.277
FA 3	0.091	0.118	0.122	0.126
FA 4	0.079	0.102	0.083	0.071
FA 5	0.380	0.297	0.309	0.289
FA 6	0.011	0.011	0.011	0.016
Total	1.000	1.000	1.000	1.000

Note: Capacity Development Unit (CDU) resources have been allocated as follows:

- i) Restricted grants relevant to a particular Focus Area have been included under that Focus Area.
- ii) All other CDU resources, including staff costs, have been allocated pro rata among all FAs.

2.4 Major External Events that have influenced the shape of Bioversity and its strategy

Many external salient events have taken place during the past 5 years that have influenced the agenda of Bioversity today. These include:

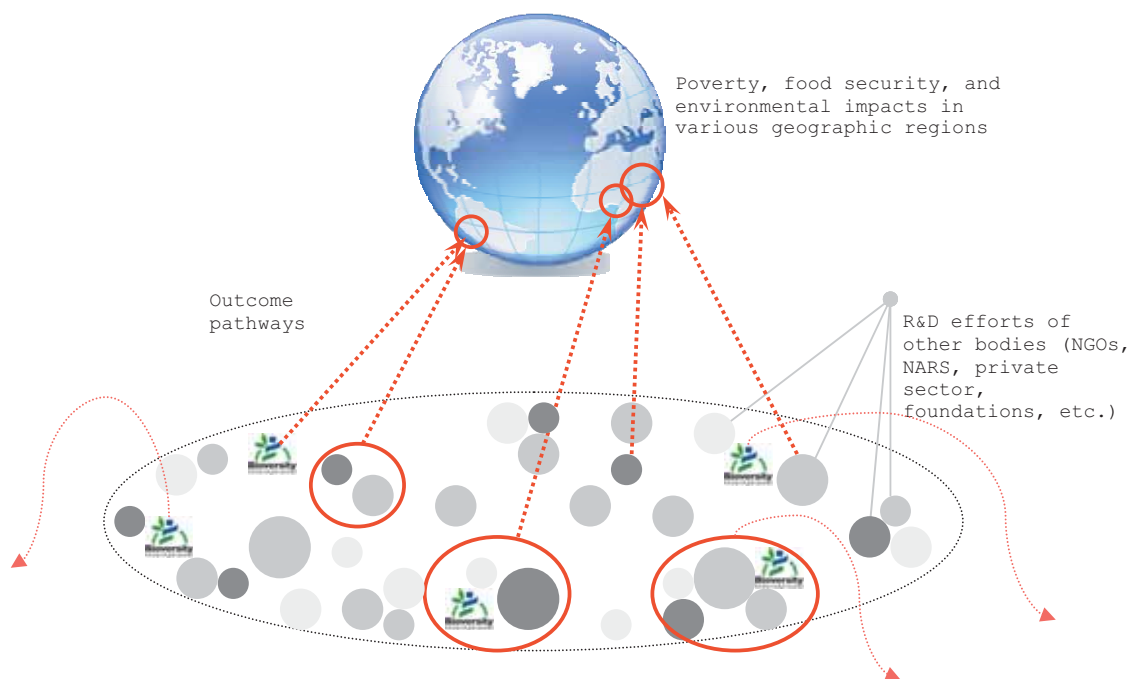
- In 2003 Geoff Hawtin (ex DG of IPGRI) became the Interim Executive Secretary of the newly formed Global Crop Diversity Trust (GCDDT). The Trust was established as an independent organization under international law in 2004 and Cary Fowler was appointed as the Executive Secretary of the Trust, in August, 2005. The Trust moved out of its offices in Bioversity into space at FAO in 2006.
- After nine years of negotiations, during which Bioversity played a well-respected role as policy advisor and an honest broker, the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) came into force in June 2004.
- At the 7th Conference of the Parties to the Convention on Biological Diversity, held in Kuala Lumpur, Malaysia in 2004, Bioversity was requested to develop a cross-cutting initiative on biodiversity for food and nutrition and the Conference welcomed the proposed Global

- The 2006 Conference of the Parties to the CBD, in Brazil, called on Bioversity and the Food and Agriculture Organization of the United Nations (FAO) to lead global programs of work on biodiversity and nutrition.

2.5 Evaluation of the Mission and Focus Areas by the EPMR

The choice of the six Focus Areas defines what Bioversity hopes to deliver to the major goals of the CGIAR. The Panel agrees that the Focus Areas are consistent with the mission of the CGIAR. However, the mission of the CGIAR is extremely broad and so are those of the Focus Areas. Therefore comparisons between them are not very meaningful.

Figure 2.2 Potential for many projects to be within a Focus Area and their potential to progress alone or with the outputs of others to make impact in the world



The Panel sees the relationship between the projects, Focus Areas and the overall mission of Bioversity and the CGIAR as depicted in Figure 2.2. There are many important points to note here. First, specific projects adopted by Bioversity inevitably can constitute only one of a large number that could fit within the concept of the Focus Area, since the latter is so broad. Other players also have projects in the same broad space. Frequently, Bioversity projects will be closer to those of others than to projects within Bioversity. The diagram illustrates that it is the choice of the specific projects that determine what Bioversity does and the potential impact their Focus Areas have on the mission of Bioversity and that of the CGIAR, not the broad concepts in each Focus Area. Second, some topics will have a better chance of producing outputs than others and these outputs in turn will have different probabilities of being turned into outcomes by Bioversity

or others, inside or outside, the CGIAR. In addition it could be that where projects are very synergistic they have a higher probability of moving along the path to impact. The diagram illustrates some projects not being developed along the track to impact for the poor. This puts great importance on how Bioversity chooses its projects since these are probably the choices that will have the largest influence on the likelihood of making any outcomes, let alone, impacts.

The Panel recommends that the Center ensures as far as possible that it chooses its research activities to maximize the probability of generating relevant outcomes and impacts and to gain maximum synergy within the Center.

It is recognized by the Panel that Bioversity will have little control over adoption in societies in most, but not all cases, and therefore Bioversity cannot be judged solely by impacts. It is more reasonable to evaluate the Center on outputs and outcomes, although like other Centers it should be held responsible for documenting impacts when they are achieved in partnerships with others.

The progress along the path of research Outputs to Impact is illustrated in Figure 2.3.

Figure 2.3 Evolution of Research to Impacts

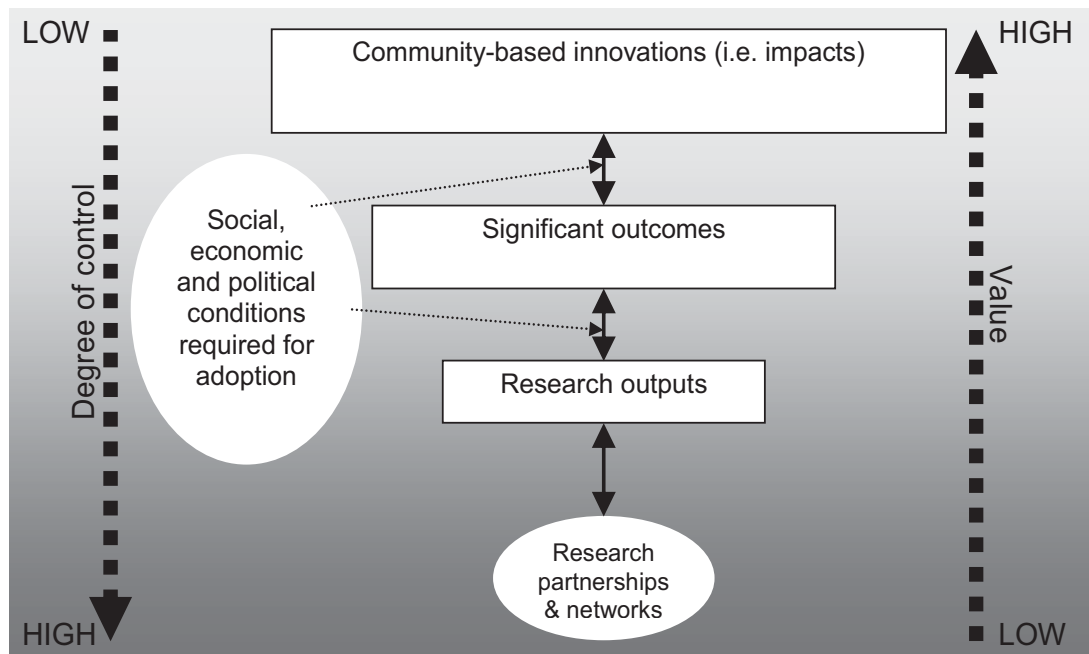


Figure 2.3 has been deliberately drawn with the boxes going from Research to Impacts getting larger. This is to signify, for example, that the value of the output gets larger the closer it gets to being adopted to make an impact. The value at the research level is of lesser value in this context. It is recognized however, that the number of items that turn out to be progressed from research to impact will get fewer since many will not be successful or not be suitable for adoption. A high failure rate is consistent with the outputs of research. Such projects have been illustrated in Figure 2.3 as not progressing along the path to impact.

Based on these points the Panel has approached its evaluations of the science and activities on:

1. The suitability of the Focus Areas and Programs to deliver impact with relevance to the mission of Bioversity and the CGIAR.

2. How well Bioversity has selected its projects in terms of the likelihood that they will, in time, generate impact.
3. How well the strategies of the projects are conceived, including the choice of partners, and the activities implemented.
4. The relevance and perceived value of the outputs and outcomes delivered against those defined by the design of the project.
5. The impacts.

Special attention has been put on number 4 even though it was not easy to assemble the outputs and outcomes for each Focus Area from all the materials supplied and compare them with those planned. It also appeared to the Panel that in the first few years under review, the Center did not put adequate emphasis on the Outcomes of its work. Progress has been made since in this area.

The selection of research projects is especially influential and thus the priority setting is of crucial significance. Bioversity has a defined procedure to aid priority setting and these are summarized in Chapter 5 but the Panel recognizes that many external and local factors come into play when projects are being selected. These include the preferences of the partners and donors, what resources happen to be on offer at any point in time and existing staff skills and projects.

The portfolio of projects and the extent to which they do or do not reinforce each other determines the profile of the Center. This profile is necessarily dynamic as projects end and others begin. This creates several dangers as well as opportunities. The strengths of a Center can be lost by failure to renew projects. The ability to progress a project to outcomes may be diminished by lack of continuity which undermines the purpose and value of past investments. This is where the combined awareness and skills of the DG, Board, CGIAR and Donors need to be working in harmony to maximize the value of investments. The Panel has made an assessment of the overall profile of the Center in Chapter 8.

2.6 Some Major Strategic Issues considered in the EPMR

In addition to the standard EPMR terms of reference related to mission, priorities, achievements and governance and management, given the major changes in mission and all the institutional changes since the last EPMR summarized above, the Panel paid special attention to the following items:

1. Expanded mission: Is the broadened mission appropriate; is it based on sound criteria and is the expansion justifiable within the context of the CGIAR?
2. Focus: Has Bioversity positioned itself clearly by “focusing on research in areas of biodiversity in which progress is lagging, where few others at the international and national level are active, and in which it has a comparative advantage”? (text from last EPMR). To achieve such a focus, what areas have been discontinued or reduced in emphasis? How does the new focus relate to those of the other Centers of the CGIAR?
3. Comparative advantage / core competence in new areas: What is Bioversity’s comparative advantage vis-à-vis other CGIAR Centers or non-CGIAR players, especially in the new areas of research such as enhancing the contribution of agricultural biodiversity to human wellbeing (F01), productivity resilience & ecosystem services from community management of diversity (F02), and managing biodiversity to improve livelihoods in commodity crop-based systems (F03)?

4. Priority setting: How is this done, and how effectively is it done in all aspects of the chain of decision-making from conceptualization of the research needed, through deployment of resources to where best to focus research and to choice of partners?
5. Partnership as a way of working and its implications: Is Bioversity's extensive use of partners and networks to deliver its mission appropriate for the CGIAR and are the institutional consequences of this acceptable?
6. Organization and Management: Are the new staff organizations and associated management systems and the modus operandi of working through networks and partnerships in all continents optimal for delivering on the mission? Does the Center have the right portfolio of skills in its staff and at the right levels?
7. Does Bioversity have adequate processes for evaluating its activities, and effective communication systems for maximizing the uptake of outcomes?
8. How does Bioversity see itself evolving over the next 5-10 years?

Assessments of these issues and others are given in appropriate places in the Report and in the assessment of the Center in Chapter 8, and the Panel's brief assessment of the Center's response to the recommendations of the previous EPMR is provided in Annex 6.

3 MODUS OPERANDI

Since its creation, Bioversity has sought to implement innovative ways to incorporate partnerships at the global, regional, national, and local levels. To do so, Bioversity has implemented several specific strategies: i) develop collaborative partnerships at different levels; ii) support regional networks, and iii) support commodity networks. Bioversity now assumes several roles, including: research, advocacy, policy and legal work and capacity building.

In the past five years, Bioversity has been moving to a more global strategy, and correspondingly reducing its efforts at strengthening national programs and regional networks. According to Bioversity, this explicit decision was based on the following premises: a) national programs linked to plant genetic resources have improved in many countries; b) the regional networks are up and running on their own and c) the emergence of global policy agreements and instruments have created the basis for more support for the regional and global efforts in Plant Genetic Resources (PGR) conservation and use. In particular, the ITPGRFA is considered by Bioversity a useful global framework and the challenge assumed by Bioversity is to promote its implementation at the regional and national levels.

Partnerships have been and still are fundamental to the functioning and implementation of Bioversity's research agenda. Earlier partnerships focused on strengthening national programs for PGR. Currently, Bioversity engages with a very wide range of partners in planning and implementing agricultural biodiversity research. As such, it seeks to leverage expertise, capacities and resources from other organizations in support of its mission. The partners' capacities vary throughout the Regions in terms of knowledge, skills, laboratory infrastructure, equipment, and, importantly, in relation to their linkages with national, sub regional and regional decision makers.

3.1 Varying roles of Bioversity

Bioversity is seen as a research organization with very valuable scientific and technical knowledge and contacts. Bioversity conceptualizes plans and implements research in collaboration with partners.

From the review of the documentation and the interviews carried out in the Regions with the staff, Bioversity is considered a key organization in:

- Capacity building, organization and implementation of training
- Research management
- The promotion of scientific networks
- Project design and fund raising (broker role)
- Network development, particularly in AB use and conservation
- Production of scientific and technical publications

Bioversity has a positive image, in particular because it is not considered as an implementing organization competing for funds with partners; instead it is seen as a Center that provides necessary financial and technical/scientific inputs so that its partners can meet their mandates. An aspect that was highlighted by the majority of such partners is the impetus that Bioversity gives to necessary and complementary actions in conservation *in situ* and *ex situ*. This is a change that the partners have noted (in particular the attention given to *in situ* conservation) that is considered as fundamental to advance the conservation and use of local genetic resources.

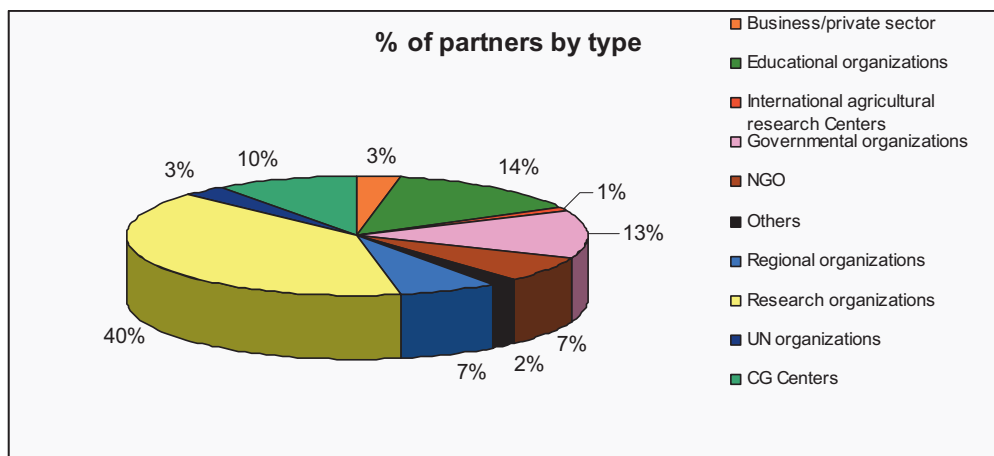
Another positive element of Bioversity is that because of its international positioning it gives national and sub regional partners more “visibility” at the regional and international levels.

3.2 Collaborative partnerships for projects’ and initiatives’ implementation

Besides its Rome HQ, Bioversity has 5 regional offices (temporarily reduced to 4 since early 2009) and 10 country offices. Half of the staff is based outside HQ. In virtually every office outside Rome, Bioversity is hosted by a partner organization: international bodies, NARS and CGIAR centers. This helps the Center to avoid owning or renting physical facilities and allows Bioversity to play out its critical roles with partners more effectively.

Bioversity works globally with a range of partners (about 260) such as individuals, organizations, regional bodies (e.g., networks) and global organizations and programs. They vary greatly in their capacities and degree of linkage with national, sub-regional and regional decision makers. Research organizations (mainly governmental organizations) are the most numerous and important of Bioversity’s partners (see Fig. 3.1).

Figure 3.1 Elaboration of Bioversity’s partners by type.



Source: elaboration based on:

http://www.bioversityinternational.org/Projects/Search_our_current_work/asp/Partner_Search.aspx?item=2

The criteria used by the Center in selecting its partners include: technical or scientific competence, opportunity for multiplying effects (scaling up), geographic relevance, cost effectiveness (i.e., leveraging potential of the partnership) and opportunities to achieve other institutional objectives such as capacity-building, influencing policy and public awareness. In theory, Bioversity’s direct involvement in these initiatives ends at the pilot testing stage when a technology has proven itself suitable for scaling up and scaling out. However, no systematized documentation was found from the documentation provided nor from the field visits that reported the formal phasing out of Bioversity after pilot testing and scaling up being in place.

Bioversity claims that many benefits are derived from operating in a partnership mode, including reduced needs for infrastructure and minimum overheads, increased intellectual exchanges and research collaboration, more sustainable outcomes and impacts and capacity building. According to the Center, the close engagement at the local level allows Bioversity researchers to provide authoritative input and feedback to the Center’s own priority setting process. Bioversity estimates that in 2007, its partners contributed over US\$2.4 M as well as in-kind contribution estimated at over US\$7 M towards collaborative research activities. However, systematic

estimation in the project and activities budgets in each programmatic area is not available, despite the fact that this type of information is critical to illustrate Bioversity *modus operandi* benefits.

The Panel suggests that it would be useful to document work on projects and activities, showing the financial and in-kind contribution of partners. This information should be available at regional and country level to evidence Bioversity leveraging of funds and efforts.

The Center believes that this type of collaboration often serves to extend the geographic coverage of Bioversity's work, so that lessons can be drawn from a range of agro-ecologies, production systems and crops. However, some partners in particular governmental institutions interviewed in the regions feel that Bioversity has withdrawn from national and network activities that were very valuable to them.

Regional and subregional integration bodies, in particular in the developing countries, have an increased role and there is a need for those regional bodies to strengthen their policies in agriculture and environment. For example, in Central America and the Andean Region a regional strategy for Agriculture, Environment and Health was approved recently, and regional initiatives on climate change are being elaborated through the Comision Andina). All these organizations, e.g., Consejo Agrícola Centroamericano, Comisión Centro-americana para el Ambiente y el desarrollo, Comision Andina and associated bodies are developing regional and sub regional policies related to key issues such as climate change adaptation and mitigation and sustainable agriculture with the support of several donors. Bioversity should consider in a more systematic way those organizations as possible "avenues" to influence policies related to environment, agriculture and health.

Panel Assessment

The information as presented by Bioversity does not allow others the opportunity to clearly grasp the projects developed in the subregions and countries. Bioversity's web pages also do not provide in a user-friendly manner this type of information which is so relevant for an international organization such as Bioversity. The Panel suggests that Bioversity improve, according to the different targets and interests, its information, communication and dissemination systems of its worldwide activities, by regions and priority and how these leverage local resources.

Although Bioversity has developed long term relationships with key partners, it is increasingly involved in generating new partners dealing with new issues in order to complement its capacities in specialized fields such as health and nutrition, e.g., the Center for Public Health and the Medical Research Institute in Kenya. Thus, as Bioversity is growing and engaging with a larger number of partners, due to the complexity of the complementary themes, it must manage its projects/initiatives with greater skill and efficiency. In particular, certain projects, such as those in Diversity for Livelihoods (DFL), Understanding and Managing Biodiversity (UMB), and Commodities for Livelihoods (CFL), need to dedicate more time in the respective countries/regions to the coordination, establishment, and strengthening of working teams and following up with partners' organizations.

One of Bioversity's strengths is involving partners from the planning stages of project research all the way through to the implementation of results. This has resulted in greater acceptance and involvement of its partners in projects. The technical and scientific credibility of Bioversity has enabled it to introduce innovative themes into national programs. Perhaps most importantly, collaboration between Bioversity and their partners have resulted in effective transfers of

technology to targeted groups, e.g., in the project in the Philippines on enhancing the livelihoods of small-holder farmers in the Cagayan Valley. This is a good example of Bioversity moving results from basic pathology research all the way to the farmers' fields via the national extension system.

The work that Bioversity carries out in several countries, regions and sub regions should lead to a more systematic analysis and exchange of information among projects dealing with the same problems. This is one important comparative advantage that Bioversity should fully capitalize.

The Panel recommends that the Center promote greater cohesiveness, synergies and learning within and between Focus Areas, projects and geographical regions, so as to use its resources more efficiently and enhance the value of its investment.

3.3 Regional networks on plant genetic resources¹

Networking has been and continues to be a key element in the *modus operandi* of Bioversity. Networking is done both through formal and informal networks. Bioversity's engagement with networks—both regional PGR and commodity networks — has evolved with time. During the IBPGR and IPGRI eras, regional networks were seen as mechanisms to support national program development in PGR. Hence, Bioversity was involved in creating, managing, facilitating and supporting the way networks operated. Currently, there are several regional PGR networks functioning in support of national, regional and global agendas in PGR management, for example, SANPGR (South Asia network on PGR), WANANET (West Asia and North Africa PGR network), EAPGREN (East African PGR network). There is no doubt about the global public goods nature of these networks and the services they provide. The role of Bioversity focuses on providing information and knowledge products including methodologies delivered by core programmatic work. One of the best examples of its strong regional network support would be the role of Bioversity in the coordination and development of the European Genebank Integrated System (AEGIS). This exemplified the balanced sharing of PGR conservation responsibilities within the regional network system. Some of the important outcomes of the regional networks include: 1) the effort toward a more standardized system of data acquisition and management at the accession level, as seen in the Sub-Saharan Africa Region national gene banks; 2) collaboration in genetic resource conservation, as seen in the long-term storage facility in Zambia for the Southern African Region and, 3) the resulting increase in funding opportunities, such as through the European Commission funding.

In the presentation on *modus operandi* to the Panel, Bioversity indicated it would continue to be committed to networking as the best approach to organizing, facilitating and promoting international collaboration among network partners. However, it will not continue to support the establishment of new or development of established networks as it has done in the past. Rather, it will utilize the potential opportunities that the existing Regional Networks now offer. In particular, Bioversity will look to promote new research issues that go beyond PGR conservation and support research projects in nutrition, livelihoods and climate change.

¹ European Cooperative Programs on PGR (ECPGR); European Forest Genetic Resources network (EUFORGEN); South Asia network on PGR (SANPGR), Pacific Agriculture PGR network (PAPGREN); Regional network for conservation and use of PGR for East Asia (EA-PGR); Regional cooperation in southeast Asia for PGR (RECSEA-PGR); Genetic Resources Network for West and Central Africa (GRENEWECA), East African PGR network (EAPGREN); Southern Africa development community PGR (SPGRC); West Asia and North Africa PGR network (WANANET); Mesoamerican network on PGR for Central America and Mexico (REMERFI); the Andean network on PGR (REDARFIT); the Amazonian network on PGR (TROPIGEN).

According to Bioversity, three key developments have influenced its new approach and “changed paradigm” towards networks: i) the maturation of a number of the networks; ii) the emergence of strong NARS and sub-regional organizations; and, iii) the emergence of a number of supporting global policy agreements and instruments. Bioversity now places a stronger emphasis on “strategic technical research collaboration involving priority setting, strategic research and capacity building”.

Panel Assessment

Even if some regional networks and national programs on genetic resources and agricultural biodiversity have improved in a few developing countries, the need to strengthen the capacities of national institutions and regional networks through close follow up, joint research projects and advocacy, still remains strong. Relevant information generated by the research at the national level must be shared and adapted through partnerships and networks to other countries/areas and at a regional level. In addition, and as mentioned previously, subregional organizations are increasingly defining the programs and policies and these need to be supported based on scientific and technical knowledge generated in the countries by the NARS. In this sense, Bioversity should not overestimate the capacity of regional networks and national programs in the implementation of research projects.

3.4 Commodity networks

Commodity networks are still the main channels through which research on *musa*, coconut and cacao are undertaken by Bioversity and its partners. Bioversity supports different types of commodity networks (see Table 3.1):

- Genetic resources networks: MusaNet, CacaoNet and COGENT-coconut network
- Regional networks on banana: MUSALAC - 15 countries from Latin America-, BARNESA (10 countries from East and Southern Africa), MUSACO (13 countries from West and Central Africa) and BAPNET (Asia and the Pacific and Oceania). REDIMA is another specific information network which includes 25 countries members of MUSACO and BARNESA.
- Research networks: ProMusa involved in banana breeding, pests and production, the Global Genomics Consortium and the PROCORD involved in coconut breeding, pests and production.

The agenda for each of those networks is guided by a global conservation strategy developed in partnership with the Trust. In the case of CacaoNet the global conservation strategy is in progress.

For example, the long term support of the International Coconut Genetic Resources Network (COGENT) has provided for activities not only in genetic resource conservation, but additionally there has been the development of value-added products beyond copra, such as coconut husk dust fertilizers, specialty coconut foods, and salable arts and crafts from the nuts and wood.

Table 3.1 Bioersity Role by Commodity Networks

Bioersity Role	Executive secretary	Core support for regional scientist/ coordinator and support staff	Preparation of grant proposals, support planning and monitoring	Supports electronic communication	Organizes technical missions/ meetings	Training	Joint project/activities implementation
Commodity Networks							
MUSALAC	X	X	X	X	X	X	X ²
BARNESA		X	X			X	X ³
MUSACO		Phased out in 2008	X				X ⁴
BAPNET	X	X	X	X		X	X ⁵
PROMUSA		X		X			
MUSANET/ TAG	X ⁶	X		X ⁷			
Global Musa	X	X	X				X ⁸
Genomics							
Consortium							
REDIMA		X ⁹		X ¹⁰		X	
CacaoNet		X ¹¹	X ¹²				X ¹³
Cocoa breeding and selection network							
COGENT	X	X	X		X	X	X

² Five FONTAGRO funded projects since 1999. Main focus on Biological control of nematodes, sigatoka / alternative control and soil health and quality.

³ On mapping and characterization of banana production areas, germplasm conservation ex-situ and in situ, IPM, banana based businesses, Xanthomonas bacterial wilt, banana biotechnology and ex ante impact assessment of new cultivars.

⁴ On cultivar dissemination and testing of banana based businesses

⁵ Germplasm repository, multiplication and distribution centers, Fusarium tropical race 4, characterization and Management, BBTV ecology and Management and post Harvest and value addition

⁶ Bioersity maintains the musa germplasm Collection, facilitated MGIS, and implement a global Musa germplasm conservation strategy with core support

⁷ Grant support to ITC plus database management

⁸ Facilitates exchange of genome resources through the Musa Genome Resource Center. Partners in GMGC have taken further steps to move the research agenda –Genetic Transformation platform at KULeuven, the Bioinformatics platform in Montpellier and the Musa genotyping centre in the Czech Republic.

⁹ For information officer and information products.

¹⁰ Jointly with IITA and CARBAP promotes documentation and information exchange

¹¹ Part time

¹² Initiated: development of a global conservation strategy; various strategy elements advanced: safe movement, information Management, status of germplasm Collection from CATIE being recognized;

¹³ With a Strong involvement from CIRAD

These activities have provided for a more sustainable livelihood for those living in areas where coconut is a staple food. In 2006 Bioversity recognized the need to safeguard the genetic diversity of cacao in order to have secure breeding germplasm available. The development of CacaoNet was supported by Bioversity to the extent that Bioversity was requested by the Network to provide the Coordinator. This effort is significant in that through the activities of the network, much cacao germplasm was put into the public domain and therefore made available to a broad base of cacao breeders.

The Panel found that the role of Bioversity in developing, coordinating and promoting participation in various networks around the world is highly valued by the stakeholders and partners. The progress in capacity building in national programs was specifically highlighted during the field trips by panel members. These networks have provided for the advancement of important crops (banana, coconut, cacao) in poor areas, as well as the utilization of highly specialized data bases by researchers from all around the world. The impact of providing support to these networks is recognized by the panel as a major accomplishment during the period under review.

Panel Assessment

It is clear that the integration of IPGRI and INIBAP into Bioversity was a highly significant event, and brought an important role for Bioversity in the long term conservation of genetic resources of dessert and cooking bananas, as well as the associated basic genetic research. The addition of CacaoNet and associated involvement into Bioversity should be continually assessed and evaluated, as well as activities in the COGENT commodity network. Bioversity needs to carefully assess its potential role in the new CGIAR, and determine if maintaining responsibility for crop (banana, cacao and coconut) PGR via a network approach is fully effective, especially in light of the importance of these crops to the poorest of farmers in the world.

3.5 Overall Assessment of modus operandi

Bioversity's *modus operandi* has many strengths. It enables Bioversity to select the best scientists and other experts with the right local knowledge to tackle particular challenges. In effect Bioversity broadens its expertise. In theory the approach should enable Bioversity's partners to provide authoritative input and feedback to the Center's own priority setting process. However, the extent to which Bioversity uses this was not clear to the Panel. The use of partners on such an extensive scale also has weaknesses. Bioversity does not control the work of its partners and so has a more difficult job of sustaining the exact protocols of the research and the quality with which it is done. Thus the choice of partners is crucial. The frequency of effective communications between Bioversity and partners is also critical.

The Panel found that the role of Bioversity in promoting the establishment of and developing and participating in various networks around the world is highly valued by the stakeholders and partners. The networking model for carrying out research adopted by Bioversity appears to be suitable for many sorts of research providing the right partners are selected and all the participants buy-into the work and can share in the ownership of it. Bioversity should not overestimate the capacity of regional networks and national programs in the implementation of research projects. Capacity building ought to be high with this *modus operandi*.

Collaboration between Bioversity and its partners has resulted in an effective transfer of technology to targeted groups. The Panel suggests that Bioversity improves, according to the

different targets and interests, its information, communication and dissemination systems of its worldwide activities, by regions and priority. This will enhance the value of Bioversity's investment. Sharing of the experiences from one project to another within Bioversity efficiently should also help Bioversity to run a global strategy more effectively.

Overall this *modus operandi* has much to commend it if the projects are properly inspired, designed and managed and the potential weaknesses are fully recognized.

4 RESEARCH PROGRAMS

The research of Bioversity is organized into 6 Focus Areas as outlined in Table 2.1. Panel reviews of each of these are given below. This is followed by a section on Systemwide Programs and Hosted Initiatives.

4.1 Focus Area 1. Managing agricultural biodiversity for nutrition, improved livelihoods and more sustainable production systems for the poor

4.1.1 *Rationale/ Justification for Initiative*

Improving livelihoods by enhancing the contribution of agro-biodiversity —at the system, crop and genetic levels—is at the heart of Bioversity’s Vision. It is Bioversity’s belief that greater agro-biodiversity can result in higher food security, better nutritional quality, increased incomes with agro-ecosystems which are more robust and better adapted to the environmental vagaries and stresses.

To better understand its potential, research is needed to examine the conditions under which enhancing agro-biodiversity at the different levels has the greatest capacity to contribute to sustainable livelihoods. Based on its previous work and current competencies, Bioversity believes it has the knowledge base (particularly genetic resources) and comparative advantage that are needed to complement existing capacities from specialized organizations in community organizations, market development and nutrition assessment to contribute to this understanding. The recent incorporation of economic valuation of agro-biodiversity constitutes a key element to generating evidence and, ultimately, influencing policies. Accordingly, the point of entry for Bioversity into this broad theme, in which many institutions work, is linking local traditional and scientific knowledge to identify, understand and propose options for improving nutrition, incomes and environmental services associated with agro-biodiversity..

The shift from “describing” to “demonstrating and enhancing” the benefits of agro-biodiversity management is consistent with the 2003 EPMP recommendations, as this Focus Area is oriented towards a better appreciation for the nutritional, cultural and, in many cases, economic value associated with agro-biodiversity. Furthermore, reducing the vulnerability of more traditional farming systems through community management of crop genetic diversity optimizes these biologically more diverse systems, and conserves this diversity for current and future generations.

4.1.2 *Strategy, Objectives, Activities, Resources*

The stated objective of FA 1 is to “demonstrate and enhance the benefits of managing agricultural biodiversity for human well-being among the poor in the developing countries”, a broad objective and one that in many ways reflects the overall goal of Bioversity.

Researchers in FA 1 have organized their efforts around two major Projects. The first, F01 “Enhancing the contribution of agricultural biodiversity to human well-being” has two major goals: (i) establishing a strong evidence base to show how agro-biodiversity provides nutrition and related health benefits that in turn result in incentives for maintaining the diversity; and (ii) identifying new biodiversity-based income options for rural and urban poor. Ultimately, this project seeks to have impact on nutrition by (a) increasing the diversity in food diets of consumers and (b) raising incomes of farmers and other value chain users from greater deployment of agro-biodiversity.

The second Project, F02 “Productivity, resilience and ecosystem services from community management of diversity in production systems” is focused on: (i) enhancing the use of crop genetic diversity to manage biotic stress in production systems, determining linkages between genetic diversity in production systems and ecosystem services, and (ii) understanding the role of seed systems and empowerment of communities and local institutions to use knowledge and tools to manage and benefit from crop genetic diversity. The ultimate impact of this work is expected to be through improving farmers’ livelihoods through increased productivity and resilience and through support of systems that improve management and use of crop genetic resources.

In order to achieve these long term impacts, the FA 1 team is focusing on achieving these major outputs (and outcomes) over the next 3-5 years:

- Nutritional and health benefits of agro-biodiversity demonstrated (leading to “Greater support mobilized and directed towards linking agriculture and nutrition”).
- Agricultural biodiversity based income options for marginal groups identified, developed, validated and made available (leading to “Methods, practices, tools, guidelines and policy recommendations to enhance the contribution of biodiversity to household incomes adopted by users in different socio economic situations”).
- Practices that use genetic diversity to maintain and improve productivity, resilience and resistance in production systems (leading to “Farmers, local institutions and NARS use of diversity rich options to enhance production systems’ productivity and resilience and these options are supported by appropriate policies and beliefs”).
- Methods that support seed systems, communities and institutions to use genetic diversity in production systems (leading to “Strategies and interventions that strengthen the mechanisms and social institutions in communities to manage, use and maintain agro biodiversity in their production systems are adopted and applied by communities themselves, governments and other stakeholders”).

The major broad research topics being addressed through these two projects include:

- Valuation of local community knowledge on genetic resources, including cultural and social processes
- Nutrition as an entry point to select genetic local resources
- Productivity and pest and disease resistance
- Community based seed and market systems.

The economic valuation of genetic resources conservation, management and erosion at agro ecosystem, farm and community levels (ecosystem services associated to genetic diversity) is a closely related topic being addressed more directly in Focus Area 6 (Project F10).

Bioversity has selected partners for this FA that are not only traditional partners, such as agricultural institutions and universities, but also emerging partners such as rural farmers, women’s organizations, local policy makers, and environmental NGOs. Bioversity has adopted several ways of influencing the implementation of the FA in its roles as co-coordinator, facilitator, agent of advocacy and dissemination and a researcher and facilitator of research with the different partners. The studies have been carried out in Africa, Asia, Latin America, Central Asia and China. To promote adoption it has linked its work with development initiatives in some

instances. It has also promoted the methods and results via publications for a variety of “customers” and training.

While the planned outputs, outcomes and impacts are well conceived and highly relevant vis-à-vis Bioversity’s mission, a key question the Panel considered was *how, and through which mechanisms FA1 projects will be able to share and influence* research centers (at national, regional and international levels) as well as development projects and agencies to adopt the results, models and methodologies generated, so that any understanding and demonstration of better nutrition, health and environmental resilience is converted into impacts.

Resources Committed

The budget for FA 1 has risen faster than any other single area, by almost 80% -- from just over US\$5 M in 2006 to US\$8.5 M in 2009, a clear signal that Bioversity is giving priority to this relatively new effort. The share of this Area in relation to the total budget of Bioversity increased from 15% in 2006 to 22% in 2009. Generating evidence of the relationship between nutrition, health, income generation, resilience and resistance to pest and disease requires long term funding for research projects carried out with similar methodologies in various representative regions. Funding, therefore, should be wisely allocated to carefully designed, implemented and monitored long term research. The increase in budget is mainly due to restricted funding coming from specific grants.

Table 4.1 Total Resources for Focus Area 1

Focus Area 1	2006	2007	2008	2009 projection
Project F01 (US\$ million)				
Total budget	1,822	3,128	3,260	3,930
of which unrestricted	1,229	1,106	1,285	1,285
% unrestricted in relation to total F01	67%	35%	39%	33%
Project F02(US\$ million)				
Total Budget	3,291	4,234	3,668	4,632
of which unrestricted	0,89	0,483	1,236	1,236
% unrestricted in relation to total F02	27%	11%	34%	27%
Total Focus Area 1 (US\$ million)	5,113	7,362	6,928	8,562
Of which unrestricted	2,119	1,589	2,521	2,521
Unrestricted as % to total Area	41%	22%	36%	29%

The Focus Area includes 29 professional /scientific staff (excluding the Program Director), of which 64% are located outside HQ. An interesting strategy implemented by the Focus Area is the incorporation of 7 associate experts and honorary research fellows who are active in the research program. This strategy has some risks because of the potential turn-over of this type of staff. In addition, 7 of the 12 international scientific staff are also located in the countries where FA1 works. Project F02 has a higher proportion of scientific staff in the countries than Project 01.

Staffing has been strengthened in the area of economics, which should help to better develop the expected outcomes and outputs; in addition to establishing more links with academic institutions

and universities. Bioversity needs to increase building partnership/alliances of Bioversity with specialized regional, international and/or national organizations in social and economic research in rural and environmental issues.

Table 4.2 Analyses of publication productivity for Focal Area 1

Focus area 1	Value
Staff (in full time equivalents)	25
# of (Thomson-index) PR journal articles	36
avg # of (Thomas-index) PR journal articles (staff/year)	0.2
# of all types of PR publications	84.0
avg # of all types of PR publications (staff/year)	0.6

This Focus Area has the lowest rate of Thomson-index publications in Bioversity, together with Focus Area 6 and Focus Area 5. However, the three most cited papers of all the scientific production of Bioversity were produced in this Focal Area for the period under evaluation.

4.1.3 Major Outputs, Outcomes and Impacts

Document 10 (Annex 5) provides an extensive listing of the major outputs produced by this Focal Area during the past six years.

Good quality *outputs* related to methods, tools, frameworks on crop biodiversity, results from pilot studies and economic valuation methods, have been generated during the period of evaluation. Some of the major ones include:

- i) Economics frameworks and methodologies described in Smale, M., (ed.). 2005. *Valuing Crop Biodiversity: On-farm genetic resources and Economic Change*. Wallingford, Oxon, UK: CAB International, constitutes an excellent reference publication on economic valuation methods for genetic diversity, including case studies from different countries.
- ii) *Market value chains in Syria. Methodological framework to analyze and interpret value chain processes and livelihood systems*. This book gives straightforward elements of characterization of different Neglected and Underutilized Species (NUS) and their importance in relation to incomes, labor and cultural value. In addition to the information provided, it constitutes a valuable guide that points out some key relevant aspects to be analyzed in relation to the importance of NUS for livelihoods.
- iii) Jarvis, D.I., C. Padoch and D. Cooper. 2007. Biodiversity, Agriculture and Ecosystem Services in *Managing Biodiversity in Agricultural Ecosystems* (D.I. Jarvis, C Padoch, and D Cooper, eds.). Columbia University Press, New York. The book examines various aspects of biodiversity such as crop, genetic resources, livestock genetic resources, aquatic and soil biodiversity as well as the relationship between biodiversity and the management of pests and diseases, farmer's management of diversity and the contribution of diversity to diet, nutrition, human health and economic valuation of services.

The concept of resilience of ecosystems is theoretically very important. We understand the use of resilience in the context of Bioversity's work as the reduction of vulnerability to pests and diseases by virtue of an enhanced biological diversity both at the genetic level of crops as well as of the agricultural production system. However, the evidence of effects of diversity on the

resilience and resistance of agricultural production systems is not easy to obtain and still needs to be more amply shown.

The outcomes, as described in the official documents of the Focus Area, appear ambitious. Partly because Bioversity is a research institution that also facilitates programs, and not a development agency, the outcomes are not easy to measure and evaluate as they depend on complex systems. Some of the key identified outcomes achieved are:

- the increased positive perception of nutritional value and health aspects of African Leafy Vegetables (ALV) in Kenya reflected in an increased acceptance of these crops on the market.
- in Morocco, Ecuador and Cuba, specific legislation to register products from local biodiversity has been approved.

Two important impacts identified are: first, in Kenya, the increasing use of diversity (45% of the households), via increased consumption of ALV relative to 1997, and 45% of households having increased storage levels; and second, in 2006, Nepal officially released the blast-resistant Poskhareli Jethobudho rice variety (based on participatory plant breeding in situ project Bioversity/NARC/LI-BIRD). The release of this variety symbolizes the recognition of farmers as co-owners of a new variety for the first time in Nepal's history.

4.1.4 Future Directions

The major achievements being targeted in FA 1 via Project F01 are threefold : a) production of solid data that demonstrate the strategic role of agro-biodiversity in general, and of NUS in particular, to improving farmers' income, nutrition and health; b) developing and disseminating evaluation methods and guidelines that help assess the contribution of agro-biodiversity research to poverty alleviation; and, c) assessing and documenting the nutritional value of local biodiversity in at least three countries that represent different ecosystems and food production systems.

Project F02 in one of the two achievements defined, will attempt to generate procedures that will allow national programs to determine trade-offs among a) maintaining or increasing current levels of diversity for current use, b) maintaining levels of diversity for the future that are resistant to a wide range of pathogens and c) maintaining levels of diversity that do not decrease total productivity of the crop. This should include having tools to assess and maximize diversity of crop genetics and assess and maximize interaction of host-pest/pathogen systems.

The second achievement targeted is developing tools to ensure that seed flows and seed production systems will continue to supply materials based on populations of large enough size so the adaptive capacity of the system to provide farmers' needs and preferences. This will include providing guidelines that allow communities to maintain high levels of phenotypic and genetic diversity within seed systems.

The Panel believes that the expected achievements of Project F01 are highly relevant and feasible, taking into account the steps that this project has taken principally in terms of nutrition and health monitoring. In the case of Project F02, as was mentioned above, the Project covers an important issue -- the role of biological diversity on enabling the production systems to better deal with environmental stresses such as pests and pathogens. This requires demonstrating the combined crop genetical and ecosystem diversities do provide such "resilience" and reduce the vulnerability of the agricultural production system. Some of the studies carried out by Project F02 in this respect are important and promising, but the Panel considers that more results in a variety

of conditions will be necessary to give evidence of this situation. Carefully planned research in a variety of conditions and of sufficient length should be supported by Bioversity on this topic.

4.1.5 Overall Assessment Focus Area 1

Quality and Relevance of Research, Facilitation, Capacity building, Advocacy

The panel considers that, based on the official documents presented among others, the Focus Area has a broad objective which in many ways reflects the overall goal of Bioversity. It is not easy for an external observer to define the scope of the Focus Area and the way in which the different grants contribute to attain its objectives.

In the last years, this Area has been focusing its activities in the Andean Region, to a lesser extent in Mesoamerica, in Central Asia and especially in Africa, in areas of high poverty, on the so-called “Neglected and Underutilized Species” (NUS) and landraces (i.e. crops such as millet, Andean grains, native maize landraces, etc). Promising results in terms of characterization (descriptor list, mapping, selection, management, post harvesting) have been achieved, promoting these crops and their diversity, linking them to markets (as is the case for ALV) but also to increased use of these species (as in the case of the Andean grains). Bioversity has also developed protocols for the assessment of nutritional value and the potential of some fruit species for the gene banks.

These results and the promotion of NUS has led the Focus Area to be a key facilitator for the design of some supportive policies as is the case of the official Peruvian registry of genetic diversity of native crop species; the revision of the new EU Novel Food Regulation (258/97/EC) which recognizes traditional foods, the simplification of their food-safety assessment and the procedures making the importation of traditional food crops much easier as of 2009.

