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Item 4 of the provisional agenda

REPORT OF THE INTERGOVERNMENTAL COMMITTEE ON THE CONVENTION ON BIOLOGICAL DIVERSITY

Report of the Open-ended Intergovernmental Meeting of Scientific Experts on Biological Diversity, including the agenda for scientific and technological research*

INTRODUCTION

1. The Open-ended Intergovernmental Meeting of Scientific Experts on Biological Diversity was held in Mexico City from 11 to 15 April 1994. The Meeting was convened by the Executive Director of the United Nations Environment Programme (UNEP), in accordance with the request of the Intergovernmental Committee on the Convention on Biological Diversity at its first session, held in Geneva from 11 to 15 October 1993.

I. OPENING OF THE MEETING

2. At its opening session, on 11 April 1994, the Meeting heard statements from Mr. Reuben Olembo, Assistant Executive Director of the United Nations Environment Programme (UNEP), speaking on behalf of Ms. Elizabeth Dowdeswell, the Executive Director of UNEP; Mr. Vicente Sanchez (Chile), Chairperson of the Intergovernmental Committee on the Convention on Biological Diversity; and Mr. Carlos Rojas, Minister of Social Development of Mexico, who formally opened the Meeting.

3. Speaking on behalf of the Executive Director of UNEP, Mr. Olembo expressed his gratitude to the Government and people of Mexico for hosting the Meeting and to the other Governments whose financial contributions had enabled the participation of such a large number of delegations. He said that, in view of the current pace of ratification of the Convention, the

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* Note by the Interim Secretariat. The report of the Open-ended Intergovernmental Meeting of the Scientific Experts on Biological Diversity, as adopted by the Meeting at its 2nd plenary session, on 15 April 1994, was submitted to the Intergovernmental Committee on the Convention on Biological Diversity at its second session, held in Nairobi from 20 June to 1 July 1994, as document UNEP/CBD/IC/2/11 and Corr.1. Also submitted to the Intergovernmental Committee at its second session was an information document (UNEP/CBD/IC/2/Inf.2) containing an agenda for scientific and technological research, which had been prepared by the Interim Secretariat in accordance with the procedure set out in the report of the Meeting of the Scientific Experts (see paragraph 43 below). Having considered the two documents at the session, Working Group I of the Intergovernmental Committee recommended "the incorporation of UNEP/CBD/IC/2/Inf.2 into the report of the Scientific Meeting as an annex and that both documents be put forward to the Conference of the Parties as guidance for the future work of SBSTTA" (the Subsidiary Body on Scientific Technological and Technological Advice). The present document is being issued in response to that request, with the agenda for scientific and technological research contained in annex X below.

work of the Meeting was both important and urgent. The Meeting had been convened because the Intergovernmental Committee on the Convention on Biological Diversity had suggested an in-depth review of scientific and technical issues for the first meeting of the Conference of the Parties. The Bureau had endeavoured to ensure that the Meeting focused on technical aspects so that, by the end of its deliberations, it could produce recommendations for the consideration of the Intergovernmental Committee. In conclusion, he noted the other rapid developments that were taking place on matters related to the Convention, particularly in relation to the Global Environment Facility, and wished the Meeting success in addressing the important tasks before it.

4. In his statement, Mr. Sanchez said that the Convention on Biological Diversity was the result of wide-ranging and difficult negotiations on the fate of biological resources. It recognized the sovereign rights of nations but, at the same time, set forth the responsibilities that such rights entailed with respect to the conservation and sustainable use of such natural resources. It established a delicate balance based on four fundamental pillars: conservation of genetic resources; controlled access to such resources; development and transfer of technology for the sustainable use and conservation of biological diversity; and greater international equity. There remained, however, the problem of finding a fully satisfactory way of putting the provisions of the Convention into practice. The Meeting had been convened to provide scientific and technical answers to various questions and to assist in resolving outstanding matters and conflicting points of view that remained among the negotiators of the Convention - mainly lawyers, diplomats and politicians - who were continuing their negotiations on matters that had not yet been resolved to the full satisfaction of all parties. He hoped that the outcome of the Meeting would also help in giving practical effect in the most appropriate way to Article 25 of the Convention (Subsidiary Body on Scientific, Technical and Technological Advice). Noting that adequate conservation and the sound and sustainable use of the components of biological diversity encompassed sustainable management in productive sectors such as agriculture, forestry and fisheries, he said that the practices for the sustainable use of biological diversity found among certain indigenous and rural communities contained useful elements for the work of the Meeting. Expressing his gratitude to the Government of Mexico for hosting the Meeting, he said that Mexico was the source of about 25 per cent of the species currently used for food and that it combined an important indigenous tradition with excellent scientific work in the fields of ecology and biotechnology. In conclusion, he wished the Meeting success in its work and expressed the hope that it would provide the Intergovernmental Committee with useful answers to its questions so that, at its next session, the Committee could agree on realistic, sound and effective proposals and approaches to facilitate the work of the Conference of the Parties at its first meeting.

5. In his statement, Mr. Rojas said that an awareness of the dramatic degradation of the global environment raised concerns over the well-being of future generations and was part of a broader concern about the legacy the current generation would leave, including the natural and cultural heritage. Culture and nature, a duality that shaped the characteristics and way of life of peoples and individuals, were included in the legacy of the current generation, which should be concerned about leaving behind a planet as rich in both aspects as it had found it. He stated that nature's vast economic potential should be considered, owing to the genetic variety of species yet to be explored and the possibility of applying them to the fields of medicine, new foods or industrial inputs, and that the value of such potential was yet to be appraised. Hence, the future of the world food supply lay to a large extent in the hands of the indigenous peoples and traditional farmers of Mexico and other Latin American nations, and in their natural ecosystems. Biological diversity was a key factor in regulating the ecological stability of the region and the world, and in

Mexico, the strategy to conserve biological diversity sought to encourage peasant farmers to play a participatory and leading role in environmental protection, as well as to ensure sustainable development and the conservationist use of natural resources. Mexico firmly believed that to be successful, the conservation of biological diversity must be rooted in social projects. Prior to declaring the Meeting formally open, Mr. Rojas said that the world population needed more resources for development and to attain higher living standards, while conserving its natural resources and their productivity for future generations. The major challenges involved in achieving that goal were how to obtain more from the land without environmental degradation; how to achieve equitable development for all social groups and how to use natural resources in an environmentally sustainable manner. The world's future depended on the capacity to respond to the challenge of meeting present-day needs without compromising the capacity of future generations, the definition of sustainability given by the Brundtland Commission.

II. ORGANIZATIONAL MATTERS

A. Attendance

6. The Meeting was attended by experts from the following 85 States: Antigua and Barbuda, Argentina, Armenia, Australia, Bahamas, Barbados, Belgium, Bhutan, Bolivia, Brazil, Burkina Faso, Canada, Central African Republic, Chile, China, Colombia, Cook Islands, Costa Rica, Croatia, Cuba, Czech Republic, Democratic People's Republic of Korea, Denmark, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Estonia, Finland, France, Gabon, Gambia, Germany, Greece, Guinea, Guyana, Iceland, India, Indonesia, Italy, Japan, Kenya, Madagascar, Malawi, Malaysia, Maldives, Mali, Mauritania, Mauritius, Mexico, Mongolia, Nepal, Netherlands, New Zealand, Nigeria, Norway, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Republic of Korea, Romania, Russian Federation, Saudi Arabia, Senegal, Seychelles, Slovakia, Spain, Sri Lanka, Surinam, Sweden, Thailand, Tunisia, Uganda, United Kingdom of Great Britain and Northern Ireland, United States of America, Uruguay, Venezuela, Yemen, Zambia.

7. The following United Nations offices and programmes were represented: secretariat of the Intergovernmental Negotiating Committee for the Elaboration of an International Convention to Combat Desertification in those Countries Experiencing Severe Drought and/or Desertification, particularly in Africa; United Nations Development Programme (UNDP). The Scientific and Technical Advisory Panel (STAP) of the Global Environment Facility (GEF) was also represented.

8. The following specialized agencies and other organizations of the United Nations system were represented: Food and Agriculture Organization of the United Nations (FAO), United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Industrial Development Organization (UNIDO), World Bank.

9. The following other intergovernmental organizations were represented: Amazonian Cooperation Treaty, European Community, Inter-American Development Bank, International Development Research Centre (IDRC), International Livestock Centre for Africa (ILCA), International Plant Genetic Resources Institute (IPGRI).

10. The following non-governmental organizations were represented: Birdlife International; Central and East European Working Group for the Enhancement of Biological Diversity (CEEWEB); Colombia-Ecofondo; CONAIE, Acción Ecológica; Conservation International; ECOLINE, A.C.; Environmental Liaison Centre International; Fundación Ecológica; Fundación Natura-Panamá; Fundo Integrado Pronatureleza (Pronatura);

German NGO Working Group on Biological Diversity; Greenpeace International; Indigenous Peoples Biodiversity Network; International Centre for Tropical Agriculture (CIAT); International Council for the Exploration of the Sea; International Council for Research in Agroforestry; International Maize and Wheat Improvement Centre (CIMMYT); International Petroleum Industry Environmental Conservation Association (IPIECA); Naturalia; Scientific Committee on Problems of the Environment (SCOPE); Service d'Appui aux Initiatives Locales de Developpement; Sociedad Mexicana de Historia Natural; Third World Network; World Conservation Monitoring Centre (WCMC); World Conservation Union (IUCN).

B. Election of officers

11. The Meeting elected the following officers:

Chairperson:	Mr. J. Sarukhan (Mexico)
Vice-Chairpersons:	Mr. P. J. Schei (Norway) Mr. J. H. Seyani (Malawi) Mr. G. Zavarzin (Russian Federation)
Rapporteur:	Mr. S. Sriwatanapongse (Thailand)

12. At the 1st session, it was agreed that the Vice-Chairperson from Norway would serve as Chairperson of Subcommittee I and that the Vice-Chairperson from Malawi would serve as Chairperson of Subcommittee II. The Vice-Chairperson from the Russian Federation would assist the Chairperson of the Meeting in the performance of his duties.

13. On assuming the Chair, the Chairperson acknowledged with gratitude the trust the Meeting had placed in him and expressed the hope that the Meeting would produce clear results for the Intergovernmental Committee.

C. Adoption of the agenda and organization of work

14. At the 1st session, the Chairperson invited Mr. Sanchez (Chile), Chairperson of the Intergovernmental Committee on the Convention of the Biological Diversity, to inform the Meeting of what the Intergovernmental Committee expected of it.

15. In his statement, Mr. Sanchez recalled that, at the first session of the Intergovernmental Committee, its Working Group I had recommended and the Committee had decided to convene an open-ended group of experts with precise terms of reference. He stressed that the Intergovernmental Committee had been unable to agree to the establishment of an interim scientific and technical advisory committee. The Committee had considered that there was a need to listen to experts on a range of outstanding issues in order to obtain vital inputs for decisions by Governments at the Committee's next session. In that connection, it was important to bear in mind that the recommendations of the Intergovernmental Committee were subject to any action that the Conference of the Parties might take on them. Just as the purpose of the Intergovernmental Committee was to simplify the work of the Conference of the Parties, the task of the current meeting was to provide scientific ideas to expedite the work of the Committee in preparing realistic recommendations for the Conference of the Parties. Drawing attention to the questions suggested by the Bureau of the Intergovernmental Committee at its meeting on 4 February 1994 (UNEP/CBD/IGSc/1/3), he said that the Meeting was free to alter their order or to add new ones. The Committee would, however, be very grateful if the Meeting could provide answers to the questions already contained in the document. With regard to the agenda for scientific and technological research, he stressed that the aim was to identify elements to assist in the preparation of an agenda, and not to define the agenda itself. Similarly, it was not for the Meeting to discuss the structure or terms of

reference of a scientific and technical advisory committee; that was a matter for the Conference of the Parties. Answers to the questions suggested would, however, help the Conference of the Parties give effect to Article 25 of the Convention. The results expected from the Meeting were therefore threefold: a general assessment of the range and adequacy of ongoing scientific programmes; a framework of elements that might be included in the programme of work for the international scientific community; and identification of the main components, including indigenous knowledge, for technology transfer and for the assessment and management of biological resources.

16. The Meeting then considered the provisional agenda as contained in document UNEP/CBD/IGSc/1/1, together with the annotations thereto in document UNEP/CBD/IGSc/1/1/Add.1.

17. On the proposal of Brazil, supported by the representatives of Malaysia, Sweden, India and Australia, the Meeting agreed to amend items 3 (a), (b) and (c) of the provisional agenda to reflect more completely the wording of Article 25, paragraph 2 (d), of the Convention, paragraph 2 (b) of resolution 2 of the Nairobi Final Act, and Article 25, paragraph 2 (c), of the Convention, respectively. The provisional agenda was adopted with the amendments introduced orally by the representative of Brazil. The agenda as adopted read as follows:

1. Opening of the Meeting.

2. Organizational matters:

   (a) Election of officers;

   (b) Adoption of the agenda and organization of work.

3. Items for consideration by the Meeting in accordance with the recommendation made by Working Group I at the first session of the Intergovernmental Committee on the Convention on Biological Diversity:

   (a) Identification of scientific programmes and international cooperation in research and development related to the conservation and sustainable use of biological diversity;

   (b) Organization of the preparation of an agenda for scientific and technological research on the conservation of biological diversity and the sustainable use of its components, including possible institutional arrangements ad interim for scientific cooperation among Governments for the early implementation of the provisions of the Convention on Biological Diversity;

   (c) Identification of innovative, efficient and state-of-the-art technologies and know-how relating to the conservation and sustainable use of biological diversity and the ways and means of promoting development and/or transferring such technologies.

4. Adoption of the report.

5. Closure of the Meeting.

18. At the same session, the Meeting considered the provisional organization of work as contained in document UNEP/CBD/IGSc/1/1/Add.2.

19. It was agreed that two Subcommittees should be established: Subcommittee I, chaired by the Vice-Chairperson from Norway, to consider the agenda items 3 (a) and (b), and Subcommittee II, chaired by the Vice-Chairperson from Malawi, to consider agenda item 3 (c).

20. It was also agreed that each Subcommittee should consider how best to organize its work.

21. At the same session, the representative of India asked for the final reports of the Subcommittees to be circulated on Thursday, 14 April, the day before they were to be considered for adoption, to enable one-person delegations, unable to attend the meetings of both bodies, to review the recommendations therein in order to prepare their own input. In response, the Executive Secretary of the Interim Secretariat for the Convention on Biological Diversity said that the issuance of the Subcommittee reports depended on when the Subcommittees completed their work. The Interim Secretariat was, however, conscious of the difficulties facing small delegations and proposed that consideration of the draft reports by the two Subcommittees be taken sequentially in order to enable one-person delegations to participate in both processes.

22. Also at the 1st session, the representative of the Bahamas asked that the formation of subgroups of the Subcommittees be restricted as far as possible to ensure the participation of all small delegations in the work of the Meeting.