In the last years, a key new and positive strategy implemented by Bioversity has been its increasing involvement with *development oriented organizations and initiatives* (i.e. IFAD, UNEP/GEF). In this case, it would be crucial to identify (as an outcome) to what extent the results, methodologies and experiences are being internalized (and also jointly developed) in those projects and organizations in charge of designing and funding development initiatives (lessons learned for scaling up). It was not obvious to the Panel where this was happening.

There are not as yet specific data to show that the central aims of the Focus Area (betterment of nutrition and health, and economic conditions of producers) are being achieved. We understand that these are long and multifactorial processes, but at least the design of the studies that will conduct the efforts towards showing those results should be more explicit for these evaluations, starting from the design of the studies to the way results will be brought to the attention of society and decision makers.

The Panel was informed that this is what is being attempted specifically in the African studies, where pilot projects have been put in place, interaction with experienced nutritionists has been established and baseline information has already been attained. This line of work should be sustained and brought to the point of obtaining more conclusive information that can be generalized as much as possible, about the nutritional effects of plant diversified diets on the population.

Pilot studies will help: a) to show whether the hypotheses put forward on the beneficial effects of plant diversity on the diet of people hold, b) to design similar studies in contrasting conditions

and convince donors and partners of the conceptual strength of the idea and c) to start deriving patterns that will allow to generalize the results obtained.

High quality economic valuation methodologies are in the process of being used with the hiring of a senior economist, and the creation of Focus Area 6. However concrete results from economic valuation of Agro-Biodiversity services useful for decision making have to be generated, as this approach and issue is just being addressed.

Relevance and quality of partners chosen, choice and design of projects, objectives, activities

Some of the partners of Focus Area 1, especially in the NUS project, have established a good relationship of mutual respect with Bioversity, maintaining due recognition to the participation of partners and facilitating the implementation and coordination of the activities. Partners are key national (governmental and non governmental) actors in agro-biodiversity issues, and several of them are also well-positioned to influence national public policies. A positive characteristic of Bioversity's *modus operandi* is the joint publication of results with partners. The recognition and respect of intellectual property of partners and their participation in the publications is very positive.

In the area of nutrition and health, Project FA1 has started a joint project in Africa with institutions and individuals with experience in nutrition studies in the area, which looks very promising.

Quality and relevance of outputs, outcomes, impacts

This is discussed in terms of four important components: enabling key stakeholders, economic valuation of local diversity and benefits to farmer's reference of publications, demonstrating resilience and resistance of systems and funding management.

Enabling key stakeholders: required to promote the use of agricultural biodiversity for better nutrition, and enhanced socio economic conditions of livelihoods).

There has been a sizeable effort in human capacity building, particularly at the level of agricultural officers, project coordinators, etc., in areas dealing with "product diversification" (i.e. home industries with local produce) judging by what the Panel saw in the field visits in Peru, Bolivia, Kenya and Malawi. It was also possible to detect Bioversity's influence at the level of policy making (i.e. agricultural offices) regarding reevaluation of genetic diversity of local crops, which in some cases (e.g., in Peru and Nepal) has had widespread effects.

Economic valuation of local diversity and benefits to farmer's reference of publications: New projects are being designed/implemented (i.e. payment for agro-biodiversity conservation services program) and several publications have been produced that are a good conceptual basis/framework and provide a state of the art on economic valuation to develop further valuations. Concrete outcomes need to be shown in the near future.

Initial examples of increased genetic diversity of crops and some analysis and quantification of social and economic benefits for the farmers (ALV, use of NUS in Syria among others) have been produced. However, this issue - private benefits to farmers from increased agro-biodiversity in production/added value in more systematic evaluations are needed as part of the research and monitoring of projects.

There has been an increase in the number of economists/social sciences staff in Bioversity, and some partnerships with well-recognized academic institutions and universities in Europe and the US have been established. However, there is still a need to establish strong alliances with Research Centers/NGOs, specialized networks for social and economic analysis (at the regional and national levels) in order to implement, with national support and in a sustained manner, the pertinent analyses in participatory methodologies, for topics such as: financial analysis of production systems, economic evaluation of goods and services generated by biodiversity and marketing analysis, and implications for market competitiveness. We understand that some alliances are being discussed with partners; for example in India for research in economic evaluation. This strategy should be strongly supported.

Demonstrating resilience and resistance of systems: As mentioned earlier, this is a conceptually complex issue and, in the Panel's opinion, a better evaluation in the future should be made of a) a clearer conceptual definition of what is meant by resilience (beyond that of resistance to diseases and pests) within the context of agricultural production systems and b) a design of a series of experiments and observations conducive to proving the hypothesis generated by the conceptual approach to the issue.

Funding management: This Area has been increasingly supported by restricted funding. Generating evidence of the relationship between nutrition, health, income generation, resilience and resistance to pest and disease requires long term funding for research projects carried out with similar methodologies in representative regions. Therefore funding should be carefully allocated to long term experimentation activities. This is an additional reason why this Focus Area should have a more focused agenda.

4.1.6 Constraints, Areas for Improvement

As mentioned before, a key constraint is the fact that this Focus Area is relying mainly on restricted budget for long term research activities, in particular the ones aiming at demonstrating the nutrition and health effects as they relate to genetic diversity use. Based on the achievements from previous years, this Focus Area is now in condition to define and present clearly its agenda (including priority specific topics and types of crops, strategies, priority regions/sub regions), adjust its financial needs and projections. Some strong inputs are required from previous experiences – through lessons learned and learning processes - in particular.

4.1.7 Conclusions and Recommendations

The EPMR Panel suggests that:

- The Agenda be more focused, based on the experience and results from past years (results, experiences and lessons learned); this agenda should aim at identifying outcomes that are viable and likely to be adopted.
- Special attention be paid to capitalizing on established global projects, added value for the partners and for Biodiversity, as well as to designing the strategies and activities required to promote the pilot projects developed at local level that are necessary for broader application/adoption.
- Furthermore to put this new area on a secure footing.

The Panel recommends that research and analysis be undertaken to examine the nutritional, health and income effects on poor farmers derived from agricultural production systems based on high biodiversity, and to evaluate the tradeoffs with agricultural systems of higher external inputs and lower biological diversity.

The recommendation to evaluate the tradeoffs between high biodiversity and low biodiversity systems will enable Bioversity (and the CGIAR) to assess its strategies for using high input, low biodiversity systems for high yielding agriculture versus the lower biodiversity being explored in this FA. The Panel does not see the two sorts of systems as mutually exclusive and believes there will be circumstances when the tradeoffs between the two approaches point to optimal systems encompassing degrees of both approaches.

4.2 Focus Area 2. Conserving and Promoting the Use of Diversity in Selected Commodity Crops of Special Importance to the Poor

4.2.1 Rationale/Justification for Initiative

The goal of FA 2 is to work towards improving smallholder food security, livelihoods and income through conserving and promoting use of banana (in this report, the EPMR reference to banana includes both dessert and cooking types), coconut and cacao. This goal is coherent with the Bioversity mission, and links conservation-characterization and use of specific crops that are associated with livelihoods over the world.

Each one of these crops has different characteristics in terms of their commercial importance, but all are associated with smallholder farmers' conditions:

Bananas (*musa*) constitute a major staple food crop for millions of people in developing countries. Recent statistics indicate that around 87% of the bananas produced around the world are for local consumption. Yet, it is also a key cash crop. The four leading banana exporting countries are Ecuador, Costa Rica, the Philippines, and Colombia. Ecuador alone provided more than 30% of global banana exports, whereas India, the world's largest banana producer, is a negligible exporter. There are distinct differences between the cultivars used for export production and those used for domestic use in all banana growing areas of the world.

The challenges of world banana production primarily are finding resistance to and breeding for resistance to pathogens/pests that cause black Sigatoka disease, Fusarium wilt (Panama disease), banana nematodes and banana weevil borer. To address these challenges, understanding and promoting the conservation of the genetic diversity, and preventing genetic erosion are important despite the fact that it is recognized that the genetic diversity is still relatively abundant for these crops, especially in the wider genepool. Therefore, targeted collecting missions to bring unique germplasm into the public domain are crucial. Also, more access and use of germplasm, technologies and opportunities to increase the value of these crops for small farmers is needed.

Coconut is a traditional food and crop for millions of people in developing countries, mainly in Asia and the Pacific. In these regions, people call coconut the 'Tree of Life' and other similar names because almost every part of coconut palm is used for food, drink, fuel, animal feed or shelter, as well as a cash crop. The main internationally traded products are copra, coconut oil, copra meal, and desiccated coconut.

Coconut seeds are very bulky, and in fact, recalcitrant, thus not allowing them to be stored in an ordinary gene bank. To date, because the germplasm is maintained in *ex situ* field genebank collections that belong to National Programs, most efforts have been to try to maintain diversity by keeping local collections alive. Only limited efforts have been made to conserve and use the genepool of these crops for the development and promotion of high-yielding and adapted varieties. Advanced coconut germplasm either does not exist, or is very limited in coconut producing areas.

Cacao is produced by smallholders but most of the production is traded as it is used for the elaboration of different products while only a small amount is consumed locally as traditional foods or beverage. Approximately 70% of the world production is from Africa. The diversity of genetic resources in the production system is very narrow and this alone drives the motivation to collect and characterize the germplasm. There are only three main variety groups of cacao grown, of which Forastero comprises 95% of the world production. Cacao germplasm usually has to be maintained as living trees, either *ex situ* in field genebanks, *in situ* in farmers' fields or in protected areas such as nature reserves, making this process expensive. The need for conservation is also being driven by the concern over the risk of genetic erosion through losses due to pests, diseases, drought, fire, adverse environments and human causes.

Banana and coconut are part of Annex 1 crops under the International Treaty on Plant Genetic Resources for Food and Agriculture. Bioversity has a long-standing commitment to conserving their genetic diversity. In contrast, cacao is not covered under the ITPGRFA and much of cacao genetic diversity is considered as national assets or is looked after by private sector actors. Bioversity was instrumental in bringing the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE) cacao collection within the multilateral system through the signature of an agreement with the ITPGRFA Governing Body.

The most important challenges and associated problems to be addressed are twofold: First, understanding and promoting the conservation of the genetic diversity to prevent genetic erosion despite the fact that the genetic diversity is still relatively abundant for these crops, and second, targeted collecting to bring unique germplasm into managed conservation as global public goods.

In addition to 1) orienting research and development on yield constraints (soil fertility, pests and diseases), 2) identifying traits of special value, and 3) incorporating them through genetic improvement into adapted cultivars of value for the poor, efforts have to be spent on post harvest management and processing, business development and farmer organization from commodity chain governance.

According to some studies developed in Africa in coordination with Bioversity, yields and production of banana and plantains have been decreasing in countries such as Cameroon and the Democratic Republic of Congo mainly due to pest and disease incidence as well as lack of supportive policies. This supports the issues addressed by Bioversity as they combine genetic diversity characterization and evaluation for specific pest and disease, with management and added value process to address social and economic needs of farmers and their link with consumers.

4.2.2 Strategy, Objectives, Activities, Resources

Objectives and hypothesis

This Focus Area aims to improve smallholder's food security, livelihoods and income, while conserving the natural resource base using more within-crop and associated diversity of banana, coconut and cacao.

The basic hypothesis underlining the FA 2 effort is that "by generating and accessing better information, methods and materials, national and local stakeholders will improve the production and value of commodity crop diversity". Then, main activities in aspects of PGR conservation are: maintenance, regeneration, accession characterization, documentation and ultimately, information and germplasm distribution.

Since 2005, Bioversity has been adjusting priorities, but has primarily been focusing on the following issues in the three crops:

- Long term conservation of genetic diversity (accessions) that are in the public domain (banana, cacao, coconut). This includes *ex situ* collection maintenance, regeneration and distribution.
- Characterization and evaluation of useful traits embodied in genetic resources
- Pest and disease management as it relates to diversity management in commodity based-systems
- Models of best practices for adding value through processing and enhances market links.

To cover these issues Bioversity has been a key factor in strengthening the commodity crop networks (MUSALAC, BAPNET, MUSACO, BARNESA, COGENT and CacaoNet) and working groups, playing a complementary role to other organizations which have an international mandate on research such as CIRAD, the Katholieke Universiteit Leuven, Belgium, the International Society for Horticultural Sciences among others.

Through its *modus operandi*, while promoting and developing research and capacity building of the different commodity crops, Bioversity has been generating results, strengthening global, regional/sub regional networks and working groups, as well as facilitating and developing information systems that underpin conservation efforts while facilitating the use of conserved diversity for breeding and other users.

Strategy

As mentioned in the CCER Report (2005), Focus Area 2 has been moving toward implementing the new Bioversity strategy including the development of improved production systems. In order to achieve its objective Bioversity uses several approaches: *Ex situ* conservation and exchange of genetic resources of the prioritized crops (banana, coconut and cacao); Facilitating crop improvement; Promoting “commodity chain” including researching the management and use of biodiversity from farmer’s field to market and Building and sustaining important crop networks. To achieve this, Headquarters and Regional Bioversity personnel work at national, regional, institutional and local levels.

In accordance with the 2005 CCER, Bioversity adjusted direction to focus on research and capacity building, and building and sustaining its role in the three commodity crops.

Activities

In terms of characterization and improvement, Bioversity aims to facilitate increased collaboration between genebanks and users of the materials to enhance utilization of germplasm, facilitating adaptation of agriculture to changing environments. Bioversity’s materials and methods for training courses and educational institutions are designed to increase the capacity of genebank managers and researchers to manage and utilize germplasm stored in *ex situ* collections.

The integrated nature of project F04 provides good characterization of the commodity germplasm now in the Bioversity mandate. Morphological and molecular marker characterization and field verification of most *Musa* accessions in the International Transit Centre (ITC) is underway. The molecular markers and cloned sequences of *Musa* are enabling the identification and characterization of genes, promoters, repeat elements etc.

The public-private *Musa* genome consortium was formed under Bioversity's leadership and is functioning in stimulating the development of information systems and tools to increase the accessibility of genome material and genomic resources. It has recently been the force behind the agreement to sequence the *Musa* genome.

Useful advanced lines of cacao are being identified through the characterization of accessions for disease resistance. Exchange, validation and adoption of disease/pest resistance testing technologies in cacao are supported. Collaborative work continues on preliminary identification of high performing varieties of cacao based on yield, quality and disease resistance in international, regional and national variety trials. There have been procedures for farmer participatory selection and evaluation of local and improved cacao cultivars.

Increasing molecular and morphological characterization of coconut accessions in regional and national collections is being coordinated.

Important conservation and exchange activities include cryopreservation and regeneration of *Musa* and coconut and cacao genetic resources. Technologies for more efficient genebank management and the development of guidelines and key technologies or protocols for more secure conservation and exchange procedures are being developed. Training workshops for moving forward the global crop conservation strategies have been held. An impact assessment of the ITC is being conducted. A strategy is also under development for the conservation of wild *Musa* species and for the rational long-term conservation of systematically identified cacao genetic resources using molecular and genomic tools. Grant projects are also being implemented in Uganda, France and Belgium to develop the tools for genetically transforming bananas. The transformation itself is being carried out in Uganda with funding from the Ugandan government. *Musa* germplasm is being screened for micro-nutrient content and strategies tested to increase total micro-nutrient produced.

Relative to information gathering and network support, the web-based tools for cataloging, querying and defining coconut, *Musa* and cacao continue to be advanced. In the case of *Musa* this includes tools for documenting the progress of genome sequencing and a key for cultivar identification. The global collection of dispersed cacao accessions is documented in a global database with characterization and evaluation data. This database is being web-enabled and links with molecular data sets are being established. For coconut a catalogue of most common and important cultivars is under development.

Activities in agronomic and/or production systems include component research, for instance to understand *Musa* germplasm for local adaptability to diseases, market acceptability and yields and characterization and mapping of disease resistance genes. Also, systems for clean planting material of high yielding cultivars are being developed. Production (organic) system research and development focus on typical small farms where banana is grown in mixed perennial systems. Improved postharvest and processing of plantain for small holders is also considered.

For cacao, focus has been on using high quality genetic resources as a means to improve trading prices and conditions for small holders. The activities include renovation of plantations with farmer selected plants with outstanding flavor and yield, molecular branding of unique local germplasm and improved fermenting techniques. In this area, participatory research focuses on integrating knowledge and testing organizational models in pilot sites. These activities are carried out with advanced research and development NGOs in selected country partners. The network-based approach contributes to priority setting with country partners, and encourages wide exchange of experiences and innovations. National agriculture research systems (NARS)

and other partners more directly linked with rural communities are supported through capacity building to manage these interventions and to institutionalize and scale-out successful interventions.

Relative to resources, the information available indicates that, of the US\$24 M funding for grants/projects funded /approved for the period 2003 to 2009, 59% is committed for *Musa*, 21% for cacao, 2% for coconut and 18% for global activities on the three crops. This means that, clearly, this Focus Area emphasizes, in terms of activities, efforts and budget, *Musa* and to a lesser extent, cacao. Coconut is the least supported crop in the overall activity of FA 2. This is as would be expected considering the history of the relationship between INIBAP and Bioversity.

Table 4.3 Total Resources for Focus Area 2

Focus Area 2	2006	2007	2008	2009 projection
Project F03(US\$ million)				
Total budget	2,396	3,966	3,973	4,332
of which unrestricted	0,8	1,485	1,760	1,760
% unrestricted in relation to total	33%	37%	44%	41%
Project F04(US\$ million)				
Total budget	7,197	5,389	6,360	5,914
of which unrestricted	4,261	2,796	2,525	3,025
% unrestricted in relation to total	59%	52%	40%	51%
Project F04-2(US\$ million)				
Total budget	0,603	0,567	0,605	0,404
of which unrestricted	0,553	0,343	0,404	0,404
% unrestricted in relation to total	92%	60%	67%	100%
Total Focus Area 2 (US\$ million)	10,196	9,922	10,938	10,65
Of which unrestricted	5,614	4,624	4,689	5,189
Unrestricted as % to total	55%	47%	43%	49%
Total budget in relation to Bioversity budget				
FOCUS AREA 2	29%	27%	29%	28%

Focus Area 2 appears to be a key component of Bioversity. The three projects represent almost 30% of the overall budget of Bioversity (see table). Bioversity is making a significant effort in terms of allocating unrestricted funding which accounts for half of the total resources of this Focus Area. This effort is mainly directed toward characterization, improvement, exchange, and bioinformatics, while those activities that are linked to local based activities and value chain promotion are increasingly funded with restricted budgets.

A critical review by the Panel of the body of published manuscripts from this program confirms the top level productivity of the staff of this Area, with an average number of publications per scientist per year of 1.4. More importantly, the use of this information (citations) in its impact on further research by other institutions around the world is highly significant. Also, the range of topics covered (plant pathology, nematology, conservation methodology, plant physiology, ethnobotany, agricultural economics, cultural anthropology, etc.) is impressive. The Panel is impressed with the overall impacts resulting from the outputs generated from this program.

Table 4.4 Analyses of publication productivity for Focal Area 2

Focus area	FA 2
Staff (in full time equivalents)	19.1
# of (Thomson-index) PR journal articles	79
avg # of (Thomas-index) PR journal articles (staff/year)	0.7
# of all types of PR publications	166.0
avg # of all types of PR publications (staff/year)	1.4

4.2.3 Major Outputs, Outcomes and Impacts

A more comprehensive list of Outputs, Outcomes and Impacts was assembled in Document 10 Annex 5. However, the Panel selected a few examples of activities that represent successful transition from output to impact. Clearly, the Panel recognizes that banana (both dessert and cooking) is currently the most significant crop of the three main commodity crops for which Bioversity has taken responsibility. Selected examples of work in banana, cacao and coconut are presented here.

The most significant constraint of world banana production, either for export product or domestic consumption, are diseases caused by pathogens and nematodes. The outputs and subsequent outcomes relative to the stated output as 'Biodiversity-based strategies for improving root, plant and soil health in commodity crops developed' were assessed by the Panel as highly significant. For instance, the role of Bioversity scientists in identifying the new variant of the causal agent of Fusarium wilt (*Fusarium oxysporum* f. sp. *Cubense* race four) in the Philippines resulted in a high level of impact with just a few publications and presentations. Similarly, the Diagnostic and Management Guide (DMG) for controlling Banana Xanthomonas Wilt (BXW) outbreaks has been widely adopted following extensive training of research and extension staff and farmers in Africa, and training materials related to maintaining virus free materials in germplasm movement have been highly utilized by stakeholders.

The output of diverse *Musa* germplasm being conserved in perpetuity and widely used by breeders and farmers is important. The main outcome was that priority germplasm collections were expanded and over half of the accessions were put into virus eradicated, cryopreserved or *in vitro* cultures or leaf banks with improved databases to aid access. Also, many accessions were characterized under field conditions in many countries and also with molecular markers. Over 2000 samples were distributed to users 2004-2008.

The research, development and subsequent publications on long-term storage using liquid nitrogen (LN) cryopreservation technologies and tissue culture methods for international distribution of genetic resources have had the outcomes of a growing and stable base world collection of banana where virus free germplasm can be distributed around the world.

For cacao, the safe and improved conservation of useful cacao genetic resources, their characterization and evaluation and research capacities of national programs were enhanced. This led to more diverse genetic resources of cacao being accessed by national agricultural systems and selected and adopted by smallholder farmers.

Conservation of useful coconut genetic resources and research capacity of NARS was supported and enhanced, particularly in Asia. This resulted in 245 accessions conserved in the International Coconut Genebank, and *ex situ* conservation of coconut genetic resources has been promoted in

23 national genebanks and international genebanks. Also, this has resulted in the conservation of resistant coconut germplasm to foliar decay disease in Vanuatu, Cadang-cadang disease in the Philippines and Lethal Yellowing Disease in Mexico. On farm efforts have resulted in 90 land race varieties of coconut being conserved *in situ* and promoted in at least 15 countries. This resulted in strategies and tools developed for network-based priority setting, partnership formation to develop Global Public Goods (GPGs) and output delivery. Methods were developed to strengthen national commodity crop sectors (innovation systems) to contribute to MDGs and were piloted with case studies. An information resources center for the *Musa* research and development community was developed and is available. InfoMusa, MusaDoc, MusaLit, regional bulletins and other information products were disseminated.

4.2.4 Future Directions

According to the Focus Area documentation, the *Musa* genome will be sequenced and annotated, and most of the genes should be recognized by comparisons with other sequenced genomes. The results of the first transgene assessments of the genetically-transformed East African Highland bananas will be gained. The *Musa* reference collection of 35 accessions will be characterized morphologically with minimum descriptors and the information built into the databases. Similarly, *Fusarium* vegetative compatibility groups (VCGs) will be characterized and mapped, with initial sampling in East Africa and Latin America. A pilot project on BBTV management will be initiated in Sub-Saharan Africa. Farmer-friendly learning framework will be developed for optimizing light, water and nutrient partitioning for *Musa* production in mixed perennial systems. Microbial endophytes and pathogenic *Fusarium* collections will be set up as global public goods, and lastly, an information resource centre and innovation platform will be piloted to strengthen impact pathway and improve effectiveness of regional networks.

One hundred cacao varieties will be assessed for yield potential, adaptation and pest and disease resistance in 12 cacao producing countries. Protocols and procedures for increasing value of cacao of unique local origins through origin labeling and improved fermentation (Nicaragua, Ecuador, Peru, Trinidad and Tobago) will be further developed and the technology transferred to producers. CacaoNet should be consolidated via global conservation and exchange strategy and web enabled database, and the Cacao of Excellence will be established to enhance market opportunities for producers of high quality cacao origins.

The coconut conservation strategy will be refined and implemented. Methods for embryoculture and cryopreservation of coconut will continue to be developed and field collections safely duplicated. Embryoculture protocols will be standardized and this will allow increased exchange of germplasm between collections. Web-based information will be enhanced for international collections.

4.2.5 Overall Assessment

Relevance of choice of research area

The issues and approaches addressed by Bioversity are highly relevant to their mission as they combine genetic diversity characterization and evaluation, for example, for specific pest and disease, with management and added value processes to address social and economic needs of farmers and their link with consumers.

The conservation of genetic resources of selected commodities of particular importance to the poor farmers of the world is highly relevant in the context of the CGIAR, where non-major crops are left to Bioversity in the overall dialog. More importantly, these crops (banana, cacao and

coconut) are actually highly significant sustenance crops for the poor farmers that represent a significantly large percent of the world's population. The research activity is highly relevant, but the activities need to be assessed more closely by Bioversity. The Panel makes this assessment in the next section.

The Focus Area is developing and implementing activities in a strategic way by providing and developing inputs to support national decision-making, through the development of framework assessment of national cultivar deployment and multiplication in Africa (on going). The comparative analysis of national innovation systems should result in a solid basis for orienting research and advocacy activities within the problematic areas of the bananas sub sector.

The support and development of commodity crop networks, in particular the ones related to banana, constitute a platform on which Bioversity in developing research, advocacy and capacity building activities are highly relevant and one of Bioversity's more important activities.

The approach of the Focus Area which includes market characteristics/potential and institutional capacities of the different actors within the market chain values of bananas is being incorporated.

Relevance and quality of partners chosen, choice and design of projects, objectives, activities

The assemblage of partners in work being conducted specifically on banana and cacao is highly relevant, but the Panel feels that the specific activities need to be reassessed by Bioversity in terms of better securing the future conservation of these crops. Whereas the world collections held in trust by all but one of the CGIAR Centers are housed at locations where the physical infrastructure has as much long term security as possible, the cacao and coconut collections are held in nationally owned or academic institutional facilities. The *Musa* collection is held in trust by Bioversity. The Panel fully expects the partner countries holding these collections to continue long-term support, but concludes that if there were a CGIAR site dedicated to the conservation of these crops, then long term security would be better assured. The Panel fully realizes that the cost of maintaining this type of germplasm is significantly more expensive than orthodox seed producing crops, and that this fact alone may be the limiting factor.

Activities in developing strategies and tools for network-based priority setting, partnership formation to develop Global Public Goods (GPGs) is highly relevant, and will progressively sustain the conservation of the crops and utilization for the betterment of the poor farmer until such time that a physical international center may be developed or found for the conservation of each of these crops. The Panel foresees that the Bioversity role in supporting and sustaining the evolution of these crop networks is vital.

Quality and relevance of outputs, outcomes, impacts

The Panel finds that the quality of the publications, both peer and non-peer reviewed, is high and of significant relevance to the overall goals of the program. The exhibited outputs and subsequent outcomes indicate that the focus of the program is on the most important and critical aspects that limit maximum utility of the selected crops by the poor farmers and farming communities. The impact associated with the identification of race 4 of the Panama disease pathogen, prior to the disease reaching epidemic levels is high. Cryopreservation techniques used on banana are being exported not only to the principle partners of Bioversity, but to institutions around the world.

The conservation efforts in banana, cacao and coconut are highly relevant, but do not receive the same attention on the world stage. Banana PGR conservation has a substantial history, will merit

continued focus, and it could be argued that the crop merits the same attention as the world mandated crops at the other CGIAR centers. Cacao work too, is highly relevant, especially in view of the fact that 70% of world cacao production is from small poor farms in West Africa. Cacao as a crop, however, is supported by the private sector and that support ensures some sense of future security. Work on coconut, both in network support and in PGR conservation is also highly relevant, and it may be argued that this crop should receive special attention by Bioversity because in the world of crop development, coconut has very few advocates. Based on the title and goal of this program then, coconut should remain a high priority of Bioversity.

The research on long term storage using LN cryopreservation technologies and tissue culture methods for international distribution of genetic resources is highly relevant and should receive continued support.

4.2.6 Constraints, Areas for Improvement

Within the context of international activities, the contribution of Bioversity in network facilitation is not always recognized. Bioversity documentation indicated that sometimes there has been conflict between network facilitation and emerging research agendas.

One area of improvement identified by the CCER was that the output of peer-reviewed articles in high indexing journals is being done by only a few center scientists. The Panel did not agree with this conclusion on close inspection. The difference may be related to the order in which authors names appear in the journal. However, Bioversity could continue to seek higher productivity of the diverse junior scientists through systematic encouragement and mentoring.

The problem of a limited strategy for prioritizing research themes relative to funding opportunities was noted in the reports. Also, when there is the temptation to accept research grants that do not adequately support a complete project, there should be a way of assessing the limitations of the grant and either negotiate adequate funding or scale the expected work to meet the resources provided. A similar approach should be taken for grants that are of too short duration.

The problem of scientists being 'spread too thin', should be addressed through the management chain where reasonable and practical set of expectations for which both management and the scientist reach agreement. Along these lines, there should be regular Bioversity assessment of the adequacy of tools and training needed for optimal productivity by each and every scientist.

There was a reported lack of follow-up strategy for cacao evaluation and improvement which is currently based on a single donor.

Other constraints include: Costs associated with a multiple network strategy with meetings and travel, and with limited, frequently non-sustainable, donor support; Limited coordination and contact with Bioversity regional PGR networks and regional offices; Limited formal ex ante research prioritization procedures; Lack of a database on banana and other commodity-growing households by agroclimatic zone, market access and technology needs.

4.2.7 Conclusions and Recommendations

Bioversity amply supports FA2 with nearly 28% of the budget, and around 18% of the staff. The focus on genetic diversity characterization and evaluation (especially relative to pest and disease evaluations) and on management and processes, addresses social and economic needs of farmers. Much of this funding, however, is directed toward sustaining the banana project(s) and associated networks.

The conservation of genetic resources of selected commodities of singular importance to the poor farmers of the world is very important. It is conceivable that, since there is not a large commercial commodity status for banana and coconut, the world support for these crops is not as significant as for the staples. On the other hand, cacao is an important commodity, but at the same time there is a great danger of its diversity being eroded, to the detriment of future breeding needs as well as the further differentiation of market and income streams. These three crops are, however, of great importance to large populations of the world, and care for the genetic resources clearly falls under the overriding mandate of the CGIAR. For these reasons, the Panel suggests that the value and importance of these crops be carefully assessed, to determine if they do indeed merit a more substantial conservation effort by the CGIAR.

The support and development of commodity crop networks constitute a platform upon which Bioversity can develop research, advocacy and capacity building activities which are very important. If Bioversity sees the future in terms of diminished activity in support of global and/or regional networks, then the Panel recommends that a well conceived and described transition for support of these networks be devised such that they continue to flourish.

The Panel strongly supports continued research on long term storage using LN cryopreservation technologies and tissue culture methods for preservation of accessions and for international distribution of genetic resources. As the total available PGRs of banana are only slightly over 50% in LN storage, we further recommend collaborations that would accelerate getting any “at risk” accessions backed up in LN storage.

4.3 Focus Area 3. Enhancing the ex situ conservation and use of diversity

4.3.1 Rationale/Justification for Initiative

A wide range of genetic diversity must be collected, adequately evaluated and conserved in order to address the need for providing plant genetic resources for the future. This germplasm will contain the diversity of traits selected over thousands of years that could be useful to adequately respond to the agricultural challenges resulting from rapidly increasing populations, degradation of agricultural lands, reduced per capita water supply, climate change and other environmental constraints. Without information the *ex situ* collections have little value and without harmonized standards the information from individual gene banks cannot be aggregated across gene banks. Thus, the investment in establishing global information systems is essential. Subsequently, these materials and the associated knowledge need to be made known and available to researchers, breeders, farmers and others who can use them to enhance the quality and quantity of agricultural products available to feed, clothe and shelter the world.

Bioversity activities in *ex situ* conservation and use of diversity in this Focus Area have evolved during the period under review and are now organized into two research projects: Enhancing the *ex situ* conservation and use of genetic diversity, (F05), and some elements of the Bioversity Informatics project (F07), which focus on the development of data standards for key crops (and across crops) and information systems managing and promoting use of genetic diversity conserved *ex situ* worldwide.

The Panel agrees that this Focus Area is highly important for and relevant to the mission of Bioversity and the CGIAR and essential for countless impacts throughout the world for the foreseeable future.

4.3.2 Strategy, Objectives, Activities, Resources

Research within this Focal Area is orientated towards supporting the development of a global system of conservation, exchange and use of genetic resources in *ex situ* collections, as called for under the International Treaty, in which the CGIAR genebanks, collaborating through the SGRP, are expected to act as a nodal hub. Research is focused on developing strategies, technologies and formulating guidelines for acquisition, regeneration and management of *ex situ* collections. Additional research is oriented towards facilitating the use of those collections by increasing the availability of information about the genetic resources they hold and improving access to them. The 2007 CCER of UMB produced a number of recommendations that have shaped Bioversity's work in this Focus Area. In response to the Panel's recommendation to undertake further priority setting, research has been prioritized according to the requirements of the International Treaty, the work of the Global Crop Diversity Trust and the World Bank funded Global Public Goods project, Phase 2 (GPG2). UMB has taken the lead in a GPG2 activity on building a readily accessible knowledge base on best practices in genebank management of seeds and *in vitro* collections of several species defined in Annex 1 of the Treaty.

The research at Bioversity seeks to clarify the bottlenecks that prevent optimal use of conserved germplasm, and contribute to overcoming these. Tools and techniques are being developed and tested to eventually facilitate selection of germplasm with desired traits. Included are activities that are developed to facilitate better characterization, evaluation and documentation of information on individual accessions, and contribute to more efficient rationalization of collections, reducing duplication and increasing coverage. The Panel agrees that a wider variety of important species can be conserved because the strategies and tools that are being developed by Bioversity for evaluating gaps in collections are being applied by germplasm management and conservation organizations, along with new techniques for conserving species whose seeds cannot tolerate desiccation for storage. Bioversity also seeks to facilitate increased collaboration between genebanks and many types of users of their materials for enhanced utilization of conserved agro-biodiversity. Bioversity continues to play a major role in contributing to the management of orthodox seed collections. The *ex situ* Conservation and Use project is leading an initiative supported by The Trust to develop crop-specific regeneration guidelines in six languages for 21 crops in Annex 1 of the International Treaty. The Panel recognizes that this has the most significant impact on the newer seed banks that were established in the last decade or so because the well-established gene banks are most likely to have established primary working protocols earlier. The Panel agrees with this shift where it is justified and agreed by gene bank managers around the world.

While maintaining some research activities on orthodox seeds, the major focus has shifted in the last five years to the development of alternative conservation technologies, including cryopreservation protocols, low-cost seed-storage technologies and advanced technologies for non-orthodox seeds. This is because procedures for orthodox seeds are now widely known.

Bioversity's materials and methods for training courses and educational institutions are clearly designed to increase the capacity of genebank managers and researchers to manage and utilize germplasm stored in *ex situ* collections. Within the framework of this Focus Area, Biodiversity has a major role in developing databases to enhance the descriptions of what is in the databases, and to stimulate use of the materials. More than 500 experts from 150 countries have been involved in producing the descriptors and standards. Consulting farmers for descriptors is a progressive activity. Other aspects of project F07 are discussed with FA 5.

Bioversity recognizes the need to add GIS and environmental data wherever possible to all accessions as this may make the collections more valuable in the future when molecular characterization is more complete and use of germplasm for gaining insight into managing climate change is possible.

Bioversity has considerable expertise in-house for this Focal Area, and has formed links with the major gene bank personnel in both rich and poor countries, consistent with its global emphasis. It also has important links with policy makers relative to genetic resource conservation. The panel endorses these ways of working and exploitation of its global honest broker role. The Panel considers that the activities and objectives of this Focal Area are of high quality and relevance to create significant outcomes.

Table 4.5 Total Resources for Focus Area 3

YEAR	2006	2007	2008	2009
Restricted	0.753	2,407	0,849	1,111
Unrestricted	0,511	0,164	1,956	1,456
Total (10⁶ dlls)	1,264	2,571	2,805	2,567

Table 4.6 Analyses of publication productivity for Focal Area 3

Focus Area 3	Value
Staff (in full time equivalents)	19.0
# of (Thomson-index) PR journal articles	56
avg # of (Thomas-index) PR journal articles (staff/year)	0.5
# of all types of PR publications	138
avg # of all types of PR publications (staff/year)	1.2

Comparatively, this is the second most productive Focus Area of all six in terms of peer reviewed publications, and the level of non peer reviewed publications is significant.

4.3.3 Major Outputs, Outcomes and Impacts

From the numerous outputs identified in the support materials provided by Bioversity to the EPMP, the Panel listed, prioritized and subsequently selected a number of outputs that support the points made in our assessments. A list of major outputs is given below, but readers should recognize that a much longer list exists:

1. Bioversity continues to publish handbooks, such as the “Best Practices for Genebank Management” and others, and continues to publish guidelines and technical bulletins for its audience. To facilitate management of genebank materials, a training-manual and other self-learning modules have recently been published for genebank staff in developing countries.
2. The effects of low-cost drying techniques (sun, shade and use of silica gels) on seed quality and seed longevity in storage have been documented and published in peer-reviewed journals.
3. With its partners, Bioversity supported the establishment of world collections stored in LN under cryogenic conditions of banana, plantain and coffee. They also worked with European partners to further research that led to the development of cryopreservation protocols that could be applied to greater range of species.

4. Bioversity has collected information on seed-storage behavior for 7,150 species of crops and their wild relatives, including information on germination and reproductive biology. The information has been made available online in Bioversity's Species Compendium 1.
5. In order to promote the use of conserved plant genetic resources to enhance crops' quality, productivity and resistance to biotic and abiotic stresses, Bioversity has developed technologies to identify useful traits and facilitate the use of germplasm in *ex situ* collections. Molecular tools such as molecular characterization (SSR) kits were developed and disseminated to universities and other research institutions around the world to enhance the characterization and use of high-value species conserved *ex situ*.
6. New technologies have been developed to assess genetic diversity for resistance to abiotic stress, particularly water scarcity, and to identify useful traits associated with water-use efficiency.
7. Methodologies for establishing core collections have also been developed; and new software, 'PowerCore' was designed in partnership with RDA Korea to facilitate genebank managers' use of this approach to finding useful germplasm.
8. Bioversity has facilitated the characterization of over 3,000 priority tropical fruit tree accessions in ten Asian countries, with 190 elite accessions identified for further evaluation; potential breeding stocks were identified for use in varietal improvement programs.
9. Research on characterization and evaluation resulted in the publication of crop-specific descriptor for a wide variety of crops as well as for the use of molecular marker technologies. Bioversity has also published a set of guidelines for developing descriptor lists.
10. The lead scientist from this Focus Area, with collaborators, carried out an impact assessment of the cryopreservation work of Bioversity using the establishment of a coffee cryo-bank at CATIE, Costa Rica to measure the cost-effectiveness of cryopreservation against field collections. The study clearly demonstrated that cryopreservation is the method of choice for long-term conservation of genetic diversity and costs less (in perpetuity per accession) than conservation in field genebanks. The results have been written up and submitted to Crop Science.

Outputs relative to Biodiversity Informatics are in the section on FA5.

Outcomes and impacts relative to outputs

Selected significant outcomes from Bioversity's outputs are described here:

1. Seed banks, supported by the Bioversity activities of facilitation, training, capacity building, and financial input are in place and functioning to the degree of effectiveness afforded by the respective national programs. Although this national support varies from country to country, in the Panel's view, all of the progress hinged on the involvement and/or intervention by Bioversity.
2. Results from the long-term seed drying experiments for efficient storage provide information and set the parameter that maximum seed longevity for a given storage temperature can be achieved by drying seeds to the appropriate relative humidity and packaging them in hermetically sealed bags. This outcome has impacted the health of extant collections and will continue to impact the future growth and stability of PGRs held in *ex situ* collections.

3. There were six new core collections established, validated and made available by using the PowerCore approach developed by the Rural Development Administration (RDA) of Korea in collaboration with Bioversity. The species selected represent crops of importance in the developing world and the impact will be significant in optimizing and economizing the germplasm screening process in order to find valuable gene combination for future breeding efforts. The crop core subsets were selected from collections of Finger millet (*Eleusine coracana*), Foxtail millet (*Setaria italica*), Proso millet (*Panicum miliaceum*), Kodo millet (*Paspalum scrobiculatum*), Little millet (*Panicum sumatrense*), and Barnyard millet (*Echinochloa frumentacea*).
4. The annual training course on '*In Vitro* Conservation and Cryopreservation Techniques for Conservation of Plant Genetic Resources' held in India will continue. The course should improve skills of participants in using tissue culture techniques for conservation and management of PGR, and to equip them with essential knowledge necessary for developing and using cryopreservation techniques and in vitro conservation and cryopreservation protocols, and this in turn, will enhance the developing collections and ultimate quality of the combined world's *ex situ* collections.

4.3.4 Future Directions

Bioversity seeks to maintain its scientific leadership in the area of *ex situ* conservation and use of agricultural biodiversity, with a focus on continuing to promote the development of a global system for conservation and exchange of PGR. This system is not confined to the CGIAR. Enhancement of value of germplasm collections will be an overarching goal. It is proposed that work will continue to optimize collections following characterization using all methods, including molecular genotyping. Better knowledge for maintaining appropriate samples of genetic diversity and regeneration will be developed. The conservation of crops with non-orthodox seeds and other difficult-to-store species remains a major challenge. Bioversity will continue to pursue the development of long-term conservation methods including cryopreservation for these species, and will seek to develop other cost-effective technologies for the long-term maintenance of genebank collection. Changing climates in agricultural environments constitute a particular challenge for research strategies. Bioversity and its partners are developing methodologies for using global climate models to project changes in crop environments, and evaluating genebank and on-farm materials for adaptive traits. This work should make it possible to identify conserved germplasm of identified crop varieties that will sustain yields – and ensure food security – under projected future climatic conditions.

Bioversity expects to increase their focus on measuring impacts of work on beneficiaries, and on monitoring and assessing these impacts. The Panel supports this. In the future, it is expected that genebanks will make greater use of the tools for more efficient collection management as a result of Bioversity's work in this Focus Area, making a wider variety of conserved materials available for crop improvement. Bioversity seeks to build on its previous work of facilitating use of conserved genebank materials to address the threats faced by farmers in areas vulnerable to climate change, especially in Sub-Saharan Africa. Such goals should be carefully selected and targeted.

Bioversity aims to continue involvement with the development of truly global information systems on plant genetic resources.

4.3.5 Overall Assessment

Relevance of choice of research area

This Focus Area is of the highest relevance to the CGIAR and to the long-term sustainability of the planet and its people. Bioversity has developed key competencies and a strong reputation for the conservation and deployment of plant genetic resources. The Panel notes that despite the broadening of Bioversity's agenda over the years to *in situ* conservation, policy, economics, nutrition, etc., the knowledge and implementation of *ex situ* conservation and use of PGR should and does remain at the core of Bioversity's work. At least a dozen of Bioversity's scientists have core competencies in the conservation and management of plant genetic resources, thus contributing to the quality of the research conducted.

Relevance and quality of partners chosen, choice and design of projects, objectives, activities

The partners at the national level are of critical importance in the implementation of technologies provided by Bioversity, as well as the deployment of materials related to capacity building/strengthening. There is considerable evidence that Bioversity has sustained the ability to forge and lead partnerships in this Focus Area, to carry out research relevant to the needs of its clients, and to convene experts to contribute to collaborative integration of knowledge. Many of these partners are at the cutting edge of research in fields related to conservation and use. The whole collaborative group is serving the world of gene banks and the associated information science in a laudable way. Their principle that those interested in *ex situ* germplasm information need it in the format they can most easily use it is to be applauded. It is clear from our field trips, that there is nominal support at the local and national levels within the regions. Similarly, there are examples of good liaisons with research partners at advanced institutions, but there are indications that Bioversity has not capitalized on all of the entities that are more than willing to collaborate on research projects.

The Panel has some concern that stakeholders who are habituated to strong Bioversity support in the past, especially in terms of training, funding and capacity building, continue to expect the programs to continue. The Panel suggests that if Bioversity does, in fact, plan to scale down activities and foci from the past, this should be communicated down to the field levels in an appropriate way to manage expectations and thus maintain the good name of Bioversity.

Bioversity is well-positioned to continue to be a leader in these areas, including in the information management associated with conservation and use of ex-situ germplasm collections. However, there are many other experts in the world and the information management/bioinformatics is a fast moving field with many other players. It is essential that Bioversity is a collaborative player with all the other groups to maximize the value of their work. Also it could be that other groups become more effective and so Bioversity's role will be to ensure that the CGIAR gene banks are always well served by state of the art systems.

Quality and relevance of outputs, outcomes, impacts

In the continuum of linking outputs to outcomes and then ultimately to significant impacts, there are some clear examples of such lines found in both projects (F05, F07) associated with this Focus Area. Although, within the timeframe of this review period there has been a shift in emphasis from directly supporting the physical establishment of seed banks, *ex situ* field plantings, and

long-term seed storage facilities, the impact resulting from the adoption and utilization of the more recent technologies devised by Bioversity is significant. There is undocumented evidence that the use of seed handling (harvest, preparation, drying, packaging) handbooks and guidelines supplied by Bioversity helped to ensure better storage of accessions with orthodox seed at national seed banks. The impact of this may not be known for many years to come. Similarly, the development and delivery of cryogenic technologies (the output) will ensure long-term preservation of genotypes that may otherwise be lost. Yet the Panel clearly sees that there is much further to go to secure stable environments for seed banks.

4.3.6 *Constraints, Areas for Improvement*

This Focus Area and UMB in particular should assist gene banks, as appropriate, in conducting a systematic assessment and identification of gaps in the genetic diversity in extant collections in order to prioritize acquisition and conservation.

Programs focused on efficient and effective acquisition of land race populations as well as wild crop relatives and NUS should be enhanced or developed such that potential imminent loss of diversity from selected environments or geographical locations is addressed. Corresponding negotiations with countries that are the centers of diversity for target species must be made in accordance with the CBD and the International Treaty.

UMB should undertake further priority setting for its research to ensure a focus on the most strategic issues, where it has a comparative advantage and where leadership by UMB is widely expected. In particular, there is a continuing need for UMB to explicitly relate its priorities to the requirements stemming from the implementation of the IT PGRFA, the work of the Global Crop Diversity Trust, and the program of work of the new GPG-2 project, and to consider how best to use the opportunities to strengthen staff capacity and expertise in these priority areas.

The program should continue to focus on the generation of products (guidelines, handbooks, protocols, standards, etc.) in this thematic area, and continue to strengthen Bioversity's role in the area of management of orthodox seed collections for which the Institute has been traditionally well known.

Reliance on limited sources of funding creates special challenges, including the need to compete for these resources with organizations undertaking related research. Whereas many of Bioversity's competitors are equipped to undertake research themselves, Bioversity must rely on its partners to carry out the work. These organizations can include genebanks within and outside the CGIAR, universities, other research institutions, botanical gardens, and other international organizations such as FAO. Other organizations have the same capacity to commission research as Bioversity, but have a more specialized focus on conservation and use of PGR. For example, the Global Crop Diversity Trust shares the same goals and objectives on *ex situ* conservation and works with the same partners. But because the Trust has a strong funding base for long-term conservation, many of Bioversity partners are working directly with the Trust. While the Trust has received Gates Foundation funding to develop long-term conservation methodologies for cassava, yams, sweet potatoes and edible aroids, and was in discussion with Bioversity to lead these research activities, it took the decision to contract the work directly with the partners themselves.

In addition, national research institutes in Europe (such as IRD, the Millennium Seed Bank at Kew) are facilitating similar research in areas such as cryopreservation, low-cost technologies and mitigating the effects of climate change, and are establishing international programs and working with the same partners as Bioversity. As the process of securing funds becomes increasingly

competitive, there will be a need to find new ways of collaborating with organizations possessing complementary expertise in larger funding schemes. For example, the *ex situ* conservation and use team recently partnered with two UK universities and a governmental research program, in addition to three national partners in Africa, on a multi-disciplinary proposal for the EU's 7th Framework.

A major obstacle that can prevent Bioversity's delivery of global public goods in this Focus Area is sustainability of resources, both human and financial. Key scientists with specific competencies in the areas of seed physiology, cryobiology and molecular biology have left Bioversity and have not been replaced. Further, the uncertainties with the changes occurring within the CGIAR may have an influence on this area of research.

4.3.7 Conclusions and Recommendations

This Focus Area is a strong part of Bioversity's portfolio of activities. They are making good contributions to conservation technologies associated with the regeneration and storage of seeds in gene banks, and also creating and linking databases to make accessible and mine the information inherent in the major banks. These are exceptionally important outputs. Bioversity's roles should always complement what is being done in the individual gene banks not duplicate or compete with it. With respect to gene bank management systems and seed handling and regeneration systems the Focus Area will be most important for the smaller national banks. Bioversity should continue to take special notice of their needs and maintain appropriate priorities between their needs and those of the well-established gene banks. Bioversity should continue to solve problems associated with the most important but difficult species to conserve and regenerate.

With respect to the information management of materials in gene banks, this must remain highly integrated with other CGIAR and non CGIAR information systems to serve the world. Such an integrated system is under construction now (see FA 5). This is a fast-moving area and Bioversity should seek to ensure that it serves the world with the needed information as opportunities arise. Because of the increasing global competition and the likely increasing independence of the Trust, Bioversity should continuously adjust its emphasis to reflect its comparative advantage. This is likely to remain connected with addressing forward-looking questions across a range of genetic resources that can only be addressed from knowledge of and access to multiple gene bank collections.

The Panel recommends that as bioinformatics needs and opportunities expand further, the Center step up its investment to ensure that the global community gains maximum benefit from the *ex situ* collections and the knowledge associated with them.

Bioversity is in a unique position to use its research capabilities to explore the links between conservation strategies and international policies as the collections in genebanks become more critical.

4.4 Focus Area 4. Conservation and sustainable use of forest and other wild species

4.4.1 Rationale/Justification for Initiative

Research on forest trees and other wild plant species at Bioversity is conducted with the intent to contribute to the effective conservation and enhanced sustainable use of diversity within and among the wild species of importance for rural livelihoods, agriculture and forestry in developing countries. There are multiple benefits of wild plant species when harvested for

subsistence use or income. Research on conservation of these species is imperative because of the accelerated degradation of native habitat resulting from man's intrusion or other abiotic stress conditions. Deforestation, land-use changes, climate change, inappropriate forest use and management practices, and uncontrolled movement of germplasm all contribute to the habitat disruption and/or ultimate degradation.

Activities in this Focus Area concentrate on assessing the conservation and use of forest genetic resources (FGR) and crop wild relatives (CWR) in order to assess and document the diversity of wild species in selected environments, as well as to study the potential benefits of these plants. The single project (F06) in this Focus Area "The Forest and Wild Species" is the primary Bioversity project addressing *in situ* conservation and use of wild species. The project specifically aims to assess and document the diversity of useful wild species; to study and make known their benefits; to analyze the threats to their persistence; and to provide knowledge, strategies, mechanisms and tools to facilitate conservation and sustainable use of the wild species identified. The project primarily focuses on the diversity of wild plant species that have been determined to be of some socioeconomic value, and that are either underutilized or threatened by native habitat disruption.

Bioversity attempts to provide global leadership in proposing research on: 1) intra-specific diversity, 2) *in situ* conservation and sustainable use of tropical arboreal species by working on a small number of priority model tree species from different forest ecosystems and with different reproductive biology and patterns of use. This project also includes wild plant species such as forest fruit trees and the wild relatives of domesticated crops, based on the idea that they can provide important genes for future crop development. FA4 is based on the assumption that it is necessary to recognize that secure conservation of these species is important because of the continued trend in habitat destruction and degradation.

The Panel concludes that the current rationale of FA 4 implies an overly broad field of work with too many issues to be covered. This makes it difficult to draw a rational agenda of work that focuses on specific goals and objectives, and generating too much dispersion.

4.4.2 Strategy, Objectives, Activities, Resources

The major objective of the project is to ensure that forest and wild crop relative species important to ecosystems and livelihoods are adequately studied such that they can be better managed. The intention is that these wild species are conserved and better used to enhance production at the local levels. Another objective is to enhance general public recognition of the critical role of wild resources in sustainable agriculture and sustainable livelihoods. The Panel recognizes that quality research on selected wild species should generate knowledge that will lead to more effective and sustainable management practices and practical conservation policies that support long term conservation and sustainable use of native plant genetic resources. Research results will also provide supporting arguments for obtaining resources to improve capacity for conservation in protected areas and manage forests.

In the past six years, Bioversity has focused on generating knowledge, tools and methodologies for conserving and using FGR and CWR. Bioversity established the research project, F06, to focus on three issues: (1) locating and monitoring genetic diversity, and analyzing the processes that threaten it; (2) *ex situ* and *in situ* conservation of FGR and CWR; and (3) the conservation and use of non-timber forest products (NTFP). The Panel notes that there appears to be some overlap between these objectives and those of F05 in terms of the goals of long term preservation under *ex situ* conditions.

A long-range objective to increase the critical mass of researchers in the area of forest genetic resources was stated in the MTP. The goal of this was to achieve greater recognition among other stakeholders of the issues associated with the conservation and use of genetic diversity of forest species.

Table 4.7 Total Resources for Focus Area 4

YEAR	2006	2007	2008	2009
Restricted	1.582	2.565	1.943	1.588
Unrestricted	1.285	1.271	1.295	1.295
Total (10 ⁶ dlls)	2.867	3.836	3.238	2.883

This Focal Area has the lowest number of total articles published in the period 2003-2008, although it has not the lowest rate (publications/staff/year) of publications among the Focal Areas.

Table 4.8 Analyses of publication productivity for Focal Area 4

Focus area 4	values
Staff (in full time equivalents)	6.5
# of PR journal articles published (2003-08)	29
avg # PR journal articles (staff/year)	0.7
MS/PhD students supervised (2003-08)	14
% staff that supervised MS/PhDs	75%
ave # students/staff member supervised	2.9
% staff receiving honors or prizes	25%
% staff giving key-note lectures	42%
% staff on panels, Boards, committees, etc.	51%
% staff on editorial boards	26%
% staff that review journals	42%
# of all types of PR publications	31.0
# of (Thomson-index) PR journal articles	13
avg # of (Thomas-index) PR journal articles (staff/year)	0.3
# of all types of PR publications	31.0
avg # of all types of PR publications (staff/year)	0.8

The first group of objectives reveals the very broad character of the agenda. Indeed, it is difficult for an external panel reviewing this work to understand the real objectives set by FA 4 when confronted with such an ample and ambitious agenda. These overly broad statements of agenda and objectives are confusing and of limited use. The Panel notes that the project lacks, up to the moment of writing this report, a full time Project Coordinator for most of the reporting period. Senior scientists in this project worked across several projects, which resulted in dilution of focus and energy to this project. We were also surprised to see no mention of any mechanisms of interaction of the WCR component of this Focus Area with the effort that is being carried out in compiling *ex situ* collections of wild relatives of crops in FA 3.

There has also been a decrease in the proportion of unrestricted funding together with the need to support Bioversity's work through restricted funding. These two elements together with the limitations of human resources (the Focus Area had in 2008 6.5 FTE staff, the second lowest of all FAs), have made long-term planning difficult. Budget for 2006-2009 is shown in the following table.

4.4.3 Major Outputs, Outcomes and Impacts

From the numerous outputs identified in the reference materials provided by Bioversity to the EPMR Panel for this Focus Area, the Panel listed, prioritized and subsequently selected those outputs that support the points made in our assessments. The presentation of this limited list does not mean the Panel was not aware of the body of work that exists which is not listed.

In the area of developing methodologies for non-orthodox seed collection and conservation of tropical trees, three specific outputs were identified by the Panel as being relevant and valuable: 1) Standardized protocols were developed to test for desiccation tolerance and then used in collaborative research with the Danish International Development Agency (DANIDA) Forest Seed Centre which involved 15 national partners who screened approximately 60 recalcitrant and orthodox tropical forest tree species; 2) A synthesis of the methods for conservation and use of selected FGR was made available in a three-volume series of guidelines published with FAO and the DANIDA Forest Seed Centre and the publications on this work were widely distributed in English, French, Spanish and Chinese; and 3) With support of the Austrian Federal Research Centre for Forests, Natural Hazards and Landscape, Bioversity offered a short course on forest genetic resources conservation and use in Malaysia in 2006, Uzbekistan in 2007, and Ethiopia in 2008. These items on seed conservation are important and the work is of high quality and the partnership with DANIDA is quite relevant. Partners of this project (Austria) spoke highly of the collaboration with Bioversity in this area.

In the research area related to locating and monitoring genetic diversity major outputs identified by the Panel included: 1) analyzing spatial patterns of genetic diversity in tropical tree species of high local priority (such as *Swietenia macrophylla* and *Hymenaea courbaril*), which has produced information useful for conservation; 2) identifying the most suitable areas for *in situ* conservation of selected species (i.e. *Araucaria araucana*, *Prunus africana*) based on plant demography and molecular diversity – linking plant demography and genetics information to help conservation planning at the national level (Bioversity's work in this area has yielded methods for assessing genetic variation in populations of some forest species, which is relevant when they are under pressure from fragmentation, coupled with intensified use by local populations); 3) A comprehensive study to assess population ecology and population genetics in *Shorea lumutensis*, a rare, endemic dipterocarp in peninsular Malaysia provided conservation priorities and strategies for using genetic information to contribute to conservation planning; and, 4) Information and publications generated relative to the study on impact of climate change on performance and distribution of tropical pine trees *P. patula*, *P. tecunumanii*, *P. kesiya*, *P. merkusii*. The Panel sought but failed to find elements of coherence in the selection of the species mentioned. The work with the *Shorea* species selected is interesting, but it is not clear why the research staff chose to work on a rare, endemic with a slender trunk and which is not a commercially interesting species. The work with climate change effects on pines is interesting in the case of *P. patutla* and *P. tucunumani* where bioclimatic algorithm predictions were combined with climate models to explore probable effects on native populations of these two pine species.

In terms of establishing or supporting existing networks of FGR, major outputs included: 1) In 2006 a new collaborative platform on FGR in the Americas, LAFORGEN, was established and

now has more than 100 representatives from national and international research institutions in 19 countries; and, 2) In this period, all the FGR networks have developed lists of priority forest species based on criteria associated with livelihoods. These priorities ensure that research on forest and other wild species is focused where it can yield the most valuable impacts. Other regional platforms for forest genetics have been established for Europe (EUFORGEN) for Sub-Saharan Africa (SAFORGEN), Asia Pacific (APFORGEN).

With respect to organizing or facilitating training workshops and other meetings to deliver new technologies, examples of key outputs were: 1) A regional expert consultation workshop held in 2004 to define research needs and priorities for indigenous fruit trees in East Africa with partners from Ethiopia, Kenya, Sudan and Tanzania-- the workshop formed the initial phase of an activity to promote the conservation and use of indigenous fruit trees in SSA; 2) The project is currently producing a training module on the conservation and sustainable use of FGR that integrates insights from a range of case studies; 3) Bioversity's Abdou Salam Ouedraogo Fellowship, Vavilov-Frankel Fellowship, and Austrian-funded Forest Genetic Resources Fellowships have provided opportunities for young scientists from developing countries to carry out research in collaboration with scientists from advanced research institutes on FGR topics; and, 4) The Asia Pacific Forest Genetic Resources Network (APFORGEN) provided training on the use of molecular markers.

In terms of generating understanding of patterns of resource use by local communities, and threats to diversity from multiple sources such as livestock, fragmentation and inbreeding, an important output was the evaluation of the impact of local use (including over-harvesting of bamboo and nut species), regeneration of target species and the potential impact of deforestation and fragmentation on the genetic processes and diversity of tree populations.

This FA included a global project comprising five countries (Armenia, Uzbekistan, Bolivia, Sri Lanka and Madagascar) in which collections of wild relatives of crops were made and information (geographic, genetic, ecological, etc.) about them was gathered and germplasm collections assembled. A series of other studies published in the last 2-3 years, ranging from Plant Population Monitoring methods (Iriondo et al), to the use of these species in crop improvement (Hajjar and Hodkin) and the possible effects of climate change on CWR (Jarvis et al), have started placing an informational and conceptual platform for the subject.

The primary objective of the global project was improved global food security through effective conservation and increased use of priority CWR. An additional objective was to develop an information system at the national and global scales, establishing also the conservation status of the CWR. Capacity building on various aspects relevant to the project (i.e. taxonomy, capacity to use information, formulation of national plans, etc.) was also another objective, as well as increasing the awareness of the value of CWR and the need for their conservation in the partner countries. Outputs expected were: a) the establishment of an international information system; b) a national information system in each country; c) development of interagency collaboration mechanisms in each country, and d) ensuring a sound public appreciation of the importance of conserving CWR in each country. There is no doubt that this is one subject that fits ideally the mission of Bioversity of conserving agro-biodiversity at a global scale and that it underlines the selective advantage of the Center within the CG system. The global nature of the design of the project is also an important asset.

However, despite the great importance that the Panel assigns to this project, it has been difficult to find a more comprehensive description of its conceptual bases that went beyond the general statement that wild relatives of crops are important as sources of genetic variability, and that

there are no institutions working on the problem at a global scale. Nor is there a discussion on the criteria used for selecting the species used in the project. The choice of countries seems reasonable from the point of view of their possessing an important richness of wild species related to crops as well as a high degree of interpopulational genetic diversity. However, the description of the limitations presented by each country in the project makes one wonder if those constraints in some cases were not enough reason as to think in a different combination of countries. This is an important element in insuring the success of global projects.

The project has just ended early at the beginning of 2009. The information the Panel received is that although resources will be sought for a second phase of the project, it will be carried out with a different set (or combination?) of countries. This may have certain advantages and reasons to be so, but unless the five countries involved will actively continue the work started in collaboration with Bioversity themselves (something that seemingly they were committed to do at the start of the project), it would represent a disruption of information, institutional strengthening and a waste of the efforts of training personnel and institutions for the purposes of the project. The Panel considers that this project not only should continue, but be strengthened by a more defined effort in setting the conceptual bases of the project, as well as defining the choice of species, countries, partners, etc. A major effort should also be put into strengthening and sustaining the CWR global portal and ensuring that the national data-bases and portals are not neglected or discontinued, but strengthened. The panel also strongly suggests that in the future this project should somehow be clearly linked to the *ex situ* germplasm collection activities which are the responsibility of Focus Area 3. There is also a logical cross connection with the projects in Focus Area 5.

With respect to developed information and databases, some important outputs were: 1) Establishment of the New World Fruits Database and its availability on the internet; 2) Information and knowledge on CWR were integrated into new information management systems such as the Global Portal on CWR and national information systems; and 3) All FGR networks developed lists of priority forest species based on criteria associated with livelihoods. Members of the Panel, however, found consulting the database on tropical fruit trees complicated. The CWR web portal focuses mostly on what the 5 participating countries on the CWR can offer, which in general is broad and limited information. Otherwise it simply links queries to other databases such as SINGER.

Assessment of outputs and outcomes

As stated above, Bioversity is ideally suited to and has the most comparative advantage for successfully completing a viable research project on securing CWR. With a sound hypothesis for Phase 2 of the project, and the logical selection of target geographical areas, an important array of results (outputs) could reasonably be expected. Of the major achievements listed for FA 4 in paper B10, the Panel considers that the production of the standardized protocols for testing desiccation tolerance (produced in three volumes in collaboration with the DANIDA Forest Seed Centre) the most relevant and valuable.

The Panel considers that the databases generated by Bioversity in collaboration with their partners for Fruit Species of the Americas and the CWR database require more attention to bring them to a more useful and operational state.

4.4.4 Future Directions

Bioversity scientists working globally through the Forest and Wild Species Project have declared that the project will produce a global *in situ* CWR conservation manual. This should lead to

improved understanding and conservation of CWR, both inside and outside protected areas. Management plans and best-practice guidelines will also be established to support CWR conservation in all five partner countries of the CWR Project. A comprehensive set of national CWR action plans and strategies will provide a model for other countries, and a set of CWR Red Lists will be produced in each country.

Currently, the Project is collaborating with FAO developing the State of the World's Forest Genetic Resources Report, which will also contribute to a redefinition and further focusing of their strategy and planning to achieve the greatest possible impact. Within the framework of this collaboration with FAO, the Forest and Wild Species Project team will develop two key thematic studies as requested by the Commission on Genetic Resources for Food and Agriculture (CGRFA). The project team will also undertake a global review on the use and exchange of forest reproductive material based on model species from different regions, and a study on the implications of future movement of FGR among countries based on projected climatic changes.

The Focus Area will maintain a high profile and key role in the development of the State of the World Forest Genetic Resources Report & SOW-PGRFA report (Future action plan for countries and region).

4.4.5 Overall assessment

Relevance of choice of research area

There are two related but quite different components in the selection of the field of interest of this Focus Area. One is related to conservation of forest tree genetics and the other one focuses attention on non-timber forest species, including not only those species of direct economic interest (such as resins or ornamental plants) but also those with potential economic interest such as the CWR because of their potential genetic diversity value. Both are very broad fields that require careful selection of projects to be incorporated into agendas of research that conform to the aims of the Focal Area. The rationale for entering in the field of forest tree conservation and genetics is the fact that other CGIAR centers do not work on these topics, which is the case: CIFOR is not involved in forest tree genetics or its conservation. However, the Panel's analysis of the work carried in this topic so far reveals a lack of a properly designed agenda of work and consequently of projects and studies that concentrate on answering specific questions for the selected aim. The Panel had the impression that the projects reflect a somewhat haphazard collection of studies of variable quality. Species chosen for study do not reflect a well defined priority (e.g. Pine species or rare endemic Dipterocarp species). There is also lack of definition of which group of species within the NTFP is the priority one and for what reason, i.e., which group of CWR species is to be selected to work with and for which reasons.

If the experience with the Bolivian group the Panel interviewed in La Paz reflects to some extent the status of the other 4 countries involved in this Global Project to produce a global *in situ* CWR conservation manual, then it becomes difficult to think that the goals set in this project will be achieved in the time and form they have been presented. The Panel noted a limited scientific leadership and lack of well defined vision of goals in the Bolivian team, in addition to the difficulties faced by that group vis-à-vis the various in-country instabilities with governmental organizations.

Relevance and quality of partners chosen, choice and design of projects, objectives, activities

The form in which these goals and strategies are expressed (something which is not exclusive to this Focus Area) transmits an impression of being very broad and ambitious. For example, FA 4

states that its goal is to focus on the diversity of socioeconomically important wild plant species that are either underutilized or threatened by overexploitation, conversion or degradation of natural ecosystems, climate change, or invasive species. This is almost a complete compendium of all the drivers of change that affect biodiversity in the planet and an enormous universe of species to choose from. Conserving and using NTFP's (*sensu lato*) is another overambitious goal. Finally as the Focus Area states "The project major goal is to contribute to the effective conservation and enhanced sustainable use of the diversity within and among wild plant species of importance to rural livelihoods, agriculture and forestry in developing countries". The list of such species is simply huge; several thousand useful species are recorded only for countries like India, China and Mexico. Obviously this is the universe within which the Focus Area will select some species, but the message one receives at reading this presentation is that the specific interest of the Focus Area is not defined. FA 4 needs to focus clearly on the group of species (be it forest trees, NTFP's or Crop Wild Relatives) and the systems or localities on which it will choose to initiate its work.

Quality and relevance of outputs, outcomes, impacts

It is rather difficult to assess the overall relevance of outputs, outcomes and impacts of a number of seemingly disconnected projects and studies. Some of the results coming from the studies are surely interesting in relation to understanding aspects of the genetics, biology or ecology of the species object of the studies, provided those studies have continuity, as seems to be the case of bamboos and rattans.

4.4.6 Constraints, Areas for Improvement

The Panel notes that the project has lacked for most of the reporting period a full time Project Coordinator, including up to the present. Senior scientists in this project worked across several projects, which resulted in dilution of focus and energy. The lack of human resources has placed an added burden on staff to maintain performance in terms of activities and achievements, as well as less time for project planning, execution of plans when made, and identification of activity areas and funding opportunities.

4.4.7 Conclusions and Recommendations

The topics on which FA 4 has worked are very important but they also represent a very broad range of thematic areas, to the degree that the staff of the Focus Area recognize this as a constraint.

There is a mixed level of quality and relevance on the research and studies carried out which may also result from the thematic and geographic dispersion of the FA. While several contributions like the collaborative project with DANIDA on forest seed preservation have had important research and practical outputs, other components look, at least relatively, more modest in scientific and practical relevance, like the work on tropical pine plantations.

For this Focus Area the lack of leadership, both formal and conceptual requires correcting. Also the areas in which it will focus its attention need to be reconsidered and careful choices made about the relevant partners with whom to carry out their work. This may be particularly relevant since the current CGIAR reorganization and the concurrent development of the State of the World's FGR Report are creating a new impetus and it is an opportunity to show how the CGIAR system can most effectively contribute to the conservation and sustainable use of the genetic resources of forest and other wild species in the future.

The Panel recommends that the work in Forests and Wild Crop Relatives be re-formulated and managed under a project coordinator to correct what now appears to comprise an unconnected list of species, localities and approaches.

Also the Panel noted synergies between two areas of work that appeared unconnected in Bioversity.

The Panel recommends that greater cohesion be established between the studies on wild crop relatives in FA 4 and the neglected and under utilized species in FA 3.

4.5 Focus Area 5. International Collaboration on Conservation and Use of Agricultural Biodiversity

4.5.1 Rationale/Justification for Initiative

Within the framework of the CGIAR, it is critical that a center is able to achieve effective and sustained international cooperation to effectively acquire, conserve and utilize global biological diversity in order to enhance world agriculture and forestry, and make these sectors more productive and sustainable. Success of this process is incumbent on reliable access to plant, animal, aquatic and microbial genetic resources. Bioversity works toward achieving this success through research, networks and facilitation in the international arena.

International collaboration is one of the hallmarks of Bioversity's activities, and it is a growing area in the evolution of Bioversity's future focus. For example, three critical areas of partnership and collaboration are in the development of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) and its Multilateral System for Access and Benefits Sharing (MLS) and the Global Crop Diversity Trust (Trust). This work is now being conducted within the components of the CGIAR SGRP that is hosted by Bioversity, the Global Partnerships Program (GPP) which coordinates international collaboration, including participation in crop and regional networks and international meetings. GPP also provides the home to the Global Facilitation Unit on Underutilized Crops (GFU) and the Platform for Agro-biodiversity Research (PAR). GPP and two Research and Support Units (RSUs), Capacity Development Unit (CDU) and the Public Awareness Unit (PAU), together with colleagues in the regional offices, oversee most of the organization's international collaboration activities. The research projects in this focus area are Biodiversity Informatics (F07), Policy and Law (F08), and Strengthening global systems for conservation and use of genetic resources (F09). The Panel sees the overarching goal of Focus Area 5 as establishing an effective global system supporting the conservation and use of agro-biodiversity through support activities on policies, genetic resources information systems and raising awareness.

4.5.2 Strategy, Objectives, Activities, Resources

The six principal areas of activity in FA 5 are aligned to the specific projects and/or research support units. As described by the GPP, these areas are:

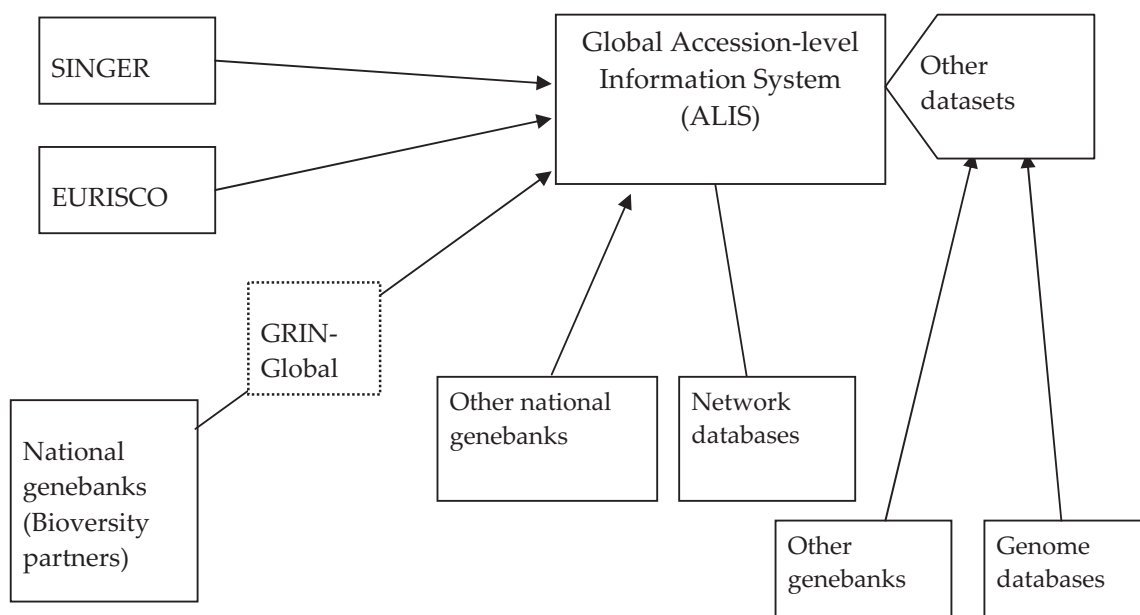
1. Global information systems; by supporting the development of global information systems. It involves providing data on material conserved *ex situ* and the terms under which it can be used and distributed.
2. Informing and influencing international agendas; by providing information and technical input and background, supporting the development of specific international programs and activities, and participating in international meetings and discussions.

3. Policy and Law; by undertaking research, capacity building and advocacy, that support the development and implementation of effective genetic resource polices at the levels of the CGIAR system, internationally, and within countries.
4. Research; by analyzing the ways in which different elements of the developing global system perform and identifying their strengths and weaknesses in respect of the desired objectives.
5. Public awareness; by ensuring that the public and stakeholders understand the justification for and importance of global efforts to conserve and use agricultural biodiversity.
6. Capacity development; by helping those involved in genetic resources conservation and use to play a fuller part in the developing global system.

Each of these areas will be addressed relative to the associated project and/or system-wide unit.

Project F07: Biodiversity Informatics.

This project aims to improve the global management of, access to, and use of plant genetic resources information at the accession level through an international standardized information gathering and management system. Also important is the support of facilitated use, exchange and access and capacity building. The assembled information plays a major role in the effective conservation and use of plant genetic resources by facilitating efficient collaboration between genebanks holding complementary collections, and by enabling a wide array of users to access information on germplasm held in different genebank collections. Project activities include: documentation of all aspects of accessions in national collections; documentation at the broader regional levels, including regional, crop-specific and global information systems and networks, and institution-level databases; and, supporting data analysis, including methods in statistical analysis, spatial analysis and application of GIS tools. Significantly, the historical global information component, the Systemwide Information Network on Genetic Resources (SINGER), is managed and coordinated through Bioversity. A major emphasis is on the development of the more inclusive global data management with the Global Accession Level Information System (Global-ALIS) and the participation of the USDA, ARS, GRIN data base unit in the development of GRIN-Global, which is a project in partnership with the Trust, to assemble the Germplasm Information on Germplasm Accessions (GIGA) database.



Project F08: Policy and Law

The Policy and Law group contribute to genetic resources policy development at global, regional, national, and CGIAR system-wide levels. Thus, it is listed as a project, but also as a Research Support Unit. Work is conducted at the international level primarily on behalf of the SGRP, through which Project staff represent the CGIAR at meetings of the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), the United Nations Food and Agriculture Organization's Commission on Genetic Resources for Food and Agriculture (CGRFA), the Convention on Biological Diversity (CBD), and the World Intellectual Property Organization (WIPO). The Project's system-wide work is provided through SGRP, the CGIAR Genetic Resources Policy Committee (GRPC) and the Central Advisory Service on Intellectual Property (CAS-IP), through which it coordinates development of system-wide policies and related legal instruments relevant to the management, collection and distribution of genetic resources for food and agriculture (GRFA), and assists Centers with IP management, and technology transfer. At regional and national levels, the Project supports partners in participatory research (and related capacity-building) to develop policies that encourage uses of GRFA to assist the poor.

In addition to supporting Bioversity and the CGIAR, the team works on developing language for laws, policies, practices and legal instruments to support development of the global system of conservation and use of plant genetic resources, and issues concerning management of farm animal and agricultural microbial genetic resources. The Panel notes the importance of Bioversity's pivotal role in the progress of the IR, CBD and other PGR related policy and law, as well as the importance of broadening Bioversity's policy activities into other GRFA policy areas, such as those related to genetic resources of other agricultural life forms.

Project F09: Strengthening global systems for conservation and use of genetic resources

This is a broad reaching project that contributes to the development of more effective global and regional collaboration on conservation and use of agricultural biodiversity. It supports the continued development of international programs, plans and initiatives that are part of global systems of conservation and use of genetic resources.

The three main elements are: 1. Analysis to determine strengths and weaknesses in existing global systems, opportunities and mechanisms for improved collaboration, and improved regional and global conservation strategies; 2. Provide inputs to global and regional processes, organizations and networks to ensure appropriate recognition of agricultural biodiversity conservation, including appropriate awareness raising and capacity building activities; 3. Support various organizations and mechanisms, such as networks, that support global conservation systems.

It is through this project that Bioversity serves to host the GFU on Underutilized Species of the Global Forum on Agricultural Research (GFAR), and the PAR, as well as hosting the SGRP. Also, it is through this project that Bioversity supports the Trust. Lastly, the Project initiates and/or coordinates regional collaborative actions to facilitate the implementation of regional strategies and policies at the national level.

System-wide Genetic Resources Program (SGRP)

The SGRP is a way by which the CG system is collectively represented on issues relating to the conservation and sustainable management of genetic resources. This system-wide program has been hosted at Bioversity since its inception, and Bioversity provides both leadership and

coordination of the program. The SGRP is the largest and unquestionably the most significant of the CGIAR hosted programs. It is funded primarily from the World Bank and the Swiss government. The Panel recognizes that the role of Bioversity in the SGRP has been and continues to be critical. Bioversity offers a strategic location, support by providing office space and support staff, and most importantly, in-house expertise on conservation of plant genetic resources. SGRP utilizes the GPP as a conduit to carry out activities in conservation and sustainable use of plant genetic resources. Thus it is being covered with the GPP section of the EPMR report. Bioversity also provides organizational input, and there is an active role taken by the Bioversity DG in representing the SGRP at international meetings. SGRP is integral in the Global Public Goods projects (GPG I & 2), and these are coordinated out of Bioversity.

The SGRP is a functional mechanism for undertaking and coordinating major projects, in concert with other centers and partners, and has a special relationship with the PAR, which originated from a SGRP initiative.

Platform for Agro-biodiversity Research (PAR)

One aim of Bioversity is to develop a more holistic, integrated and collaborative approach to progress the efforts in plant genetic resource conservation. The PAR serves to promote and/or identify research ideas, and then provide information to stakeholders. The objective is to provide a neutral space where governments, international and national research institutes, civil society organization and the private sector can come together to discuss important issues related to agricultural biodiversity. The content of the PAR program of work is evolving over time. The GPP reports that ultimately priority areas will include topics such as management, policy and practice of biodiversity conservation to address hunger, malnutrition, desertification, climate change and emerging diseases of global significance. The work of the PAR is overseen by a Steering Committee selected by Platform partners. The Platform is hosted by Bioversity International, and operates with a secretariat based in Rome, Italy, and one in Nairobi, Kenya. The PAR website is now operational, and the site provides information on current events and on the work being done by other organizations and other related activities.

Global Facilitation Unit for Underutilized Species (GFU)

The GFU was established as a project in 2002 with the financial support of the German Government, and it has been hosted at Bioversity because of GFU thematic affinity and strong commitment to working on species neglected by other institutions. The current GFU funding comes to an end in 2009. A major challenge will be to promote the continuation and strengthening of Bioversity partnerships to work on the strategic areas of NUS. The Panel considers that these species are important in the reduction of poverty and hunger alleviation, crop diversification and adaptation to climate change and Bioversity involvement in this area needs to continue and be strengthened wherever possible. The Panel looked closely at the numerous sub-objectives to this project and feels that Bioversity needs to address the comprehensive issue of 'wild' plant species used in subsistence farming systems.

4.5.3 Major Outputs, Outcomes and Impacts

Project F07: Biodiversity informatics

Outputs

SINGER, the entry point to information on the CGIAR in-trust collections, has been strengthened through the release of a new web site improving the visibility and accessibility of the information

on germplasm held in CG genebanks. A new development is Germplasm Ordering Gateway for users to select germplasm of interest and send their order to the germplasm providers.

Using SINGER as a model, Bioversity, in collaboration with the European Cooperative Programme for Plant Genetic Resources (ECPGR), supported the establishment of the European Search Catalogue (EURISCO).

Bioversity initiated the design of a global accession level information structure based on its previous experience in collaboratively developing the SINGER and (subsequently) EURISCO systems, as model information sharing networks. This global system will also include information from the Plant Genetic Resources Information Network (USDA-GRIN) and other major genebanks worldwide. These initiatives are being lead by Bioversity, in partnership with the Global Crop Diversity Trust and the Secretariat of the ITPGRFA, in a joint project.

In the European region, a strategic framework for the establishment of a virtual European Genebank of genetically unique and important accessions has been created through the AEGIS project within the framework of ECP/GR.

Outcomes, Impacts

With Bioversity in the position to coalesce information provided by all of the CGIAR Centers, a world information resource was created. By developing, testing and implementing SINGER, Bioversity has produced a model for other biodiversity information systems.

The creation of an integrated network of biodiversity information systems contributes to establishing an even broader global information system, which is seen as an essential component of a global system for plant genetic resources for food and agriculture. This resulted in the assembly of the Global Accession Level Information System (Global-ALIS), and the development of GRIN- Global to assemble the GIGA.

Project F08: Policy and Law

Outputs

In advance of the second session of the Governing Body of the IT, Bioversity, through SGRP and the GRPC, led an effort to obtain a system-wide recommendation that the Governing Body should decide that the Centers would use the SMTA for non-Annex 1 materials. The Governing Body ultimately decided in line with the Centers recommendation.

After a wide range of activities and communications over the course of two years, Bioversity staff prepared a position statement to be submitted to the Second Session of the Governing Body. This was circulated for approval to the AE, and finally, submitted to the Secretariat of the Governing Body. Bioversity has continually emphasized the administrative efficacy of being allowed to use the SMTA for non-Annex 1 materials.

Bioversity coordinated the process of developing the Agreements between the CGIAR Centers and the Governing Body of the Treaty pursuant to Article 15 of the Treaty.

The development of system-wide policies, legal instruments and practices conducive to the proper management and use of genetic resources for food and agriculture and intellectual assets, consistent with the international legal framework (SGRP, CAS-IP).

Technical and process-based contributions made support the development of regional and national policies.

Outcomes and Impacts

There has been an excellent track record of the Centers using and respecting the interim MTA, and a system-wide position with respect to the best outcome of the Governing Body's amendment of the interim MTA.

Other key outcomes/impacts include:

- Inclusion in the SMTA of provisions that encourage developing countries to believe in and be generally positive about, the International Treaty's multilateral system of access and benefit sharing.
- Bioversity focused significant resources for international policy work on supporting the national institutions with the implementation of the ITPGRFA and related provisions of the CBD.
- Under the SGRP over the last two years the F08 project developed a series of policy briefs for submission to the CBD concerning the special nature of GRFA, and why they should not be swept inadvertently into the norms developed for other forms of GRs under the evolving CBD ABS framework.
- All eleven CGIAR Centers signed Agreements with the Governing Body by October 16, 2007 and agreement on the interpretive statement by the Centers.
- The Bioversity annual magazine for non-technical audiences, "Geneflow", is read by policy-makers and the media in 186 countries. An article in the 2005 issue of Geneflow about the Svalbard Seed Vault prompted a request from the New Scientist for further information and contacts. The article that resulted from this request, entitled 'The Doomsday Vault', sparked off massive global media coverage of Svalbard and the Trust that continues to this day. Geneflow won a Gold Award from the Association for Communications Excellence in 2007, a Silver Award in 2006, and a Bronze Award in 2003.
- Implementation of system-wide policies, legal instruments and practices conducive to the proper management and use of genetic resources for food and agriculture and intellectual assets.
- Implementation of technical and process-based contributions were made to support the development of regional and national policies.

Project F09: Strengthening global systems for conservation and use of genetic resources

Outputs

Key outputs from this project include:

- Development, establishment of, and subsequent move to FAO of the Global Crop Diversity Trust.
- Information provided to selected international agendas on the importance of the maintenance and use of biodiversity (coordinated with SGRP). This output seeks to ensure that CGIAR and SGRP perspectives are reflected in international meetings.

- Operations, mechanisms and frameworks were established or supported that strengthen the conservation and use of genetic resources. These include regional networks that enhance collaboration and information exchange, and strengthen country capacities to participate in the global system and benefit from SGRP collections. They also include facilitation mechanisms such as PAR, which link CGIAR research work to wider communities of researchers and users.
- The research effort that was mounted into the risk of the introgression of transgenes into CGIAR *ex situ* collections provided a basis for the adoption and implementation of agreed standards for management of materials.
- A major initiative under the auspices of SGRP has been the Global Public Goods Rehabilitation Phase 1, which ended in 2006.

Outcomes and Impacts

The Trust has since taken its place as an independent player in the worldwide effort to conserve and better use plant genetic resources, and is supporting national and regional *ex situ* conservation efforts in line with the Global Plan of Action. The Trust operates within the policy framework of the IT and is an essential element of the IT's funding strategy. The development of the Trust has been supported throughout the last five years by Bioversity who, with FAO, have provided the necessary hosting arrangements, have overseen the development of appropriate constitutional and legal operating framework, and provided technical inputs.

International agendas were informed and influenced on the importance of the maintenance and use of biodiversity which ensured that CGIAR and SGRP perspectives were reflected in international meetings.

Analyses and strategies made available that inform development and operation of global systems for conservation and use of genetic resources.

As a result of the work on the Global Public Goods Rehabilitation Phase 1, the project improved storage facilities at all CGIAR genebanks, ensured safety duplication of 190,000 accessions, reduced processing backlogs by 400,000 accessions, improved regeneration facilities at nine Centers, and characterized over 80,000 accessions at six Centers. A second phase of the project, SGRP's GPG2 Project was initiated in 2007.

Beginning in 2003, the Trust promoted the development of regional and crop conservation strategies to assist in its efforts to identify collections for funding priority. Strategies have been completed for 20 crops and 9 regions. Bioversity staff have been heavily involved in facilitating the strategy development process, most often through regional and crop networks.

Systemwide Genetic Resources Programme (SGRP)

Outputs

Key outputs of the SGRP include:

- System-wide policies and practices for managing, acquiring and making available genetic resources that are consistent with international agreements concerning the conservation and sustainable use of agricultural, forest and aquatic biodiversity.
- SGRP was integral in developing the initiative Global Public Goods- Phase 1 in 2003, and it terminated in 2006. Subsequently, the GPG-2 was a continuation and started in 2007.

- As part of the world agreements related to plant genetic resources, the SGRP helped to orchestrate the inclusion of the plant genetic resources collections to be held in-trust by the CGIAR Centers.
- SGRP has played a significant roll in the coordination and development of SINGER by interfacing with Centers and donors. Knowledge, technologies and information about agricultural, forest and aquatic biodiversity were delivered by the partners.
- Through SGRP, Bioversity has promoted the EURISCO model in other regions as part of a process to establish regional databases of national genetic resources inventories.
- Awareness raising and technical contributions that support the development of international policies, processes and programs concerning the conservation and sustainable use of agricultural, forest and aquatic biodiversity.

Outcomes

Major outcomes of this project were:

- International agendas were informed and influenced on the importance of the maintenance and use of biodiversity (coordinated with SGRP). This will help ensure that CGIAR and SGRP perspectives are reflected in international meetings.
- The success of GPG 1 led to the continuation of the initiative to establish GPG - Phase 2: Consolidation, research and leadership. This initiative runs from 2007-2009. The Project's second phase builds on the collaborative effort that made Phase 1 so successful. As part of the SGRP GPG2 Project, Bioversity has articulated a project for the development of global crop registries for at least eight crops. The project is now fully funded and underway.

Outcomes from at least three of the Bioversity programs are closely linked to activities of the SGRP. It is this unit that ties Bioversity to the rest of the CGIAR, and is the connection to international activities, treaties, agreements, meetings, etc.

Global Facilitation Unit on Underutilized Crops (GFU)

Outputs

Several key outputs of the GFU were identified by the Panel:

- Development of a web portal that represents a gateway to all relevant information about underutilized species and related themes.
- Publications on policy aspects of the conservation and use of underutilized species and on the influence of regulatory frameworks.
- Together with its partners, recommendations to the European Commission for an amendment to the European Novel Food Regulation, which in its current form represents a non-tariff barrier to trade with most traditional food products from developing countries.
- A major documentary produced in 2008 in collaboration with TVE (Television Trust for the Environment) and broadcast by BBC World on the topic of neglected species. The documentary, entitled 'Forgotten Fruits', was in part sponsored by the GFU and featured work by Bioversity and the MS Swaminathan Foundation.

Outcomes

The work of the GFU has led to an increased recognition of the values of underutilized plant species among researchers, consumers, policy-makers and donor agencies. Thus, underutilized species now feature more prominently in the CGIAR Science Council Priorities.

Specific initiatives supported by GFU, such as the development of the Chennai Declaration, have significantly increased the visibility of neglected and underutilized species and have led to a recognition of their potential significance in addressing nutritional problems and improving the livelihoods of the rural poor.

4.5.4 Future Directions

The combined components of this Focus Area plan to strengthen collaboration with the United Nations Educational, Scientific and Cultural Organization (UNESCO), and the United Nations Environment Programme (UNEP) around defined work programs and objectives to ensure greater recognition of agricultural biodiversity.