D. Documentation

23. The documentation before the Meeting is listed in annex I to the present report.

III. ITEMS FOR CONSIDERATION BY THE MEETING IN ACCORDANCE WITH THE RECOMMENDATION MADE BY WORKING GROUP I AT THE FIRST SESSION OF THE INTERGOVERNMENTAL COMMITTEE OF THE CONVENTION ON BIOLOGICAL DIVERSITY

A. Identification of scientific programmes and international cooperation in research and development related to the conservation and sustainable use of biological diversity

24. In accordance with the terms of reference given it by the Meeting at the 1st plenary session, Subcommittee I held 7 meetings from 11 to 15 April, 1994, to consider agenda items 3 (a) and (b). Its deliberations were presided over by Mr. Peter J. Schei (Norway), a Vice-Chairperson of the Meeting.

25. The Subcommittee considered agenda item 3(a), "Identification of scientific programmes and international cooperation in research and development related to the conservation and sustainable use of biological diversity", at its 1st, 2nd and 3rd meetings, held on 11 and 12 April 1994.

26. It first examined the implications of the amendments to item 3 (a) of the provisional agenda agreed during the adoption of the agenda at the 1st plenary session of the Meeting.

27. The Chairperson then requested the Interim Secretariat to report on the preliminary survey of the trends in international scientific programmes relating to the Convention, a survey carried out to facilitate the work of the scientific experts.

28. The report by the Interim Secretariat included:

(a) An outline of the structure and content of the form distributed by the Interim Secretariat for the survey;

(b) An explanation of difficulties encountered during the development and completion of the form in particular the short timeframe for response and the comprehensive nature of the form;

(c) The type of output that could be obtained from the compilation of the information provided on the form distributed by the Interim Secretariat.

A written report was circulated as a conference room paper.

29. In relation to the survey of scientific programmes and international cooperation in research and identification of gaps and areas to be strengthened, the Subcommittee examined the following three items, which generated some suggestions for future actions:

(a) Main processes or mechanisms for identifying scientific programmes and international cooperation, and for strengthening national capacity to develop and carry out scientific programmes;

(b) Gaps identified in scientific programmes and in research and development;

(c) Scientific programmes, research and development areas that would benefit from the international cooperation.

30. With regard to the item referred to in paragraph 29 (a) above, the Subcommittee noted the need for an international research agenda under the auspices of the Conference of the Parties to the Convention on Biological Diversity and agreed that mechanisms for identification of scientific programmes should focus on regions and/or themes based on activities stipulated in the Convention. Thus, the Subcommittee emphasized the importance of building up national capacity to develop and carry out scientific programmes. The mechanisms to be considered for the identification of scientific programmes and international cooperation in research and development could utilize a number of data-gathering and information-input techniques; where possible, these should build on existing mechanisms. The mechanisms include, inter alia, the use of:

(a) Country studies, national biological-diversity strategies and action plans;

(b) Questionnaires, surveys, mailings to governmental, intergovernmental, private sector and non-governmental organizations;

(c) Information provided on a voluntary basis by non-governmental organizations and other institutions on gaps in scientific programmes in research;

(d) A clearing-house mechanism, including regional network systems, in the form of an electronic data network that would utilize existing institutions, allow for open access to the network and have a decentralized and transparent structure;

(e) Regional expert group workshops;

(f) Consultants on a contractual basis, where appropriate.

31. It was felt that scientific capacity-building and mobilization of financial resources should be integrated into a general national capacity-building programme and should incorporate the use of indigenous knowledge.

(a) Areas where scientific capacity should be increased included:

(i) Understanding of in situ and ex situ conservation;

(ii) Understanding of sustainable use of biological diversity and its components and of integrating sustainable use into relevant sectoral or cross-sectoral plans, programmes and policies;

(iii) Understanding the role of biological diversity in maintaining ecosystem functions;

(iv) Project management and data management and strategic planning;

(v) Taxonomic capability;

(vi) Identification, characterization and screening of biological diversity to facilitate sharing of benefits and transparency in use of resources, particularly in countries of origin;

(b) Suggested modalities to strengthen national capacity included:

(i) Increased provision and use of geographic information systems;

(ii) Integration of other sciences, such as the social and human sciences, and socio-economics;

(iii) Integration of social science in human resource development;

(iv) Identification of areas where scientific and institutional expertise do not exist;

(v) Facilitation of national, regional and international workshops;

(vi) Establishment and consolidation of training programmes in developing countries;

(vii) Encouraging cooperation in long-term research in order to sustain the building up of institutional capacity;

(viii) Use of new technologies such as interactive computer training programmes in taxonomy;

(ix) Establishment of additional ex situ facilities, enhancement of in situ conservation and support for sustainable use;

(x) Provision of incentives to those people involved in less studied sectors of biological diversity research;

(c) Suggested elements for national capacity-building programmes included:

(i) Maintenance and enhancement of existing effective scientific infrastructure;

(ii) Establishment of national trust funds to support institutional and local training efforts;

(iii) Provision of career opportunities to ensure the maintenance of scientific and national capacity, especially in less popular sectors of biological diversity research;

(iv) Review of the scientific capacity-building activities of institutions and international organizations.

32. With regard to the item referred to in paragraph 29 (b) above, the Subcommittee identified a number of gaps in scientific programmes in research and development related to the conservation and sustainable use of biological resources. These gaps were addressed in specific programme areas proposed as a basis for the development of a scientific agenda, possible elements of which were made available as a conference room paper.

33. With regard to the identification of scientific programmes, research and development areas that would benefit from international cooperation, referred to in paragraph 29 (c) above, the following were presented as examples, bearing in mind that priorities are to be based on national needs:

(a) In situ conservation for which bilateral and multilateral cooperation may be needed;

(b) Ex situ conservation for which international cooperation can be useful, particularly with reference to appropriate technology transfer and training of personnel;

(c) Sustainable use of biological resources in economic sectors and cross-sectoral activities;

(d) Strengthening of taxonomy, systematics and conservation biology;

(e) Biological-diversity prospecting;

(f) Conservation and sustainable use of all types of forests, including their function as a genetic resource pool;

(g) Applications of biotechnology in the identification, characterization and use of biological resources;

(h) Knowledge on marine, other aquatic systems, coastal and terrestrial ecosystems;

(i) Impacts on biological diversity;

(j) Process for the management of biological resources and access to such resources;

(k) Effective and efficient systems for rapid building and the development of institutional capacity;

(l) The role of biological diversity in maintaining ecosystem function;

(m) Integrated coastal zone management.

34. The Subcommittee recognized that comprehensive surveys of scientific programmes and strategies require substantial time to complete. Each country should strive to carry out this type of survey as a basis for developing national strategies on biological diversity. An

interdisciplinary approach and a more comprehensive analysis are necessary in identifying and bridging gaps in research areas. It was suggested that in the short-term, illustrative models, case-studies and examples of successful international cooperation on biological diversity should be gathered and disseminated.

35. As no country could have the full capacity to undertake comprehensive taxonomic inventories, international cooperation is essential. Data on biological diversity should be transferred or made accessible to countries of origin.

36. The Subcommittee suggested that studies be commissioned on electronic communications and data exchange facilities for the purposes of meeting the requirements of the Convention on Biological Diversity and the needs of the Parties in relation to the conservation and sustainable use of biological diversity. The uses of such facilities could include: exchange of information on biological-diversity research projects and technology; dissemination of papers and reports of the Conference of the Parties; and dissemination of information on activities of the Parties, e.g., national studies and action plans/strategies, policies and programmes.