A defined and ongoing program of work with the Commission on Genetic Resources for Food and Agriculture (the Commission) is continuing in support of the different elements of its Multi-Year Plan of Work MYPOW.

Bioversity has established a new department of Communications, and have hired a Director to lead the Communications program. Three groups have been rolled into the Communications team; Public Awareness, Information Marketing and Management and Public Relations.

Based on the information presented to the EPMP on activities in Public Awareness, the Diversity for Life campaign is proposed to have a high profile presence at major events over the next two years, culminating in COP10 in October 2010 where the campaign will have a pavilion and host a series of events throughout the COP meeting. Also, in May 2010, Bioversity will host the *Settimana della Biodiversità*, a week long festival in Rome devoted to the topic of agricultural biodiversity.

Within the policy area they expect to facilitate the following: 1) the adoption of a system-wide policy concerning the management of, and access to, Centers' intellectual assets (including improved germplasm); 2) Work toward getting fifteen countries to implement the multilateral system of the Treaty, and as a result provide a much wider scope of material to be accessible through the MLS; and 3) Induce the international community to decide to develop access and benefit-sharing norms for genetic resources for food and agriculture on a sectoral basis.

The current global information system initiative has identified very significant short term objectives which include: By 2010, agreed characterization and evaluation data standards will be produced for 22 crops. This future goal would also be related to FA 3. By 2011, deployment of GRIN-Global (USDA-ARS system) in at least 25 genebanks world-wide and a helpdesk is established to facilitate the adoption of GRIN-Global; By 2011, "Global Accession Level Information System (Global-ALIS)" will provide access to at least 2.5 million records of accessions from SINGER, EURISCO and the GRIN.

Over the next 4-5 years significantly more research is expected to be under way on the global system. This is likely to include work on: whether the existence of Annex 1 results in further marginalization of neglected and underutilized crops not included in the Annex; the ways in which duplication and redundancy can be best managed from conservation and user

perspectives; and, the optimal use of different mechanisms for collaboration with the global system.

In addition to the work developing from the GPG2 project, SGRP is likely to emphasize work on non-crop genetic resources and the development of closer links with national genetic resources programs and activities. SGRP will seek to provide an appropriate collaborative contribution for animal, forestry, aquatic and microbial resources within the system as it has provided for crops, taking account of the very different nature of these resources.

SGRP will also support strengthened linkages between national and Center genebanks and plant genetic resources activities. Crop and regional conservation strategies developed over the last five years with support from the Trust and inputs from Bioversity provide a first step in this area.

In the immediate future Bioversity is likely to focus its work with regional networks in two specific areas: 1) Strengthening cooperation and collaboration among the regional and crop networks and the CGIAR Centers.; and, 2) Supporting further development and implementation of regional genetic resources conservation and use strategies. The panel agrees that a supportive role from Bioversity seems to be justified.

4.5.5 Overall Assessment

Relevance of choice of research area

This Focus Area comprises a wide range of disciplines focused on the singular goal of enhancing the international collaboration on the conservation and use of agricultural biodiversity. The assemblage of skills for team building in information management, legislative/ policy implementation, and facilitation and network development on an international scale is unique to Bioversity in the CGIAR.

Based on outputs and outcomes relative to these projects, Bioversity is positioned as the best, if not the only center in the consortium that can ideally fulfill the functions of: 1) Global information assembly and management; and, 2). Development of policy language and instruments that have broad application across the suite of centers.

The Panel looked closely at the numerous sub-objectives to this project and feels that Bioversity as a whole needs to address and assess the comprehensive issue of wild crop relatives/new and underutilized species/alternative traditional crops/etc. This group of plants has significant value to the poor farmers of the world, but the range of species is not focused on in a cohesive or systematic manner. The species are not represented in Annex 1, nor are they priorities of any of the CGIAR centers. That provides an excellent opportunity for Bioversity to address the global issue of conservation of the 'wild' crop relatives/species.

Relevance and quality of partners chosen, choice and design of projects, objectives, activities

The Panel noted that the activities of the SGRP are highly valued and commended by CG Centers and partners of Bioversity. The Panel commends the work of the SGRP in supporting the negotiations of the Treaty and underlines the important role it should continue to play in supporting implementation of the IT.

The Panel believes that Bioversity has strategically selected the most appropriate partners to develop the GIGA concept and position itself as the main player in deployment and implementation of critical information networks such as SINGER, EUNESCO and GRIN-Global.

The value of the overall program of GPP is in the judicious selection of quality partnerships. The challenge will be to obtain longer term commitments for collaboration or funding.

Quality and relevance of outputs, outcomes, impacts

Within the framework of GPP, Bioversity has generated a number of tangible outputs, many of which have produced accompanying outcomes that have led to plant genetic resource conservation products that have significantly impacted access to global plant genetic resources by the user community. Furthermore, even more substantial outcomes could be expected when considering the possibilities of enhanced utilization of genetic resources when the components of a global information system are deployed.

4.5.6 Constraints, Areas for Improvement

The results of the stakeholder survey and other analyses carried out for the CCER suggested that areas that needed strengthening included support for regional policy work and developing greater awareness among stakeholders of Bioversity's various publications and information products. Intra-regional partnerships also need strengthening through new approaches to effective use of networks.

Resource availability, particularly limited availability of the necessary human resources, as well as lack of funding, was identified as the major weakness. A particular concern was the loss of key technical expertise in areas such as *ex situ* conservation and plant genetics. Other concerns included the perception that Bioversity continues to spread itself too thinly over too many different areas.

The failure of countries to implement the Treaty was seen as the major threat to Bioversity, and the work being done in this area. There was also a clear concern that the importance of SGRP would not be fully recognized and that the various mechanisms supported by Bioversity (GFU, PAR, regional networks) would be undervalued. The need for Bioversity to continue to provide partners with support and backstopping in key areas was also noted and there was a concern that this might become more limited in future.

There is a need to support the further development of SGRP. In the new CGIAR this may become the major vehicle for the CGIAR's contribution to international collaboration and it has already demonstrated very clearly the ability of Centers to work together and helped realize the benefits that come from a system approach. The changing nature of the CGIAR needs to ensure that SGRP emerges further strengthened.

The Panel suspects that the CCER recommendation for FA 5 to broaden its vision concerning biodiversity and human well-being may have inspired the GPP to broaden its agenda too far, and has thus extended its program beyond the efficient and economical constraints of existing resources.

Developing a greater research role is a major objective of the Focus Area over the next few years and creating the capacity, partnerships, linkages and resources to do this will be crucial. Within this area of work, the identification of the key research questions and the development of appropriate research methodologies will be extremely important. There will need to be very substantial exploration of the questions of relationships and causality (what effects can be truly attributed to Treaty implementation for example). There will also need to be deployment of sufficient resources to make an in depth contribution to research.

4.5.7 Conclusions and Recommendations

Bioversity contributions in bioinformatics should continue to emphasize and facilitate increased inter-operability, standards and linkages among global biodiversity information systems. In addition to continuing its vital roles in the collaborative development of major information systems, such as SINGER, the Global Information System of the ITPGRFA and the emerging Global Accession Level Information System (ALIS), Bioversity should seek additional resources and partnerships to broaden its bioinformatics activities and partnerships.

The Panel recommends that as bioinformatics needs and opportunities expand further, the Center step up its investment to ensure that the global community gains maximum benefit from the ex situ collections and the knowledge associated with them.

Bioversity should strengthen its established partnerships and continue relevant contributions in the arena of PGR policy research, provision of information and capacity building, and if stable and long term funding and secure collaboration becomes available, they should broaden policy activities to cover other genetic resources.

The Panel supports the CCER recommendation that Bioversity should continue a regional presence and well-supported regional activities under FA5 and related areas, with particular attention to collaboration with and support to networks and emerging nodal genetic resources centers, for advancing the conservation and use of genetic resources at regional and national levels.

In order to continue and to expand systematically its contributions to regional and national capacity building in support of conservation and use of genetic resources, and particularly to assist implementation of the ITPGRFA, Bioversity should seek additional resources and make longer-term plans, covering a broad range of capacity building and target audiences. This should parallel the longer-term perspectives and broadened activities recommended throughout FA5, including the development of multi-lingual training modules at the interface of public awareness and capacity building.

Bioversity should prioritize further development of the SGRP, through an expanded portfolio of SGRP projects and partnerships, developed in concert with other CGIAR Centers. This is even more important in light of the changes projected in the CGIAR framework of the future. SGRP could and maybe should evolve into a megaprogram in its own right.

The PAR looks promising, although it is still a new program. However, the Panel recognizes its potential for identifying research gaps and facilitating well prioritized and effective collaborative research on agricultural biodiversity. Bioversity should continue to support development.

The Panel recognizes the excellent work done by Bioversity in support of the FAO negotiation of the ITPGRFA and the importance of continuing Bioversity's support of it and its MLS on Access and Benefit Sharing. Bioversity needs to find its future niche that will integrate smoothly with the activities of the ITPGRFA Secretariat at FAO.

4.6 Focus Area 6. Monitoring the status and trends of useful Diversity and Valuation of Agro-biodiversity

4.6.1 Rationale/justification for Initiative

Economic valuation of ecological functions and attributes of ecosystems have been investigated for more than a decade by academic entities and even some governments. However, the

consequences of the *loss* of agricultural biodiversity associated mainly with agricultural intensification and monocultural agroecosystems has received little attention. Now the potential effects of climate changes are adding to the concerns over changes in ecosystems.

In order to achieve adequate cost-effective interventions in agricultural production and its associated policies, new tools and better valuation of the services and benefits are necessary. Bioversity can play a useful role in this. Equally, the task of evaluating and monitoring loss of genetic diversity ought to be a central activity in the future development of Bioversity.

4.6.2 Objectives, Strategies, Activities, Resources

This Focus Area emphasizes:

- Monitoring the loss of Biological diversity both in crops and production systems to understand its status, the trends, the drivers of change and
- Valuing the services and benefits derived from such diversity, noting that Bioversity has recognized the need for assessing both the direct and indirect values of agro-biodiversity and its ecosystem services.

This is a relatively new Focal Area working on the above mentioned topics which have been a focus of attention in Bioversity and the CG system for some time now.

In the panel's opinion, the importance of this issue will increase in the future and should be placed in the "heart of the debate" of climate change effects and the need for including agricultural biodiversity conservation and climate change adaptation as well as generating mitigation measures and policies.

It is clear from the information provided, that documenting and measuring the erosion of genetic diversity and providing improved economic valuation methods – based on tangible results – should be directed toward public policy making. The incorporation of results and methods on agro-biodiversity conservation, use and erosion constitutes a real challenge as it deals with different sectorial national and regional policies.

If Bioversity decides to seriously contribute to the valuation of agro-biodiversity, there is a need to design/define clear "channels" of communication at the different levels and between the national, regional and global levels. It also needs to generate indicators in order to define its path to impact.

From the Focus Area Overview, it is clear that "knowledge of the extent, distribution and value of genetic resources to improve the sustainable conservation and use of agricultural biodiversity" is being recognized by several international initiatives¹. There is a specific request from the CBD for Bioversity to play a leading role in refining the biodiversity indicators on trends in genetic diversity at the global level. The panel considers that if this is not qualified and defined, it will be an overwhelmingly broad task.

It is mentioned in the description of FA6 that these services and benefits have not been properly quantified and accounted for because many of them "constitute *impure* public goods and have non-market values associated with them". It is true that services that are not given a mainstream

¹ CBD, Global Plan of Action on Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture (GPA-PGRFA), the Global Plan of Action for Animal Genetic Resources (GPA-AnGR) and the ITPGRFA.

social (market) value will not be appreciated and regarded as worthy of attention and investment.

Several issues need to be defined in this Focus Area so as to have a sound and limited agenda. Studies carried out previously by Bioversity and key partners² on valuation constitute an excellent basis to specify elements/focus of the work; among others: the spatial scale of the valuation studies, the usefulness and strategies of the valuation for developing incentives to farmers to promote higher plant diversity (mixing crops), and ways of measuring the insurance value of Biodiversity, etc.

This new Focus Area’s goal is “to ensure that people and institutions are enabled to evaluate, monitor and respond to changes in agricultural biodiversity in order to reduce or prevent its loss”. The document “Bioversity in focus” delineates the following outcomes and outputs:

Expected outcomes	Expected outputs
Policy decisions based on sound information and allowing for the accomplishment of countries obligations under the various agreements.	1. Tools for capturing values of agro-biodiversity and assessing the status and trends of genetic diversity and monitoring its erosion over space and time in crop and forage systems made available and applied at local, national and regional levels.
	2. Economic valuation and trends of genetic diversity of target crops and wild species of socioeconomic importance (in particular banana and coconut) made available.
	3. National agricultural research systems, especially of developing countries, trained in the use of tools for assessing and monitoring the status and erosion of genetic diversity
	4. Policy analyses (including policies’ roles as drivers of genetic erosion)
	5. Contribution to the implementation of international conventions and treaties

The Panel agrees that a major challenge of the Focus Area is that the issues being investigated (i.e. erosion/conservation of agro-biodiversity and determining its value) are very complex and require long time-series of data, which is something that partners, including donors are not used to dealing with. It possesses also an out-of-the-ordinary approach to conservation practices, which in our opinion is very important, albeit challenging.

The ways the outputs and outcomes are defined clearly reflect the need for combining “academic research” with outreach and strong advocacy activities to influence policy decision making.

² In Biodiversity, Agriculture and ecosystem services. Chapter 18. M. Ceroni, S.Liu and R.Costanza “ Ecological and economic roles of biodiversity in agroecosystems”.

Resources

The resources allocated to this Focus Area consist basically of “seed funding” as can be seen in the following table but new grants are under negotiation.

Table 4.9 Total Resources for Focus Area 6

Focus Area 6	2006	2007	2008	2009 projection
		Project F10(US\$ million)		
Total budget	0,303	0,315	0,328	0,513
of which unrestricted	0,303	0,315	0,328	0,513
% unrestricted in relation to total	100%	100%	100%	100%
Project F10-SGRP(US\$ million)				
Total budget	0,086	0,074	0,085	0,085
of which unrestricted	0,086	0,074	0,085	0,085
% unrestricted in relation to total	100%	100%	100%	100%
Total Focus Area 6 (US\$ million)	0,389	0,389	0,413	0,598
Of which unrestricted	0,389	0,389	0,413	0,598
Unrestricted as % to total	100%	100%	100%	100%
Total Focus Area in relation to total Biodiversity budget (%)	1%	1%	1%	2%

4.6.3 Major Outputs, Outcomes and Impacts

Because this Area is new, the level of publications of the Focus Area staff (which accounts for 4.0 equivalent full time staff) is low, compared to the other Areas, especially in peer-reviewed journal articles, and in general, all types of peer-reviewed publications.

Table 4.10 Analyses of publication productivity for Focal Area 6

Focus area	6
Staff (in full time equivalents)	4,0
# of (Thomson-index) PR journal articles	8
avg # of (Thomas-index) PR journal articles (staff/year)	0,3
# of all types of PR publications	15,0
avg # of all types of PR publications (staff/year)	0,6

Prior to the formal creation of this Focus Area, Biodiversity has been “block-building”, developing activities of economic evaluation and identification and analysis of benefits generated from agro biodiversity management for the farmers. Several of these activities have been carried out

amongst others, in a partnership between Bioversity and IFPRI. Some high quality publications referred to “the state of the art” in valuation economics have been developed. Some of the most relevant ones are found in “Valuing Crop Biodiversity: on farm genetic resources and economic change” and “Managing Biodiversity in agricultural ecosystems”³.

The work done in the past with plant genetic diversity and erosion of various species (pistachio papayas, cherimoya, passion fruit and cassava) of which only one is a staple serves as templates and methodological references to achieve the goals stated above. It is therefore of considerable significance.

The participation of Bioversity with UNEP/GEF in achieving the biodiversity targets for reducing loss of biodiversity by 2010 is cited as an ongoing activity. What has resulted until now in reduction of loss of biodiversity is anything but stimulating; many researchers of biodiversity consider those initial goals as misconceived and utopist. This scenario does not necessarily include the work done on knowing the trends of change in domesticated plants, animals or fishes of economic importance that is done in collaboration with FAO.

Another project is the work done regarding the Global Strategy for Plant Conservation which has 16 targets of which Bioversity is collaborating in the following 5:

- i) At least 30 per cent of production lands managed consistent with the conservation of plant diversity; *
- ii) 60 per cent of threatened plant species in accessible *ex situ* collections, preferably in the country of origin, and 10 per cent of them included in recovery and restoration programs; *
- iii) 70 per cent of the genetic diversity of crops and other major socio-economically valuable plant species conserved, and associated indigenous and local knowledge maintained; *
- iv) 30 per cent of plant-based products derived from sources that are sustainably managed; *
- v) The decline of plant resources, and associated indigenous and local knowledge, innovations and practices that support sustainable livelihoods, local food security and health care, halted.

It is quite obvious that none of these targets are achievable by 2010, so much so that the CBD has issued a notification in April 2009, indicating that the GSPC will go beyond 2010. Clearly, these targets constitute an important recognition of the importance of conservation of biodiversity in general and of agro-biodiversity in particular, and should be taken as a framework for studies and research that permit advances in each of the targets. Bioversity as part of the CGIAR system is committed to the betterment of the well-being of poor populations; this therefore commits Bioversity to contributing to such goals. However, care should be taken to progress along those targets in a very well planned way and a realistic time-frame in order to consolidate information that can be applicable to real situations for the benefit of both commercial as well as non commercial rural agricultural activities.

³ Edited by M.Smale. 2006;

A third area of activity of FA 6 is a project on Payment of Agricultural Biodiversity Conservation Services (PACS) which is funded by the Syngenta Foundation, an agri-business company interested in sustainable agriculture. This work is linked to Bioversity's IFAD project on NUS.

The fourth area of activity is in the animal genetic resources (AnGR) field in which the use of stated preference choice experiments is to be applied. The choice experiment techniques will be used to address issues related to the importance of disease and pest (DP) resistance relative to other traits, The degree to which DP resistance may be a trade-off with other traits, and how different household types have different preferences for DP resistance will be explored.

It is too early for identifying outcomes. In particular, because most of the above mentioned outputs (publications) and the activities were not designed to involve policy decision makers from the beginning of project implementation. Influencing decision makers require significant efforts to motivate them in this type of analysis and for them to adopt the results. Nevertheless, from the interviews with staff the Panel learned that the development of the case studies in economic valuation has led to the strengthening of capacities to use the evaluation tools in many countries where they have been deployed.

4.6.4 Future Directions

In FA 6 Bioversity is planning to develop guidelines, indicators, methodologies and tools that are urgently needed for the evaluation and monitoring of genetic diversity, and to assess economic values in *ex situ*, on farm and in wild environments.

Bioversity is also planning to work with its partners to apply the indicators, with case studies, at the national and regional levels for a number of target crops and livestock, as well as at the global level for CGIAR mandated crops and animal species. Additionally, Bioversity proposes to evaluate agricultural biodiversity to enable better decision-making for the efficient allocation of resources to plant and animal genetic resources. This should enhance the NARS capacities to monitor the changing status and trends of diversity in their respective countries.

The Focus Area staff recognize that the large opportunity comes from genetic erosion being increasingly appreciated as a globally important issue, and that collaboration is planned to be strengthened with a large number of institutions (such as IUCN, IFPRI as well as other international agricultural research organizations and universities) on the area of status and trends of the non-market value of agro-biodiversity, with a broader global perspective to strengthen greatly Bioversity's initiative. The Panel believes there is a need to identify "key" regional and national partners really interested in these issues to ensure that the activities do not remain only at "global level".

4.6.5 Overall Assessments

Relevance of research area, partners chosen and objectives

The main way to overcome the above mentioned challenges is to set a realistic plan of work that will provide results that are not only conceptually credible, but applicable to specific situations. If a lead role is expected to be exerted by Bioversity, this will require either a very large staff, similar to those at large academic institutions, or an impressive capacity to engage with various partners in different countries and to coordinate their work in a very efficient modality. The inclusion of domestic animals is a new element which the Panel thinks amplifies unpredictably the work that Bioversity has carried until now. The Panel view is that it must be clear that the incorporation of this issue is justified only by capitalizing on methodologies, approaches and

experiences from other centers and partners specialized in these types of evaluation in animal production.

Bioversity, and maybe the CGIAR system, should become efficient catalysts to trigger a sound scientific movement on the issue of genetic erosion at a global scale. The subject is at the conceptual core of the centers activity. However, it should start in a small way and grow as experience, human capital and international recognition of its work is gained.

It is essential that FA 6 develops the evidence that shows how biodiversity will provide insurance for farmers seeking to increase the stability of the agricultural systems, and will provide “safety nets” against the vagaries of climate and the economy.

One major challenge is the need to involve experienced economists working closely with scientists based in ecology, agronomy and the associated sciences to develop an approach to economic valuation that incorporates the so-called environmental “externalities” of agricultural production systems.

The identification of key partners within the regions would require also planning activities for capacity building, and the clear definition of a strategy to ensure that policy decision-makers are involved and motivated to incorporate the results and methodologies generated.

The project “PACS” is a good example of appropriate design that embodies:

- Using existing project platforms within Bioversity (in this case, the NUS project) to develop and apply valuation methods in concrete situations at a defined scale (farming system in this case).
- Including explicitly the total economic value of the species, variety or breed
- Including the use of the results to provide national policy makers with decision support tools.

However, Bioversity needs to identify who will be in charge of influencing policy decision-makers, among the “traditional” partners of Bioversity in the countries and in the regions. In fact, Bioversity recognizes (see “Main competitors” in Paper B9f) that most of the institutions involved in economic valuation are mostly of academic character and that they have little influence in facilitating policy making changes. In this situation, Bioversity requires strong political support from inside (at the higher management level), and in the Regions.

Finally, the incorporation of animal genetic resources into this Focal Area should be discussed based on the magnitude of the challenges identified previously, on the available resources (scientific, technical and financial) and the perspectives of future fund raising. One could argue that Bioversity’s credibility in such complex issues should be strengthened before getting involved into these new issues.

Quality and relevance of outputs, outcomes and impacts

The FA is too young to have produced substantial outcomes and impacts as stated in 3 above.

4.6.6 Constraints, Areas for Improvement

Based on the analysis made above, the main constraints and areas for improvement are:

- The Center needs to produce a focused agenda, defining concrete steps and strategies to generate the desired outcomes, and to identify partners at different levels

- There needs to be a commitment within the different Focus Areas to ensure that economic valuation and monitoring of genetic erosion will be part of the effort of projects and grants within the organization.
- There needs to be a Coordinator in charge of the component on Monitoring the status and trends of useful diversity.

4.6.7 Conclusions and Recommendations

- The EP MR endorses fully the initiative of the Focus Area 6 to design research based on existing projects in other Focus Areas, taking into account existing strengths and information generated. The main message then of the Panel is to continue developing and applying this approach, which will require strong support from other Focus Areas and from senior management of Bioversity.
- The EP MR suggests that in the short term, a working agenda is set up, to identify in the regions, key stakeholders to be involved in the initiatives and to prioritize them. The EP MR endorses the effort being made to strengthen partnerships with International Universities and Research Centers, as a way of networking according to Bioversity *modus operandi*.
- The Focus Area needs to build on a designated team and in particular to designate a Coordinator for the monitoring of trends of useful diversity.

4.7 System-wide Programs and Hosted Initiatives

These Programs to which Bioversity contributes or Initiatives that Bioversity hosts have not been reviewed in detail in this EP MR. Thus this Report does not contain critical assessment on Bioversity's performance in helping to meet their objectives. However, more extensive appreciation of the activities of ILAC was gathered by the Panel and this is reflected in the notes below. Overall, discussion with other CGIAR Center staff and some stakeholders in the System gave the Panel the impression that Bioversity's efforts and contributions to these programs and initiatives are productive and valued.

4.7.1 CGIAR Systemwide and Ecoregional Programs (SWEPs)

Systemwide Programs emerged within the CGIAR in the early 1990s in response to the perceived need to enhance complementarities across Centers and thereby increase the efficiency of the research in the CGIAR. What emerged were an initial set of eight systemwide and ecoregional programs (SWEPs) focusing on particular research themes and problems common to all or a group of Centers.

There are currently some 15 ongoing SWEPs in the CGIAR. Bioversity is most heavily involved with and is the coordinator of the Systemwide Genetic Resources Program (SGRP). This systemwide program is discussed in Section 4.5. Bioversity's role in coordinating this SWEP is highly appreciated as are many of its contributions. Bioversity is also involved at different levels and to varying degrees with five other SWEPs. These are:

Collective Action and Property Rights (CAPRI): Bioversity is one of many CGIAR Centers along with other institutions collaborating with IFPRI on this SWEP which analyzes and disseminates knowledge about how collective action and property rights can influence natural resource use. Earlier it had been involved in a project with IFPRI on strengthening community institutions supporting the conservation and use of plant genetic resources in Uzbekistan and Turkmenistan.

Participatory Research and Gender Analysis (PRGA): The System-wide program on PGRA develops and promotes methods and organizational approaches for gender-sensitive

participatory research on plant breeding and on management of crops and natural resources. Bioversity is one of 14 centers participating in this program along with over 20 other organizations. Bioversity played a role in participatory plant breeding (PPB) approach to implement on-farm management of agricultural biodiversity. Bioversity provided support to the PRGA recently in developing a concept proposal on the second-generation problems of PPB.

Integrated Pest Management. (SP-IPM) The Systemwide Program on IPM (SP-IPM) addresses research and outreach programs on crop pest management, and does so by combining strengths and expertise of diverse CGIAR centers. Seven Centers collaborate on the SP-IPM and Bioversity is the most recent to join (in 2005). Bioversity has taken a lead role in developing concept notes on seed systems for vegetatively propagated clonal crops in the SSA region and on capacity building on soil and root diseases.

Collaborative Program for Sustainable Agricultural development in Central Asia and the Caucasus (CAC)

The SWEF on the CAC is a consortium of eight NARS, eight CGIAR Centers and three non-CG centers addressing agricultural development issues in Central Asia and Caucasus regions. Bioversity has played a key role in supporting national programs in the conservation and sustainable management of PGR since 1998. The Central Asian and Trans Caucasian Network on Plant Genetic Resources (CATCN-PGR) was established in 1999 for which Bioversity's office in Tashkent has been providing secretariat and technical support. The Regional Strategy for Conservation and Use of PGRFA was developed and endorsed by all countries in the region in 2007. Recently, collaboration between national PGR institutions in CAC countries and the Vavilov Institute (VIR) was re-established. The project, In situ/On farm Conservation and Use of Agricultural Biodiversity (Horticultural Crops and Wild Fruit Species) in Central Asia, started in 2006. Currently, Bioversity has one of the largest shares of the CAC program.

The Amazon Initiative The Amazon Initiative established in 2003 is a consortium of major research and development institutes that was formed to help prevent, reduce and reverse land degradation by promoting policies and technologies for sustainable land management in the region. Bioversity is a founding member of this Initiative and participates in the governance of the Consortium as member of the Steering Committee. Bioversity is also a member of the Technical Steering Committee and has participated in many of the research priority setting exercises.

4.7.2 Special Initiatives

European Cooperative Programme for Plant Genetic Resources (ECPGR) The ECPGR is a network of European countries seeking to facilitate conservation and use of PGRFA through increasing cooperation, joint activities and through sharing of responsibilities. As their focus is on solving problems that are too complex or large for individual countries to solve alone, ECPGR provides a logical interface between countries and the global level activities. ECPGR is also seen as the framework for the coordination of a European Genebank Management System based on sharing responsibilities. In the view of the Panel, there is good potential for Bioversity to use ECPGR to move the European region towards a global system (ex situ, in situ, policy) for the development of solutions and appropriate arrangements that may be adapted for other regions.

4.7.3 Hosted Initiatives

Central Advisory Service on Intellectual Property (CAS-IP) CAS-IP is a system office unit of the CGIAR, and is hosted by Bioversity. The CAS-IP mission is to assist the Alliance Centers of the CGIAR, their partners and the CGIAR System as a whole, in a comprehensive approach to

management of Centre intellectual assets as public goods. To do this Bioversity provides transactional support, capacity building and facilitation of the sharing of experiences across the Centers. This mission implies the full spectrum of product development, distribution and effective use in a socially responsible and sustainable manner. The overall goal/vision of CAS-IP is to enable access and use of CGIAR products for the benefit of the poor through effective IP and technology transfer management. Specifically, CAS-IP contributes legal information to the CGIAR that benefits subsistence farmers in developing countries. It also, maintains a knowledge base of IP lessons learned within CGIAR, and provides market development, planning, and implementation. Lastly, it consults on IP risk management, licensing, and design of distribution and supply chains. The importance of keeping material in the public domain will continue to be a challenge, but also a critical aspect of PGR conservation. The role of Bioversity in hosting this initiative is important because the center is critically involved in aspects of the eight major projects identified at <http://www.cas-ip.org/contact-us/>, and specifically of the ten research projects listed.

Institutional Learning and Culture (ILAC) Initiative ILAC is an inter-CG Centers’ initiative aiming at increasing the contribution of the CGIAR agricultural and development research to poverty alleviation, through work in two main areas: a) Improved planning, monitoring and evaluation practices in the CGIAR; and b) Strengthened capacity of the CGIAR to work collaboratively with key stakeholders and partners. Its final goal is to make more efficient the design and implementation of research processes and results toward impacts. This approach is complementary with traditional econometric “ex-ante” and “ex-post” analysis methods.

ILAC activities are centered on:

- providing training and technical support
- Facilitating knowledge sharing
- Mobilizing funds and resources
- Increasing the professionalism of the CGIAR in P, M & E and collaborative research
- Providing policy advice and where possible, developing policies

Between 2004 and 2009, ILAC support to Bioversity focused on the following activities indicated in the table below.

Table 4.11 Activities related to ILAC support to Bioversity 2004 and 2009

Purpose	Activities
Strengthening capacity to work collaboratively with stakeholders	Training of professional staff (18) in courses facilitation for participatory decision making, Facilitation and support to PSC for priority setting (forum) Facilitation of strategic meetings of Programs, and thematic strategies (i.e. in Forest genetic resources)
Improve PME practice	Technical support to GPP and projects on knowledge sharing and tools to have systematized information on BI work and partners, including stakeholders survey, CCER definition. Methodological support for self assessments, project impact evaluation (in Costa Rica) Training/motivation of BI staff at different levels on impact assessments, project design, organizational learning Technical support and funding to research related to establishing baselines or to assess livelihood impacts on projects/networks (i.e. related

to banana in Uganda, Tanzania, Venezuela, Nicaragua, Panama and Dominican Republic), and to support the learning and knowledge management of project experiences.
Support to the CG Council in issues related to performance measurement and impact assessment.

A mid-term review will be carried out of the ILAC Initiative grant activities in the fall of 2009 which will systematically assess its influence and outcomes achieved to date. The timing of this evaluation did not enable it to inform the EPMR.

Some of the preliminary conclusions of the Panel are:

- the fact that ILAC is hosted at Bioversity shows the interest of Bioversity in improving its institutional learning and knowledge management capacities. According to ILAC as well as Bioversity staff at HQ and in the Regions, there is an increased level of awareness of the importance of high quality systems and processes for planning, monitoring and evaluation.
- there is a demand, from Bioversity staff (at program director level as well as at project level) for inputs and advice on project planning, specifically to help refine goals and objectives and to develop appropriate indicators and monitoring systems. The PEL Unit is now providing such advice and guidance on project planning.
- the initiative of the Assistant Director General and the PEL Unit to complement the formal CG PMS system with specific tools at the project and program level is evidence of the increasing interest in data quality and management in Bioversity (even if it was not clear to the Panel to what extent these data are used for decision-making at the different levels and in particular in reorientation of project and program strategies).
- based on the analysis of the way ILAC has been developing its activities, the ILAC strategy has been to support, simultaneously, the PME and LKM at different levels: project staff (in the fields), high management decision makers and the SC.
- ILAC is a small program relative to the size (and needs) of Bioversity and the CGIAR Centers in terms of PME and LKM. Thus a top level commitment (with concrete actions, decisions and funding) as well as strong support in the Regions is required to take advantage of ILAC links and capacities, to improve collaborative research and the processes of PME and LKM.
- The CGIAR Change Process (with Consortium and Mega programs) offers an important opportunity to increase the professionalism of PM&E in the CGIAR and to stimulate learning and change behavior across the system. This means also that the methodologies and results of previous work done at Bioversity and other Centers would need to be i) “up scaled” ii) complemented with more *thematic studies* and iii) integrated in a more systematic (and institutional) way in the different levels of the organization.

The Panel concludes, based on the experiences of other organizations, from what it saw in the Regions and from the CCER reports, that there is a need for Bioversity to strengthen its capacity and institutional learning culture. Then, ILAC – and other existing LKM networks in the Regions - would represent a “supporting initiative”, more than an “implementation unit” hosted at Bioversity. (The implementation unit is in fact the recently established PEL Unit). It should be noted that several of the Recommendations in this Report point to the need to improve communication, planning and implementation towards outcomes and impacts.

5 RESEARCH MANAGEMENT

The assessment of research management of the whole Bioversity Center in terms of staff productivity, research leadership and the processes of planning, monitoring and evaluation of the outputs, outcomes and impacts is exceptionally important. It is particularly so here during the period when major institutional changes were instigated. These are the aspects discussed in the present chapter. The analysis of the relevance, quality and effects of the activities and management of specific program and Focus Areas, and of the governance, management and human resources are detailed in other chapters of this EPMR document.

5.1 Bioversity's Asset Base

5.1.1 Human Resources

Staff is arguably the most valuable asset and resource in a research institute. This is even more so when the institute functions primarily in partnership mode, and relies extensively on partners' human capital, infrastructure and laboratories to carry out its work.

Table 5.1 Bioversity Research Staff by Discipline in each Focus Area

Discipline - Area of Training	Focus Area						CDU	TOTAL
	1	2	3	4	5	6		
I Basic Science								
Agronomy/plant sciences/biology/botany/plant pathology	9.1	8.1	4.6	0.1	1.6	0.1	0.1	24
Ecology/natural resource management	3.9	2.1	3.1	2.1	3.1	0.4	0.1	15
Genetics/Plant breeding	0.3	2.8	6.3	0.3	1.8	1.3	0.3	13
II Applied Sciences								
Forests	1.3	0.3	1.5	3.5	2.5	0.5	2.3	12
Germplasm conservation & use/diversity	2.5	1.5	1.5		3.0	0.5	1.0	10
Information/Knowledge management/computer science	0.5		2.0		3.5		3.0	9
Agriculture/Agricultural sciences	1.0	2.0	0.5		1.5			5
Nutrition/food science/health science	2.0	1.0	1.0					4
Other (ag.engineering, ag. development)	0.1	0.1	1.1	0.1	1.1	0.1	0.1	3
Veterinary medicine/animals	2.0							2
III Social Sciences								
Economics/anthropology/geography	4.3	1.3	1.3	0.3	1.3	1.3	0.3	10
History/government/politics/law/political economy	1.0	1.0			3.0			5
Community based conservation/management/livelihoods	2.0							2
Totals	30.0	20.3	23.0	6.5	22.5	4.3	7.3	114

Scientific staff at Bioversity cover a range of disciplines which span the extent of the subjects of study in the six Focus Areas of the Center (see Table 5.1). They can be grouped for ease of classification into 3 broad categories: basic sciences: (ecology, natural resources, genetics, plant sciences, biology, etc.): 52; applied sciences (forestry, germplasm conservation, agricultural sciences, computer sciences, nutrition, health, veterinary medicine, etc.): 45; and social sciences (economics, anthropology, geography, history, policy, etc.): 17, for a total of 114 research staff.

Considering Bioversity's expanded vision launched in 2004 which gives a special focus to research on agro-biodiversity for the well-being of present and future generations, and in particular on social and economic aspects (see Chapter 4 Focus Area 1 and 6), there is a need to strengthen Bioversity's capacities in the social and economic sciences, to ensure adequate skills are available to help target the programmatic work of the Center from its inception to generation of outcomes and to establish strong partnerships with similarly specialized organizations worldwide. Therefore, the Panel suggests that the Center improve the balance between social and economic sciences and the rest of the basic and applied sciences.

5.1.2 Staff productivity: Measures of esteem and publication records

Based on research staff CV information provided by the Center, data on publications and other measures of esteem over the period 2003-2008 were assembled (Table 5.2). This does not necessarily reflect Bioversity's past performance (many staff arrived during the period under review and many have departed), but it does provide an indication of past performance of the current staff and hence provides some measure or proxy for 'potential to perform' in the future, given the current staff profile.

Table 5.2 Research Staff Quality Analysis by Focus Area (source: Staff CVs)

	Focus Area						CDU	TOTAL
	1	2	3	4	5	6		
Staff	30.0	20.3	23.0	6.5	22.5	4.4	7.3	114.0
#of PR journal articles	213	169	130	29	35	48	11	635
avg#PR journal articles (staff/year)	1.2	1.4	0.9	0.7	0.3	1.8	0.3	0.9
MS/PhD students supervised (2003-08)	120	108	33	14	18	20	6	318
% staff that supervised MS/PhDs	47%	68%	41%	75%	33%	82%	26%	48%
ave # students/staff member supervised	8.5	7.7	3.5	2.9	2.5	5.5	3.2	5.8
% staff receiving honors or prizes	29%	35%	18%	25%	14%	25%	8%	23%
% staff giving key-note lectures	28%	35%	57%	42%	23%	56%	37%	37%
% staff on panels, Boards, committees, etc.	48%	34%	45%	51%	26%	52%	41%	40%
% staff on editorial boards	15%	7%	16%	26%	12%	16%	33%	15%
% staff that review journals	29%	46%	36%	42%	14%	33%	19%	31%

The total number of peer reviewed journal articles authored by staff now in the Center for the period 2003-2008 is 635, which is equivalent to an average of 0.9 publications/staff/year. The variability of the number of peer reviewed publications among the Focus Areas is high (low=29; high=213) as is the number of papers/staff member/year (low=0.3; high=1.8).

The number of articles published per year per staff member is also highly variable at the Center within and between the different categories of staff (IRS, LRS, Other) (see Table 5.3).

Table 5.3 Proportion of staff publishing in Peer-reviewed journal articles by staff category

	Staff category			
	IRS	LRS	Other	TOTAL
% staff published in PR journals	80,9%	60,0%	77,8%	72,8%
% staff that publish ≥1 article/year	42,6%	10,0%	40,7%	30,7%
avg # PR journal articles (staff/year)	0,9	0,4	1,8	0,9

The IRS are publishing a higher number of articles per year than the LRS, but the fact that well over half of the IRS and about two-thirds of the research staff overall publish less than one journal article per year raises concern about the publication potential of the current staff profile. One would expect a higher proportion of the current staff to be publishing more frequently. An analysis of outputs in each Focus Area shows that a higher proportion of research staff in FA 1 and FA 6 are publishing more than one peer reviewed journal article per year than in the other FAs. Interestingly, almost certainly due to the Honorary Research Fellow effect, all FA's had a few of their staff publishing 5 or more of articles per year in peer reviewed journals.

Table 5.4 Proportion of staff publishing in peer-reviewed journal articles by Focus Area and Unit

Focus area	Focus area						CDU	TOTAL
	1	2	3	4	5	6		
% staff publishing in PR journals	80,8%	88,7%	97,0%	81,5%	36,7%	90,9%	13,7%	72,8%
% staff that publish ≥1 article/year	46,0%	38,9%	31,3%	26,2%	7,6%	54,5%	5,5%	30,7%
avg # PR journal articles (staff/year)	1,2	1,4	0,9	0,7	0,3	1,8	0,3	0,9

International recognition of Bioversity staff members is reflected in the proportion of them that have supervised graduate students (48%), have been invited to give key-note lectures at meetings (37%), belong to Boards or committees (40%), are part of editorial boards of journals (15%) and are requested to review manuscripts for publication in journals (31%).

Panel Assessment

In general, staff credentials appear to be quite satisfactory when based on the various measures of esteem, which bodes well for Bioversity's future potential to perform and recognition of the Center by the international scientific community. The considerable variability in publications in peer reviewed journals, however, should catch the attention of the Center: it suggests significant differences in potential to generate publications across the Center and perhaps variable quality of staff and motivation to publish in peer-reviewed journals.

5.1.3 Focus Area publication productivity and citation analysis

Productivity analysis of the Center and by Focus Area is shown in Table 5.5 This analysis relies mainly on analyses of publications lists provided to the Panel in document B-10 (ref. Annex 5).

Table 5.5 Peer-reviewed publications productivity by Focus Area, 2003-2008

Focus Area	Focus Area						CDU	TOTAL
	1	2	3	4	5	6		
Staff **	25.0	19.1	19.0	6.2	20.8	4.0	7.1	101.2
# of Thomson journals	36	79	56	13	12	8	6	179.0
avg# PR journal articles (staff/year)	0.2	0.7	0.5	0.3	0.1	0.3	0.1	0.3
# of other PR publications	48	87	82.0	18.0	63.0	7.0	29.0	353.0
avg # PR publications (staff/year)	0.3	0.8	0.7	0.5	0.5	0.3	0.7	0.6
#of PR publications-all types	84.0	166.0	138.0	31.0	75.0	15.0	35.0	529.0
avg # PR publications – all types	0.6	1.4	1.2	0.8	0.6	0.6	0.8	0.9

Total is not the sum of FAs because publications appearing in more than 1 FAs are counted only once.

The total number of peer-reviewed journal articles, contained in the Thomson-index, is 176 for the period 2003-2008, which divided by the number of staff in FTE (101) [Honorary Research Fellows counted as proportionate time] results in an average of 0.3 peer-reviewed publications per staff/year. When considering the total number of peer-reviewed publications (Thomson + non-Thomson journals) the figure reaches 529 and the rate of publication per staff member and per year almost triples to 0.8.

Table 5.6 (based on document B10 provided by the Center) shows the number of articles published in peer reviewed journals (category A=Thomson index; category B=Non-Thomson index) and the number of citations of those papers for the period 2003-2008.

Table 5.6 Citation analysis for publications (2003-2008), by Focus Area

Focus Area	Category	Articles	Articles identified in Google Scholar	Coverage	Sum of citations	Average citations	≥1 citation	≥3 citations	Top 3 citations
1	A	36	31	86%	171	5.5	71%	45%	34, 31, 25
1	B	48	29	60%	84	2.9	59%	34%	27, 9, 9
1	C	145	65	45%	40	0.6	20%	5%	20, 4, 3
1	A+B	84	60	71%					
2	A	79	71	90%	404	5.7	77%	49%	65, 24, 24
2	B	87	72	83%	125	1.7	58%	22%	10, 9, 9
2	A+B	166	143	86%	2	A+B	166	143	86%
3	A	56	52	93%	245	4.7	75%	48%	26, 24, 17
3	B	82	41	50%	129	3.1	66%	7%	17, 13, 11
3	A+B	138	93	67%					
4	A	13	11	85%	60	5.5	64%	45%	17, 14, 11
4	B	18	8	44%	14	1.8	63%	13%	8, 2, 2
4	A+B	31	19	61%					
5	A	12	10	83%	90	9.0	90%	6%	25, 20, 17
5	B	63	28	44%	103	3.7	43%	9%	33, 19, 17
5	A+B	75	38	51%					
6	A	8	5	63%	13	2.6	80%	40%	6, 5, 1
6	B	7	6	86%	37	6.2	67%	50%	28, 4, 2
6	A+B	15	11	73%					
CDU	A	6	4	67%	5	1.3	75%	0%	2, 2, 1
CDU	B	29	8	28%	37	4.6	63%	13%	33, 1, 1
CDU	A+B	35	12	34%					
Center	A	176	154	88%	820	5.3	75%	48%	34, 31, 26
Center	B	353	210	59%	645	3.1	60%	30%	65, 33, 28
Center	A+B	529	364	69%					

As mentioned above, the total number of peer reviewed publications from the Center during 2003 - 2008 was 529, of which 176 are in category A (Thompson index) and 353 in category B (non-Thompson) journals. Not all of these were recognized by Google Scholar (GS): 88% of the total articles published in category A journals and 59% of the articles published in category B journals were recognized by GS. The total sum of citations recorded in GS is 820 and 645 for

category A and B, respectively. Three-quarters of the articles published in category A had at least one citation, while just under half had three or more citations. The corresponding figures for articles published in category B journals were 60% and 30%, respectively.

The most articles published in peer reviewed journals (A+B) during the period 2003-2008 were from Focus Area 2 (166) while the lowest were from Focus Area 4 (31). The highest rate of publications per scientist (articles/staff/year) for both category A type articles and category A+B articles was from FA2 (0.5 and 1.4, respectively). This reflects its work in commodity crops and their *ex situ* conservation. Publication rates are relatively low for FA5 for category A type journals (0.1) and low for FA1 and FA6 B type journals (0.5). The average rates of publication for category A type articles at the all-Center level was 0.3; the corresponding figure for all peer reviewed articles was 0.8 articles/staff/year. The three papers in category A with the highest number of citations were produced in FA1 (34 and 31 citations) and FA3 (26 citations); for category B journals the figures were FA2 (65), FA5 (33) and FA6 (28).

Panel assessment

Bioversity needs to find a mechanism to encourage scientists to publish more in Thomson (particularly) and non-Thomson listed journals, but also in the non-scientific media for the use of their non-academic clients. The Center also needs to increase the visibility of its work and achievements. Increasing publications in highly rated and well respected journals in the field is a particularly effective way of accomplishing that goal, enhancing career development of scientists and also attracting ambitious scientists to the Center.

The Panel recommends that the Center create, implement and monitor a publication policy that: (a) encourages peer reviewed publications to aid career development, (b) meets the needs of targeted clients and (c) embodies assessment of how the scientists and the Center are performing.

Table 5.7 Publications related PMS Results for CGIAR Centers 2004-2008

Indicator	4a	4a	4a	4a	4a	4b	4b	4b	4b
	Peer-reviewed (all)	Peer-reviewed (all)	Peer-reviewed (non Thomson)	Peer-reviewed (non Thomson)	Peer-reviewed (non Thomson)	Peer-reviewed (Thomson)	Peer-reviewed (Thomson)	Peer-reviewed (Thomson)	Peer-reviewed (Thomson)
Year	2004	2005	2006	2007	2008	2005	2006	2007	2008
A.Rice	2.6	1.71	0.33	0.72	1.39	0.61	0.62	0.63	1.34
Bioversity	4.33	2.48	1.12	0.76	1.27	0.69	0.74	0.77	0.63
CIAT	2.63	3.05	1.54	1.74	1.83	1.14	1.13	1.76	1.03
CIFOR	3.23	3.37	1.14	0.91	1.49	1	0.84	0.8	1.14
CIMMYT	1.66	1.62	0.75	1.12	0.59	1.12	1.85	1.9	1.54
CIP	1.16	1.17	0.28	0.44	0.63	0.6	0.95	1.13	0.85
ICARDA	1.72	3.05	0.76	1.45	1.41	0.52	0.63	0.61	1.44
ICRISAT	2.7	2.72	2.43	1.93	1.46	0.9	0.77	1.15	1.03
IFPRI	1.92	2.27	1.55	1.42	0.98	0.67	0.53	0.88	1.02
IITA	3.22	2.31	0.79	1.42	0.94	1.09	1.68	1.49	1.62
ILRI	2.67	1.78	0.79	1.11	0.91	0.79	0.9	0.89	0.99
IRRI	2.7	2.43	1.04	0.58	1.17	1.39	1.58	1.39	1.26
IWMI	2.25	1.72	1.19	1.87	1.53	0.65	0.73	0.93	1.26
WAC	1.8	1.23	0.93	2.15	2.08	0.56	0.98	0.94	1.13
WFC	0.69	0.82	0.67	0.93	0.62	0.59	0.91	0.83	0.88

Such a policy would of course be all embracing and include all types of publications including non-refereed publications that are a vital part of the Center's outputs.

How does Bioversity compare with other CGIAR Centers in this respect? The Performance Management System results for 2004-2008 for the CG System allow a comparison (EPMR results across Centers use different metrics and so are not comparable). The PMS publications data for Centers are shown in Table 5.7.

During 2005 and 2008 Bioversity maintained a relatively stable average of between 0.8 and 0.6 (category A papers/staff/year, compared with the 1.1 to 0.8 overall average of the CGIAR. The total papers per staff varied between 4.3 and 2.6 while the average for the CGIAR was 2.4 and 2.1. Co-published papers per scientist during that period for Bioversity (not shown) was 3.5 while the same value for the overall CGIAR was 1.5, which probably reflects the more interdisciplinary type of research as well as the partnership mode of operation of Bioversity.

For non-Thomson peer reviewed journal articles Bioversity's output ranged between 0.8 and 1.3 per staff/year between 2006-2008, while the corresponding CGIAR average ranged between 1.0 and 1.2. Forty two percent of Bioversity's peer reviewed journal type A are co-published with developing country partners (2006-2008) which is similar to the CGIAR average (44%).

5.1.4 Other comparative advantages

The location of Bioversity HQ outside Rome facilitates its close collaboration with a number of key international actors, including FAO, GCDT, and IFAD. These partnerships reflect and support Bioversity's full engagement in key international initiatives (ITPGRFA, CBD, FAO Commission on GR).

5.2 Research Leadership and Management

Research leadership at Bioversity is provided primarily through the four Program Directors who report directly to the DG, who therefore provides cross-cutting oversight over the research. In this research oversight function, the DG is assisted by the DDG, whose position though, is not DDG for Research. Overall strategic direction is provided through the Priorities and Strategies Committee (PSC). The PSC is a decision-making body that meets three times a year. It is composed of the SMT members, all Programme Directors, all Regional Directors and all Heads of Research Support Units. The PSC decides on the strategic scientific direction of Bioversity, on research priorities and on resource allocation between programs and units. It examines long term scenarios for the Center and promotes cooperation between programs and regions. Decisions of the PSC are implemented by the Programme Directors (and Unit Heads), under the overall oversight and guidance of the DG, assisted by the DDG. The PSC does not deal with management issues. It presents the results of its meetings to staff and the agendas and minutes of its meetings are provided to the Board.

At the beginning of the review period (2004), Bioversity decided to move away from the implementation of Regional Projects, whereby each of the regions was developing and implementing independent regional activities under the leadership of the respective Regional Directors. Bioversity's management felt that there was an increasing need to develop and implement a global research agenda and that there was insufficient coherence between the regional research programs and between similar projects implemented in different regions. To remedy this situation in 2005, Bioversity reorganized its agenda in four research programs, implemented through a streamlined Project set with research activities in the regions. A matrix-type organization was implemented with the objective of creating a more cohesive research

program with better scientific oversight. The role and functions of regional directors therefore changed from that of managing and running their respective regional projects to that of coordinating and facilitating the overall implementation of Bioversity research in the region. The new model was also expected to free the time of the regional directors from direct engagement in national program development, to playing an increasingly important role in policy related activities as well as, in coordinating resource mobilization functions in the regions.

The key differences with the previous regionally based organization structure are that:

- four organization-wide research Programs were created (see current Bioversity organigram in Chapter 2);
- programs are headed by Program Directors who report directly to the DG . They have the direct responsibility for quality control of research, facilitation, coordination, honest broker, advocacy. Three Program Directors are based at HQ and one, the “Commodities for Livelihood” Program Director, is based in Montpellier, France, within the Agropolis Center of Agricultural Research;
- ten institutional Projects are designed and managed by project coordinators based in HQ (seven) or in regions (three) and are funded and monitored by the Programs
- scientists, whether based at headquarters or in the regions, are “mapped” organizationally to a Program and they report to that Program Director. The Regional Directors are co-supervisors of scientists based in regional offices; they provide both technical and administrative support to these scientists and they provide input in their performance appraisal;
- Regional Directors, even though they have an input in priority setting, project identification and design, and performance appraisal of Project staff, now have more of an ambassadorial, policy advocacy and networking role and they contribute to the identification of fund raising opportunities at regional level.

The Panel notes that four years after its implementation the purpose and merits of this organization structure are still debated within Bioversity, which means that its benefits may not be obvious to many staff or that it has significant drawbacks. The question is whether, in practice, the structure satisfies the objectives for which it was created and whether its benefits more than compensate for its drawbacks. In this respect the Panel, following its field visits and interviews with staff and partners, notes that:

- a number of Bioversity interviewees, from staff to Board, feel that there is a gap in strategic leadership of research due to the fact that, apart from the DG, who in the past 2 years was heavily involved in CGIAR change process, research oversight lacked continuity;
- there is synergy and increased coherence within some of the program activities based in Rome, while some regionally-based staff mentioned that there is limited guidance from their project coordinator or their program director;
- programs appear to operate in parallel, with insufficient cross learning or cooperation;
- sometimes the programs compete internally for funds which does not encourage cooperation between programs;
- the new role of regional directors appears still not to be well understood, even by its incumbents. Regional Offices have limited funds to organize networking activities in the region which would lead to the identification of new projects and funding opportunities, as well as develop outreach and dissemination of Bioversity results;

- most of the resources (research staff and budget) are concentrated in the hands of the Program Directors thus leaving little incentive for them to cooperate with Regional Directors who essentially have neither.
- there is sometimes inadequate Bioversity research leadership where projects are being carried out
- some partners feel that Bioversity has withdrawn from national and regional networks which they see as critical aspects of its previous activities;
- a number of staff feel that by reducing its regional autonomy, Bioversity is running the risk of becoming weak where it used to be strong (i.e., in partnerships) and thus is at risk of losing one of its comparative advantage;
- this matrix structure creates tensions (especially the dual relationship of regionally based researchers to Program Directors and Regional Directors), but apparently not more than any matrix structure in any other organization;
- The concept of the matrix itself may not be in question but Bioversity may have let the pendulum swing too far to one side by concentrating most of the resources on the program side and excessively disempowering the Regional Directors.

The Panel recommends that the Board and Senior Management further pursue examination of the organizational structure of the Center to ensure optimization of research management, paying particular attention to the responsibilities and roles of the Regional Directors such that they can play a stronger role in the delivery of outputs and outcomes from the programs.

5.3 Processes for ensuring the relevance and quality of Bioversity's activities

The Panel reviewed Bioversity's primary mechanisms for planning, monitoring and evaluation of its research and research related activities.

Bioversity has recently established a separate unit for coordinating the Center's research planning, monitoring and evaluation activities, the Planning, Evaluation and Learning (PEL) Unit. The PEL Unit is responsible for facilitating and coordinating a broad array of planning and evaluation activities within the Center and is managed by a single individual who reports to the ADG within the Office of the Director General. The Unit is also responsible for ensuring that planning, monitoring and evaluation reports are properly disseminated, and that recommendations and lessons are systematically followed-up on.

5.3.1 Planning and priority setting

Bioversity has been running four planning processes: the institutional strategic priority setting, the medium term planning, the prioritization of research proposals and annual planning.

Strategic research prioritization.

Bioversity conducted a major priority setting exercise in 2004 which led to a new strategy and new priorities, ultimately leading to the definition of the Focus Areas. The exercise included consultation with stakeholders and several internal workshops and meetings in order to develop the new strategy to guide future activities.

In terms of updating its priorities and reconsideration of them, Bioversity utilizes a multi-step process for shorter-term priority setting. Ideas are submitted to and considered by the Priorities and Strategies Committee (PSC). The criteria used by the PSC for priority setting are:

- i) alignment with existing CGIAR System Priorities and other internationally recognized priorities (i.e. GFAR, FARA);
- ii) compatibility with Bioversity's strategy and Focus Areas.
- iii) impact potential
- iv) ability to produce global or regional public goods
- v) Bioversity's comparative advantage;
- vi) potential for innovation and
- vii) likelihood of getting funding to support the research.

The participation of Bioversity partners in the priority setting events is scarce and not the rule. Some inputs from the Regional Directors are provided based on previous identification of priorities through the staff and the partners based in the Regions.

Bioversity could gain more from these meetings if during this exercise more attention was paid to the tendency and prospective analysis of the economic, social and political situation of the regions/world, and to a formal involvement and participation of partners as a basis for defining future needs and demands and then, as necessary, adjusting its priorities. Predictions emerging from climate change research may be another useful criterion for choices of projects and for reassessing priorities.

Medium term planning

The PEL Unit coordinates and facilitates the preparation of Bioversity's annual rolling three-year Medium Term Plan (MTP). An online tool, based on a searchable database, was developed by Bioversity to facilitate this process. This tool has since been refined, named EasyMTP, and adopted by all 15 of the CGIAR Centers. Based on the MTP logframes, each Project at Bioversity produces a more detailed Annual Project Workplan (APW), which is more functional, using the newly developed Bioversity Research Manager database. APWs are also linked to the Grants Office Database, so that all on-going grants can be shown against the relevant Output and Output Target in the MTP. The Panel was informed that, in the near future, APWs will be linked to the online Proposals Tracking Tool, so that proposals to donors can also be shown against the relevant Outputs and Output Targets. This should help facilitate the strategic planning of future proposals to donors.

Prioritization of research proposals

Following the proposal evaluations by the PSC, the Program Directors (PDs) meet and evaluate the proposals based on programmatic and non programmatic criteria. These criteria are similar to those used by the PSC with regard to the programs with the added criteria that the proposal must be in alignment with one of the Focus Areas. Also, the PDs decide if the proposal is scientifically feasible and what is the likelihood of success, as well as projecting the impact potential of the work. In addition, they ask the following questions relative to non-programmatic criteria:

- i) Does Bioversity currently have the capacity to implement the research?
- ii) Is there a time sensitivity (will it address a need or opportunity that will be missed if we don't act now?).
- iii) What is the likelihood of success in obtaining funds from this donor?

- iv) Does it contribute co-funding to existing project?
- v) Is it likely to leverage additional funding?
- vi) Is there under-representation in Bioversity's portfolio for this type of project, and
- vii) Does it meet their cost recoveries target?

The panel is concerned that the probability of generating high value outcomes and impacts and synergy with existing research are not high profile in this list, although impact potential is a criterion. According to the interviews from the Regions, it seems that improvement in the *development of the proposals* could be made. In particular, the staff and the Regional Offices request more support from the Focus Area/Programs heads when proposals are being developed from the Regions. A claim is that sometimes they have to lobby heavily for HQ to accept the idea and content of the proposal.

Annual planning

Each year in February, Bioversity holds a 'Planning Week' in which most scientists from HQ and the regional and country offices participate. The Planning Week provides opportunities for the Programs to begin the process of planning their work for the following year and for Programs and RSUs to discuss and plan inter-Program and inter-Unit activities. The PEL Unit coordinates the planning and preparations for Planning Week.

From the interviews carried out with the staff at HQ and in the Regions, one of the most important and positive aspects of the Planning Week is the opportunity that Bioversity's staff have to communicate, exchange and share information.

Based on the interaction with staff during the field trips and the planning week, the Panel found that, apart from the formal event – the planning week, there is a need to plan and operate in a more systematic way, and undertake technical and scientific analysis on the methodologies, the results, and the outcomes generated. This type of "exercise" should be based on issues of interest for specific projects and programs involving staff and partners from HQ, and the Regions.

5.3.2 Performance and impact monitoring and evaluation

The Center relies on an array of monitoring and evaluation activities carried out periodically or regularly to ensure that on-going research remains both appropriately targeted, and is on track and meeting stated milestones and outputs. There are both internal and external processes for this. The internal ones are the CCERs, Annual Project Reports, the annual planning meetings (discussed above), regular reporting to the Board, internal and external publication review processes, and annual staff appraisals.

CCERs

Bioversity's intention is that each Research Program and RSU is externally evaluated approximately every five years through Centre Commissioned External Reviews (CCERs), which are coordinated by the PEL Unit. The Panel reviewed carefully all the CCERs carried out during the review period and while they were variable in terms of the coverage of areas, depth and quality of analysis, in general, the Panel found them helpful, although they should have been more strategic. In effect, the Panel suggests that these evaluations should generate more useful analyses and recommendations on the quality and relevance of the grants in the framework of the overall Program or Focus Area objectives and their strategies.

Annual Project Reports

Each Project is required to produce an Annual Project Report (APR) each year. The APRs review the annual progress achieved against the *Output Targets* and other milestones contained in the APWs. APRs are also prepared using the Bioversity Research Manager database, which enables the APRs to be completed online as a rolling report throughout the year. Project Coordinators are encouraged to use their APRs as monitoring tools throughout the year, recording achieved targets and milestones as they occur. The PEL Unit ensures that APRs are completed at the end of the year. Another important part of APRs is the reporting of *Outcomes*. Progress of the Outputs towards Outcomes is recorded regularly until such time as sufficient documentary evidence is available for the preparation of an "Outcome Statement" in the relevant APR. The publications produced during each year are another important part of the APRs. APRs are now linked online to Bioversity's SciLit database, which is managed by the Library and in which all publications should be entered. Publications listed directly in Sci.Lit are then used to prepare the relevant publications indicators for the CGIAR Performance Measurement Report.

ILAC

Bioversity hosts *ILAC* which, in addition to its role as an inter-center initiative (Chapter 4.7), seeks to strengthen M&E processes internally and encourage institutional learning culture and practice. *ILAC* has been supporting Bioversity through training of staff, facilitation of PSC activities and of programs meetings, and giving methodological support for self assessment, project impact evaluation and stakeholder survey among others. The Panel suggest that, in order to make a more efficient use of *ILAC* capacities – including the existing networks worldwide-Bioversity should clearly identify its needs – for example in terms of learning and knowledge management, and in defining, monitoring and evaluation outcomes (see above) - so that the joint work with *ILAC* can contribute more effectively and in the medium term, to strengthening the effectiveness of Bioversity outcomes and the quality of research processes. It will also be important to evaluate the extent to which *ILAC*'s activities are having a positive influence on Bioversity. However, the PEL Unit which was established in 2008 has been instrumental in setting up systems for improved monitoring and evaluations of all the Projects' research outputs and outcomes.

The main external evaluation mechanisms are the Performance Measurement System (PMS), donor reviews, and the External Program and Management Reviews (EPMR).

PMS

Bioversity as a whole is evaluated annually by the CGIAR annual Performance Measurement System, which consists of an online questionnaire requiring data on more than 50 performance indicators. The PEL Unit coordinates the compilation of these data, the submission of Bioversity's annual Performance Measurement Report, and manages the subsequent verification process.

Donor Reviews

Research funded by individual donor grants is evaluated on an *ad hoc* basis by the donors.

The Panel reviewed some of these evaluations which it considers methodologically appropriate and useful for the project staff.

Panel Assessment

Bioversity has improved significantly its formal planning, monitoring and evaluation system. The Panel recognizes the efforts made by Bioversity in building up Project logical frameworks as

part of the process of clarifying the paths to impacts. In recent years Bioversity's management and the SC have emphasized the need for assessing Bioversity impacts, and several impact assessments are now undertaken each year. The Panel recognizes the need and importance of such evaluations.

Bioversity, relative to other Centers, has done poorly in former years on the outcome and impact indicators of the PMS but in 2008 Bioversity scored well above the average in both types of indicators. From the interviews carried out at HQ and in the Regions, and the review of the documents and reports of the different Programs, it remains clear that Bioversity has in the past mainly focused on outputs. The Panel suggests that more attention be paid to the analysis, evaluation and clear presentation of outcomes and their achievements. One of Bioversity's main strengths is its mode of operation - working through and with partners. Considering that Bioversity is not a development organization but an applied research center for development, the monitoring and evaluation of *changes* such as the capacities of the partners, the use of the research products, the adjustments of policies related to genetic resources etc. are key outcomes that Bioversity should be accountable for. To do so, Bioversity should also clearly identify the key "direct beneficiaries" of its work, instead of listing "target groups" in a generic way (especially in the logframe of the projects) as currently requested by the Science Council. Then, these performance criteria should be reviewed and clearly stated in the planning process of the projects, the Programs and the Focus Areas. The Panel notes that since 2008 the PEL Unit has increased the focus on outcome reporting and developing the on-line Bioversity Research Manager database with Outcome tracking functionality. This should significantly aid Bioversity in the future in defining its Outcomes more efficiently and effectively.

In the Panel's view, three main areas should be improved:

- The first is the need to pay much more attention to programs' and projects' outcomes. This is particularly important as Bioversity is working through partners and consequently some key outcomes on strengthening their capacities and performance remain as significant challenges.
- The second is use of the PMS system for managerial purposes and for adjusting strategies and priorities within the projects, the programs and for the overall Bioversity centre. From what the Panel was able to see, the system and the tools for monitoring and evaluation are mainly used for reporting. But a question remains: to what extent and at what level are the results (from impact assessment, from monitoring results etc.) used by the scientists and managers? From the interviews with Regional Offices, it seems that they are not very familiar with the system in place, as they are not reporting/feeding the system.
- The third is that despite the structuring in Focus Areas, planning and monitoring continue to be made at the Project level, as required by the SC. This situation limits the possibility for Bioversity, to present in a coherent way, the research priorities, results, including outcomes at the Focus Area and Center levels, in particular outside the Center but also within the Center.

The Panel recommends that Bioversity better define, express and evaluate its outputs, outcomes and impacts and communicate effectively internally and externally the value of Bioversity and its partners' work.

6 GOVERNANCE AND MANAGEMENT

6.1 Governance

6.1.1 *Legal Status*

Significant changes in the legal status of the International Plant Genetic Resources Institute (IPGRI) since the last EPMR in 2003 are that a) the institute changed its operating name to Bioversity International or, in short, Bioversity in 2006 as a result of changes in its orientation and programs of work; b) at the same time the International Network for the improvement of Banana and Plantain (INIBAP), based in France, which was already under the governance and administration of IPGRI since 1993, became fully integrated within Bioversity as the core of the Commodities for Livelihoods programs while remaining a separate legal entity; c) a new agreement is being negotiated with Belgium and another is still in negotiation with France to reflect the integration of INIBAP. These changes were reflected in successive revisions of the Bioversity constitution, the latest version of which is dated September 22, 2008. These changes have not affected the status of Bioversity vis-à-vis the host country or the CGIAR or its long association with FAO, governed by a series of Memoranda of Understanding. Other major changes that occurred in Bioversity during the review period are covered in Chapter 2 - Bioversity International: history, mandate, vision, strategy and organization.

6.1.2 *Board composition and operation*

Since the last EPMR Bioversity, for reasons of cost effectiveness, has reduced the size of its Board. Per its current constitution the Board is composed of between 9 and 13 members (versus 15 in the former IPGRI constitution): 2 members selected by the Board from a list of candidates submitted by the CGIAR, up to 8 members at large selected by the Board from its own list, one host country representative, one representative from FAO and, ex-officio, the Director General. At the time of the EPMR the Board had 11 members (3 CGIAR members but only 6 at large members versus the maximum of 8) but a 12th member will be joining in 2009. While the current Board has a gender imbalance (only 2 women for 9 men, worse than in prior years) it has a good balance of members from developed countries (6) versus developing countries (5). The Board is addressing this gender imbalance and it feels that it still needs to get more members from the South. In terms of Board leadership positions (chair, vice-chair, heads of committees/task groups) occupied by members from developing countries (2 out of 5), Bioversity is at the same level as most other CGIAR centers.

Expertise represented on the Board is fairly varied: plant breeding/plant pathology (3), biology (2), chemistry/farming (1), ecology (1), finance/governance (2), agriculture research (1), socio-economics (1) and law (1). This is an improved distribution compared to the period of the previous EPMR when there was no economist on the Board and limited financial expertise. The Nominating Task Group (see paragraph 8.1.3 below) also discussed a need for a communications and a nutrition expert. The composition of the Board since the last EPMR is given in Table 6.1 with dates of service, gender, nationality and areas of expertise.

The full Board meets twice a year, once in Rome and once in a region where Bioversity operates, and the Executive Committee meets four times a year (including virtual meetings). According to the CGIAR's performance indicators, this frequency of Board plus Executive Committee meetings is among the highest of all CGIAR centers. In addition, at its March 2009 meeting the Board decided to add one conference call of all Board members between full Board meetings. Board sub-committees/task groups generally meet at the same time the Board meets.

Table 6.1 Members of the Bioversity International Board of Trustees 2003 - 2008

NAME	Term Start	Term End	Nationality	Expertise	Type of Member	2003		2004		2005		2006		2007		2008	
						(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
Nielsen, Ivan	1/4/97	31/3/03	Denmark	Botany	Board	VF-L											
Sengooba, Theresa	1/3/97	31/3/03	Uganda	Pathology	CGIAR	X											
Hawtin, Geoffrey	29/7/91	29/7/03	Canada/UK	Plant Breeding	Ex-officio DG until 07/03	N											
Shinawatra, Benchaphun	1/4/98	31/3/05	Thailand	Agricultural Economics	CGIAR Chair until 03/05	N	✓	N	N	VF-L							
Cottier, Thomas	1/4/98	31/3/04	Switzerland	Law	Board	X	P	P									
Salazar, Renato	1/10/98	30/9/04	Philippines	Sociology	Board	F	N-L	N-L, P									
Madkour, Magdy	1/3/04	12/04*	Egypt	Plant Pathology/Biotechnology	Board		X	✓	X								
Caño, Carlos	1/3/02	28/2/05	Colombia	Finance	CGIAR	F	X	X									
Miyazaki, Shoji	1/4/02	31/3/05	Japan	Genebank Management	Board	N, F	✓	P	✓	X							
Wambugu, Florence	1/1/00	1/3/06	Kenya	Biotechnology	Board	✓	X	✓	X	✓							
Lefort, Marianne	1/4/00	31/3/06	France	Genetics/Plant Breeding	Board	X	P-L	P-L	N-L	VF	X						
Solh, Mahmoud	17/5/02	16/5/06	Lebanon	Genetic/Plant Breeding	FAO	✓	P	✓	X	✓	✓						
Smith, Stephen	1/11/02	31/10/08	UK/USA	Genetics, Business Management	Board	✓	N	✓	✓	X	✓	P-L	✓	P-L, VF	VF, P-L	✓	
Frison, Emile	1/8/03	31/07/13	Belgium	Plant Pathology	Ex-officio Incoming DG 08/03		✓	N	N	VF	✓	✓	P, F	N	N		
Linares, Olga F	1/11/02	31/10/08	USA/Panama	Anthropology	Board	✓	P	✓	✓	P-L	✓	✓	X	✓	VF-L	✓	
Lukhele-Olorunju, Phindile	1/10/06	30/9/09	South Africa	Plant Breeding	Board Vice Board Chair from 08/08									P, VF	✓	VF, F	F
Gregson, Anthony	1/11/02	31/12/09	Australia	Chemistry, Farming	Board Chair from 04/05	F-L, N	F-L	F-L	F-L	F-L	✓	VF	✓	F	N	N	✓

NAME	Term Start	Term End	Nationality	Expertise	Type of Member	2003		2004		2005		2006		2007		2008	
						(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
Sittenfeld, Ana	F	1/3/04	Costa Rica	Biology, Biotechnology	CGIAR (Vice Board Chair until 08)		P**	✓	X	✓	F	VF-L, F	✓	P	N	N	✓
La Vina, Antonio	M	1/4/05	Philippines	Law	Board					✓	✓	N-L	✓	✓	VF-L, F	✓	X
Zuckerman, Paul	M	1/4/05	UK	Financial Management	Board					F	X	F-L	✓	F-L	N-L	N-L, F	F
Balachander, Ganesan	M	1/4/06	India	Finance, Governance, Ecology	CGIAR							✓	✓	F	F-L, N	N, F-L	F-L
Hazell, Peter	M	1/1/06	UK	Socio-Economics	CGIAR							✓	✓	✓	✓	✓	P-L
Monti, Luigi M	M	25/2/89	Italy	Plant Breeding	Host Country		N-L	✓	N	✓	F	✓	✓	P, VF	✓	X	✓
Pandey, Shivaji	M	17/5/06	India	Agricultural Research and Development	FAO								X	✓	✓	F	F

- (a) Spring meeting (March)
(b) Fall meeting (August-September)
✓ Attended
x Absent
* Resigned
** Attended as observer
-L Leader of the task group
P Programs and Oversight Task Group
N Nominations Task Group
F Finance Issues Task Group (Now Finance and Audit Task Group)
VF Vavilov-Frankel Fellowships Task Group

Elected members of the Board serve in their individual capacity for a three year term renewable once. The non-elected members (FAO and host country) have no time limit for service and the representative of the host country has in fact been serving on the Board for 20 years, an extraordinary and, in the Panel's view, excessively long and inappropriate period of time. The Chair is elected from within the Board for a three year term renewable once but with an overall limit of 8 years of Board service. The Vice-Chair is elected annually and cannot serve more than three years in that capacity. Decisions are by consensus but if votes are required decisions are by simple majority except for the selection or dismissal of the Director-General which require a majority of two-thirds. All members have voting rights except the FAO representative who, by request of FAO, is a non-voting member of the Board.

6.1.3 Board oversight

Boards exercise a large part of their oversight through standing committees. The Bioversity Board is no different although it does not call them committees (except for the Executive Committee and the Vavilov-Frankel Fellowships Committee) but "task groups". Compared to committees these task groups are more informal, do not have a specified size or membership composition and are not supposed to be "standing" groups; they are supposed to be constituted for each meeting. In practice the Bioversity Board has three standing task groups for which the Board Manual suggests some continuity of membership from one Board meeting to the next and further suggests task group leadership by someone who was a prior member of the task group. Despite the different labeling the Panel does not see much difference between these task groups and board committees in other centers. The three standing task groups are: Programs Oversight Task Group (POTG), Finance and Audit Task Group (FATG) and Nominations Task Group (NTG). These groups meet prior or during each Board meeting and more often if need be and their mandate is similar to those at other centers.

The Executive Committee is comprised of six members (Chair, Vice-Chair, Director General, FAO representative, and the leaders of the POTG and FATG). Its role is similar to that of Executive Committees in other centers. It meets in person prior to each Board meeting and electronically as needed; in practice it currently meets four times a year. Since the last EPMP the Executive Committee has become more involved in center matters and its interactions with senior management are more frequent.

The POTG operates as a committee of the whole, i.e., all Board members attend its meetings. Presentations are made by staff to the POTG on relevant programs issues and the POTG receives minutes of Bioversity's Priorities and Strategies Committee meetings. Nevertheless, Board self-assessments and minutes of Board meetings show that, until the March 2009 meeting which the Panel attended, members of the POTG expressed concerns about the insufficient amount of time spent on science (now increased to one full day) and about the insufficient depth of information it received on science and on the impact of Bioversity's work. At the March 2009 meeting many pertinent questions were raised following presentations that showed that Board members were alert to and concerned by the mechanisms by which priorities were selected, the rationale for undertaking projects and the necessity to gain evidence of outcomes and impacts. Firm statements were made from the meeting that indicated that the POTG seeks to be involved more effectively and indeed more in-depth reviews of science (as opposed to programs) are planned by the POTG and so is a pipeline of regular impact studies. Members were also concerned about how the science program would be assimilated or not into the new CGIAR priorities. While the POTG and the Board have endorsed the general programmatic research direction of the center, it

appears, in view of the above, that the POTG has not participated in helping formulate and evaluate the scientific strategy of the Center to the same extent the FATG did in its area of oversight. The Panel therefore suggests that the Center plan its interactions with the POTG more thoroughly to both help the Center address more strategic issues with the POTG and allow the experience of the POTG to help the center position its science and relevance optimally. Alignment of the Board and Center on scientific programmatic matters will be increasingly important during the imminent changes of Bioversity and the CGIAR.

The FATG was attended by all Board members, for the first time, at the March 2009 Board meeting; the consensus was that this full attendance allowed for a better shared understanding of financial and audit matters, that it significantly improved the quality and effectiveness of the Board's discussion of the issues and that it allowed to significantly shorten the overall duration of the Board meeting. Just as the POTG became a "committee of the whole" in 2006 this may become standard practice for the FATG. As in other centers, the FATG meets in closed session with the external auditors. The chair of the FATG also meets with the internal auditor in closed session and, at the urging of one of its members, the full FATG met with the internal auditor in closed session for the first time at the March 2009 meeting. The Panel suggests that this become standard practice. The FATG discusses and monitors budgets as well as the schedule of internal audits and the implementation of the Internal Audit Unit's recommendations. At each of its meetings it also discusses the extensive Risk Management Statement prepared by management. Compared to the previous EPMR review period, the leader of the FATG now has more frequent (monthly) interaction with the Director of Corporate Services and receives quarterly financial updates.

The NTG is composed of three to five members for a period covering preferably two Board meetings. The Director General is explicitly not a member of the group, which is good practice, but he serves as a resource person. At the NTG meeting the Panel attended, the NTG devoted significant time and attention to finding ways to correct the gender imbalance at the Board. The NTG also wants to broaden the expertise on the Board, for example in the areas of communications and nutrition. Since the current Board chair is in the last year of his mandate, the NTG also discussed the selection of a Board Chair Elect.

The Vavilov-Frankel Fellowships Committee meets once a year, or more if needed, to select recipients for these fellowships awarded by the Center. The Committee is composed of the Board Chair, two Board members and, occasionally, the Director General.

CGIAR boards use Center Commissioned External Reviews (CCERs) to help them exercise their oversight. The Bioversity Board has set a timetable for CCERs so as to review each area of the Center every five years. In general a CCER was conducted of the region where the Board was going to hold its next regional meeting and a CCER of a corporate area was conducted for the Board meetings held at HQ. The Board devotes half a day to reviewing the recommendations of the CCERs and at each of its meetings monitors their implementation by management. Most CCERs have been considered useful by the Board and management although less so for the one on Human Resources. The Panel concurs with these assessments and used the CCERs as very useful input to its own work. The Panel feels, however, that the CCERs could have been more strategic.

One of the most important functions of a CGIAR board, apart from the selection of a Director General, is the monitoring of the DG's performance. At the time of the previous EPMR the Board had established an *ad hoc* search committee which resulted in the selection of the current DG. With respect to the assessment of the DG's performance, the full Board assesses the performance every year according to detailed written guidelines. Every other year the evaluation is based on

an extensive 360 degree feedback questionnaire which is sent to Board members, staff, donors and partners. On alternate years the evaluation is based only on the Board members' assessment. This system appears to be working well and has been helpful to the Board in broadening the scope of feedback it receives on the DG's performance. The Board has been very satisfied with the DG's performance and in 2008 renewed his contract for another term.

6.1.4 Board effectiveness

To assess the effectiveness of the Board the EPMR chair and one of the Panel members attended most of the March 2009 Board and committee/task group meetings. The Panel found that the Board is receiving good support from the center. The Board secretary function is ably fulfilled by the Assistant to the Director General. The agendas clearly identify items for decision, items for discussion or items for follow-up or monitoring by the Board. Documents provided to the Board are relevant, of good quality, sent in a timely fashion and made available online. Task Group papers are also sent to all Board members. In addition, all Board papers are sent to the Board members on a CD after the Board meetings. Minutes of meetings are clear and detailed (possibly too detailed) but should be sent to Board members sooner after the meetings.

Attendance at Board meetings has significantly improved over the review period, from an average of 3 absentees per Board meeting for 2003-2005 to an average of one absentee for the period 2006-2008. The term of two frequently absent members was not renewed. Board self-evaluations show that participation during meetings by all Board members has in most cases been considered satisfactory. Discussions at the Board and committee/task group meetings which the Panel attended were of high quality and Board members freely expressed their views in a respectful environment. They challenge themselves and management if required and make information requests from management as needed.

Bioversity has an extensive Board Policies and Procedures Manual prepared by the Board Secretary. Among others, it features background information on Bioversity for the benefit of new Board members, the structure of the Board and its committees, Board policies and procedures as well as responsibilities, accountabilities and expectations from Board members. Although the Manual states that new Board members are expected to attend the CGIAR orientation seminar for new Board members, the schedule of these seminars has not always made this possible. To increase the Board's understanding of Bioversity operations, new Board members are provided with an induction program, and the Board organizes field visits for its members prior to the meetings held in regional offices. To increase its effectiveness the Board has also introduced the valuable practice of holding, at the end of its meetings, a learning session during which members discuss what can be learned from the just completed meeting and should be taken into account for future meetings.

In budgetary terms the cost of the Bioversity Board during the review period was between US\$209,000 and US\$220,000 per year except in 2003 when the amount was US\$294,000 because of expenses related to the recruitment for a new DG. As a percentage of total budget, the cost of the Board has decreased from 0.71% in 2004 to 0.56% in 2008. This is the result of conscious efforts by the Board to control costs. Of note is the fact that a discretionary annual imprest account of US\$50,000 is available to the Board Chair as recommended by the previous EPMR.

Relationships between Board and Management are important to a well functioning Board and Center. The Bioversity Board receives, through the Board Chair, the agenda and minutes of the monthly Senior Management Team meetings and the Board Chair and the DG have at minimum monthly contacts. Similarly, the leader of the FATG and the Director of Corporate Service also have monthly contacts. Several Board members feel that the absence of a single management

counterpart at director level for the leader of the POTG at least partly explains why the POTG has not been as effective in its oversight of the programmatic area as the FATG has been in its oversight of the financial area. Management feels that the Board is clear in its advice and in its fiduciary responsibilities, that it is investigative without micromanaging and that it gives management the support it needs. Similarly, Board self assessments and interviews with Board members show that the Board is satisfied with its relationship with senior management and with the degree to which management is willing to take Board suggestions. The DG is felt not to be too close to the Board, to have grown in his position over time, and to be hiring people of quality. The Board is also generally satisfied with its interaction with HQ staff but naturally has less opportunity to interact with regional staff.

6.1.5 Board self governance

The Bioversity Board has a code of conduct which new members are required to sign at their first meeting. In conjunction with the Board Manual this sets clear guidelines for and expectations from Board members in various areas such as attendance, individual behavior, preparation for and participation at meetings, potential conflict of interest, etc. With respect to the latter, the disclosure of potential conflicts of interest is a standard agenda item of the Board meetings; minutes of Board meetings show that members have disclosed such items for discussion by the Board.

Board members who are up for re-election to a second term are evaluated by their Board member colleagues along six criteria; during the period under review two members were not re-elected. At each of its March meetings the Board also evaluates the Board Chair using a form designed by Bioversity and now used by other centers; results show that the outgoing Board Chair satisfactorily discharged his duties and established a collegial and productive environment in the Board. The Board also conducts self assessments. A 10 question assessment form is used at each Board meeting and a more detailed 24 question assessment is used additionally once a year at the March Board meeting. A 12 item assessment is used at each task group meeting; these assessments could be expanded based on the Internal Audit Unit's Good Practice Note on the subject. Additionally, the Panel suggests, as the Board itself suggested at its September 2007 meeting, that all assessment forms use one rating scale instead of the different rating scales currently used. The Panel further suggests that the results of the assessments be communicated sooner to the Board. While 2007 results were lower than for the other years, the Board has generally expressed satisfaction over the years on all rated items. Key findings from the most recently available Board self assessments are that the Board is slightly less satisfied on items such as: its long-term oversight of programs; its vision of how the organization should evolve over the medium term; the planning process to respond to opportunities and challenges; and the adequacy of the Center's performance in the area of impact assessment. Satisfaction with how the POTG and FATG are operating now is good and improving.

6.1.6 Bioversity Board and CGIAR change process

The Bioversity Board has been informed regularly by management about the CGIAR change process and although final decisions have not been made yet with respect to the change process, the Board is discussing its potential impact on Bioversity and asked management to look at the implications of various funding scenarios that may result from the change. The Board is also considering the impact on its own role and responsibilities, e.g., what would the relationship be with a Consortium board? What are Bioversity's scientific priorities and how should they be best organized in the new proposed Megaprograms? What part should the Board play in ensuring that high priority programs are sustained? How much independence might the Bioversity Board

be asked and willing to give up? What if centers are merged? Under what conditions would Bioversity join a consortium and how would the Board make its decision? While nothing definitive emerged from the discussions they show that the Board takes the implications of the change process seriously and the Panel believes that the Board will formulate its views on all these matters as relevant information becomes available.

6.1.7 Overall assessment of governance

The Panel notes that the recommendations of the previous EPMR relating to the Board have been largely implemented and it is the Panel's view that the Board operates more effectively and more efficiently than at the time of the previous EPMR and that it fulfills its fiduciary obligations appropriately even though the programmatic oversight was not of the same quality as the financial oversight. Improvements are possible in several areas discussed above (e.g., better monitoring of science priorities and impact, better gender balance, better adherence to some of the Internal Audit Unit's Good Practice Notes) but the Board is already aware of most of the areas that need to be addressed. Overall the Panel has at present no cause for concern with respect to Board governance and operation but it nevertheless offered a few suggestions for improvements and one recommendation about the operation of the POTG.

6.2 Management and Administration

6.2.1 Organization structure

Bioversity's organization structure, shown in Chapter 2 (Figure 2.1), is significantly different from what it was during the previous EPMR. As explained earlier in this report, Bioversity manages its operations in a matrix type organization. Projects/activities have been restructured into four research programs within a ten (F series) MTP project structure. Each research program is headed by a Director who controls the budget for his/her programs. Correspondingly, the role of the regions has been redefined. The role of Programs and Regions, their interaction and the difficulties the matrix organization creates have been discussed earlier and need not be repeated here. Programs Directors report directly to the DG while the Regional Directors report to the Deputy DG.

During the review period Bioversity also made other significant organizational changes:

- INIBAP, from being a separate entity has been integrated as one of the core programs;
- the role of the Deputy DG has been changed from supervising the programs to supervising the regions and other operational units (Policy and Law; Capacity Development; and Public Awareness which was recently transferred under a newly recruited Director of Communications);
- the Human Resources function has been separated from Finance and a new Director of Human Resources has been hired, reporting directly to the DG—in recognition of the more strategic role given to Human Resources management;
- a new Director of Corporate Services, also reporting directly to the DG, was hired during the period to oversee Finance, Administration and Information Management (the latter also now transferred under the Director of Communications); without the HR function to oversee, the Director Corporate Services can better focus on the Financial function;
- the various communications and public awareness units were combined under a new Director of Communications who came on board in mid-May 2009 just as the Panel was finalizing its work;

- the donor relations and grants submission/monitoring function have been reinforced and are managed by the Assistant Director General;
- a Risk Management Committee has been created to identify and monitor the key risks to the center.

The Panel has examined the role of all the major Bioversity organizational units in various sections of this report: research management and support in Chapter 5, Human Resources and Finance in Chapter 7.

6.2.2 Senior Leadership

The current Director General has been in post since 2003 and his contract was renewed in 2008 for another five years. As mentioned in the governance section, his performance is reviewed by the Board every year and, every other year, with the benefit of the results of an extensive 360 feedback exercise. The Panel commends the center for organizing such a feedback exercise. In 2008 the DG was heavily involved in the CGIAR change process and was therefore much less available to deal with center issues.

To support the DG in its management of the center, Bioversity has four standing committees:

- the Senior Management Team (SMT) meets monthly, is chaired by the DG and is composed of the DG, Deputy DG, Assistant DG, Director Corporate Services, Director HR, and, since the beginning of 2009, one Programs Director selected by her/his peers. Within the Board's policy framework the SMT defines strategic HR planning, oversees the preparation of the MTP, prepares and monitors financial plans and resource mobilization, monitors the main risks facing the organization and, more generally, oversees the general management of the center. The agendas and minutes of the SMT meetings are provided to the Board.
- the Priorities and Strategies Committee (PSC) is a decision making body that meets three times a year. It is composed of the SMT members, all Programs Directors, all Regional Directors and all Heads of Research Support Units. The PSC decides on the strategic scientific direction of Bioversity, on research priorities and on resource allocation between programs and units. It examines long term scenarios for the center and promotes cooperation between programs and regions. The PSC does not deal with management issues. It presents the results of its meetings to staff and the agendas and minutes of its meetings are provided to the Board.
- the Risk Management Committee meets 3 or 4 times a year, is chaired by the Director of Corporate Services and also comprises several representative staff from both headquarters and regional offices. It designs the Risk Management Framework, identifies significant risks, recommends mitigation measures and action plans, and ensures that controls are in place. The committee reports twice a year to the DG, the SMT and the Finance and Audit Committee of the Board. The committee has identified and prioritized a number of potential risks which both management and the Board discuss and monitor on a regular basis.
- the Occupational Health and Safety Committee, which meets 4 times a year, is chaired by the Director of Corporate Services, and comprises the Office Manager and representative staff from headquarters and each regional office. It oversees occupational health and safety policies, ensures a safe working environment and ensures that adequate emergency procedures are in place. The Board is kept apprised by management of any issue arising in that area; none were raised at the Board meeting the Panel attended.

The Panel did not have the opportunity to attend any meeting of these committees and could not, therefore, offer any assessment of their effectiveness from direct experience.

6.2.3 Resource Mobilization

Resource mobilization (RM) has taken increasing importance in Bioversity, as in other CGIAR centers. While many are involved, from scientists to Board members, these RM efforts need to be coordinated if they are to be effective. As a result of the last EPMR, Bioversity has established an Assistant DG position with responsibility for Donor Relations, Planning and Evaluation, and a Grants Office, under the Board's approved RM strategy for 2006-2010. All submissions to donors, whether for restricted or unrestricted funding, have to be channeled through the grant's office which maintains a grants database and monitors the grants and the very large number of donor reporting requirements. Bioversity is making efforts to diversify its sources of funding by approaching new potential donors, e.g., foundations, trusts, wealthy individuals. Bioversity is also making a concerted fundraising effort in the UK; to that effect it has established a Bioversity International (UK) charity. At the regional level, Regional Directors are expected, among other duties, to facilitate identification of regional funding sources, and development of funding proposals. All these efforts, as well as the centralized set-up, have been paying off: since 2004 unrestricted funding has increased in absolute and relative terms and Bioversity now has the highest rate of unrestricted funding of all CGIAR centers (see chapter 7 for a more detailed discussion of the evolution of funding during the review period). The Panel commends Bioversity for its innovative approaches to broaden its funding base.