B. Organization of the preparation of an agenda for scientific and technological research on the conservation of biological and the sustainable use of its components, including possible institutional arrangements ad interim for scientific cooperation among Governments for the early implementation of the provisions of the Convention on Biological Diversity

37. The Subcommittee considered agenda item 3 (b) at its 3rd, 4th and 5th meetings, on 12 and 13 April 1994.

38. The Subcommittee agreed to organize its work under the following three headings:

(a) Development of a framework for an agenda for scientific and technological research on the conservation of biological diversity and the sustainable use of its components;

(b) Consideration of the content of such an agenda using table 4 in the report of Expert Panel I (UNEP/Bio.Div/Panels/Inf.1) as a basis;

(c) Other matters for consideration regarding the Subsidiary Body for Scientific, Technical and Technological Advice (SBSTTA).

39. With regard to sub-item (a) in paragraph 38 above, the Subcommittee agreed that the development of an agenda for issues and activities should be structured according to the provisions of the Convention. The Subcommittee also agreed that research priorities should be defined at national level and acknowledged the relevance of country studies in the process of identifying national needs which an agenda could then seek to fulfil.

40. Many experts expressed the view that national research priorities should be a basis for an integrated research agenda under the Convention. Recognizing that there are biological diversity concerns that transcend national boundaries, the Subcommittee considered that an integrated research agenda could contribute to the amelioration of these concerns. Identification of the target audiences was also presented as a necessary prerequisite to the development of the research agenda. For example, scientists would be interested in the framework for a research agenda as a guide to which projects were likely to be funded, and funding agencies would use it as an indication of relevant research areas.

41. The following sequential framework for the development of an agenda was proposed as an iterative process:

(a) Identification of scientific and technological knowledge and methodologies required to implement the provisions of the Convention on Biological Diversity;

(b) Assessment of the current state of knowledge, including gaps and areas to be strengthened, and identification of processes for assessment (e.g., electronic networks);

(c) Development of the research agenda based on results from above activities;

(d) Review and revision of the agenda.

42. In order to outline the scope of the research agenda, the Subcommittee noted that the agenda should consider inter alia the following important elements: key linkages and relationships with, inter alia, local communities and resource managers; some indications on the target for research funding and on appropriate forums and style of communication of research results. Many experts expressed the view that the agenda should address specific management questions of current and anticipated management programmes as identified from the review process. Consultations may be required at some stages of the sequential framework.

43. With regard to sub-item (b) in paragraph 38 above, the Subcommittee recognized that table 4, part A, of the report of Expert Panel I (UNEP/Bio.Div/Panels/Inf.1) might serve as a useful framework for the identification of gaps and as possible elements for a scientific agenda and, thus, provide the basis for discussions on agenda item 3 (b). Two conference room papers were before Subcommittee I for consideration. Because of time constraints, it was not possible to reach a final decision on both papers. The Meeting invited participants and observers to study the conference room papers and submit their comments to the Interim Secretariat by 1 May 1994. The Interim Secretariat should then prepare a consolidated information document, based on the conference room papers and comments received, to be submitted to the Intergovernmental Committee on the Convention on Biological Diversity at its second session.

44. The Subcommittee then examined the implications of the amendments to item 3 (b) of the provisional agenda made by the Meeting at its 1st plenary session on 11 April 1994, which resulted in the consideration of possible institutional arrangements ad interim for scientific cooperation among Governments for the early implementation of the provisions of the Convention on Biological Diversity. Two proposals for possible ad interim arrangements were put forward. The first involved the use of networks (e.g., electronic mail), whereas the second involved the creation of regional workshops to identify common needs. It was suggested that further studies be commissioned to evaluate specific networks and how they may serve the Interim Secretariat and the Conference of the Parties.

45. Some delegations requested the Chairperson to introduce the following items for consideration by the Subcommittee:

(a) The scientific basis for eligibility criteria to be used by the financial mechanism;

(b) The scientific basis for the development of national reporting requirements;

(c) The scientific basis for the development of guidelines for establishment of the Subsidiary Body for Scientific, Technical and Technological Advice.

After some discussion, it was decided that the Subcommittee should not discuss these items since consensus could not be reached on their appropriateness under the terms of reference of the Meeting.

46. The Subcommittee adopted its report at its 7th meeting, on 15 April 1994, on the basis of the draft report circulated as document UNEP/CBD/IGSc/1/SC.I/L.1 and Add. 1.

C. Identification of innovative, efficient and state-of-the-art technologies and know-how relating to the conservation and sustainable use of biological diversity and the ways and means of promoting development and/or transferring such technologies

47. In accordance with the terms of reference given it by the Meeting at the 1st plenary session, Subcommittee II held 8 meetings from 11 to 15 April to consider agenda item 3 (c). Its deliberations were presided over by Mr. J. H. Seyani (Malawi), a Vice-Chairperson of the Meeting.

48. At its 1st meeting, on 11 April 1994, the Subcommittee agreed to discuss the following sub-items, as outlined in the annotations to the provisional agenda (UNEP/CBD/IGSc/1/1/Add.1, para. 12):

(a) Technologies and know-how relevant to the identification, characterization and monitoring of ecosystems (including agro-ecosystems); species (including cultivated and domesticated species), and genetic resources (including agricultural genetic resources);

(b) Technologies and know-how for the in situ and ex situ conservation of components of biological diversity;

(c) Development of methods to measure sustainability;

(d) Ways to integrate, in modern management practices, knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles;

(e) Scientific and technical programmes for training in conservation of biological diversity and sustainable use of its components;

(f) Data collection, management and transfer.

49. The Subcommittee also agreed to discuss the following sub-item (g) in order to accommodate the amendment introduced to item 3 (c) of the provisional agenda when the agenda was adopted in plenary:

(g) Ways and means of promoting development and/or transfer of innovative, efficient and state-of-the-art technologies.

50. At its 1st meeting, the Subcommittee agreed to start its deliberations with sub-item (a).

51. Before the Subcommittee addressed the issue of a list of technologies, there was a discussion on the extent to which, when providing assessments for policy makers, there was a need to distinguish between methods to evaluate natural ecosystems and those to evaluate systems more strongly affected by human influence. The extent to which there was a need to develop sampling criteria and indices on species diversity was also discussed. One expert described a system used in his country for evaluating ecosystems based on their regulatory, production, carrier and information functions.

52. The view was expressed that some species could provide efficient indicators of biological diversity, and that their distribution provided important information for decision-making on ecosystem management.

53. It was stressed that technologies should be appropriate within the country concerned and that old and proven techniques often could be as appropriate as more modern technologies, in developed as well as in developing countries. It was further stated that advanced and traditional technologies should be given equal weight in the Subcommittee's discussions. The possibility of matching traditional with more advanced technologies into cost- and time-efficient systems for biological-diversity identification and exploitation was stressed, drawing on the example of the use of parataxonomists.

54. The Subcommittee then turned its attention to the list of technologies identified in the note by the UNEP secretariat entitled "Description of transferable technologies relevant to conservation of biological diversity and its sustainable use" (UNEP/Bio.Div/WG.2/3/10 of 9 May 1991), prepared during the negotiations for the Convention on Biological Diversity.

55. It was perceived that a new, well-focused list would be useful for the purpose of the Convention. Several deficiencies were recognized in the UNEP list, in particular the lack of methods related to and derived from traditional knowledge regarding biological diversity, as well as modern communication technologies, such as information and data-exchange technologies, including electronic-mail networks. It was also suggested that economic evaluation methods and other relevant methods from the social sciences, including education and training, be added to the list, as well as sensor technologies and habitat classification techniques. The need to identify or develop monitoring technologies that could be used by rural communities was also stressed.

56. The Subcommittee decided to set up an open-ended subgroup to examine in more detail the list presented in document UNEP/Bio.Div/WG.2/3/10. A draft list was prepared by the subgroup and considered by the Subcommittee. Suggestions for improvement in the classification of technologies, as well as additional technologies that could be considered, were discussed. The suggestions were accepted, and the Subcommittee adopted the amended list (see annex II to the present report).

57. The Subcommittee then proceeded to consider sub-item (b) in paragraph 48 above, "Technologies and know-how for the in situ and ex situ conservation of components of biological diversity".

58. The Subcommittee decided to establish an open-ended subgroup for in situ conservation technologies that would partly draw on the list of technologies elaborated under sub-item (a). The subgroup presented to the Subcommittee a list of technologies it considered appropriate in the context. Amendments and suggestions were added to the list and the Subcommittee adopted the list (see annex III to the present report).

59. The Subcommittee then took up the question of ex situ conservation technologies. Another open-ended subgroup was established to address the issue and to prepare a draft list of technologies for the Subcommittee's consideration. The subgroup presented its work to the Subcommittee which, after introducing some amendments, adopted the list (see annex IV to the present report).

60. The Subcommittee then decided to address the issue of technologies for the sustainable use of biological diversity. For that purpose, another open-ended subgroup was set up. It was also decided that the subgroup should also address sub-item (c) in paragraph 48 above, "Development of methods to measure sustainability". The subgroup prepared a list, which it presented to the Subcommittee for discussion.

61. At its 4th and 5th meetings, on 13 April, the Subcommittee reviewed the draft outline of recommendations of the open-ended subgroup on technologies for sustainable use of biological diversity and its components, including methods to measure sustainability. Amendments, including additional technologies, were proposed and the Subcommittee adopted the list (see annex V to the present report).

62. The Subcommittee then turned to sub-item (g) in paragraph 49 above, "Ways and means of promoting development and/or transferring innovative, efficient and state-of-the-art technologies relevant to the conservation and sustainable use of biological diversity". It was decided to establish an open-ended subgroup to look into the issue.

63. It was also decided to establish another open-ended subgroup to address sub-item (d) in paragraph 48 above, "Ways to integrate, in modern management practices, knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles", to work in parallel to the subgroup discussing sub-item (g).

64. The Subcommittee then reviewed and adopted, after introducing appropriate amendments, the recommendations of the open-ended subgroup on ways and means of promoting development and/or transferring innovative, efficient and state-of-the art technologies relevant to the conservation and sustainable use of biological diversity (see annex VI to the present report).

65. The Subcommittee then heard an oral presentation on the discussions in the open-ended subgroup addressing sub-item (d). The Chairperson of the Subcommittee asked the subgroup to prepare a written draft of its work for consideration by the Subcommittee.

66. In order to make rapid progress, the Subcommittee then decided to set up two parallel open-ended subgroups to prepare recommendations on the remaining sub-items in paragraph 48 above: (e), "Scientific and technical programmes for training in conservation of biological diversity and sustainable use of its components", and (f), "Data collection, management and transfer".

67. After allowing the two open-ended subgroups sufficient time to discuss the issues allocated to them, the Subcommittee heard oral presentations on their discussions. Following the presentations, the Chairman of the Subcommittee asked the subgroups to prepare written drafts of their work for consideration by the Subcommittee.

68. The Subcommittee started its 6th meeting, on 14 April 1994, by reviewing the draft report of the deliberations at its 2nd and 3rd meetings (document UNEP/CBD/IGSc/1/SC.II/L.1/Add.2).

69. The Subcommittee then reviewed the draft report of the deliberations at its 4th and 5th meetings (document UNEP/CBD/IGSc/1/SC.II/L.1/Add.3).

70. Thereafter, the Subcommittee turned to the draft paper prepared by the open-ended subgroup established to address sub-item (d), "Ways to integrate, in modern management practices, knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles". After introducing some amendments the Subcommittee adopted the paper (see annex VII to the present report).

71. The Subcommittee then considered the draft list prepared by the open-ended subgroup working on sub-item (e), "Scientific and technical programmes for training in conservation of biological diversity and sustainable use of its components". The Subcommittee, after making a few comments, adopted the list (see annex VIII to the present report).

72. The Subcommittee then turned to the draft list prepared by the open-ended subgroup set up to consider sub-item (f), "Data collection, management and transfer". The Subcommittee heard a number of comments from the experts, after which it adopted the list (see annex IX to the present report).

73. The Subcommittee adopted its report at its 8th meeting, on 15 April 1994, on the basis of its draft report and the annexes thereto contained in document UNEP/CBD/IGSc/1/Sc.II/L.1 and Corr.1 and Add.1-4 and UNEP/CBD/IGSc/1/Sc.II/L.2 and Corr. 1 and Add. 1 and 2.

IV. ADOPTION OF THE REPORT

74. The Meeting adopted the present report, including the reports of the Subcommittees as reflected in chapter III above, at its 2nd plenary session on Friday, 15 April 1994, on the basis of its draft report (UNEP/CBD/IGSc/1/L.1 and Corr. 1 and Add. 1 and 2) and the final parts of the reports of the Subcommittees as presented orally by the Chairpersons of the respective Subcommittees.

V. CLOSURE OF THE MEETING

75. After the customary exchange of courtesies, the Chairperson of the Meeting declared the Meeting closed at 2 p.m. on Friday, 15 April 1994.

Annex I

LIST OF DOCUMENTS FOR THE OPEN-ENDED INTERGOVERNMENTAL MEETING OF SCIENTIFIC EXPERTS ON BIOLOGICAL DIVERSITY

Documents prepared for the Meeting

UNEP/CBD/IGSc/1/1	Provisional agenda
UNEP/CBD/IGSc/1/1/Add.1	Annotations to the provisional agenda
UNEP/CBD/IGSc/1/2	Terms of reference for the Meeting. Note by the Interim Secretariat
UNEP/CBD/IGSc/1/3	Questions suggested by the Bureau of the Intergovernmental Committee on the Convention on Biological Diversity. Note by the Interim Secretariat

Other documents available at the Meeting

UNEP/Bio.Div/Panels/Inf.1	Report of Panel I of the expert panels established by UNEP for follow-up to the Convention: "Priorities for action for conservation and sustainable use of biological diversity and agenda for scientific and technological research"
UNEP/Bio.Div/Guidelines/CS/Rev.2	Guidelines for country studies on biological diversity
UNEP/Bio.Div/WG.2/3/10	Description of transferable technologies relevant to conservation of biological diversity and its sustainable use
UNEP/Bio.Div/WG.2/3/5	A note clarifying a clearing-house mechanism on transfer of technology and technical cooperation
No symbol	Chapters 14, 15 and 16 of Agenda 21

Annex II

INDICATIVE LIST OF TECHNOLOGIES AND KNOW-HOW RELEVANT TO THE IDENTIFICATION, CHARACTERIZATION AND MONITORING OF ECOSYSTEMS, SPECIES AND GENETIC RESOURCES

I. Classification technologies for terrestrial, marine and other aquatic ecosystems

(a) Biogeography (including climate)

(b) Natural ecosystems identification

(c) Agro- and aquaculture ecosystem identification

(d) Landscape and habitat classification (all scales)

(e) Traditional knowledge about local ecosystems

II. Ecosystem evaluation technologies

(a) Ecosystem function and carrying capacity measurement and modelling (scale, from molecular to ecosystem level)

(b) Technology to monitor micro-organisms including unculturable microbes, and to assess their eco-functions

(c) Assess ecosystem socio-economic values

(d) Assess stability, sustainability and sensitivity of ecosystems

(e) Monitor and model effects of non-indigenous organisms

(f) Identify indicators (species and conditions)

(g) Traditional knowledge about ecosystem function

(h) Physical components, including geology, soil, hydrology, etc.