6.2.4 Communications

Because of its modus operandi of doing research in partnership with others, communication and public awareness activities are all the more important in Bioversity. Up to May 2009, external communications and public awareness activities were split between different units reporting to different managers. The Board expressed concern that this resulted in insufficient coordination and less than optimal efficiency. Additionally, the Panel understands that public awareness activities were not always being conducted with sufficient coordination with the research projects. The recent creation of the Director of Communications position and the arrival of its incumbent in May 2009 should bring increased cohesion and focus to these activities.

Internal communications have improved over the review period. As mentioned in the Governance section, communications between management and the Board and its committees have increased in frequency and quality. Board meetings (except closed sessions) are open to all staff although the Panel did not see many availing themselves of the opportunity. Communications between management and staff have increased as well: at headquarters the Director of HR meets at least monthly with the staff association representatives to discuss issues of concern to staff and the DG meets with the Association every few months. The DG also has regular meetings with all staff. Nevertheless, progress can still be made as demonstrated by the fact that the communication about the closure of the CWANA office was handled sub-optimally which, as a result, had an impact on staff morale and created concerns about possible further closures.

6.2.5 Corporate Services

While the Finance and Human Resources areas are covered in detail in the next chapter, the Panel did not have time to look at the other units in Corporate Services in any detail. On the other hand, the 2007 CCER on Finance and Administration examined the corporate/administrative services in more detail, found them to be operating satisfactorily and made only a few

suggestions but no recommendations. These units cover: procurement, facilities, visas, conference services, travel, supplies, documents, etc. The Panel did nevertheless note that the workload of the Corporate Services units has increased considerably during the review period (the volume of transactions per year has increased up to threefold in some units) and the number of staff these units have to serve has increased as well. To adequately respond to such an increase, Corporate Services has been progressively shifting from a control mode of operation to an enabler mode of operation and the units received very favorable ratings in the 2007 Customer Service Survey with the exception of clarity of policies and procedures, clarity about who to go to for services, and customer service attitude of Administrative Services (which clearly conflicts with the desire of becoming an enabling unit rather than a controlling unit). Among all these units the Travel Office received the highest positive ratings.

The Panel found no indication in the Customer Service Survey that there were serious problems with any of these units and it found nothing that would contradict the CCER assessment which it therefore endorses.

7 RESOURCE MANAGEMENT

7.1 Human Resources Management

7.1.1 Staffing

At the time of this EPMP, Bioversity's total regular staff (excluding hosted staff) was about the same as at the time of the previous review - 224 in February 2009 vs. 220 at the end of 2002 (a 2% increase) after having peaked at 242 in 2005. Complementary staff (honorary fellows, temporaries, consultants and interns) rose from 37 in 2002 to 50 in early 2009 (although honorary fellows and consultants represent only about 10 full-time equivalent staff). While total regular staff only increased marginally there was a significant shift of staff from the regions (-21%) to headquarters (+51%). This is consistent with the strategic move at Bioversity toward more global programs. Currently, of the total 224 regular staff, 110 (49%) are at HQ and 116 (51%) in the regions. In 2002, 73 were at HQ (33%) and 147 (67%) in the regions. Of the 114 non-HQ regular staff the largest numbers are in Montpellier (23), Nairobi (17), Cali (14) and Serdang (13) (see Table 7.1).

Bioversity increased its cadre of Internationally Recruited Staff (IRS) from 45 in 2002 to 62 in 2008 (and 52 at the time of this review in 2009). In terms of percentage of total staff, IRS represents 23% of total regular staff in 2009 versus 20% in 2002 and 26-27% in the years in-between. A little over half of them (52%) are based at HQ compared to 29% in 2009, also a major shift from regions to HQ.

In terms of distribution by organizational units, Programs have, quite logically, the most staff (118 or 53%); CfLP is the largest program with 47 staff, DfLP has 32, UMPB has 27 and GPP has 12. Regions have 44 staff (20% of the total), one-third of them in Europe. Operational support units have 13 staff (6%) and the corporate units (DG's office, Finance, HR, etc.) have 49 staff or 22% of the total.

At the end of 2008, 103 regular professional staff (including the 4 programs directors) were engaged in research and research support versus 117 in 2005 (the earliest date for which comparable data was easily available). This is a decrease of 12%. A distribution of staff by title is given in Table 7.2. In contrast, the number of regular staff involved in non-research increased slightly from 125 in 2005 to 129 in 2009. As a percentage of total regular staff, research and research support staff decreased from 48% to 44% and non research staff increased from 52% to 56%. This is a ratio of more than one non-research staff for each research staff, a ratio which the center may want to monitor closely. The ratio of research support personnel over scientists was in the 0.74 to 0.84 range from 2005 to 2007 and fell to 0.68 in 2008 as a result of job reclassifications of a number of programs specialists (non-research jobs increased correspondingly).

7.1.2 Staffing strategy

In 2007, as a result of the Center's medium term strategy, the Center looked at skills needed at a 3 to 5 year horizon and identified skills gap and ways to fill them (recruitment, training, transfer, separation, non-renewal of contracts). At the leadership level, the SMT looks annually at upcoming vacancies and identifies staff with high potential and provides them with training so as to make them competitive when the open recruitment process starts for a given position. Some potential new managers have attended the CGIAR's former first level leadership course. Risks associated with succession planning and the possible lack of qualified candidates is highlighted in the Risk Assessment paper submitted to and discussed by the Board.

Table 7.2 Bioersity Staffing 2005 - 2008

	2005		2006		2007		2008		TOT.
	IRS	LRS	IRS	LRS	IRS	LRS	IRS	LRS	
REGULAR STAFF RESEARCH									
RESEARCH									
Principal Scientist	1	2	1	1	1	0	1	0	1
Senior Scientist	19	20	16	17	16	1	18	1	18
Scientist	26	18	23	14	23	9	23	9	23
Associate Scientist	19	18	21	13	21	4	17	4	17
Programs Directors	4	4	4	4	4	0	4	0	4
Sub-total	69	62	65	49	65	14	63	14	63
RESEARCH SUPPORT									
Programs Specialists	45	46	49		49		38		38
Technicians	3	2	2		2		2		2
	48	48	51		51		40		40
Sub-total	117	110	116		116		54		103
TOTAL RESEARCH									
REGULAR STAFF NON-RESEARCH*									
SMT	5	5	5		5		0		5
RD / Unit Heads	9	9	8		8		0		8
Support Functions	111	107	107		107		116		116
	125	121	120		120		116		129
Sub-total	242	231	236		236		170		232
COMPLEMENTARY STAFF (FTE - 2008 Only)									
Research									6
Consultants									4
Sub-total									10
REGULAR STAFF NON-RESEARCH									
TOTAL REGULAR STAFF									
COMPLEMENTARY STAFF (FTE - 2008 Only)									
IRS as a % of Total Regular Staff	27%	26%	26%		26%		27%		27%
LRS as a % of Total Regular Staff	73%	74%	74%		74%		73%		73%
Research Staff as a % of Total Regular Staff									
*Non Research Staff as a % of Total Regular Staff	48%	48%	49%		49%		44%		44%
	52%	52%	51%		51%		56%		56%

* Non Research Staff includes: Programmatic Administrative Support, Finance, HR, IT, Publications, ODG

Recruitment of regular staff, whether at HQ or in the regions, is on a competitive basis; positions are advertised and candidates are interviewed by panels. Overall, 82 positions were advertised and filled from 2006 to 2008. The Center does not seem to have problems attracting IRS or LRS staff at the quality level it currently needs. The Center's standing and reputation are good. Its compensation package for IRS is in line with its competitors. For LRS, Bioversity is competitive in the various local markets where it recruits but it may not always be with other international organizations because Bioversity LRS at HQ have to pay taxes while this is not the case with other international organizations. To redress past situations (except the tax issue mentioned above), job reclassification exercises were conducted in 2007/2008 in Montpellier, Rome and Kampala, resulting in salary increases for some staff. A similar exercise is scheduled for the Asia region in 2010.

Staff turnover, in percentage of staff on board, decreased from 8% in 2004 to 6% in 2006 and then increased sharply to 10% in 2008., a potentially worrisome result especially since these figures do not include the closure of the CWANA regional office which occurred in 2009. The distribution of departures between IRS and LRS is about the same as their proportion of total staff meaning that the turnover rate is about the same in both groups. Over the 2004-2008 period about half of the departures were voluntary and half non-voluntary except in 2008 when the large majority (19 of 23) were voluntary departures. It is not clear why there was such a jump in voluntary departures in 2008; the exit interviews conducted do not seem to have revealed any pattern. The future rate of staff turnover needs to be carefully monitored. With respect to exit interviews, the audit of the HR function conducted in early 2009 by the CGIAR's Internal Audit Unit indicated that there is no policy or procedure requiring that such exit interviews be conducted systematically. The Panel agrees with the IAU that systematic exit interviews should be conducted according to defined guidelines so that the center can detect and correct negative trends in staff departures.

7.1.3 *HR Management, Processes and Systems*

In line with the major changes in the Center over the review period, HR has strived to evolve from a purely administrative/transactional function to a more strategic function better aligned and integrated with the organization's goals and strategies. A director of HR was recruited in 2005 to implement this shift.

Bioversity has clear and extensive policies, processes and procedures which were streamlined over the review period and are assembled and well documented in a Personnel Policies Manual and Human Resources Manual which were last updated in September 2008 and are now complemented by diagram/flow charts which make them easier to understand and follow. The Panel feels that these are adequate. A new HR system already used by other CGIAR centers (HR4U) is being implemented in stages starting in May 2008. It should help decrease the amount of paper-based HR transactions and should increase the efficiency of the HR function.

7.1.4 *Performance Management*

Staff's performance is appraised annually. Individual Performance Agreements (the agreed objectives for the coming year) are the basis for the end of year performance and a mid-year review is conducted. The completed appraisals are sent to HR for archiving and monitoring on a sample basis. Overall review of performance agreements and performance appraisals by the PSC and SMT is scheduled in their annual cycle of meetings. The PSC also looks at the distribution of ratings by supervisors so as to detect and correct possible biases. The management of this

process was raised by regional HR staff as an issue because, pending the introduction of the new HR system (HR4U) the process is still largely paper-based so that getting input/feedback/assessments from supervisors, co-supervisors or other staff is time consuming and requires a lot of follow-up and back-and-forth. The new HR system should simplify its implementation. Overall, the annual performance appraisal *system* in place at Bioversity is sound. However, as in all organizations, its effectiveness depends on proper implementation by individual managers and on enforcement by HR.

In this respect IAU's audit showed that in 2008 all staff were rated as fully effective and none rated in the "needing development" category. Since the probability of such a high level of performance is very low, this would indicate that the performance appraisal system was not applied properly by Bioversity supervisors/managers and not monitored closely enough by senior management. Results of the 2006 staff survey (see paragraph 7.1.6) also show that this is an area for management to monitor more closely and HR to enforce more firmly. IAU made recommendations in this respect which the Panel endorses. In view of the above, the Panel also urges Bioversity to implement the performance module of the HR4U system as early as possible.

7.1.5 Staff Development

Policies and procedures exist for staff development but their actual implementation does not seem clear cut. Proposed staff development actions result from the individual performance agreements and performance assessments and are then aggregated at the Center level before decisions on budgets and specific actions can be taken. While this ensures consistency across the Center and allows the emergence of Center wide needs, it takes away flexibility from supervisors and HR staff are not clear on available budgets for training and staff development and they cannot therefore advise staff or managers on what might be feasible or not. In addition, there are no clear stated targets for the amount of time staff are expected to spend on personal development. In terms of actual training days used, the Panel noted the difference between the 3.1 training days taken in 2008 by IRS staff (excluding conferences and seminars) and the 1.9 training days taken by LRS. In 2007 there had been an even wider difference (4.88 training days for IRS vs. 1.35 for LRS) partly because training funds were frozen as a result of budget constraints. The Panel also noted that while Bioversity had among the highest average training days for IRS (compared to other CGIAR centers but not compared to other knowledge based organizations) it devotes among the lowest proportion of its total budget to staff training (0.31% in 2008 and 0.27% in 2007). While this may be explained by the existence of training monies within projects and by the organization of group training courses provided internally, the Panel suggests that Bioversity reassess its training and development budget and policies so as to devote sufficient resources to maintain and develop its human capital in a balanced fashion between all categories of staff, especially in view of the fact that this area was one with a high level of dissatisfaction in the staff survey (see next paragraph). On the other hand the Panel notes that the Centre has recently introduced a Board-approved mentoring policy targeting young scientists in particular.

7.1.6 Staff Survey and Customer Satisfaction Survey

Bioversity conducted a staff survey in 2006. The results were analyzed very thoroughly and shared with staff. Respondents were satisfied with the whole organization, with their immediate work group environment, and with their immediate supervisors. Areas with higher levels of dissatisfaction were: upward and downward communication; learning and development; and performance management. These are areas where management should monitor progress frequently. The recruitment of a Director of Communication should help improve matters in the

area of internal as well as external communication. The other two areas (staff development and performance management) were already mentioned as needing closer monitoring. A more detailed analysis of the results shows that the professional level staff and HQ staff were generally less satisfied than support staff and non-HQ staff but there was no clear pattern of differences between the responses of male and female staff.

In 2007 Bioversity also conducted a customer satisfaction survey for HR and Finance and Administration as part of the CCER conducted for these two areas. The survey was administered and interpreted internally by ILAC. It covered the whole center and had a response rate of 59%. Of all the areas covered by the survey, HR faced the greatest levels of dissatisfaction although all questions but 2 had more than 50% of positive responses. The areas of highest negative responses were: staff development and training; recruitment and hiring; performance management; and General HR. This is consistent with the results of the Staff Survey and with information received by the Panel. Measures were taken by HR to address the areas of concern but HR has not overcome its image problem yet.

The Panel commends management for carrying out such staff and customer satisfaction surveys and it suggests that another customer satisfaction survey be conducted in the next year so as to measure progress made.

7.1.7 Diversity

The Bioversity Board has gender diversity goals in place and, according to management, during the recruitment process the Centre makes special efforts to attract qualified women candidates, for example through the use of the Gender and Diversity Programme database and networks, and by adopting policies and procedures that ensure a discrimination-free selection process. Yet there is still a gender imbalance at all levels of the Center: staff, management and Board. The Board has two females out of 11 members and the Senior Management Team has none. For IRS in 2008 there were 40% women at the director/unit head level, 12% at senior scientist level, 29% at scientist level and 54% at associate scientist level. Since 2006 the proportion of women has increased for scientists and associate scientists, but it decreased for the higher level groups. Since women represented less than 30% of IRS applicants in 2008 and an even lower 17% of appointments their overall percentage among the IRS will not increase unless a concerted and sustained effort continues to be made by management to increase their numbers.

For the LRS the picture is a little better at the scientist level (36% of women) and it is above 50% for all other categories with a high of 76% of women for professional non-scientific support staff. If women continue to represent about 65% of the pool of LRS applicants, as was the case in 2008, and 85% of appointments, the proportion of women among LRS will continue to increase.

In terms of diversity by origin, the Board is well balanced but the Senior Management Team has only one member out of 6 from the South. Part II IRS staff represent between 21% (of scientists) and 45% (of director/unit heads). At recruitment they represented 26% of the applicant pool in 2008 but half of the appointments. Among LRS, Part II staff represent 79% of scientists but only 18% of professional non-scientific staff; the latter can be explained in large part by the fact that LRS at headquarters and in Montpellier are mostly from the North. Nevertheless, a disturbing fact is that Part II (South) LRS represented only 22% of the pool of LRS applicants in 2008 and only 5% of appointments. This means that if this were to continue the proportion of Part II LRS would decrease.

In view of the imbalances in gender and origin highlighted above, and even though management and the Board are aware of the need to reverse the trend and are taking steps to do so, **the Panel**

suggests that management make a concerted and sustained effort to attract and retain women at all levels and for all categories of staff and Part II nationals at the IRS level.

7.1.8 Staff Association

Bioversity has a working Staff Association which meets monthly with the Director of HR, periodically with the DG and annually with members of the Board. Like many staff associations of international organizations it struggles somewhat with the effectiveness of its representation of non-HQ staff but makes efforts to overcome the constraints of distance. In its meeting with Panel members the Association expressed a number of concerns. Chief among those is the closure of the CWANA office, the way it was communicated to staff and the lack of staff involvement in the decision. The Association feels that the measure was not fully thought through and that the alternative cost reduction measures it proposed were not considered. According to the Association many staff now fear that Bioversity may close other regional offices which has resulted in a decrease in staff morale and a reluctance of staff to express themselves freely for fear of losing their job. The staff who spoke to the Panel seemed to express themselves freely and voiced the same concerns the staff association had raised. Given the above experience and its potential negative impact on staff morale and staff/management relations, the Panel suggests that management take special care in preparing, communicating and implementing cost reduction measures if they are needed, taking staff into confidence as appropriate.

The Association is also concerned that the matrix structure has increased the cost of running the organization; that there is an imbalance between research and research support; that the addition of a Director of Communications position will be adding to an already top heavy structure; that there are not enough staff at the regional level to raise funds and develop programs; that appropriate comparators are not always selected in the job reclassification and salary increase exercises (especially with respect to taxability of salaries) which may endanger the center's competitiveness on the job market; that the shortening of staff contracts from 5 to 3 years may decrease the center's ability to retain staff. With the agreement of the Association the Panel forwarded these concerns to the Director HR with the understanding that both parties would examine them jointly. The Panel's own view on several of these issues is discussed in other parts of this report.

On the positive side the Association representatives expressed overall satisfaction with Bioversity and mentioned that there is no rift between IRS and LRS staff in the Center such as can be found in other organizations.

7.1.9 Grievance and Whistle Blowing

Bioversity has well defined grievance and whistle blowing policies and processes, clearly stated in the Personnel Policies Manual. Depending on the complexity and seriousness of a grievance several levels of appeal are possible and clearly laid out (second in line supervisor, DG, *ad hoc* Appeals Committee, Board Chair and the International Labour Organization Administrative Tribunal). Whistle blowing can be reported beyond one's chain of command to the Board Chair, the Chair of FATG and the Director of the Internal Audit Unit of the CGIAR. All cases of whistle blowing have to be reported to the Board Chair. From its discussions with Board members, representatives of the Staff Association and HR staff, the Panel understands that policies and procedures are indeed felt to be clear and comprehensive, that there are no systemic issues with respect to complaints, grievances or harassment (of any type) and that the whistle blowing policy has yet to be used by anyone. However, given the uncertainty resulting from the CGIAR change process and from the recent closing of the Bioversity CWANA office, there is an increased

insecurity about individual contract renewals which may prevent staff from raising issues or concerns.

7.1.10 CCER and Internal Audit

Bioversity conducted a CCER of its HR, Finance and Administration functions in 2007. The CCER pointed out the changing role of the HR function as a result of Bioversity's new strategy and the fact that four of the six members of the HR team had joined the center over the previous two years. The CCER covered a number of areas, many of which are covered in the previous paragraphs. The CCER made 21 recommendations; the Board rejected several of them, prioritized the others and is monitoring their implementation. The Panel concurs with the Board on its acceptance and rejection of the respective CCER recommendations. This CCER was not considered by Board members as useful as the others and the Panel concurs. It made too many recommendations and did not provide much rationale for its recommendations. The Panel was surprised that the CCER did not comment on the structure of the HR unit, i.e., an HR Director supervising one HR Manager supervising four HR staff. This setup was probably fully justified when HR was changing its role, refocusing its functions and updating many processes and procedures but the Panel wonders whether this is still required or whether a flatter structure might not now be more appropriate. In terms of number of HR staff, while many in Bioversity feel that HR is overstaffed, the ratio of HR staff to total staff, 2 per 100 in Bioversity, is lower than the 2.2 to 2.8 found, for example, in UN organizations.

As mentioned earlier, the Internal Audit Unit conducted an audit of Bioversity's HR function in early 2009. The Panel received a copy of the draft audit report just as it concluded its review. While IAU did not raise any issue of high concern, it made recommendations in several areas in addition to those already mentioned in the paragraphs above: ensure better compliance with HR policies, do an annual risk assessment of the HR function, establish procedures on the clearance of departing staff, stop Bioversity email usage by staff who have left the center, and watch for issues in the implementation of the new HR4U system. The Panel fully endorses these IAU recommendations.

Overall, and despite the lower scores on the customer satisfaction survey, the Panel feels that the HR function in Bioversity has made significant progress since the last EPMP in many areas. The function, under its current director, also seems to be clear about what remains to be done.

7.2 Financial Management

7.2.1 Funding

Bioversity's total funding grew significantly during the review period, from US\$ 27.7 M in 2003 to US\$ 38.5 M in 2008, a 39% increase (Table 7.3). This increase, however, occurred in spurts. Unrestricted funding was constant at about US\$ 10.5 M to US\$ 11 M for several years prior to 2004 and in 2004 jumped by 41% because of a new hosting contribution from Italy and a switch of DFID's contribution from restricted to unrestricted. Unrestricted funding then remained flat till 2008 when it increased by another 12% to reach US\$ 17.5 M. Restricted funding evolved more unevenly with year-to-year variations of close to 20% up or down. In 2008 restricted funding reached close to US\$ 21 M, a 25% increase over 2003.

Table 7.3 Bioersity Funding, Expenses and Balance Sheet 2003-2008

	2003	2004	2005	2006	2007	2008	Change 2003-08
REVENUE							
Unrestricted	10,927	15,399	15,484	15,141	15,536	17,481	60%
Restricted	16,724	19,824	20,254	17,196	22,708	20,974	25%
Total Revenue	27,651	35,223	35,738	32,337	38,244	38,455	39%
OPERATING EXPENSES							
Programs	25,009	28,519	29,574	28,790	31,728	31,998	28%
Management & General	2,911	3,913	5,512	6,021	4,797	6,275	116%
Total Operating Expenses	27,920	32,432	35,086	34,811	36,525	38,273	37%
Surplus/(Deficit)	(269)	2,791	652	(2,474)	1,719	182	
Allocated as follows:							
Unappropriated	(269)	2,791	652	(2,474)	1,719	182	
Appropriated	0	0	0	0	0	0	
Operating expenses by natural classification (a):							
Personnel Costs	13,491	15,790	18,175	18,773	19,514	21,466	59%
Supplies & Services	14,270	10,558	10,978	9,697	10,692	10,416	
Collaborators/Partnership Costs			5,505	5,404	6,545	6,634	19%
Travel	1,654	1,690	1,783	1,795	1,935	1,769	7%
Depreciation	426	499	506	476	450	558	
	29,841	34,238	36,947	36,145	39,136	40,843	37%
Indirect Cost Recovery	(1,921)	(1,806)	(1,861)	(1,334)	(2,611)	(2,570)	
Total Operating Expenses	27,920	32,432	35,086	34,811	36,525	38,273	37%
BALANCE SHEET ELEMENTS							
Current Assets	25,748	35,416	30,795	26,262	40,990	67,773	163%
Non-current assets	103	199	128	40	15	0	
Fixed Asssets	2,188	2,054	2,037	1,890	1,755	1,679	25%
Total Assets	28,039	37,669	32,960	28,192	42,760	69,452	148%
Current Liabilities	18,170	24,570	19,197	16,466	28,829	55,310	204%
Working Capital*	7,578	10,846	11,598	9,796	12,161	12,463	64%
Long-term Liabilities	2,669	3,108	3,120	3,557	4,043	4,072	53%
Fund balances							
Unappropriated	4,197	6,986	7,631	5,152	6,873	7,055	
Appropriated	3,003	3,005	3,012	3,017	3,015	3,015	
CASH BALANCES (b)							
Opening Balance	9,867	14,200	24,262	19,657	20,188	34,199	
Receipts	31,714	38,194	55,072	44,341	88,003	66,440	
Payments	(27,381)	(28,132)	(59,677)	(43,810)	(73,992)	(44,288)	
Closing balance	14,200	24,262	19,657	20,188	34,199	56,351	

(a) The category Collaborators/Partnership Costs was introduced in 2004.

This positive evolution of unrestricted funding during the review period is in contrast to the decline, in absolute and relative terms, across CGIAR centers during the period of the previous EPMP. During the period covered by this EPMP (2003-2008), Bioversity's unrestricted funding, as a share of its total funding, increased from 39.5% to 45.5%. This makes Bioversity the CGIAR center with the highest level and percentage of unrestricted funding. This evolution is encouraging, compared to that of other centers, and Bioversity should be commended for its successful efforts to bring greater stability to its funding. However, when adjusted for inflation, unrestricted funding has remained almost constant over the past 15 years (US\$ 10.2 M in 1994 and US\$ 10.7 M in 2008 in adjusted dollars). And at present an additional level of uncertainty and risk has been created with the current change process in the CGIAR. While the hope is that the new funding mechanism (donor contributions flowing from the donor fund to the consortium to megaprograms) will actually increase the amount of unrestricted funding received by the centers, there is no certainty, at this point, that all of Bioversity's projects/activities will fit under the megaprograms. If they don't, the center would have to either abandon them or find other ways of funding them, both of which would be disruptive in the short to medium term. To be prepared for such possible outcomes, the center has set up an internal working group to examine the implications of both a funding increase and a funding shortfall and to present mitigating measures.

7.2.2 Financial Performance Indicators

During the review period Bioversity has been in good financial health as can be seen in Table 7.4. From 2003 to 2008 the center has generated a cumulative surplus of US\$ 2.6 M despite a deficit during two of these six years. The main financial indicators are discussed below.

Table 7.4 Bioversity - Main Financial Indicators 2003 - 2008

		2003	2004	2005	2006	2007	2008
Year end results	\$000	-269	2,791	652	-2,474	1,719	182
Short term liquidity	Days	102	127	122	104	123	120
Long term reserves	Days	67	1	91	67	82	81
Indirect cost ratio	%	20.9%	20.1%	19.4%	18.4%	19.3%	19.4%
Personnel costs	%	45.0%	46.0%	49.0%	52.0%	50.0%	53.0%
indirect cost recovery	%	11.5%	9.1%	9.2%	7.8%	11.5%	11.7%

Short Term Solvency (Liquidity) (CGIAR target: 90-120 days)

Bioversity's current assets minus current liabilities at 31 December 2008 were US\$ 12.463 M (2007: US\$ 12.176 M. Net operating expenditures were US\$ 37.714 M after a depreciation charge of US\$ 0.56 M resulting in a short term solvency ratio of 121 days. The ratio has been within or above guidelines during the whole review period: 102 and 104 days in 2003 and 2006 respectively; at or above 120 days in the other years.

Long Term Financial Stability (adequacy of reserves) (CGIAR target: 75-90 days)

CGIAR guidelines and the Bioversity Board's policy with respect to operating reserves were 60 days. The CGIAR later changed the guideline to a 75 to 90 day range in order to overcome the pressure on unrestricted funding some centers were encountering. At its September 2007 meeting the Board set a target of 90 days. During the review period adequacy of reserves at Bioversity oscillated between the top and the bottom of the recommended range. In 2003 and 2006 it was 67 days. In 2006 this was due to Italy and the EU defaulting on their contribution. In 2004 and 2005 it was at 91 days, slightly above the top of the range, and in 2007 and 2008 it fell at 82 and 81 days respectively.

Efficiency of Operations (Indirect cost ratio) (CGIAR target: below 20%)

The indirect cost ratio is measured by dividing total indirect costs by total direct costs. It is a way of expressing how much of the total costs of an organization the "back office" represents. From 2003 to 2008 the ratio has varied between 19% and 21% except in 2006 when it dipped to 18.4%. Compared to other CGIAR centers, Bioversity's performance has been among the best (i.e., its ratio has been among the lowest). This indicates that despite the fact of having slightly more than half its staff at HQ, a high cost location, Bioversity's indirect costs are comparatively on the lower side.

Indirect Cost Recovery (Overhead Recovery)

The CGIAR has a policy of full cost recovery, meaning that each project (and therefore each donor who gives restricted funds) should bear its fair share of indirect costs. This is done by adding a set percentage of indirect costs to a project's direct costs. As seen in the indirect cost ratio above, at Bioversity these indirect costs represent on average 20% of total costs or 25% of direct costs. Hence 25% should be added to the direct costs of a project. In reality donors are generally unwilling to pay such amounts and Bioversity's average cost recovery has been 9% which is about the average of all CGIAR centers. However, Bioversity has been able to charge some indirect costs to projects. This has increased its cost recovery to about 15 to 16%.

7.2.3 Expenditures by Categories

The CGIAR breaks down expenditures in five categories, as illustrated in Figure 7.1 and table 7.5: personnel, supplies & services, partnerships, travel and depreciation. Personnel and supplies represent more than three quarters of all expenditures. Personnel costs have steadily increased from 45% (2003) to 53% (2008) of total costs. This ratio is one of the highest among the CGIAR centers and its upward trend is worrisome especially since the number of staff hardly increased during the same period as shown in section 7.1 above. The increase is explained in large part by the fact that Bioversity has an increasing proportion of its staff based at HQ, where salaries are higher than in the regions, and by the fact that almost half of its expenses are incurred in Euros which appreciated by about 20% against the US dollar thus negatively affecting the center (e.g., for 2008 expenditures were budgeted at a rate of 1.4 Euro/US\$ but the actual rate was 1.47). It is also noted that hosted staff (CAS-IP, ICT-KM and Alliance) that were added after 2003 represent 3% of total costs.

Figure 7.1 Objects of Expenditure

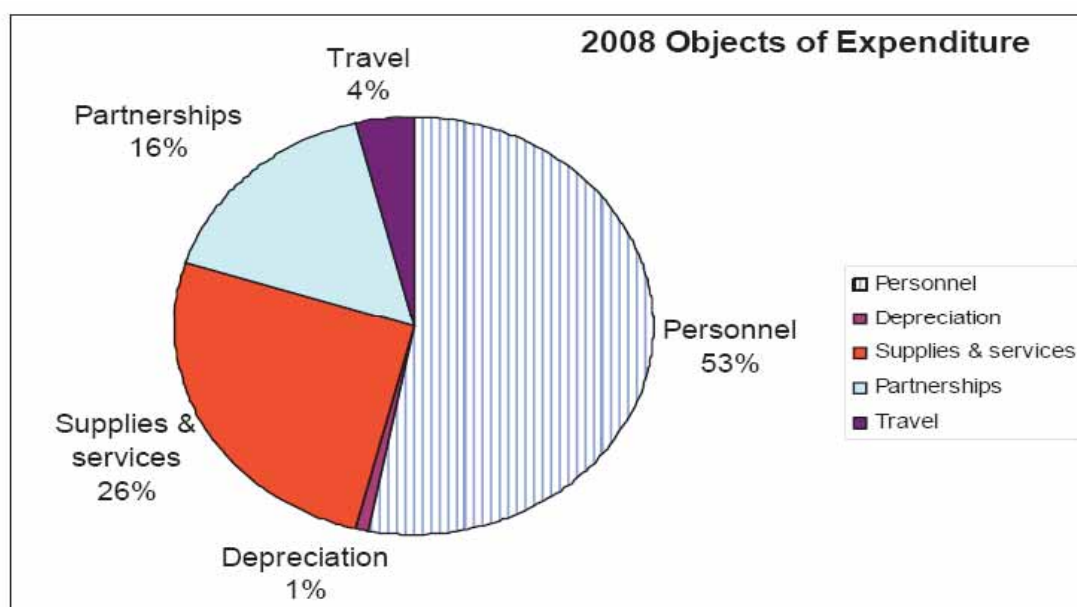


Table 7.5 Objects of Expenditures by year

	2004		2005		2006		2007		2008	
	US\$'000	% share	US\$'000	% share	US\$'000	% share	US\$'000	% share	US\$'000	% share
Personnel	15,790	46%	18,175	49%	18,773	52%	19,514	50%	21,466	53%
Supplies & Services	10,594	31%	10,978	30%	9,697	27%	10,692	27%	10,416	26%
Collaborators/Partnership costs	5,701	17%	5,505	15%	5,404	15%	6,545	17%	6,632	16%
Travel	1,690	5%	1,783	5%	1,795	5%	1,935	5%	1,769	4%
Depreciation	499	1%	506	1%	476	1%	450	1%	556	1%
Gross costs	34,274	100%	36,947	100%	38,145	100%	39,136	100%	40,841	100%
Cost recovery	(1,806)		(1,861)		(1,334)		(2,811)		(2,569)	
Net	32,468		35,086		34,811		36,525		38,272	

In contrast to personnel expenses, expenses in supplies/services diminished and travel and collaborators/partnership costs remained essentially stable.

Expenditures by regions are presented in Table 7.6. Over the review period expenses increased in all regions except Asia.

Table 7.6 Expenditures by region 2003 – 2008

	2003	2004	2005	2006	2007	2008	CAGR*
SSA	8,376	11,568	12,031	10,777	11,561	11,880	6%
Asia	7,538	9,293	9,045	9,650	9,921	11,014	7%
LAC	5,864	6,966	5,324	8,489	8,818	9,540	8%
CWANA	6,142	4,641	8,686	5,895	6,225	5,838	-1%
TOTAL	27,920	32,468	35,086	34,811	36,525	38,282	5%
% growth		16%	8%	-1%	5%	5%	

* CAGR: compounded annual growth rate

7.2.4 Accounting Systems

Bioversity uses Platinum for Windows as its accounting software. This software is now over 10 years old and while it produces accurate and timely financial information the center recognizes the need to upgrade the system to provide more flexible financial information. The 2007 CCER recommended the purchase of new accounting software. The panel also noted that since the Platinum system is not good for project accounting, the Programs run parallel systems. Many of the software's inefficiencies are overcome with the internal controls in place, although these are not self sustainable because they require a great amount of manual work.

Bioversity has been collaborating with a number of other CGIAR Centers with a view to identifying a common 'Project Management and Financial Information System' which would be used by all of the collaborating centers. The aim of the collaboration is to identify a system that incorporates a total integration of a center's core operational business processes. These include project management, resource management and financial management. Bioversity participated in a meeting held at IRRI in Los Banos in early May 2009 which shortlisted a number of potential systems and a 'Request for Proposal' is being prepared. This exercise is also currently being integrated into the Change Management Process phase 2 consultancy on 'Shared Services'. It is the intention of Bioversity to migrate to the new common system once it has been identified and funding permitted.

7.2.5 Financial Policies and Guidelines

As stated in the 2007 CCER on Finance and Administration, Bioversity is in compliance with the CGIAR guidelines and policies for maintaining its internal control processes and its accounting and financial practices. However, the guidelines are not always explicit and some possible improvements are suggested hereunder.

Investment and Foreign Risk

Bioversity has never dealt with any instrument to protect cash from currency devaluation or from month to month fluctuations. So far, at the end of the year, accounting results never proved the need for having sophisticated controls. In addition the pattern of US\$ /non US\$ income and expenditures have roughly matched over the course of a year and so a natural hedge has existed. However, given the increase of donor payment volatility, the Panel suggests that Bioversity have a written policy stating what type of instruments should be applicable in any of the possible scenarios, already approved by the Board and ready to be executed at any time.

Risk Management Controls

Bioversity is monitoring operational risks on a monthly basis and reports on such to the Board twice a year. IAU recommended the risk management approach and helped in the development of the framework that was later approved and audited by Deloitte. New policy and controls have been submitted to the Board and senior management has a clear and transparent view of the problems being faced. In addition, the internal discussion of the risk framework provoked a discussion on how to mitigate the identified risks. In order to enhance the effectiveness of the risk identification and monitoring process the Panel suggests giving the Board not only a risk score based on High, Medium or Low but an idea on the magnitude of the possible impact in US dollars.

Grants/ Funding Controls

After 2005, with the creation of the Grants Office, Bioversity improved considerably not only on the financial controls related to restricted projects but also on the elaboration and submission of proposals to potential donors. A guide was developed which includes all controls and procedures to help in the handling and transfer of responsibilities from one person to the next. Detailed controls were implemented reducing dramatically the delay in the submission of donor reports submitted by the center, thus improving the image of the center as a whole. To facilitate communications between units in Bioversity, the Grants Office could have its software integrated with the report generated by the scientists on new research ideas.

Budget Management Controls

An internal policy was developed by the finance department stating the approval limits and the process for approval. One missing piece that could improve the understanding of the process itself would be to explain and detail each step of the process, documenting the function responsible and how is it linked with the PBFA's function and responsibilities.

The monthly reports given to project managers compare budgeted vs. actual expenditures but they do not give them the complete and detailed picture to diagnose possible deviations. The system which will ultimately replace the Platinum system should be able to provide the project managers with such detail.

7.2.6 External Auditor

Deloitte has been the External Auditor for Biodiversity for the past 6 years and, in accordance with the CGIAR guidelines, will be replaced after they audit the 2009 accounts. The external audits of the 5 past years have been satisfactory and without any serious recommendations with respect to internal controls and accounting practices. The auditors informed the Panel that, apart from their first two years as auditors, they have found no significant deficiencies and had no significant points to raise. They find the internal controls well designed and the financial statement preparation efficient. Potential risks and problems could be due to exchange rate fluctuations but the auditors feel that Bioversity manages that risk well.

7.2.7 Internal Auditor (IAU)

The Panel spoke at length with the Head of the CGIAR's Internal Audit Unit (IAU) which does Bioversity's internal auditing since 1999. Overall, the internal audit reports were always satisfactory. They pointed to some improvements throughout the years but never items of non-compliance with the CGIAR guidelines and procedures. From 2001 to 2007 the Internal Audit Unit (IAU) made 309 recommendations of which none was on financial control issues. Out of these 309 only 7 are still pending of which 5 are in the research management area. IAU has audited Bioversity's regional offices as well as HQ units.

According to IAU, Bioversity is fairly disciplined about respecting procedures and there are no major issues of internal controls. With respect to financial indicators IAU finds Bioversity somewhat fragile and without much of a margin of error, especially with respect to reserves. On the investment side it has a fairly conservative investment policy thus minimizing risks.

7.2.8 CCER

A comprehensive CCER of Finance and Administration was conducted in 2007. The CCER found all the key elements of the financial, budget and accounting systems in Bioversity to be satisfactory or better: financial, budget and accounting policies and procedures; internal controls;

delegation of financial authorizations; financial, budget and donor reporting; risk management. The CCER also found the qualifications and professional development of staff in the Finance department to be satisfactory and it concluded that the decentralization and devolution of financial functions worked effectively and so has the creation of Programs, Budget and Finance Assistant (PBFA) positions in the Programs.

7.2.9 Customer Satisfaction Survey

Prior to the CCER a Customer Satisfaction Survey was conducted for HR and the Finance and Administration functions. The customer service attitude of the Finance and Budget office was rated highly and so were most of the questions relating to the office. Only three areas had a high (30%) level of dissatisfaction: two had to do with the readability and timeliness of Platinum reports and one with the clarity of financial policies and procedures. In response Bioversity's Financial Policies and Procedures Manual has subsequently been re-written and approved by the Board of Trustees. The issue of the Platinum reports will be addressed with the purchase of a new project management and financial information system.

7.2.10 Assessment and recommendation

Given the statements of the internal and external auditors, given the results of the above mentioned CCER and customer satisfaction survey, and given that the Panel, during its interviews with staff, management, the Board and other stakeholders did not hear anything that could give cause for concern, the Panel is satisfied that the financial department of Bioversity is discharging its responsibilities satisfactorily. The Panel nevertheless suggests that:

- in view of the uncertainties in funding Bioversity continue its efforts at diversifying its funding base;
- in view of the increase in staff at HQ Bioversity carefully monitor its personnel costs; and
- in view of the issues related to the Platinum system, Bioversity replace the system at the earliest so as to increase the finance department's effectiveness even further.

8 OVERALL ASSESSMENT AND RECOMMENDATIONS

8.1 Introduction

Bioversity International is a substantial research Center that has undergone much change under its dynamic leadership over the past five years. While retaining its mandate for advancing the conservation and use of genetic diversity, it has broadened its mission and its research profile, implemented major organizational and structural changes, and attracted more resources. Since the last review, it has generated a significant output of science, publications of all kinds, influenced the agendas of many organizations, trained many people and contributed to the overall goals of the CGIAR. It is concerned about its future given the pending new CGIAR changes.

The Center has sustained a distinguished history of leading in the area of crop genetic resource management. Having an international status it is able to achieve what most national research institutes cannot and it often seeks to play an “honest broker” role with its many partners. Because of its international positioning, it gives national and sub regional partners more “visibility” at the regional and international levels.

It has responsibility for maintaining *ex-situ* collections of banana and coconut germplasm, and is coordinating a network for the conservation of cacao genetic resources. It has contributed much through providing leading information on how to conserve and regenerate *ex-situ* germplasm, run gene banks and has spearheaded the production of leading databases for the CGIAR. It has led and operated as part of the SGRP of the CGIAR and provided help in the development of key policies governing the collection, storage and movement of germplasm under the CBD. It has sustained its reputation over the period under review but the external community has noted its new agro-biodiversity mission and concerns have been naturally expressed about this new mission and future support for germplasm conservation.

The Panel, recognizing the crucial role of biodiversity for the planet today and the shortage of time to manage it for the future of mankind, especially the poor and disadvantaged, has taken a very critical look at Bioversity in the belief that the challenges are so important that the CGIAR and donors need a critical assessment of the potential role this Center could play. It will be noted that many of the formal Recommendations of this report focus on outcomes and impacts. The urgency to translate research into outcomes and impacts is apparent to all. Yet Bioversity is a research organization for development and relies on others to translate whenever possible its research into impacts to enhance the livelihoods of others and aid the conservation of germplasm. This makes it essential that Bioversity does all it can to pick the right topics for research and communicate as broadly as possible its findings and knowledge. This is perhaps the most important strategic message from this review. Much more can and needs to be achieved.

8.2 Bioversity’s Comparative Advantage and Assessment of Attributes and Activities

The Panel sees Bioversity today as a unique center with its focus on understanding and managing biodiversity in the agricultural context. Its staff at HQ outside Rome and throughout the world have a deep understanding of genetic variation and its value for the planet. It has a long and distinguished history of stimulating the conservation of *ex-situ* accessions and the management of gene banks. It publishes and teaches widely on methods for storage and regeneration of many species, including some of the difficult ones, and is a world leader in cryopreservation technologies for plant conservation. It understands the value of characterizing the species and especially intra-species variation and making the details available through user-

friendly databases. As a leader in bioinformatics in SGRP it occupies a key position in enabling others to extract value out of germplasm databases. Bioversity is linked to experienced teams across the whole value chain for banana, extending from the DNA sequence to the market needs and policies needed to support small farmers. It has a long history of working with partners all over the world and creating functioning networks to do research. These relationships are extremely valuable and are not easily reproduced or created *de novo*. Its interest in *in situ* contributions of species, especially intra-specific variation, and in agro-biodiversity should enable the Center to build the intellectual and practical bridges between *in situ* ecology and *ex situ* collections. It is developing interests in CWR, neglected and under-utilized species and other plants that play a valuable part in agro-biodiversity. Its staff are leaders in recognizing the importance of and helping shape policies to protect germplasm and stimulate its use to ultimately provide better livelihoods for the poor.

Bioversity has staff and skills that range from generating the basic science fundamental to understanding biodiversity in ecological and agricultural production systems to the adoption of new and highly relevant outputs, passing through to the enhancement of social awareness about the value and importance of agricultural biodiversity that, in turn, should stimulate achievement of broader, more meaningful impacts. Outcomes from research by Bioversity and partners come mainly through partners or through adoption by others in the field of development. Bioversity is thus envisaged to be a catalyst to many other scientists, agencies and NGOs for bringing into use better technologies based on findings and deployment of improved germplasm and systems.

Bioversity is regarded positively by partners, in particular because it is not considered as an implementing organization competing for funds with partners. Instead it is seen as a center that provides necessary inputs (financial, technical/scientific) so that its partners can achieve their mandates. Aspects highlighted by partners included the impetus that Bioversity gives to necessary and complementary actions in conservation both *in situ* and *ex situ*. The new attention being given to *in situ* conservation is considered as fundamental to advance the conservation and use of local genetic resources.

In summary, this collection of people and experience is valuable for the CGIAR and the world and it has many comparative advantages in specific areas as well as being a functioning institution outside Rome and around the world. It has the potential to provide much more value, especially in our world where the value of germplasm and biodiversity is increasingly recognized but is being increasingly lost, as outlined in Chapter 1.

Below are twelve major areas of focus of the EPMR and the Panel's assessment of them.