(i) Geographic information systems

III. Biogeographical mapping technologies

(a) Habitat, vegetation and gene-variation mapping

(b) Regional mapping technologies

(c) Remote sensing for spatial heterogeneity and complexity (new tools)

(d) Geographic information systems

(e) Aerial survey, patrol and photography

(f) Traditional knowledge of territories and habitats

IV. Isolation, characterization and classification technologies (for terrestrial, marine and other aquatic organisms; for plants, animals, microbes and genes; and for indigenous and non-indigenous organisms)

(a) Traditional and advanced taxonomies

(b) Uses, both traditional and current

(c) Biotechnology and other advanced technologies (see below)

V. Technologies to determine species and genetic resource status

(a) Habitat status and carrying capacity

(b) Life history

(c) Abundance, distribution and range

(d) Population dynamics and species characterization

(e) Traditional knowledge of all of the above and of population norms over time

(f) Biotechnology and other advanced technologies (see below)

VI. Key enabling technologies

(a) Advanced electronic technologies for information and data management, acquisition, storage, analysis, transmission and communication (computer networks and hard media type of transmission)

(b) Advanced chemical, biochemical and molecular technologies

(c) Information linkage to decision makers

(d) Traditional techniques for communication and information transmittal

(e) Risk assessment technologies

Annex III

INDICATIVE LIST OF TECHNOLOGIES APPROPRIATE FOR THE IN SITU CONSERVATION OF COMPONENTS OF BIOLOGICAL DIVERSITY

Technologies and know-how relevant to the identification, characterization and monitoring of ecosystems, species and genetic resources are also considered to be basic technologies for conservation of components of biological diversity.

The additional appropriate technologies are regrouped under two major categories:

I. Management

(a) Control technologies for situational pests (including fencing and policing technologies, pest management technologies, biological control methods, etc.)

(b) Environmental stewardship technologies:

(i) Environmental health (including clean technologies)

(ii) Soil and water conservation and management (including watershed stabilization and soil erosion control)

(c) Law enforcement technologies (including control of illegal use of biological diversity components, such as poaching)

(d) Management technologies for ecosystems, both natural and man-made, including:

(i) Agro-ecosystems

(ii) Forest ecosystems

(iii) Marine and other aquatic ecosystems

and the integrated management thereof

(e) Management planning technologies (including consultation and participation of interest groups)

(f) Pollution prevention and abatement technologies
Note: applies to in situ and ex situ

(g) Species and site-specific management technologies (including techniques to assess the viability of habitats and small populations of species)

(h) Traditional knowledge and technologies for in situ conservation

(i) Ecosystem restoration and rehabilitation technologies

(j) Environmental impact assessment technologies

(k) Techniques for the conservation of species and ecosystems, including those at risk

(l) Techniques for monitoring in situ conservation practices

(m) Value assessment technologies

(n) Technologies which enable the strengthening of the in situ conservation of human biological diversity, recognizing that ex situ conservation of human genetic material may give rise to deep ethical concerns in some cultures

II. Education and awareness technologies to improve conservation

Annex IV

INDICATIVE LIST OF TECHNOLOGIES AND KNOW-HOW FOR THE EX SITU CONSERVATION OF COMPONENTS OF BIOLOGICAL DIVERSITY*

(Animals, plants, micro-organisms and subcellular elements)

I. Information technologies

(a) Data collection, analysis, storage, management, and dissemination (including networking)

(b) Specimen (reference) collections

II. Technologies for collections of living organisms

(a) Management

(i) Zoos and breeding in captivity

(ii) Botanical gardens, etc.

(iii) Collections of micro-organisms

(iv) Plant seeds and vegetative parts

(b) Propagation/subculturing technologies

(i) Genetic monitoring in breeding and propagation

(ii) In vitro insemination

(c) Germplasm preservation/storage techniques

(i) Cryogeny and low temperatures

(ii) Lyophilization, etc.

(d) Reintroduction technologies

(e) Translocation technologies

(f) Quality control and genetic integrity: gene pool sampling, authentification and validation

(g) Conservation at the subcellular level

(i) Gene storage

(ii) DNA banks

III. Management of small populations in non-confined environments

IV. Technologies for control of the effects of introduced organisms, including genetically modified ones, on native biological diversity

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* Technologies and know-how relevant to identification, characterization and monitoring of ecosystems and for in situ conservation are also considered to be basic for ex situ conservation.

V. Biosafety/protection technologies

(a) Quarantine

(b) Health safety

VI. Technologies for control of illegal trade

(a) National

(b) International

VII. Enabling technologies

(a) Information technologies

(b) Molecular technologies

(c) Genetic diversity technologies

(d) Bioprocessing using non-native biological diversity

Annex V

INDICATIVE LIST OF TECHNOLOGIES FOR SUSTAINABLE USE OF BIOLOGICAL DIVERSITY AND ITS COMPONENTS

The following technologies for sustainable use of biological diversity and its components are aimed at ensuring conservation for future generations while permitting the present generation to benefit from the use of biological diversity and its components.

I. Technologies for sustainable use of biological diversity in its entirety

Activities		Example technologies
(a)	Ecosystem services	- carbon sequestering techniques
		- protected areas management techniques
		- watershed management techniques
(b)	Spiritual and cultural uses	- techniques reinforcing spiritual rituals and sustainable cultural uses
(c)	Ecotourism	- environmental impact assessment techniques

II. Technologies for sustainable use of the components of biological diversity

Innovative, efficient and state-of-the-art technologies, including biotechnologies, for:

(a) Production compatible with sustainable use of the components of biological diversity, including clean "cradle-to-grave" production

(b) Development of new products based on sustainably managed components of biological diversity

(c) Marketing of such products

1. Economic sectors

Activities		Example technologies
(a)	Agriculture	- sustainable agricultural systems techniques
		- permaculture techniques
(b)	Forestry	- analogue forestry techniques
		- sustained yield forest techniques
		- small-scale harvesting techniques
(c)	Fisheries, including aquaculture and mariculture	- responsible fishing techniques
		- stock evaluation techniques

(d)	Energy	- new and renewable sources of energy techniques
		- energy efficiency techniques
(e)	Manufacturing	- pharmaceutical production techniques using biological resources
		- traditional medicine production techniques
		- production techniques based on substitutes for components of biological diversity
		- techniques for development and production of such substitutes
		- techniques for other industrial uses of biological resources, including food, industry, textile industry and building material production
(f)	Tourism	- environmentally sound and sustainable tourism techniques
(g)	Rural economy based on natural biological resources	
-	fisheries	
-	wildlife and natural forest management	- breeding techniques
-	wildlife farming	
-	wildlife ranching	
-	wildcrafting	
-	handicraft	

2. Cross-sectoral activities

Activities	Example technologies
(a) Integrated land use	
- agroforestry	
- integrated coastal zone management	
- mangrove management	
- arid zone management	

- rangeland management
- tundra management techniques
- permafrost management
- wetlands management
- watershed management
- buffer zone management
- corridor management
- mountain area management

(b) Natural resource management with the use of indigenous knowledge and technologies

(c) Rehabilitation of degraded areas and soil remediation*

3. Activities to maintain the balance between human demand for natural resources and the world's natural resource base

	Activities	Example technologies
(a)	Less wasteful lifestyles consumption and production patterns	- techniques to influence people to develop less wasteful lifestyles and consumption patterns - low- and non-waste technologies
(b)	Human demographic dynamics	- health care technologies - family planning techniques

III. Tools for promotion and implementation of sustainable use of biological diversity and its components

(a) Methodologies for evaluation of biological diversity, including non-economic values such as existence, religious, ethical and cultural values

(b) Education, training and awareness raising activities

(c) Mediation and facilitation technologies

(d) Information dissemination technologies

(e) Economic and financial instruments

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* Not to be used as an excuse for unsustainable management of biological diversity and its components. Badly degraded areas might not readily be rehabilitated.

(f) Regulatory instruments and monitoring of compliance with regulations in force, including trade regulation of components of biological diversity

(g) High performance prospecting of biological resources, including taxonomic identification, natural history, and characterization technologies including chemical, molecular, genetic fingerprinting and computer technologies as well as technologies for the integration of traditional and indigenous use characteristics, extraction and biological tests

(h) Scientific certification systems

(i) Diagnostic technologies

(j) Adaptive management technologies

(k) Management of harvests that are likely to be sustainable

(l) Integrated promotion of conservation and sustainable use of biological diversity and its components

IV. Measurement of sustainability

1. Mathematical analysis techniques, e.g.

(a) Composite indices

(b) Statistical evaluation

(c) Sustained yield estimation

(d) Population dynamics modelling

(e) Input-output analysis

2. Monitoring and sampling techniques

(a) Indicator species

(b) Indicators of the state of the environment

(c) Yield analysis techniques

(d) Geographic information systems - GIS

3. Assessment techniques, e.g.

(a) Biological

(b) Economic

(c) Social welfare

Annex VI

INDICATIVE LIST OF WAYS AND MEANS OF PROMOTING DEVELOPMENT AND/OR TRANSFERRING OF INNOVATIVE, EFFICIENT AND STATE-OF-THE-ART TECHNOLOGIES RELEVANT TO THE CONSERVATION AND SUSTAINABLE USE OF BIOLOGICAL DIVERSITY

I. Infrastructure and capacity-building

(a) Technology transfer has to be a process of simultaneous human resources development, including training and the provision of continued support.

(b) Institutional build-up and strengthening and financial resources are necessary for an efficient transfer of technology.

(c) Standardization/coordination of existing international programmes.

(d) Provision of incentives for keeping trained scientists in their home countries.

II. Information

(a) There has been a felt need for the establishment of information services to facilitate the identification and transfer of useful technologies.

(b) There is a need for the development of a decentralized information exchange system on technologies relevant to the Convention, through international networks including electronic transfer of data.

III. Technology development

(a) Both traditional and modern technologies are necessary to implement the Convention on Biological Diversity.

(b) There is a need to foster cooperation for the development of new and appropriate technologies at a local level.

(c) Identification of appropriate technologies.

IV. Technology exchange

(a) It is necessary to define technological needs at different levels: communities, NGOs, private sector research institutions, Governments and geographical areas. If unsolicited, participants of technologies exchange should undertake a critical evaluation process.

(b) There is a need to build-up facilitating mechanisms for technology exchange, through commercial and non-commercial channels and on a fair and equitable basis.

(c) It is necessary to establish mechanisms to follow-up the appropriate usage of technology.

(d) Transfer of technologies should be beneficial to all parties involved.

(e) Identification of technologies that could be transferred or which are needed.

(f) Creation of a system for exchange of personnel.

Annex VII

WAYS TO INTEGRATE, IN MODERN MANAGEMENT PRACTICES, KNOWLEDGE, INNOVATIONS AND PRACTICES OF INDIGENOUS AND LOCAL COMMUNITIES EMBODYING TRADITIONAL LIFESTYLES

1. As scientists, we recognize that this is not a purely scientific issue but, at the same time, that the involvement of scientists is critical.

2. The question itself has to be rephrased. The challenge is not to find the ways to integrate, in modern management practices, knowledge, innovations and practices of indigenous and local communities. Rather, it is to define, in collaboration with indigenous and local communities, which modern tools may be of help to them, and how these tools might be used, to strengthen and develop their own strategy for conservation and sustainable use of biological diversity, fully respecting their intellectual and cultural integrity and their own vision of development.

3. In order to address such a complex issue, we must have at our disposal a critical review of success stories and failures, an analysis of the scientific components, and an overall theoretical framework. There is also a need to recognize the value of traditional knowledge, and subsequently develop a mechanism for appropriate protection and compensation for such knowledge. This can be achieved through:

(a) Compilation of available information, with the support of a group of specialists;

(b) Organization of workshop(s);

(c) Elaboration of recommendations to develop an inter-cultural strategy for conservation and sustainable use of biological diversity.

4. This whole process has to integrate specialists with a background in anthropology, ethnobiology and law, scientists having worked in the field and representatives of indigenous and local communities.

5. This should be done with the collaboration of a range of grass-roots, local, regional, national and international agencies and NGOs active in this field.

Annex VIII

INDICATIVE LIST OF SCIENTIFIC AND TECHNICAL PROGRAMMES FOR TRAINING IN CONSERVATION OF BIOLOGICAL DIVERSITY AND SUSTAINABLE USE OF ITS COMPONENTS (AT REGIONAL, NATIONAL, AND LOCAL LEVELS)

I. Training components

(a) Data collection and management, identification, surveying, and information systems

(b) Analytical know-how, assessment, evaluation, and modelling

(c) Management in in situ and ex situ conservation

(i) Sectoral and cross-sectoral activities

(ii) Integrated activities

(d) Technological development

(e) Market technologies

II. Scope of training

(a) Formal

(i) Standard training (primary to university) on basic disciplines, especially taxonomy, at different levels (incorporating traditional knowledge, language needs and computer basics)

(ii) Traditional culture knowledge transmittal

(iii) More specialized subjects

a. Project management

b. Environmental impact assessment

c. Monitoring

d. Information systems (computer networks and databases)

e. Key enabling technologies

f. Integrated management of ecosystems

g. Education aimed at policy makers and the media

h. Nature conservation research

i. Natural and biological resources economics (value assessment)

(b) Informal

(i) On-the-job training

(ii) Workshops

(iii) Field/pilot project training in in situ and ex situ conservation

(iv) Guidance for different target groups:

a. Government agencies/sectoral

b. Universities/scientists

c. Private sector

d. NGOs/community/grass-roots organizations level

e. Parataxonomists

Annex IX

DATA COLLECTION, MANAGEMENT, AND TRANSFER

I. Data collection technologies

It is fundamentally important to address quality assurance. The ways in which data can be acquired for the conservation of biological diversity and sustainable utilization include:

(a) Global positioning systems (GPS);

(b) Remote sensing;

(c) Field work;

(d) Expert networks;

(e) Archival retrieval, e.g., scanning, optical readers, card catalogues;

(f) Radio telemetry;

(g) Ethnobiological techniques;

(h) Multi-media.

II. Management

It should be recognized that data collected in the systems described previously are dynamic and this characteristic needs to be recognized and incorporated into management planning.

(a) Standardization schemes for sampling techniques

(b) Relational databases

(c) Geographic information systems (GIS) (including software development for the translation of descriptive locality data to georeferenced systems)

(d) Electronic/manual information systems, e.g., standardization schemes for sampling techniques

(e) Traditional information management systems

(f) Networks and distributed databases

(g) Database design techniques

(h) Interfacing software

(i) Preparation of training materials

(j) Statistical techniques

(k) Bibliographic databases

(l) Quality assurance

III. Transfer

(a) Networking

(b) Electronic security

(c) Print/publication

(d) Audio-visual

(e) Traditional transmittal techniques, e.g., puppetry, songs, dance, plays

(f) Public education systems

(g) Collaborative work

(h) Sharing of specimens/information repatriation

(i) Translation

(j) Exchange of personnel

Annex X

AGENDA FOR SCIENTIFIC AND TECHNOLOGICAL RESEARCH

Preamble

In preparing an agenda for scientific and technological research on the conservation of biological diversity and the sustainable use of its components, the Intergovernmental Committee on the Convention on Biological Diversity (ICCBD) may wish to consider the programme areas listed below. Many of them are clearly of an interdisciplinary nature. In carrying out research within these programme areas, consideration should be given to cross-sectoral issues such as: trade, intellectual property rights, transitional corporations, the equitable sharing of its benefits, local community participation in resource management, culture, lifestyle, gender, and education. The Open-ended Intergovernmental Meeting of Scientific Experts on Biological Diversity is aware that the present document is one step in a continuing process, and fully expects further development of the agenda for scientific and technological research.