8.2.1 New Organization Structure

To be able to fulfill its broadened mission more effectively Bioversity established a new organization structure. This is discussed in Chapters 2 and 5. The structure seeks to support research throughout the world but lead the science from its headquarters and so generate a stronger scientific base. It resulted in the reduction of the role and power of the Regional Offices and the Regional Directors. The Panel sees the value in concentrating the scientific leadership in headquarters to enhance synergies and maximize the ability to address problems globally, not just locally. However, there are sufficient concerns amongst staff and others that imply the system is not ideal. In any complex structure, especially one covering many countries and regions, there are inevitably compromises that have to be made and new problems to be managed. In an organization like Bioversity where many staff seek to serve the poor through projects and networks in the developing world, the new balance of operations apparently feels flawed in the eyes of some. This suggests that the training of and communication to staff to see

and own the new system and all its values, with the necessity to make compromises for the greater good of the Center, has been insufficient. It also suggests that the compromises in the system are too great and adjustments need to be made. The Panel believes that the Regional Directors should have a stronger role in serving the Center and at the same time give more support to the needs of the scientific projects in the regions, thereby aiding the Program Leaders.

The Panel recommends that the Board and Senior Management further pursue examination of the organizational structure of the Center to ensure optimization of research management, paying particular attention to the responsibilities and roles of the Regional Directors such that they can play a stronger role in the delivery of outputs and outcomes from the programs.

Communication challenges between different groups, programs and projects focused on different aspects of agro-biodiversity and operating in different parts of the world are inherent in the organization and *modus operandi* of Bioversity. The Panel saw much evidence of sub-optimal communication and “siloeed” activities. This is well worth overcoming to enhance the efficiency and effectiveness of the research.

The Panel recommends that the Center promote greater cohesiveness, synergies and learning within and between Focus Areas, projects and geographical regions, so as to use its resources more efficiently and enhance the value of its investment.

The Panel also suggests that the Center should consider the value of having a DDG for research to help ensure this is achieved.

8.2.2 Governance and Management

Significant changes in the legal status of the International Plant Genetic Resources Institute (IPGRI) occurred since the last EPMR in 2003: (a) the institute changed its operating name to Bioversity International or, in short, Bioversity in 2006 as a result of changes in its orientation and program of work; (b) at the same time the International Network for the Improvement of Banana and Plantain (INIBAP), based in France, which was already under the governance and administration of IPGRI since 1994, became fully integrated within Bioversity while remaining a separate legal entity.

Since the last EPMR Bioversity, for reasons of cost effectiveness, has reduced the size of its Board. The Board’s Program Oversight Task Force was previously concerned about the inadequate opportunity to assess the science of the Center but this has now improved. The Panel found that the Board is receiving good support from the Center. Documents made available to the Board are relevant and given in a timely fashion. The Board considers its own operations as satisfactory.

The Panel notes that the Board now operates more effectively and more efficiently than at the time of the previous EPMR and fulfills its fiduciary duties appropriately. The Panel has no significant concerns about Board governance and operation but encourages the Board to maintain its now-improved focus on scientific matters and opportunities. The Panel notes that the Centre scored highest of all Centers for governance during the latest PMS exercise. The Board clearly has some crucial decisions to make in the near future with respect to the changing CGIAR and will need to ensure that important pieces of governance, management and science are not lost in any changes.

8.2.3 Financial and Human Resources

The Panel finds the Center’s financial matters under control with no significant concerns. Bioversity’s total funding grew significantly during the review period from US\$27.7 M to US\$38.5 M. The unrestricted funds in 2008 were US\$17.5 M but only around 11 million before 2004. This

increase in unrestricted funding is in contrast to the decline in absolute and relative terms across the CGIAR. The Panel commends Bioversity for its successful efforts to bring greater stability to its funding. Personnel costs have increased from 45% to 53% of total costs. Almost 3% are due to the increase in hosted staff and some of this increase is because more staff are now at HQ in Rome where salaries are higher than in the Regions. Some of it is also due to exchange rate variations. The Panel suggests the Center keep a watchful eye on such increases. The external auditor finds the internal controls well designed and financial statement preparation efficient.

With the founding of its Grants Office, Bioversity improved considerably not only its financial controls related to restricted projects but also elaboration and submission of proposals to potential donors. The Panel commends the Center on this development.

Human Resource functions have made significant progress since the last EPMP. On the distribution of staff numbers, the Center increased its cadre of IRS from 45 in 2002 to 62 in 2008 (and 52 at the time of this review). A little over half of them are at HQ compared with 29% in 2002. This shift is consistent with the centralization of science management at HQ. The annual staff appraisal system is sound but in 2008 no staff were classified as “needing development”. This is surprising and suggests that the staff may not be getting evaluated properly.

The most precious and important resource is the staff. Thus staff recruitment, employment conditions, staff training and development and the ethos under which they work for the mission of the Center are critically important. The EPMP has addressed many of these items. The Panel heard many good things but also concerns expressed by staff and these are elaborated in Chapters 6 and 7. In these times of intense competition for resources and uncertainty in the CGIAR, special attention needs to be given to all the issues, whether problem-free or problematical. The Panel suggests that more resources should be devoted to staff training and, separately, that a concerted effort should be made to attract and retain women at all levels and all categories to achieve gender balance.

The Panel noted that many staff are invited to give keynote lectures internationally and belong to key committees in the field. These statistics look satisfactory and are roughly on par with other centers. The task of capacity building, training and preparing the future generations of researchers in the area is proceeding adequately judging by the number of graduate students tutored by almost half of the personnel of Bioversity—each supervising about six per research staff/year.

The publication outputs of staff in significant peer-reviewed journals of the whole center are not particularly good for a leading international research center in today’s competitive research environment. Details are elaborated in Chapter 5. For example, 67% of staff publish less than one article per year in such journals. These numbers are additionally disturbing when one takes into account that the IRS staff are working in partnerships where many additional scientists are working to produce such outputs and would be expected to publish in collaboration with Bioversity scientists. On the other hand there are some staff—mainly the Honorary Research Fellows—who are publishing more than five such papers per year.

Many kinds of publications are key to Bioversity’s mission. Bioversity’s guides, manuals, and teaching manuals as well as text books edited or written by Staff are of enormous value. Therefore the Panel believes the Center should have a broad-based publication policy that promotes consideration of what to publish, where to get maximum exposure, how to publish and regularly make assessments of how the success or otherwise of the scientists, programs and the Center are being reflected by publications of all kinds.

The Panel recommends that the Center create, implement and monitor a publication policy that: (a) encourages peer reviewed publications to aid career development, (b) meets the needs of targeted clients and (c) embodies assessment of how the scientists and the Center are performing.

Bioversity suffers from the same syndromes as many scientific research centers around the world in that the most able scientists are burdened by much administration that does not allow them to pay enough attention to project design, project guidance and quality control. Such deficiencies are much more significant for Bioversity than for most institutions because their projects are complex and carried out with a high proportion of partners not in Bioversity line management and often in institutions and geographical areas with poor infrastructure. The new CGIAR needs to take this issue on board to protect the quality and relevance of the future outputs and outcomes. Donors need to recognize the seriousness of the issue too.

8.2.4 *Modus Operandi*

Bioversity carries out research using many partners worldwide. This way of working has many strengths. It enables Bioversity to select the best scientists and other experts with the right local knowledge to tackle particular challenges. This flexibility enables projects to be tackled that use skills far beyond those in-house and enables additional resources to be leveraged. Bioversity estimates that in 2007 its partners contributed over US\$2.4 M and in kind contribution estimated at over US\$7 M towards collaborative research activities. A close engagement of partners at the local level allows Bioversity researchers to provide authoritative input and feedback to the Center's own priority setting process, in theory. However, the extent to which Bioversity uses this was not clear to the Panel.

The use of partners on such an extensive scale also has weaknesses. Bioversity does not control the work of its partners and so has a more difficult job of sustaining the exact protocols of the research and the quality with which it is done. The *modus operandi* that Bioversity has generated and the lessons learned from these experiences can constitute key inputs to the process of construction of the new CGIAR. The networking model for carrying out research adopted by Bioversity appears to be suitable for many sorts of research providing the right partners are selected and all the participants buy-into the work and can share in the ownership of it. It may be useful to have a CCER specifically to assess the success or otherwise of each of the projects in the light of them being carried out via partners.

In the past five years, Bioversity has been moving to a more global strategy, reducing its efforts at strengthening national programs and regional networks. According to Bioversity, this explicit decision was based on the following premises: a) national programs linked to plant genetic resources have improved in many countries; b) the regional networks are up and running on their own; c) the difficulty to demonstrate the impact of a large number of small regionally managed projects and d) the emergence of global policy agreements and instruments have created the basis for more support for the regional and global efforts in PGR conservation and use. In particular, the International Treaty on Plant Genetic Resources for Food and Agriculture is considered by Bioversity a useful global framework and the challenge assumed by Bioversity is to promote its implementation at the regional and national levels.

The Panel found that the role of Bioversity in promoting the establishment of and developing and participating in various networks around the world is highly valued by the stakeholders and partners. The progress in capacity building in national programs was specifically highlighted during the field trips by Panel members. These networks have provided for the advancement of important crops (banana, coconut, cacao) in poor areas, as well as the utilization of highly

specialized databases by researchers from all around the world. However, even though some regional networks and national programs on genetic resources and agricultural biodiversity have improved in a few developing countries, the need to strengthen the capacities of national institutions and regional networks through close follow up, joint research projects and advocacy, remains to be done. This is especially important to ensure that relevant information generated by the research at the national level are shared and adapted through partnerships and networks to other countries and at the regional level. In addition, subregional organizations are increasingly defining programs and policies that need to be supported based on scientific and technical knowledge generated in the countries by their NARS. In this sense, Bioversity should not overestimate the capacity of regional networks and national programs in the implementation of research projects.

Collaboration between Bioversity and their partners has resulted in an effective transfer of technology to targeted groups, e.g., in the project in the Philippines on enhancing the livelihoods of small-holder farmers in the Cagayan Valley. This is a good example of Bioversity moving results from basic pathology research all the way to the farmers' fields via the national extension system.

One of the issues that arises from using partners extensively is that they do not know all the results known to Bioversity staff and so projects may not be developed optimally. The information as presented by Bioversity does not always allow others to clearly grasp the projects developed in the sub regions and countries. Bioversity webpages do not provide in a friendly manner this type of information which is so relevant for an international organization such as Bioversity. The Panel suggests that Bioversity improve, according to the different targets and interests, its information, communication and dissemination systems of its worldwide activities, by regions and priority.

8.2.5 *Priority Setting and Project Selection*

The EPMR has paid particular attention to priority setting because the number of options of what and where to study is enormous. Yet these choices determine the value and outputs of the Center. The Panel appreciated the systems in place for setting priorities, selecting projects and evaluating progress. They clearly function and are based on relevant criteria and have broad staff participation, although staff in the regions seek to have a stronger voice believing that their familiarity with the people and places where many of the projects are carried out is very relevant. The Panel suggests that other partners in projects should have a stronger input given their role in implementing projects and the different kinds of knowledge they bring to priority setting and planning. The Planning Week that the Center uses to bring all together for joint planning is good but more emphasis on outcome planning would be beneficial. The Panel suggests that the project and Center monitoring system should be increasingly used for management purposes, for example, adjusting strategies and priorities right down to the project level, in addition to reporting, so that staff in the regions are also familiar with it, its role and value.

Bioversity has a broad mission statement and has also chosen broad Focus Area descriptions in which to organize its projects and present its Programs to the EPMR. Theoretically there are a huge number of projects that could contribute to the goals of each Focus Area because they are so broad. The Panel has assumed that the closer two projects are to one another the greater the probability of there being valuable synergy between them and the greater the probability that together they are likely to generate impacts. Therefore, unless special care is taken to select grants and projects that are highly complementary to one another within a broad Focus Area, the outcome and impact potential of these, and of Bioversity as a whole, may be compromised. This

can lead to disappointment of CGIAR, donors and scientists. Bioversity should put as much care, skill and emphasis as possible on selecting projects, placing high emphasis not only on the feasibility of creating outputs from the project but on the likely adoption to create outcomes and for the project to lead to impacts somewhere in the world. This poses a very difficult series of decisions, especially because Bioversity has little chance of controlling impact. Policy makers are often most instrumental in bringing about impacts and adoption may take many years. Skilled social scientists and economists need to be critically involved in the planning phase. In many instances the Panel found that some projects were not planned tightly enough to be able to reach the goals at which they were aiming. This seriously limits their impact potential. In more instances it would be better to deliberately create pilot projects and ensure that the larger experiments are designed on strong grounds. This is especially relevant in the new areas of the expanded mission. The Panel was made aware that many of the new large projects such as the GEF-funded ones have preparatory phases of 12 to 18 months, with a lot of attention to outcomes and impact potential.

The Panel recommends that the Center ensure as far as possible that it chooses its research activities to maximize the probability of generating relevant outcomes and impacts and to gain maximum synergy within the Center.

8.2.6 Outputs, outcomes and impacts

The centre has generated many significant outcomes and even some impacts over the past five years. Yet the Panel found it hard to learn about these. The Panel feels strongly that the Center needs to pay more attention to analyzing the value of its outputs and ensuring that they are known broadly, but especially by those able to develop them and use them to develop outcomes and impacts. With any research activity, the probability that the results of research turns into outcomes and impacts is not high and therefore special attention needs to be paid to these issues. To do this demands that they are analyzed not only at the project level but in many other contexts since their value may be obvious or useful only when transferred and transformed into other contexts that may be distant from the original project.

Bioversity has decided to become involved in the valuation of the components of agro-biodiversity. The Panel thinks this is critically important for Bioversity as it will guide its own priorities of what to study and how. There is an urgent need to place values on many components of agro-ecosystems to inform policymakers and prioritize research and development activities. Such values should be placed in the heart of the debate of climate change effects and the role of conservation and agro-biodiversity. To do this and conclude which scenarios and outputs can contribute to the well-being of people and sustainability of land use Bioversity needs to have clear understanding of the pathway between outputs and impact in each particular case. If this is not done the task will be overwhelmingly broad. Guidelines, indicators, methodologies and tools are urgently needed for these evaluations and also monitoring of genetic diversity to measure its dynamics. The process requires specialized economists, impressive planning and credible concepts that can be analyzed rationally and comprehensively. Bioversity will need to develop a comparative advantage to supply these tools.

The Panel recommends that Bioversity better define, express and evaluate its outputs, outcomes and impacts and communicate effectively internally and externally the value of Bioversity and its partners' work.

8.2.7 *Expansion of mission into effects of agro-biodiversity on human nutrition, well-being and sustainable resilience of environments*

The intense process of change that the world's ecosystems have undergone during the last 150 years, but particularly in the second half of the last century, mostly due to the need to feed an exponentially growing population, has produced an unprecedented loss of biological diversity and the services that ecosystems provide to humankind. Agricultural systems, specially the crops grown in them, have not been immune to such losses of biological diversity. In consequence, Bioversity has expanded substantially its mission and strategy in the last few years, increasing its program and budget to address the links between agro-biodiversity conservation, human nutrition, well-being, and the economic betterment of the poor farmers. Does this appear to have been an appropriate change? The Panel recognizes that there has been a groundswell of interest in these topics in political, environmental and donor arenas. It is no longer acceptable to simply conserve and facilitate *ex-situ* germplasm collections and associated activities, however large the task remaining. There is pressure to focus on *using* collected germplasm. Many CGIAR centers are focused on using germplasm in, for example, plant breeding but Bioversity had limited opportunity to do this. Even in its mandate crops, notably banana, IITA plays the major breeding role in the CGIAR. Thus Bioversity had good reasons to consider how it should broaden its mission to be more relevant, forward-looking and make a bigger contribution to the CGIAR. The Panel believes such a shift in mission was potentially useful for the long term good of the Center and the CGIAR, if developed appropriately.

The Panel commends Bioversity for being entrepreneurial and concerned about important scientific areas not being addressed. The Panel notes that in its new areas of linking agro-biodiversity with nutrition, well-being and more agro-ecological resilience, much stimulating work has begun with some outputs. Other pieces of work have been initiated without apparently testing the primary premise that biodiversity enhances well-being and better nutrition in a large number of societies and environments. The links between specific biodiversity and the specific desirable attributes should be established in the specific cases before large scale investments are carried out. The Panel also notes that even when specific links can be established then these may not always be relevant to other regions since such agro-ecologies are local.

The Panel recommends that research and analysis be undertaken to examine the nutritional, health and income effects on poor farmers derived from agricultural production systems based on high biodiversity, and to evaluate the tradeoffs with agricultural systems of higher external inputs and lower biological diversity.

The Panel also believes Bioversity and the CGIAR should take the research several steps further by comparing the tradeoffs with agriculture with lower biodiversity and higher inputs. It is only by having such comparisons that the CGIAR will understand better how to balance the needed high input, high productivity agriculture that it is championing in other programs and the benefits gained from the high biodiversity programs being examined here. The Panel does not see high biodiversity and low biodiversity as simple alternates systems but instead expects that in many places a balance will be better but for this to be appreciated the tradeoffs need to be understood and quantified better. These are very important issues within the framework of the CGIAR and Bioversity is equipped to explore them.

8.2.8 *Ex situ Conservation*

Bioversity continues to play an effective role in *ex situ* conservation strategies and in developing tools and information to enlarge the number of species being conserved and fill gaps in collections. It remains a very important part of Bioversity' work. Their efforts have positively

impacted the health of extant collections and will continue to impact the future growth and stability of plant germplasm *ex situ* collections.

Bioversity has successfully sustained its leadership in *Musa*, its mandated commodity crop. It has not only strengthened the *ex-situ* conservation gene bank collections but also, through forming and leading a network, has stimulated progress of the molecular genetics of the crop, stimulated formation of some transgenics, moved them into trials in Africa and persuaded Genoscope (France) to provide a full genome sequence for banana. Through the efforts and leadership of Bioversity with its partners, *Musa* is joining the distinguished list of species whose genome sequence and genetics can be co-explored. Coconut and cacao germplasm conservation are in a weaker situation and Bioversity needs to continue to work with partners to put conservation of the germplasm of these crops on a more secure foundation.

While maintaining some research activities on orthodox seeds, Bioversity's focus has shifted in the past five years to the development of alternative conservation technologies, including cryopreservation protocols, low-cost seed-storage technologies and advanced technologies for non-orthodox seeds. This is because procedures for orthodox seeds are now widely known. The Panel supports this shift in emphasis, while recognizing that there is still an enormous amount of work to do in securing stable environments for seed banks.

The Center has published numerous useful handbooks on genebank management, has contributed to significant publications on defining how seed quality and storage conditions can enhance longevity in storage, maintained a leading position in cryopreservations technologies and with partners supported the storage under cryogenic conditions of world collections of banana, plantain and coffee. It has collected information on seed storage behavior of over 7000 species.

Bioversity has stimulated the development of a global system of conservation, exchange and use of genetic resources in *ex situ* collections, as called for under the International Treaty, in which the CGIAR genebanks are collaborating through the SGRP. It has taken the lead in a GPG2 activity by building a readily accessible knowledge base on best practices in genebank management of seeds and *in vitro* collections of several species defined in Annex 1 of the Treaty.

Bioversity has a major role in developing databases to enhance the descriptions of what is in the gene banks, and to stimulate use of the materials. There has been a major investment to create and agree on common descriptors of plant species stored in gene banks. The Panel commends this work. The creation of an integrated network of biodiversity information systems contributes to establishing an even broader global information system, which is seen as an essential component of a global system for plant genetic resources for food and agriculture. This resulted in the development of the Global Accession Level Information System (Global-ALIS), and GRIN-Global, a genebank management system. The Panel considers this integrated network extremely important to enable germplasm to be valued and utilized worldwide and commends Bioversity for its leadership and technical role in this development.

8.2.9 The Global Crop Diversity Trust

During the period under review the Global Genetic Diversity Trust was established by Bioversity and FAO, and Bioversity was particularly influential in its establishment. The Panel commends Bioversity for this important step in helping secure the future of key germplasm collections. The remit of the Trust is to ensure the conservation of germplasm under the Treaty and it is closely associated with the CGIAR. In effect it took over some of the responsibilities of Bioversity but there remains a close working relationship. Nevertheless as an independent body it can and does compete with Bioversity for resources. Bioversity needs to continue to work with the Trust in

complementary ways to help secure the conservation and utilization of genetic resources in Annex 1 germplasm of the Treaty as efficiently and effectively as possible. With the Trust being specially concerned with the Annex 1 crops and Bioversity becoming increasingly interested in wild relatives of crops, neglected and under-utilized species and other species that influence agro-biodiversity, it highlights the need for Bioversity to further enhance the profile of these forgotten species in its mission.

8.2.10 Forests and Wild Crop Relatives

Focus Area 4 addresses *in situ* conservation and use of wild species. A major objective is to ensure that the benefits, threats to and issues associated with conservation and management of selected forest and wild crop relatives are adequately understood and become better managed to benefit the sustainability of environments and livelihoods of the poor. There are two related but quite different components in this Focus Area—forest tree genetics and non timber forest species and also CWR. The rationale for entering in the field of forest trees conservation and genetics is the fact that no other CGIAR Center works on these topics/aspects. Both are very broad with opportunities to study many different species and habitats and questions. The Panel sees significant value in the overall topic and some of the foci of study have produced interesting results; for example identifying the most suitable areas for conserving specific tree species, the population ecology and genetics of *Shorea lumutesis* and climate change effects on two species of pine. However the Panel did not find an evident coherence between the examples selected for study. There needs to be a much better focus based on a carefully formulated strategy. The Panel also noted that there has not been a Project Co-ordinator of this Focus Area and this is a major deficiency.

The Panel recommends that the work in Forests and Wild Crop Relatives be re-formulated and managed under a project coordinator to correct what now appears to comprise an unconnected list of species, localities and approaches.

The Panel also noted the potential synergies between work on wild crop relatives in FA 4 and the neglected and under-utilized species in FA 3 and believes there should be greater cohesion here.

The Panel recommends that greater cohesion be established between the studies on wild crop relatives in FA 4 and the neglected and under utilized species in FA 3.

8.2.11 System-wide Genetic Resources Program

This SGRP has been hosted by Bioversity since its inception, and Bioversity provides both leadership and coordination of the program. Bioversity offers a strategic location, support by providing office space and support staff, and most importantly, in-house expertise on conservation of plant genetic resources and there is an active role taken by the Bioversity DG in representing the SGRP. SGRP is integral in the Global Public Goods projects (GPG I & 2), and these are coordinated out of Bioversity. The role of Bioversity in the SGRP has been and continues to be critical. SGRP utilizes the GPP as a conduit to carry out activities in conservation and sustainable use of plant genetic resources. The Panel noted that the activities of the SGRP are highly valued and commended by CG Centers and partners of Bioversity. The Panel commends the work of the SGRP in support of the negotiations of the Treaty, and underlines the important role it should continue to pay in support of the implementation of the International Treaty.

Work is conducted at the international level primarily on behalf of the SGRP, through which Bioversity staff represent the CGIAR at meetings of the Governing Body of the ITPGRFA, the United Nations Food and Agriculture Organization's CGRFA, the CBD, and the WIPO. The Project's system-wide work is provided through SGRP, the CGIAR GRPC and the CAS-IP,

through which it coordinates development of system-wide policies and related legal instruments relevant to the management, collection and distribution of GRFA, and assists Centers with IP management, and technology transfer. At regional and national levels, the Project supports partners in participatory research and capacity-building to develop policies that encourage uses of GRFA to assist the poor.

In advance of the second session of the Governing Body of the IT, Bioversity, through SGRP and the GRPC, led an effort to obtain a system-wide recommendation that the Centers would use the SMTA for non-Annex 1 materials. The Governing Body ultimately decided in line with the Centers recommendation. Bioversity coordinated the process of developing the Agreements between the CGIAR Centers and the Governing Body of the Treaty pursuant to Article 15 of the Treaty. The Panel commends Bioversity for this important development that is very valuable to the CGIAR.

There has been an excellent track record of the Centers using and respecting the interim MTA, and a system-wide position with respect to the best outcome of the Governing Body's amendment of the interim MTA.

8.2.12 Bioversity in the new CGIAR

As outlined above the Panel recognizes many excellent and desirable and relevant attributes in Bioversity and their comparative advantage. They must not be lost but championed to contribute ever more effectively to meet the enormous needs of the poor and the planet. The role for Bioversity in the new CGIAR vision needs to be articulated and championed for the sake of the credibility of the CGIAR, as well as ensuring that the key attributes of Bioversity are not lost but find their rightful place in the new CGIAR.

The Panel recommends that the Board and Senior Management do everything possible to ensure a smooth transition into the new CGIAR, and that the precious scientific strengths and competencies of the Center, including *ex situ* collections and conservation competencies, are maintained for sustaining the mission of Bioversity.

Leadership can play a major role beyond the specific outputs of a center. Bioversity should be a catalyst for many other organizations and researchers who are seeking to contribute to the same mission. This leadership should be also directed at policy makers, wherever they sit—internationally, regionally or locally. The right policies are essential for outputs to be turned into outcomes and impacts. Bioversity needs to inspire and capture the attention and commitment of development agencies to ensure its outputs are tested in the path towards adoption and impact. The Panel puts great emphasis on this point.

Specifically, the Panel sees the opportunity for Bioversity to maintain its leadership role in germplasm information technology, working with the other state-of-the-art leaders in the fast moving field. They should do this for CGIAR and the scientific community at large where it is within their comparative advantage. This is an extraordinary time for germplasm characterization. The costs of DNA sequencing and the opportunities for genome annotation now create a whole new vision for germplasm conservation and characterization. It will be a very big wave in the next 10 years driven by technologies, databases and IT systems. The opportunities that will open up are simply staggering. New questions will pour off the computer screens as data are analyzed. It could revolutionize the concepts and working practice of core collections. Core collections may get turned into conserving chromosomal segments and combinations of segments. Molecular descriptions will enable better answers to questions regarding duplication

and sufficiency in ex-situ and in-situ collections. The next 10 years will bring progress on the path to synthesizing new genotypes by rational design to meet specific breeding objectives. Perhaps in another decade or two, plant breeding will be based much more on molecular and functional descriptions of chromosomal segments of germplasm. The Panel sees this area as one of the breakthrough technologies that will change the whole field of opportunity in characterizing germplasm and the CGIAR needs to fulfill its responsibility with others in making much more knowledge available on the germplasm collections underpinning its mission.

The Panel recommends that as bioinformatics needs and opportunities expand further, the Center step up its investment to ensure that the global community gains maximum benefit from the *ex situ* collections and the knowledge associated with them.

The Panel sees the need to continue the excellent work in development of the new scientific opportunities for the whole chain from gene to markets for banana and also taking care of coconut and cacao germplasm in some appropriate way in the new CGIAR.

Bioversity should take advantage of the Trust to progress its mission. It should continue to have influence on and facilitate global and national PGR policies, including but far beyond the Treaty where essential, as described above.

In its new field of agro-biodiversity it should lead the debates about where, when and how biodiversity does or could enhance human nutrition, well-being and environmental resilience. This is a very complex field and there are no simple answers. Operationally, as outlined above, the Panel believes that Bioversity should build on its beginnings in its new fields with carefully selected experiments, often pilot experiments, to find out what can be discovered and what can be expected to be applied over time up the chain to impact. It also should seek to provide the tools and methods to explore the value of agro-biodiversity also as outlined above. In this way it can serve as a catalyst to many others who are needed to work on these topics. It should seek, and this is conveniently done within the CGIAR, the rightful place of this thinking relative to the need of maintaining – and improving – high output agriculture that is based on monocultures and high, but cost effective and sustainable, inputs. The necessity to feed the urban poor, develop markets and use less land for food, feed and fiber production are unassailable facts and features of the CGIAR mission. Where in this are the places for agro-biodiversity to play a crucial role?

The Panel found that other CGIAR Institutes do not always understand the new aspirations of Bioversity. Thus the debate needs to be held across the CGIAR and there is no better time for this than when the new Consortium is seeking to optimize the mix of science it supports. Bioversity should help lead and develop the conceptual framework for addressing short term and long term needs of the planet based on biodiversity, especially intra-species diversity.

9 CHALLENGES FOR BIOVERSITY AND THE NEW CGIAR

As the CGIAR restructures into a new organizational model and formulates new “Megaprograms”, new opportunities will arise for Bioversity. With those opportunities, new responsibilities for taking on new challenges and new agendas against the backdrop of the mission of its donors and for the world, present and future will emerge. This backcloth is built upon the facts of poverty today, increasing populations, climate change and the need to conserve the ecosystems of the planet. At the heart of this huge research and development agenda is understanding, managing and using agro-biodiversity since biodiversity is the source of better plant breeding and optimal, sustainable use of the land and the services it provides.

The tasks of feeding the world, sustainably managing the use of land and minimizing both the further loss of natural biodiversity and the causes of global warming, are the responsibility of every nation and society. Yet the mission adopted by the CGIAR and Bioversity International places a large responsibility on their shoulders, given that they seek to find ways to produce more food in agricultural systems that preserve and use biodiversity to obtain the highest productivity possible. The task is enormous and its magnitude needs to be understood clearly by all. To contribute efficiently the CGIAR needs to be working alongside others at the highest levels of policy making at national, regional and international levels and yet also at local levels where poor people live and depend upon an array of biodiversity. This requires the CGIAR to be positioned strategically and optimally, working with partners everywhere in the world. In this context, the Panel notes that Bioversity’s *modus operandi* presently involves selecting and working with partners around the world to bring about such changes.

Defining optimal strategies for collecting, conserving, monitoring and using agro-biodiversity is critical for future success. Helping bring the right policies into being is urgent. The high rate of environmental deterioration, both due to climate change and loss and degradation of natural ecosystems, has no precedent. The time it takes to do research and have solutions ready for adoption means that there is no time to waste. The Panel urges the CGIAR and Bioversity International to recognize even more acutely the responsibilities they carry for the future of the world and build on the strengths specified in this review. We all need to be doing the best we can, for current and future generations. For this, “business as usual” is clearly out of the question. New scientific breakthroughs and ways of working are required. Properly inspired research is essential but its conversion to desirable outcomes and impacts is even more important. This has been the major concern that has been in the minds of the Panel as it has conducted this review.

What breakthroughs and changes in policies will be required to fulfill the mission of the CGIAR in general and of Bioversity International in particular? Since optimal conservation and exploitation of agro-biodiversity are essential to the CGIAR strategy, the way agro-biodiversity is positioned and championed within the “Megaprograms” and linked to the research in many other organizations is critical.

To produce more food, feed and fiber on less land will require breakthroughs in both plant breeding and also in the way sustainable agriculture can be attained, not only in agriculturally biodiverse systems but also in high input, low-biodiversity systems. Plant breeding will be strongly driven by molecular genetics, DNA sequencing and IT systems focused on germplasm holdings all of which could transform the knowledge base of agro-biodiversity and enable scientists to use it more powerfully. Knowledge of which genes contribute to which traits will be emerging rapidly over the coming years, and this information will help breeders pick which gene combinations to fix into germplasm. How, for example, will the ability to assess hundreds of drought-specifying gene systems in germplasm collections be brought into breeding programs?

In 2030 will much plant breeding be done with a computer because databases will exist that carry information on how every segment of a genome in the accessions held in genebanks contributes to the yield of a plant? Will CGIAR breeders be able to synthesize better genotypes and predict yields better given climate data using computer-based systems? Breakthroughs in how to achieve sustainable agriculture incorporating the ecological, economic and social dimensions will likely require 1) understanding better how biological diversity can help maintain sustainability and resilience in agricultural systems, minimizing the impacts to the environment of agricultural inputs; 2) undertaking a more systematic exploration of genetic variability in CWR and new sources of useful plants for food and fiber; and 3) including key germplasm in easily accessible and well annotated gene banks to help manage agricultural systems of all types in a more ecologically and economically sustainable manner.

All these are important issues relevant to biodiversity today but will perhaps become increasingly important in the decades ahead. The new opportunities and envisaged needs raise yet again what is the strategy of the whole CGIAR system in relation to agro-biodiversity. Where will maintaining and improving high input agriculture with low agro-biodiversity be the best way forward? Conversely, will systems with lower inputs but higher agro-biodiversity be better in many situations? Does the CGIAR envisage that there are sufficient accessions in collections, or are more of them required? Are there sufficient species in the collections or does it appear that future generations will require additional species for its agriculture and well being? Who is assessing what research on biodiversity the future of agricultural investigations will require?

What legislation would drive better use of land and biodiversity? Will a global cap and trade system for carbon, for example, make a difference for production systems, alternative land uses and the economics of crop production both in developed and developing countries? Which social policies will change adoption of new technologies more easily? What are CGIAR's strategies on these and how do they influence the use of agro-biodiversity?

The Panel believes that in seeking answers to all these questions, designing "Megaprograms" and institutions and positioning itself to meet its mission in the most effective way, the CGIAR can gain significant help from the skills, knowledge and talents of Bioversity that are described in this Report of the 6th External Review of Bioversity International.

ANNEX 1
Bioversity International EPMR Panel Composition

Richard Flavell (Chair)

Chief Scientific Officer, Ceres Inc.
3007 Malibu Canyon Road
Malibu, California 90265
USA

Tel: +1-310-317 8930

Email: rflavell@ceres-inc.com

Members

Tania Ammour

Apartado 45 - 2250 Tres Ros
Cartago, Costa Rica

Tel: (506) 2 278 6355

Email: tammour@racsa.co.cr

Richard Hannan

Plant Germplasm Conservation Systems
Consulting
12235 Easley Rd.
Rapid City, MI 49676

Tel: +1-509-432-3345

Email: rich.hannan@gmail.com

Jean-Yves Maillat

Executive Coach
Management Consultant
Tel./Fax: (443) 249-3481

Email: maillatj@yahoo.com

José Sarukhán Kermez

Investigador, Instituto de Ecología-UNAM

Apartado Postal 70-275
Ciudad Universitaria - UNAM
04510 México, D.F.
3er. Circuito Exterior, Anexo Jardín Botánico

Tel. (52 55) 5622-90-14/09

Email: sarukhan@servidor.unam.mx

Carolina Berti (Consultant)

Rue de Maunoir 10
CH-1207 Geneva
Switzerland

Email : caroberti@gmail.com

Bioversity International 6th EPMR
Panel Composition & Biographical Information

Chair: Richard B. FLAVELL (United Kingdom)

Position: Chief Scientific Officer, CERES, USA.

Expertise: Research management, plant genomics, plant breeding, microbiology, fungal genetics, biology, bioinformatics

Experience:

Present position since 1998. 1994-98: Director, John Innes Center, Norwich Research Park, Colney, Norwich, UK, and Professor of Biology, University of East Anglia, Norwich, Norfolk; 1990-94: Chairman of the Management Board, John Innes Center; 1988-94: Director, John Innes Center; 1969-88: Plant Breeding Institute, Trumpington, Cambridge; 1969-72: Scientific Officer; 1972-75: Senior Scientific Officer; 1975-81: Principal Scientific Officer; 1981-85: Grade 6 (Individual Merit Promotion); 1985-88: Head of Department of Molecular Genetics. Founded the Department of Molecular Genetics, which grew to include over 60 scientists investigation a broad range of topics in plant science; 1967-69: Department of Biological Sciences, Stanford University, California, USA. Fellowship awarded by Jane Coffin Childs Foundation for studies on fungal biochemical genetics. He has studied the regulation of gene expression in several systems, the molecular basis of cytoplasmic male sterility in maize and gathered much novel information on the structure of cereal genomes. Has contributed significantly to the development of modern biotechnology in agriculture. Has been involved in a number of scientific activities such as Associate Editor, Molecular Biology and Evolution, Editor of Plant Molecular Biology, Genes and Development, Environmental and Experimental Botany, BioEssays and The Plant Journal. CIAT Board member (1994-99). Chair of the 6th IRRR EPMR 2004. Fellow of EMBO. Elected Fellow of The Royal Society of London. Awarded CBE by Queen Elizabeth for services to science.

Genetic Resource & Genebanks: Richard HANNAN (United States of America)

Position: Owner and chief consultant of Plant Germplasm Conservation Systems Consulting

Expertise: Germplasm conservation/distribution, plant genetic resource, horticulture

Experience:

Current position since 2006. 1997-2006: Research Leader/Horticulturist, USDA, ARS, Western Regional Plant Introduction Station (WRPIS), Pullman, WA. Included management of four USDA, National Plant Germplasm sites in Washington, California and Alaska. The four NPGS sites have a combined national responsibility for over 73,000 accessions (unique samples) of plant germplasm in 355 genera and over 2,400 species. Retired from USDA June 9, 2006. 1983-97: Supervisory Horticulturist, USDA, ARS, Western Regional Plant Introduction Station (WRPIS), Pullman, WA. Until January 3, 1997. 1978-83: Biological Technician, USDA, ARS, WRPIS, Pullman, WA. 1976-78: Biological Technician, USDA, ARS at the Irrigated Agriculture Research and Extension Center (IAREC), Prosser, WA. 1974-76: United States Peace Corps in Korea. Author or co-author on 127 publications, 65 in refereed journals (includes book chapters). Germplasm collection experience in Colombia, Bolivia, China, Kazakhstan, Turkmenistan, Russia, Bulgaria, Armenia, Italy and Mexico. International Interaction and Collaborative Experience (19 countries) Korea, Germany, Ireland, Canada, Mexico, England, Russia, Thailand, Laos, Colombia, Bolivia, Costa Rica, Nicaragua, China, Kazakhstan, Turkmenistan, Bulgaria, Armenia, and Italy. Also served as the Coordinator for the CSREES cooperative Multi-State Research Project (W-006). The overall mission of these units is the acquisition, increase, evaluation, documentation, conservation, distribution, enhancement and research of plant genetic resources to/for scientists and other stakeholders worldwide.

Agricultural biodiversity & sustainable use: José SARUKHÁN KERMEZ (Mexico)

Position: Emeritus Professor, Instituto de Ecología, Universidad Nacional Autónoma de México (for consistency with Instituto de Ecología) National Autonomous University of Mexico (UNAM)

Expertise: Biodiversity, plant population ecology, systems ecology, agricultural botany education in science and ecology in developing countries

Experience:

1979-1987: Director to the Instituto de Biología, UNAM. 1987: appointed Vice Chancellor for Science at UNAM. 1989-97: elected by the Board of Governors as Rector (President) of UNAM. 1988-1997: Emeritus Professor, Institute of Ecology, UNAM. 1978-: Commissioner for Human and Social Development, Executive Office of the President. 2001-2002: president of the Mexican Academy of Sciences. 1986-87: National Coordinator of the Mexican National Commission on the Conservation and use of Biodiversity (CONABIO). Invited Lecturer, Tinker Professor, Dept. of Biological Sciences Stanford University 1997-1998.

Former President of the Latin American Union of Universities (UDUAL). Founder and Coordinator of the Red Latino Americana de Botánica. Published more than 125 papers and 6 books. His main areas of interest have been Plant Population Ecology and Systems Ecology, Biodiversity science, focused especially in Mexico, as well as the role of training and education in Science in general and in Ecology in particular in the development of Third World countries. He was Chairman of DIVERSITAS (ICSU/UNESCO) an International Program on Biodiversity Science, and a Member of the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST/UNESCO). He chaired the trinational committee on the effects of transgenic maize in Mexican maize land races, a study established by the CEC of NAFTA. He is a foreign member of the U.S. National Academy of Sciences and the Royal Society of London.

Social Science: Tania AMMOUR (France)

Position: Economist in Agricultural Development

Expertise: Agricultural development, Farming system analysis, economic evaluation of ecosystems, rural development, farming system analysis and in planning, monitoring and evaluation, development and conservation.

Experience:

Since 2004: International consultant in Planning, monitoring and evaluation of projects, programs and organizations; and in learning and knowledge management (Coordinator of FIDAMERICA/Rimisp/FIDA).

2002-2003: Director, Outreach and Strategic Planning. Tropical Agricultural Research and Higher Education Center (CATIE), Costa Rica; 2000-2001: Director, Strategic Planning, CATIE; 1999-2000: Leader of the Project "Impact Monitoring and Evaluation", CATIE; 1996-99: Leader of two regional projects: "Conservation for sustainable development in Central America" and "Wise use of mangrove resources - Nicaragua and Costa Rica", CATIE; 1989-95: Principal Economist and Co-coordinator for the "Conservation for Sustainable Development in Central America" project "a.k.a. Olofo-, CATIE; 1986-88: Associate Director for CRS/CAP for Costa Rica, Nicaragua and Panama, Catholic Relief Services, United States Catholic Conference, Costa Rica; 1983-84: Advisor, Planning Economist for the EEC Program NA/81/25 in Nicaragua. Consulint International (Rome, Italy) for the European Economic Community (EEC), Belgium, for the Agricultural Development Ministry (MIDINRA), Planning Department, Nicaragua; 1980-82: Economist " Researcher, Project "Cooperative Research on Agricultural Technology in Latin America", Rural Development Department Inter- American Institute for Cooperation in Agriculture (IICA-OEA), Coronado, San José, Costa Rica. Consultant for PROFOR-MAGFOR "Ministry of Agriculture/Forestry, Nicaragua (on lessons learned from the Forestry

Program); for the IUCN External Review 1999-2003; for CARE Denmark (Evaluation and design of the Madidi Project in Bolivia); for the Ministry of Environment, Colombia; World Bank; Inter American Development Bank; GFA Consultancy for FAO (Evaluation and design of the research program on farming systems of the National Agronomy Research Institute (INIA) of the Republic of Mozambique. Author/Editor of 2 books, 11 Technical Series/Chapters in books; 27 papers in Proceedings and Institutional Series; more than 20 papers presented in international and regional meetings and conferences, 3 screenplays for dissemination videos; totaling more than 40 publications related to farming system analysis, sustainability evaluation at farm and municipality level, economic, financial and social analysis/valuation of tropical ecosystem management, community forest management, project and organizations planning, monitoring and evaluation.

Governance & Management: Jean-Yves MAILLAT (France)

Position: Independent Management Consultant and Executive Coach

Expertise: management, management consulting and executive coaching in the international, public, private and non-profit sectors, strategic planning, organization development, executive development

Experience:

Current position since 2000: Independent Management Consultant and Executive Coach; Management audit of international agricultural research centers; One-on-One coaching of managers at the World Bank, International Monetary Fund, Inter-American Development Bank, ICRAF and private clients. Between 1983 and 1999 held different positions at the World Bank, Washington DC: Senior Internal Management Consultant; Manager, Internal Management Consulting Unit; Manager, Economics and Sector Training Programs, Manager Translation and Interpretation Division. Previous positions: Senior Management Consultant with Booz.Allen & Hamilton International based in Algeria and Egypt; Independent Management Consultant working for small and medium size French companies, for Booz.Allen & Hamilton International and for Qatar Petrochemical Company. Co-founder and first manager of a small consumer cooperative in France. Participated in project appraisal, supervision and evaluation missions for the World Bank to assess/evaluate the effectiveness of proposed/actual organization structures, policies, systems and procedures of public sector organizations in Burkina Faso, Burundi, Colombia, Egypt, India, Ivory Coast, Kenya, Mauritania, Mexico, Peru, Senegal, Tanzania, Vietnam. Participated in the EPMRs of five CGIAR centers: CIAT, CIP, ICRISAT, IWMI, WARDA, and of the SGRP.

Finance: Carolina BERTI (Brazil)

Position: Corporate marketing and sales consultant, EMEA, Dupont International

Expertise: marketing and sales, management consulting, strategic planning, financial planning and business development

Experience:

Current post since 2008 - Current post since 2008 – Corporate Marketing & Sales Consultant responsible for projects in Europe, Middle East and Africa; Developed a Country Entry Strategy for DuPont in Nigeria targeting \$100MM revenue generation in 3 years; EMEA sales channels and organization design project for Performance Coatings business resulting in \$85MM revenue uplift (20% of current results); developed a new marketing consulting methodology expanding a customer segmentation and route to market approach to an organizational set up concept. Previous positions: Latin America corporate finance leader – DuPont Safety Resources; South America Finance Coordinator – DuPont Advanced Fibers; South America Business Development – Iberdrola S.A.; Brazil Corporate Finance Manager – Optiglobe Telecommunications.

ANNEX 2
Terms of Reference for External Program and Management Reviews
of CGIAR Centers

TERMS OF REFERENCE FOR EPMRS¹

Objectives and Scope

EPMRs seek to inform CGIAR members that their investment is sound, or recommend measures to make it so. Members of the CGIAR and other stakeholders can be informed whether the Center is doing its work effectively and efficiently. EPMRs are both retrospective and prospective and help ensure the Centers' excellence, relevance and continued viability, and the CGIAR System's coherence. Each review is expected to be strategic in orientation and as comprehensive as the situation warrants.

The broad objectives of EPMRs are to: a) provide CGIAR members with an independent and rigorous assessment of the institutional health and contribution of a Center they are supporting; and b) to provide the Center and its collaborators with assessment information that complements or validates their own evaluation efforts, including the CCERs.

The EPMR Panel is specifically charged to assess the following:

1. The Center 's mission, strategy and priorities in the context of the CGIAR's priorities and strategies;
2. The quality and relevance of the science undertaken, including the effectiveness and potential impact of the Center's completed and ongoing research;
3. The effectiveness and efficiency of management, including the mechanisms and processes for ensuring quality; and
4. The accomplishments and impact of the Center's research and related activities.

Topics to be covered

Mission, Strategy and Priorities

- The continuing appropriateness of the Center's mission in light of important changes in the Center and its external environment since the previous external review.
- The policies, strategies, and priorities of the Center, their coherence with the CGIAR's goals (of poverty alleviation, natural resources management, and sustainable food security), and relevance to beneficiaries, especially rural women.
- The appropriateness of the roles of relevant partners in the formulation and implementation of the Center's strategy and priorities, considering alternative sources of supply and the benefits of partnerships with others.

Quality and Relevance

- The quality and relevance of the science practised at the Center.

¹ As endorsed by the CGIAR in 1997.

- The effectiveness of the Center’s processes for planning, priority setting, quality management (e.g., CCERs, peer reviews and other quality and relevance assurance mechanisms), and impact assessment.

Effectiveness and Efficiency of Management

- The performance of the Center's Board in governing the Center, the effectiveness of leadership throughout the Center, and the suitability of the organization's culture to its mission.
- The adequacy of the Center's organizational structure and the mechanisms in place to manage, coordinate and ensure the excellence of the research programs and related activities.
- The adequacy of resources (financial, human, physical and information) available and the effectiveness and efficiency of their management.
- The effectiveness of the Center's relationships with relevant research partners and other stakeholders of the CGIAR System.

Accomplishments and Impact

- Recent achievements of the Center in research and other areas.
- The effectiveness of the Center's programs in terms of their impact and contribution to the achievement of the mission and goals of the CGIAR.

Summary of Specific Strategic Issues for Bioversity EPMR

1. **Expanded mandate:** Has Bioversity presented a convincing case for expanding the scope of its mandate to cover agricultural biodiversity conservation and use? Is the rationale sound? Is the content of the broadened mandate appropriate?
2. **Focus:** What is the core business of Bioversity? Has Bioversity positioned itself clearly by “focusing on ... research in areas of biodiversity in which progress is lagging, where few others at the international and national level are active, and in which it has a comparative advantage”? (text from last EPMR) If so, what are those areas?
3. **Comparative advantage / core competence in new areas:** What is Bioversity’s comparative advantage (vis-à-vis other CGIAR Centers or non-CGIAR players) in the following new areas of research: enhancing the contribution of agricultural biodiversity to human wellbeing (F01), productivity resilience & ecosystem services from community management of diversity (F02), and managing biodiversity to improve livelihoods in commodity crop-based systems (F03):
 - Are these areas core competences of Bioversity, or are there any convincing developments in competence-building in these areas?
 - Does the Institute have the staffing profile to undertake a leading scientific role in research on the deployment and use of diversity?
 - What is the role of Bioversity, vis-à-vis other Centers and non-Center partners, e.g., primary research role, complementary role, facilitator, etc.?
 - What is the IPG nature of the work done by Bioversity in these areas? Is the impact pathway described, and are output targets clear and measurable?
4. **Research vs. research coordination:** Does Bioversity strike a reasonable balance, particularly in light of its new mandate, between research and research coordination /facilitation/support:
 - Can Bioversity’s network-based model, which has been used effectively on its genetic resource conservation activities, be applied to the broader mandate of use (of genetic resources), and is it being applied effectively?
 - Is Bioversity achieving the right balance between the old information exchange – networking functions of IBPGR/IPGRI and the new aspiration to actually engage in

- To what extent, if any, should Bioversity be engaged in activities such as public awareness-raising, development of school curricula, and stimulating consumer uptake/use of nutritious foods?
5. **Global processes:** Is Bioversity's role in and contribution to various global processes and hosted initiatives appropriate, and is this where Bioversity's real comparative advantage lies or is this work competing with other activities such as innovative research? To what extent do contributions to the following activities contribute to the CGIAR mission?
 - global processes in agricultural biodiversity (ITPGRFA, CBD, WIPO, COHAB, etc.)
 - Linkages to FAO, particularly regarding genetic resources (CGRFA)
 - linkages with the Global Crop Diversity Trust (GCDT)
 - relationship between Bioversity and SGRP, and SGRP and other CGIAR Centers? Optimal? Are there activities which may better be addressed by the respective crop research Centers?
 6. **Emerging Areas:** What has been Bioversity's contribution to research in major emerging challenges, such as climate change, biofuels debate, the rising food prices, etc? Is it appropriate? Does Bioversity have a comparative advantage in these areas?
 7. **Balancing short and long term objectives across projects:** Many of Bioversity's projects (and hence impacts) are long term in perspective, however donors are increasingly demanding evidence of impacts in the short and medium term too. Does Bioversity have a portfolio approach to deal with this? Many of the potential sources of funding now consider short/medium term impact in the design and implementation of projects.
 8. **Mandate overlap:** Has the mandate overlap between IITA and Bioversity been resolved?
 9. **Impact Assessment:** Is Bioversity's approach to and investment in ex-ante and ex-post impact assessment sufficient? What are its most notable impacts to-date?

ANNEX 3
Itinerary of the EPMR Panel

<i>Dates</i>	<i>Panel members</i>	<i>Details</i>
7 – 10 February 2009 9 – 14 February 2009	José Sarukhan Richard Flavell, Tania Ammour, Carolina Berti, Rich Hannan, Jean-Yves Maillat	Initial Phase: Entire Panel (with exception of J.Sarukhan as above), including panel consultant, visits Bioversity International HQ in Maccarese, Italy. Includes participation in the Bioversity Planning Week.
23 – 24 March 2009	Richard Flavell, Jean-Yves Maillat	Attendance at the Bioversity International Board Meeting held at HQ in Maccarese, Italy
23 – 26 March 2009	Rich Hannan	Phillipines field site visit
31 March – 4 April 2009	Tania Ammour José Sarukhan	Peru/Bolivia field site visit
20 – 23 April 2009	Tania Ammour Rich Hannan	Kenya/Malawi field site visit and Bioversity International Regional Office for Africa
21 May – 1 June		Main Phase: entire Panel visits Bioversity International HQ in Maccarese, Italy

Annex 4

People Consulted by the Panel

Government/Ministry

Staff member, Bureau of Plant Industry (BPI), The Philippines
Aldo Claude & Rafael Murillo, Vice ministry of environment, biodiversity and climate change, Ministry of Environment and Water, Bolivia
Beatriz Zapata Ferrufino, CWR project Coordinator, Ministry of Environment and Water, Bolivia
Joycelyn E. Eusebio, Crops Research Division, PCARRD-DOST, The Philippines
Maxim Banda, Deputy Director, Ministry of Agriculture, Malawi
Victor Mshani, Research Dept., Malawi
Victoriano B. Guiam, DA-BAR Head of International Relations Unit, The Philippines

NARS

Staff member, Chitedze Agricultural Research Station, Malawi
Abebe Demissie, East African Plant Genetic Resources Network (EAPGREN), Uganda
Antonio Gandarillas, General Manager, Promoción e Investigación de Productos Andinos (PROINPA), Bolivia
Billy Temmanel, Cagayan Valley Agriculture and Resources Research and Development Consortium (CVARRD), The Philippines
Ester Bosibori, National Museum of Kenya, Kenya
Fernando Patiño, UNEP/GEF Project on Crop Wild Relatives (CWR), PROINPA, Bolivia
Filepe dela Cruz, University of the Philippines Los Banos, The Philippines
Fino Opió, Kambala, Uganda
Francisco Ibarra, Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias (INIFAP), Mexico
Freddy Amores, INIAP, Ecuador
Gonzalo Avila, Director, Centro de Investigaciones fitoecogenéticas de Pairumani, Simon Patiño Foundation (PAIRUMANI), Cochabamba, Bolivia
Jorge Benavides, Specialist in genetic resources and biotechnology, Instituto Nacional de Innovación Agraria (INIA), Lima, Peru
Jorge Sandoval, Research Director, Corporación Bananera Nacional (CORBANA), Costa Rica
José Joaquín Campos, General Director, CATIE, Costa Rica
Joseph Chirchir, Kenya Resource Center for Indigenous Knowledge (KENRIK), National Museums of Kenya, Kenya
Joséph Kori-Njuguna, Kenya Agricultural Research Institute (KARI), Kenya
Joseph Mutang'a, Head of Kenrik Section, National Museums of Kenya, Kenya
Juan Risi, Director, Instituto Nacional de Innovación Agraria (INIA), Peru
Judith Kimiywe, Senior Lecturer, Food, Nutrition, Dietetics, Kenyatta University, Kenya
Lawrent Pungulani, National Focal Point, Global Plan of Action National Information Sharing Mechanism (GPA-NISM), Malawi
Levi Shadeya Akundabweni, Crop science Department, University of Nairobi, Kenya
Lorena Guzman Villaroel, Genebank, Centro de Investigaciones fitoecogenéticas de Pairumani. Fundación Simon Patiño. Cochabamba, Bolivia
Llermé Ríos Lobo, INIA, Peru
Lucy Lariuki, Student, University of Nairobi, Kenya
Luz George, Regional Project Coordinator on coconut (COGENT), The Philippines
Manuel Ruiz, Executive Director, Sociedad de Derecho Ambiental (SPDA), Lima, Peru
Manuel Sigueñas, Specialist in variety protection and access to genetic resources, Instituto Nacional de Innovación Agraria (INIA), Lima, Peru

Maria del Carmen Rocabado, President Directory Fundación para el Desarrollo de la Ecología, FUNDECO, Bolivia

Maria Zavala, President, Banabeni, Peru

Maureen K. Nyangwara, SocioEconomics & Biometrics Division, Kenya Agricultural Research Institute (KARI), Kenya

Mgenzi Byabachwezi, Maruku Agricultural Research and Development Inst. MARDI, Tanzania

Milton Pinto, Specialist in genetic resources, Promoción e Investigación de productos Andinos (PROINPA), Bolivia

Mutegi Evans, Kenya Agricultural Research Institute, Kenya

Nora Luz Gálvez, Director of INIA/Puno, Peru

Patricio S. Faylon, Philippine Council for Agriculture, Forestry and Natural Resources, Research and Development (PCARRD), The Philippines

Patrick Maundu, (National Museums of Kenya staff and Honorary Fellow at Bioversity International), Kenya

Philip Ndemwa, Kenya Medical Research Institute (KEMRI) Center for Public Health Research, Kenya

Pratap K Shrestha, Local Initiatives for Biodiversity, Research and Development (LI-BIRD), Nepal

Rolando Oros, Coordinador, Socio-economics. PROINPA, Bolivia

Ricardo Sevilla, Secretaria Técnica de Coordinación con el CGIAR, Peru (advisor to the Ministry of Agriculture in Lima and former member of the Board), Peru

Rosario Ysabel Bravo Portocarrero, Professor, Facultad de Ciencias Agraras, Universidad Nacional del Altiplano, Puno, Peru

Ruth Adeka, Kenya Resource Center for Indigenous Knowledge (KENRIK); National Museums of Kenya, Kenya

Teresita Borromeo, University of the Philippines Los Banos, The Philippines

Thomson Chilang'a, Department of Agricultural Research Services and Malawian lead partner in Sub-Saharan Africa Challenge Programs (SSA-CP) Bvumbwe research center, Malawi

Wilbert Phillips, Researcher, Cacao Program, Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), Costa Rica

Nelly Vasquez, Researcher, Coffee Program, Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), Costa Rica

Willman García, Proyecto CHERLA (Chirimoya), Bolivia

Ximena Cadima, Coordinator, Unit of genetic resources, PROINPA, Bolivia

Zachary K. Muthamia, National Genebank of Kenya (KARI), Kenya

Zheng Yongqui, Research Inst. of Forestry, Chinese Acad. of Forestry, China

Advanced Research Institutes

Candy Gardner, USDA, Ames, IA, USA

Christina Walters / Dave Ellis, USDA-ARS National Center for Genetic Resources, USA

Enrique Valdivia, Executive Director, Centro de Investigación de Recursos Naturales y Medio Ambiente (CIRNMA). NUS Project, Peru

Francois Cote / Thierry Lescot, CIRAD – PERSYST, France

Louise Jackson, UC Davis

Peter Bretting, USDA, Beltsville, MD, USA

Robert Williams, Australia

S. Linington, Kew Gardens, UK

Sheelagh O'Reilly, Research into Use Programs, DFID, UK

Thomas Geburek, Federal Research and Training Center for Forests, Natural Hazards and Landscape, Australia

Tim Murray, Dept of Plant Pathology, Univ. Washington, USA

NGOs

M.S. Swaminathan, M.S. Swaminathan Research Foundation, India
Saúl Cuellar, Fundación Amigos de la Naturaleza (FAN), Bolivia
Steve Taranto, La Paz on Foot, Bolivia

CGIAR Center Staff

Papa Abdoulaye Seck, DG, Africa Rice Center
Colin Chartres, DG, IWMI
Frances Seymour, DG, CIFOR
Mahmoud B Solh, DG, ICARDA
Tom Lumpkin, DG, CIMMYT
Willy Dar, DG, ICRISAT
Joachim von Braun, DG, IFPRI
P. Hartmann, DG, IITA
Carlos O. Sere, DG, ILRI
Robert Zeigler, DG, IRRI
Stephen Hall, DG, Worldfish
Jean-Marcel Ribaut, Coordinator, Generation Challenge Program
Howarth Bouis, Coordinator, HarvestPlus Challenge Program
Paul Seck, Africa Rice Center

Biodiversity Board

Tony Gregson (Chair)
Phindile Lukhele-Olorunju (Vice Chair)
Ganesan Balachander
Emile Frison
Peter Hazell
Tony la Viña
Ana Sittenfeld
Paul Zuckerman
Jeremy Burdon

Donors

Alessandro Meschinelli, Technical Advisory Division, IFAD
Rodney Cooke, Technical Advisory Division, IFAD
Shantanu Mathur, Grant Programs, IFAD
Marieta Sakalien, UNEP/GEF Programs Management /Liaison Officer, Biodiversity (FAO)
Patrick Hollebosch, FPS Foreign Affairs, Foreign Trade and Development Cooperation, Belgium
Robert Bertram, Franklin Moore, USAID, USA
Gicchino carabba, Director General, DG Development Cooperation, Italian Ministry of Foreign Affairs, Italy
Amb. Pietro Sabastiani, Permanent representative, Diplomatic Perm. Rep. of Italy to the UN organizations, Italy

Other Stakeholders

Member, Kyanika Adult Women's Group, Kitui, Kenya

Farmer, Dry zone, Kang'uutheni, Kenya
Farmer, Humid zone, Museve, Kenya
Store manager, Uchumi Supermarket, Aga Khan Walk, Nairobi, Kenya
Staff member, Lapanday Corp., The Philippines
David Coates, Secretariat of the Convention on Biological Diversity (CBD)
Charity Irungu, Partner, Kenya
Dan Leskien, Commission on Genetic Resource for Food and Agriculture (CGRFA), FAO
Douglas Horton, Consultant, ILAC, CGIAR
Elcio Guimares, Plant Genetic Resources, FAO
Eric Kueneman, Crop and Grassland Service, FAO
Eunice N. Mutemi, Nutritionist, Kenyatta National Hospital, Kenya
Jackson Matheka, District Nutritionist, Kitui, Kenya
Jane Toll / Luigi Guarino, Global Crop Diversity Trust
John Logedi, District Medical Officer of Health, Kenya
Kakoli Ghosh, Plant Genetic Resources, FAO
Melinda Smale, Oxfam USA
Nancy Mutamu, Farmer, Museve, Kenya
Ouada Souvanavong, Forestry Biological Diversity & Conservation, FAO
Peter Kenmore, Plant Production and Protection, FAO
Shadrack Matuku Musyoka, Catholic Diocese of Kitui, Kenya
Shakeel Bhatti, International Treaty on Plant Genetic Resource for Food and Agriculture, FAO
Susan Burlingame, Nutrition Assessment and Evaluation, FAO
Cary Fowler, Global Crop Diversity Trust

ANNEX 5

List of Documents Reviewed by the Panel

1. Terms of Reference and Guidelines for External Program and Management Reviews of CGIAR Centers
2. Most recent EPMR report of the Center
3. Summary of actions taken in response to the last EPMR
4. CGIAR research Priorities 2005-2015
5. The latest Board-approved Strategic Plan of the Center
6. Medium-Term Plans of the Center for the period of review
7. SC commentaries of the Center's Medium-Term Plans
8. Center-Commissioned External Review Reports
9. Donor commissioned external review reports
10. List of achievements/outputs by Program or other research unit: publications (peer-review and other), research breakthroughs as recognized by peers, germplasm, genetic stocks, new technologies etc.
11. A paper prepared by Center management and Board on: a) main issues of current concern, b) vision of clients needs in intermediate (5 years) and long (10 years) term; c) vision on CGIAR and donor status in intermediate and long term; d) state of the relevant science in intermediate and long term; e) plan of action reflecting these vision statements
12. The current organization chart, with a brief description of the Center's internal management structure, including the composition and terms of reference of each major committee
13. Toward a New Vision and Strategy for the CGIAR
14. EPMR reports of CGIAR Centers
15. The CGIAR Charter
16. Most recent Annual Report of the Center, and comparable research reports of the programs, if available
17. The latest Annual Funding Request
18. Professional Staff Assessment for each professional staff member, according to the Professional Staff Assessment CV Form to be provided by the SC Secretariat.
19. List of reports of major planning conferences, internal reviews, expert meetings, etc., which have had a major influence on the direction of specific Center programs
20. List of the agreements for cooperative activities with other Centers and institutions
21. List of ongoing and recently completed contracted projects
22. Most recent CGIAR financial guidelines and manuals
23. Reference Guides for CGIAR International Agricultural Research Centers and their Boards of Trustees
24. Center Charter and other basic documents establishing the Center, along with subsequent amendments
25. Table showing composition of the Board over the last five years, along with an indication of the term of office of current members and their roles on the Board
26. Board handbook or rules of procedure
27. Table showing allowances, benefits, and salary ranges for each category of staff
28. Table showing personal data on professional staff by program, including each job title, incumbent's location, IRS/NRS/LRS status, period of tenure, gender, nationality, age, salary over the last three years, funding source (excluding names)
29. Table summarizing turnover of staff over the last five years by staff category
30. List of international staff vacancies and how long positions have been vacant
31. Set of minutes covering Board and Board committee meetings since the last External Review (and reports of board committees to the full Board if not included in the minutes)

32. Staff manual or a description of current personnel procedures for international and locally-recruited staff
33. Local compensation surveys used by the Center
34. Reports of external auditors, including management letters, and financial officer's reports to the Board since the last External Review
35. Most recent internal audit reports
36. Performance Management System Data 2005, 2006, 2007

- B01. Bioersivity Modus Operandi paper
- B01a. Annex 1. Regional Networks
- B01b. Annex 2. Commodity networks
- B01c. Annex 3. Partnerships in Bioersivity
- B02. Overview of Impact Assessment
- B03. Evolution of Bioersivity Funding
- B04. Key Stakeholders for EPMR Panel to Contact
- B04a. Supplementary List of Clients Peers and Competitors
- B05. Strategic developments at Bioersivity 2003-2008
- B07. Representing the Centers
- B08. Key Publications available in EPMR Panel Room
- B09a. Focus Area 1 Overview
- B09b. Focus Area 2 Overview
- B09c. Focus Area 3 Overview
- B09d. Focus Area 4 Overview
- B09e. Focus Area 5 Overview
- B09f. Focus Area 6 Overview
- B09g. CDU Overview
- B10. Major Achievements

Board of Trustees Information

- Self Evaluation Summaries
- Evaluation summaries

Commodities for Livelihoods (CfL) Programs

- Additional information from Charles Staver
- CTA ASTI methodology - Judith Francis
- Seed system strengthening Global Science article 5
- Staver Musa processing for rural development draft 4 V2

Corporate Services

- HelpDesk Survey Results
- 2003-2008-TOP-DONORS
- 2009 AWB Dec 08
- 2009 AWB Dec 08 board
- Admin Instruction inflationary increases 2009
- Bioersivity Follow-Up 2000-2007 Status Report - Annex I
- Bioersivity resources by Focus Area
- Bioersivity Status of Past IAs - Worksheet by Audit and FY
- CCER FA HR Customer Satisfaction Survey Report Final
- EPMR 2000-2007 Income Feb 09
- EPMR 2003 - 2009 Euro Income and Expenditure Feb 09xls
- EPMR 2003-2008-Regions

- EPMR Financial Indicators
- EPMR Personnel-to-projects
- F Assets Statements 2008
- FY2006-01 IPGRI 2006-2008 Medium Term IA Plan
- IPGRI Risk Frameworks - Combined - As of April 23 2005
- Monthly reporting RESTRICTED GRANTS SUMMARY REPORTS 13
- Monthly reporting management SUMMARY REPORTS 13
- Official Holidays in HQ 2009
- Review of Implementation of past Internal Audit Recommendations
- Setting salary on appointment
- Survey Summary 02112009
- Table 9.2 Finance data 2001-2010

Diversity for Livelihoods (DfL) Programs

- The value of plant genetic diversity to resource-poor farmers

Grants Office

- CF E10004 Contract Sample
- Grants April 09 Countries
- Grants by Project 13-02-09
- Parallell Session 2 - Grants Office

Human Resources

- Bioersivity Staffing Summary Feb09_HRFs
- G and D Statistics for 2006, 2007, 2008
- Honorary Research Fellows
- HR Engaged in Research Dec 08
- Research-Admin Proportions_ILR_LRS
- Staff by Duty Station and Org Unit Feb 09
- Staff by Duty Station and Staff Category Feb 09
- Type of personnel employed by Bioersivity

Office of the Director General

- Board members absentees
- Evaluation of BOT 33
- PSC Selection Criteria
- BOT Self Evaluation Summaries
- BOT Evaluation summaries
- Public relations at Bioersivity International

Policy RSU

- GRPI Final Technical Report 2002-2008

Understanding and Managing Biodiversity (UMB) Programs

- EPMR Standards highlights Focus Area 3 F07 2009
- Genetic resources and crop evolution article
- Impact 1999 Final

ANNEX 6

5th Biodiversity International (IPGRI) EPMR Recommendations: Bioersivity's response and Panel comments

EPMR Recommendation	Progress Achieved	EPMR Panel comments
<p>1. IPGRI position itself clearly by focusing on a number of topical research areas in which progress is lagging, where few others at the international and national level are active, and in which IPGRI has a comparative advantage. The Panel recommends that IPGRI take a holistic approach to decide in which topics it will invest further in order to excel.</p>	<p>During the course of developing the organizations new Strategy (Dec 2004), a careful examination was undertaken of our comparative advantage and of stakeholder needs and expectations. This resulted in a reshaping of the programs content, and our organizational structure, to maximize impact, including through partnerships and leveraging. Priority was given to topics that require a holistic approach, and that are of critical importance to resource-poor communities and weaker national programs. The final phase of sharpening Bioersivity's research focus was undertaken during 2005 and 2006, resulting in the identification of six Focus Areas. Based on these, our Project set has been reviewed and revised, and the new F-Series Projects commenced in Jan 2008.</p>	<p>New mission and strategy has been adopted following holistic analysis</p>
<p>2. Explore opportunities for optimizing use of forest genetic resources (FGR) network databases through meta-analyses across regions and other methods that would contribute to understanding of general global forest genetic resources patterns and dynamics.</p>	<p>A meta-analysis of the categories of data held in publicly accessible databases on forest genetic resources, including CGIAR centers and FAO, is currently being undertaken. In three major regions (Sub-Saharan Africa, Asia-Pacific and Latin America) an assessment is being made on the current state of conservation of forest genetic resources: these regional assessments will be integrated to provide a global synthesis. These assessments will be an input into a future State of the World Report on FGR (as proposed by the recent 14th Session of the FAO Panel of Forest Gene Experts). Since 2003 additional support for Bioersivity FGR networks has been secured as follows: EUFORGEN (Phase 3 contributions from 28 member countries), APFORGEN (ITTO-support), SAFORGEN and LAFORGEN (both supported by the Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (INIA), Spain. These networking platforms are instrumental in collating up to date information on FGR status and trends: some of the networks are producing databases on important groups of species, at sub-regional and regional levels, e.g. Food Tree Species in Africa. EUFGIS European Information System on Forest Genetic Resources is being developed as a model web-based, permanent and easily accessible information system on forest genetic resources.</p>	<p>Analysis ongoing</p>
<p>3. Proactively engage with CIFOR and ICRAF to review and update the 1993 agreement on their shared agenda, redefine roles as appropriate and implement mechanisms to facilitate regular interactions necessary for effective collaboration and information sharing.</p>	<p>Since 2004, discussions on Centers work on forest and tree genetic resources have been undertaken, culminating in a meeting at Biodiversity Headquarters in Rome in September 2006. This involved representatives of six CGIAR Centers, FAO and other major organizations working with FTGR. It identified four elements for a CGIAR strategy on FTGR: Understanding the diversity and value of FTGR and the processes that affect them;</p>	<p>Extensive discussions took place and new shared understandings adopted</p>

EPMR Recommendation	Progress Achieved	EPMR Panel comments
	<p>Conducting research to inform the conservation of FTGR;</p> <p>Development of approaches to effectively make available germplasm of FTGR to improve livelihoods and benefit society;</p> <p>Promotion of the uptake and sustainable utilization of FTGR.</p> <p>These elements, along with policy and advocacy, and capacity development as cross-cutting issues, provide the foundation for future development of integrated, complementary or collaborative actions on FTGR among the Centers. During 2006 and 2007 Bioversity proactively engaged and collaborated with ICRAF and CIFOR in the formulation of research proposals, such as on tamarind, global indicators for forest genetic diversity, and forest food bank.</p> <p>Additionally, the development of Framework Plans for the System Priorities will see Bioversity, CIFOR and ICRAF working together on FTGR components of the Priorities.</p>	
<p>4. The Panel recommends that IPGRI review the position of the <i>Musa</i> programs with a view to completing full integration of INIBAP into the Center. Options considered should include:</p> <p>a) removing use of the INIBAP acronym (this might accompany a rebranding of the entire Center);</p>	<p>These recommendations have been fully achieved. Specifically: a) This issue was addressed in the context of the re-branding and renaming of Bioversity, when in December 2006, INIBAP and IPGRI became Bioversity International.</p> <p>Note: The acronym INIBAP is therefore no longer used, except where necessary for legal purposes. The INIBAP legal identity will have to be retained until issues relating to the legal status of Bioversity in France have been resolved. Progress has recently been made and following discussions with the French Government, France has now agreed to negotiate an agreement with Bioversity, even though they are not a signatory to Bioversity/IPGRI's establishment agreement. We have now submitted a draft headquarters agreement for Bioversity France and have requested an accelerated negotiation process.</p>	<p>4a) achieved in the rebranding sense, but the use of INIBAP is still required in France until the legal status of agreements is amended or the agreements come to term.</p>
<p>b) establishing the <i>Musa</i> work, possibly together with other IPGRI commodity work, as a new grouping; The head of the group could be at Group Director level, with appropriate reporting lines;</p>	<p>The new programs structure of Bioversity assimilates the activities of INIBAP into the Commodities for Livelihoods Programs, headed by a Programs Director. This positions the Institute to continue to make a focused contribution on <i>Musa</i>, reflecting the importance of the crop, while at the same time facilitating wider benefit of the knowledge and experience of Bioversity scientists to work on other commodities and vice versa.</p>	<p>Technically, with the rebranding to Bioversity, and the integration of INIBAP activities into CFLP this recommendation has been achieved. Activities in coconut and cacao were added, but <i>Musa</i> is the primary crop of focus.</p>
<p>(c) rationalizing use of the Montpellier facility to optimize scientific synergies and administrative</p>	<p>The new structure and associated administrative changes address point (c).</p>	<p>4c) Administrative adaptations and subsequent agreements were made</p>

EPMR Recommendation	Progress Achieved	EPMR Panel comments
<p>function with IPGRI headquarters; and</p> <p>(d) rationalizing use of the regional facilities to achieve maximum scientific synergy and efficiency, again with an appropriate reporting structures.</p>	<p>The new structure and associated administrative changes address point (d).</p>	<p>to address the recommendation.</p> <p>4d) Achieved this using existing relationships carried over from INIBAP.</p>
<p>5. Develop, and obtain Board approval for, the Institutes policy and guidelines on research and breeding, including field trials, of genetically modified bananas and other crop products. The policy should articulate a clear strategy for obtaining public support for any introduction and field testing of GM crops in the environment.</p>	<p>A new Bioversity policy on working with GMOs was reviewed by the Board in March 2005, and approved at the September 2005 Board meeting. The new policy follows the CGIAR guiding principles on GMOs and more specifically acknowledges that GMOs have two distinct roles in agricultural research: as tools, to facilitate discovery, and as outputs with specific production benefits. In both, Bioversity will adhere to three primary principles, (1) Bioversity will ensure transparency in all its work related to GMOs; (2) Bioversity's work with GMOs will be designed to produce global public goods; (3) Bioversity will observe the highest standards of safety in the conduct of laboratory and field experiments.</p>	<p>The Board approved a policy.</p>
<p>6. Recruit a full time staff member with the necessary academic qualifications and experience in environmental and agricultural economics, preferably with a focus on PGR.</p>	<p>Various initiatives have been taken, which are coordinated through the new Programs Diversity for Livelihoods, the Programs Director of which is himself an economist. An Associate Scientist was hired in September 2004 to work in Rome on economics of agro-biodiversity, with particular focus on Central Asian countries; and a second Associate Scientist strengthened the economics capacity in January 2005. In 2006 a senior economist was recruited as Regional Director for SSA, and a Senior Economist, Dr Adam Drucker, was recruited in January 2008.</p>	<p>The senior economist hired in 2008 is fully involved in research on environmental economics. However, more capacity is needed in economic and social sciences to support research activities directly and through alliances with strong partners in the Regions.</p>
<p>7. Over the next 5 years, the Institute should focus most of its resources for international policy work on supporting the national institutions with the implementation of the ITPGREFA and related provisions of the CBD.</p>	<p>Bioversity is investing most of its resources for international policy work on supporting the implementation of the International Treaty. It came into force in 2004, but negotiations for the standard material transfer agreement to be used under the Treaty only finished in June 2006.</p> <p>We are now working on Treaty implementation on a number of different fronts, most of which support national institutions either directly or indirectly. These include:</p> <ul style="list-style-type: none"> submissions to the Governing Body concerning Farmers Rights; a three year, 3.5 million dollar, joint Bioversity/FAO programs of technical assistance to developing countries to implement the Treaty; 	<p>Activities are aligned to support the implementation of the International Treaty, including focus on national institutions.</p>

EPMR Recommendation	Progress Achieved	EPMR Panel comments
	<p>working with particular countries and regional organizations to implement the Treaty in the context of the GRPI, which was extended to June 2008;</p> <p>under GPC 2, undertaking four country case studies concerning incentives and disincentives for implementing the Treaty.</p> <p>Bioversity has continued its high level of participation in meetings of the CBD related to biosafety and access and benefit sharing, and meetings associated with the implementation of the International Treaty. Under the SGRP over the last two years we have developed a series of policy briefs for submission to the CBD concerning the special nature of GRFA, and why they should not be swept inadvertently into the norms developed for other forms of GRs under the evolving CBD ABS framework.</p> <p>The CCER of Bioversity's policy work in March 2004, cautioned against Bioversity foregoing activities at the international level. GRPI, the joint programs with FAO, and GPC 2, are indeed allowing us to expand our work on the Treaty to include national and regional level work. However, that work has not diminished our global and system wide efforts to advance the implementation of the Treaty; in fact our level of engagement in the latter areas has also expanded.</p>	
<p>8. Establish specific mechanisms to promote collaboration between the Regions at the Regional Director level.</p>	<p>Since June 2004, Bioversity dedicates time for face-to-face meetings among Regional Directors. This is done through the Regional Directors Consultative Forum, which meets twice yearly during the Priorities and Strategies Committee (PSC) meeting. It also engages through electronic means. Bioversity has also enhanced teleconferencing facilities in Regional Offices for bilateral and multilateral virtual meetings. Moreover, the new programs structure emphasizes the common agenda in the regions and shared ownership of research activities across the programs.</p>	<p>The recommendation as stated is superceded by the new organization structure which gives Program Directors the responsibility to increase synergy and coherence within and between programs and regions. Nevertheless, the panel found that programs still appear to operate in parallel (in "silos") without significant cooperation.</p>
<p>9. Review staff time allocation between research work and technical assistance, particularly in the Regions.</p>	<p>The new Bioversity Strategy and structure provide a clearer separation of responsibilities for research and technical assistance activities. Staff time is now allocated systematically during the preparation of the Annual Project Workplans.</p>	<p>Annual planning exercises and the Performance Agreements should allow better planning and monitoring of how staff time is being allocated. However, the Progress Achieved statement doesn't say enough, i.e.,</p>

EPMR Recommendation	Progress Achieved	EPMR Panel comments
<p>10. The panel recommends that a more formal relationship between the Board and the Institutes management to ensure that the Boards governance role as overseer is effectively exercised. To this end there should be:</p> <p>a) a regular monthly interaction between the Chair and the DG (Director General);</p>	<p>All of these issues have been addressed by a review of current practices, especially but not exclusively, in the course of developing and implementing the new Bioversity Strategy. They are being incorporated as appropriate into the Board Policies and Procedures Manual. Specifically:</p> <p>(a) The Board Chair and the Director General communicate at least monthly by telephone and face-to-face when possible.</p>	<p>does not address the less than positive impact of the new structure on research in the regions, but they did change the structure.</p> <p>Recommendation satisfactorily addressed</p>
<p>b) the agenda and minutes of the Management Executive Committee (MEC) made available to the Chair on a timely basis;</p>	<p>(b) The agenda and minutes of the Management Executive Committee (now the Senior Management Team (SMT)) are sent regularly to the Board Chair.</p>	<p>Recommendation satisfactorily addressed</p>
<p>(c) Board approval of a schedule of issues and expenditure levels on which management has to inform and seek approval from the Board</p>	<p>(c) A schedule of issues and expenditure levels on which management has to inform and seek approval from the Board was approved in March 2004.</p>	<p>Recommendation satisfactorily addressed</p>
<p>(d) a discretionary annual imprest account of, say, US\$ 50,000 for the Chair</p>	<p>(d) A discretionary annual imprest account of US\$50,000 has been made available to the Board Chair.</p>	<p>Recommendation satisfactorily addressed</p>
<p>(e) an Executive Committee-MEC conference call at least once between scheduled Board meetings;</p>	<p>(e) A virtual meeting of the Executive Committee is held at least once between scheduled Board meetings, with the participation of the relevant SMT members. In addition, several topics are now regularly discussed electronically through email by all Board members.</p>	<p>Recommendation satisfactorily addressed</p>
<p>(f) an invitation to the Leader of POTG to the November project review meeting;</p>	<p>(f) Under the new structure of Bioversity, the PSC meets three times a year. Minutes of the PSC are distributed to Board Members, including the Chair of the POTG. Presentations on relevant programmatic issues are given to the POTG twice a year, before Board Meetings, and summarized to the full BOT. Detailed discussions are held with the POTG on two of the four research Programms each year, and the POTG oversees one programs CCER each year.</p>	<p>Recommendation satisfactorily addressed</p>
<p>(g) more regular interaction between the Leader of the</p>	<p>(g) The Director of Finance (now Director of Corporate Services) meets twice a year with the Finance</p>	<p>Recommendation satisfactorily</p>

EPMR Recommendation	Progress Achieved	EPMR Panel comments
FATG and the DFA;	and Audit Task Group (FATG, successor to the FITG) to review in detail progress with Bioversity's finances and audit activities. In addition he provides updates to the FATG on a quarterly basis; and is in contact monthly with the FATG Chair.	addressed
(h) a strengthening of the financial and economic oversight by the Board through appropriate selection of the next three Board members;	(h) Two Trustees with strong financial and fundraising backgrounds joined the Board in April 2005. During 2006, the Board was further strengthened by two new Trustees with backgrounds in economics and finance.	Recommendation satisfactorily addressed
(i) a review of the Board procedures, particularly as they relate to the composition of Board quorums and the voting rights of the DG.	(i) Issues relating to Board quorum and voting rights were discussed by the Board in March 2004, and modifications made to the Board Policies and Procedures Manual. Accordingly, the quorum remains eight, with an exception in the case of election of a new Director General, who must be elected by a majority of two thirds of the voting members of the Board. The DG does not have voting rights for the selection of the DG.	Recommendation satisfactorily addressed
11. The Panel recommends that a more formal and transparent planning and decision making process is required with respect to the Institutes scientific programs, whereby:	All of these issues have been addressed in the course of developing and implementing the new Bioversity Strategy. Specifically:	Recommendation satisfactorily addressed
(a) an appropriate ToR for MEC should be agreed with the Board, which would include the requirement that all new projects and activities are approved by the full MEC before they are submitted to donors;	(a) A new Priorities and Strategies Committee has been established to discuss and approve all new strategic directions, and to assign research priorities. It meets three times a year. The Senior Management Team replaced the MEC with effect from 1 January 2005. It deals with institutional management issues, and meets at least monthly. A new Project Office was established in January 2005 under the Assistant Director General (ADG), through which all proposals and reports are submitted to donors.	Recommendation satisfactorily addressed
(b) MEC meet regularly once a month, and the agenda and minutes are available on the intranet to all staff in a timely manner;	A formal, transparent and comprehensive research planning process has been established, overseen by the ADG and monitored by the PSC. Formal procedures have been institutionalized for developing research ideas into concept notes and proposals. These include a standard clearance process for all proposals. (b) The SMT meets at least monthly, and minutes and agendas of the meetings are made available to staff on the Bioversity Intranet.	Recommendation satisfactorily addressed
(c) Regional Directors report directly to the DDGP; and	(c) This recommendation was implemented in 2003 and the arrangement continues under the new Bioversity structure, wherein Regional Directors report to the Deputy Director General.	Recommendation satisfactorily addressed

EPMR Recommendation	Progress Achieved	EPMR Panel comments
<p>(d) all activities with an annual budget of over US\$ 500,000, and activities where IPGRI is assuming non-traditional risks, are brought to the attention of the Executive Committee of the Board.</p>	<p>(d) Bioversity has developed a comprehensive risk management framework, which is up-dated and reviewed twice yearly by the FATG, and endorsed by the full BOT. The POTG also reviews all significant changes to the research programs twice yearly, for endorsement by the full BOT. Together with on-going monitoring by the PSC, these measures fully meet this recommendation.</p>	<p>Recommendation satisfactorily addressed</p>
<p>12. A key senior individual be exclusively dedicated to fundraising, working to the Board approved fund raising strategy incorporating an appropriate PR function.</p>	<p>Dr Paul Harding was appointed as Assistant Director General, Donor Relations, as of 1 March 2005. He is fully engaged in coordinating all activities relating to donor relations and fundraising, including submission of proposals and donor reports; research planning, monitoring, evaluation and impact assessment. He works closely with other managers on resource mobilization issues including public relations and marketing of Bioversity, and is a member of a joint Public Awareness (PA); Public Relations (PR) and Marketing Committee which meets monthly. He works to a Resource Mobilization Strategy, which was approved by the September 2006 BOT meeting.</p>	<p>Recommendation satisfactorily addressed</p>

ANNEX 7

Acronyms

ADG	Assistant Director General
AE	Alliance Executive
AEGIS	European Genebank Integrated System AGM
ALV	African Leafy Vegetables
APFORGEN	Asia Pacific Forest Genetic Resources Network
APR	Annual Project Report
ARS	Agricultural Research Service
APW	Annual Project Workplan
BAPNET	Banana Asia Pacific network
BARNESA	Banana Research Network for Eastern and Southern Africa
BBTV	Banana Bunchy Top Virus
CAC	Central Asia and the Caucasus
CAS-IP	Central Advisory Service on Intellectual Property
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza
CBD	Convention on Biological Diversity
CCAD	Comisión Centro-americana para el Ambiente y el desarrollo
CCER	Center Commissioned External Review
CDU	Capacity Development Unit
CFL	Commodities for Livelihoods
CGIAR	Consultative Group on International Agricultural Research
CGRFA	Commission on Genetic Resources for Food and Agriculture
CIFOR	Center for International Forestry Research
COGENT	International Coconut Genetic Resources Network
CV	Curriculum vitae
CWANA	Central and West Asia and North Africa region
CWR	crop wild relatives
DANIDA	Danish International Development Agency
DDG	Deputy Director General
DFID	UK Department for International Development
DFL	Diversity for livelihoods
DG	Director General
DMG	Diagnostic and Management Guide
DNA	Deoxyribonucleic acid
DP	Disease and Pest
EAPGREN	(East African PGR network)
EA-PGR	Regional Network for Conservation and Use of PGR for East Asia
ECPGR	European Cooperative Programs on PGR
EPMR	External Program and Management Review
EUFORGEN	European Forest Genetic Resources network
EURISCO	European Search Catalogue
FA	Focus Area
FARA	Forum for Agricultural Research in Africa
FATG	Finance and Audit Task Group
FAO	Food and Agricultural organization-
FGR	Forest Genetic Resources
FTE	Full-time Equivalent
GCDT	Global Crop Diversity Trust
GFAR	Global Forum on Agricultural Research

GIGA	Germplasm Information on Germplasm Accessions
GRIN	Germplasm Resource Information System
GBIF	Global Biodiversity Information Facility
GEF	Global Environment Facility
GFAR	Global Forum on Agricultural Research
GFU	Global Facilitation Unit on Underutilized Crops
GIS	Geographic Information System
Global-ALIS	Global Accession Level Information System
GMO	Genetically Modified Organism
GPG	Global Public Goods
GPP	Global Partnerships Program
GRENEWCA	Genetic Resources Network for West and Central Africa
GRFA	Genetic Resources for Food and Agriculture
GRPC	Genetic Resources Policy Committee
HQ	Headquarters
HR	Human Resources
IAU	Internal Audit Unit
IBPGR	International Board for Plant Genetic Resources
ICT-KM	Information and Communications Technology Knowledge Management Unit
IFAD	International Fund for Agricultural Research
IFPRI	International Food Policy Research Institute
IITA	International Institute of Tropical Agriculture
ILAC	Institutional Learning and Change Initiative
INIBAP	International Network for the improvement of Banana and Plantain
IPGRI	International Plant Genetic Resources Institute
IRD	Institut de Recherche pour le Développement (France)
IRRI	International Rice Research Institute
IRS	Internationally Recruited Staff
IT	Information Technology
ITC	International Transit Center
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
IUCN	International Union for Conservation of Nature
LAFORGEN	Latin America Forest Genetic Resources Network
LI-BIRD	Local Initiatives for Biodiversity, Research and Development
LRS	Locally Recruited Staff
LN	liquid nitrogen
MDG	Millennium Development Goals
MS	Master of Science
MTA	Material Transfer Agreement
MTP	Medium Term Plan
MUSACO	Réseau Musa pour l'Afrique Centrale et Occidentale
MUSALAC Caribbean	Plantain and Banana Research and Development Network for Latin America and the Caribbean
MYPOW	Multi-Year Plan of Work
NARC	National Agricultural Research Centers
NARS	National Agricultural Research System
NGO	Non-Governmental Organization
NTFP	non-timber forest products
NTG	Nominations Task Group
NUS	Neglected and Underutilized Species
PACS	Payment of Agricultural Biodiversity Conservation Services

PAPGREN	Pacific Agriculture Plant Genetic Resources network
PAR	Platform for Agro-biodiversity Research
PAU	Public Awareness Unit
PD	Program Director
PEL	Planning, Evaluation and Learning (Unit)
PGR	Plant Genetic Resources
PGRFA	Plant Genetic Resources for Food and Agriculture
PMS	Performance Measurement System
POTG	Programs Oversight Task Group
PR	Peer-reviewed
PROCORD	Global Coconut Research for Development Programme
PSC	Priorities and Strategies Committee
RDA	Rural Development Administration
RECSEA-PGR	Regional Cooperation in Southeast Asia for PGR
REDARFIT	Andean network on PGR
REDIMA	Musa Documentation and Information Network for Africa
REMERFI	Mesoamerican network on PGR for Central America and Mexico
RM	Resource Mobilization
RSU	Research and Support Unit
SAFORGEN	Sub-Saharan Africa Forest Genetic Resources Network
SANPGR	South Asia network on PGR
SC	Science Council
SGRP	System-wide Genetic Resources Program
SINGER	Systemwide Information Network on Genetic Resources
SMT	Senior Management Team
SMTA	Standard Material Transfer Agreement
SOW	State of the World
SPGRC	Southern Africa development community PGR
SSR	Simple Sequence Repeat
TROPIGEN	Amazonian network on PGR
TVE	Television Trust for the Environment
UMB	Understanding and Managing Biodiversity
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USDA	United States Department of Agriculture
VCG	Vegetative Compatibility Group
WANANET	West Asia and North Africa PGR network
WIPO	World Intellectual Property Organization



CGIAR

Science Council Secretariat
c/o FAO
Viale delle Terme di Caracalla snc
00153 Rome, Italy

Tel : 39 06 57056782
Fax : +39 06 57053298
E-mail : sc-secretariat@fao.org