1. Identification, inventory and documentation of status and distribution of biological diversity (Article 7 (a) and (d))

1.1 *Objective*

Survey and inventory components of biological diversity, in particular, those referred to in annex I of the Convention.

1.2 *Examples of facilitating research activities*

1.2.1 *Identification*

(a) Determine baseline data requirements including the establishment of minimum acceptable levels of information for inventories;

(b) Undertake taxonomic, biosystematic and genetic diversity research to facilitate identification;

(c) Characterize biological diversity, including its source of origin.

1.2.2 *Measuring and assessing biological diversity*

(a) Develop methods to locate and assess the components of biological diversity, including those based on:

(i) Ecosystems, species,genetic resources and/or abiotic factors indicating levels of biological diversity and ecological processes at each level;

(ii) Remote sensing and geographic information systems (GIS) with statistical/analytical capabilities;

(iii) Rapid ecosystem/habitat, species and genetic resources diversity assessment techniques including particularly molecular biology techniques;

(iv) Analysis of genetic diversity;

(b) Develop and define criteria regarding indicator species and/or other indicators;

(c) Develop methods to assess conservation status;

(d) Carry out total inventories of all components within selected sites;

(e) Assess the status and condition of global ecosystems.

1.2.3 *Information management*

(a) Develop databases, including:

(i) Integration of quantitative and qualitative data (including status, distribution, importance, values, uses, etc.);

(ii) Standards to record and manage data;

(iii) Protocols for data exchange;

(b) Establish and/or coordinate national or regional biological diversity in *in situ* and *ex situ* collections, information centres and networks;

(c) Strengthen, where appropriate, local and national institutional capacities;

(d) Strengthen taxonomic capability at national, regional and international levels;

(e) Develop research and/or international cooperation to compare and determine the inter-relatedness of the various nomenclatures and classification criteria for ecosystems.

2. *Monitoring and evaluation of changes in biological diversity caused by natural fluctuations and/or human impacts (Article 7 (b) and (c))*

2.1 *Objectives*

(a) Document changes to biological diversity, giving priority to components identified in Annex I of the Convention and threatening processes and activities including, *inter alia*:

(i) Establishment of baseline data and determination of natural and human impact patterns of change including habitat and genetic diversity erosion;

(ii) Development of selected time series to identify changes and anticipate erosion;

(b) Determine the causes and implications of changes particularly for the sustainable use of biological resources.

2.2 *Examples of facilitating research activities*

2.2.1 *Monitoring systems*

(a) Establish/strengthen bodies responsible for monitoring the status and the changes in biological diversity and ensure coordination and cooperation among such bodies;

(b) Establish a network of reference sites in representative species, habitats and ecosystems, including agro-ecosystems;

(c) Research on ecological processes affecting conservation and sustainable use of biological diversity;

(d) Monitor the effects of ecological processes (e.g., species interaction) on productivity;

(e) Include biogeochemical, biophysical, and climatic processes in field surveys and experimental plots.

2.2.2 *Methods development*

(a) Establish priorities for field monitoring at genetic, species and ecosystem levels;

(b) Develop standard, cost-effective methods for monitoring and environmental impact assessment, including:

(i) Methods for monitoring genetic erosion, population and species extinction, and loss of ecological complexity;

(ii) Remote sensing, GIS, particularly for assessing rapid changes;

(iii) Methods involving indicator species or other indicators that may be used as measures of biological diversity and/or environmental stress resulting from natural or human causes;

(iv) Indicators to distinguish between natural and human processes that have adverse impacts on biological diversity;

(v) Automated systems for image identification and their adaptation to developing countries conditions;

(vi) Appropriate statistical tests for analyzing monitoring data;

(c) Apply existing technologies and programmes, including knowledge in local communities and among indigenous peoples;

(d) Link biological-diversity monitoring systems with other monitoring systems.

3. ***Role of biological diversity in maintaining ecosystem structures and functions (Article 8 (a)-(f))***

3.1 *Objectives*

(a) Identify the role of components of biological diversity for ecosystem stability and resilience;

(b) Determine the role of biological diversity in ecosystem functions, such as gene, energy and water flows, biochemical cycling and soil structure and fertility, and evaluate the consequences of loss of biological diversity on these functions;

(c) Determine the sustainability of human-modified habitats or ecosystems.

3.2 Examples of facilitating research activities

(a) Define and identify keystone species and their particular role in ecosystems;

(b) Develop ways to determine the economic value of the components of biological diversity;

(c) Find methods for understanding natural versus human-induced fluctuations and changes in ecosystems.

4. Threats to and adverse impacts on biological diversity (Articles 7 (c), 8 (g), (h) and (l), and 14)

4.1 Objectives

(a) Identify major adverse effects on biological-diversity components, specifically on different ecosystems (marine, freshwater and terrestrial etc.), caused e.g., by habitat alteration, pollution, climate change, effects of alien species and unsustainable exploitation of biological resources;

(b) Identify methods for mitigating adverse effects.

4.2 Examples of facilitating research activities.

(a) Develop methods and procedures for biological-diversity impact assessment;

(b) Develop criteria for determining processes that are likely to have impacts on biological diversity;

(c) Analyze the effects of habitat fragmentation and determine the origin of the impact;

(d) Analyze the effects of clearcutting on biological diversity in forests;

(e) Analyze the impact of various forms of tourism, particularly in protected areas;

(f) Develop criteria for categories of activities, e.g. clearcutting, which are likely to have impacts on biological diversity (particularly undesirable impacts) and examine their impacts;

(g) Develop methods (e.g. predictive models) for predicting the impacts of potential threats;

(h) Analyze economic incentives/disincentives for the conservation of biological diversity and the sustainable use of its components, and compensation mechanisms for loss of biological diversity due to development pressures;

(i) Develop ways to include loss of biological diversity in national economic systems.

5. Conservation and restoration of biological diversity (Articles 8 (a)-(f) and (k)-(l), 9, and 10(d))

5.1 *Objective*

Develop the basic scientific foundation and appropriate methods for conservation and restoration of biological diversity.

5.2 *Examples of facilitating research activities*

(a) Develop methods for the conservation and sustainable use of biological diversity (e.g., sustainable agriculture), particularly in rural areas adjacent to protected areas;

(b) Develop methods for increasing awareness of the values of biological diversity and its components, including, inter alia, rare and endemic species contained within buffer zones inside and outside of protected areas;

(c) Analyze possible integration of biological, social, cultural, ethnic, religious, economic and ethical dimensions of conservation of biological diversity;

(d) Improve methods of selection, design and management of protected areas, including buffer zones and corridors;

(e) Develop methods to determine minimum viable and ecologically operational populations, and minimum amounts of genetic variation for the conservation of populations and species;

(f) Analyze the role of water and its effects on soil biological diversity on a subregional basis;

(g) Describe processes which give rise to and maintain components of biological diversity;

(h) Understand appropriateness of and develop means to increase biological diversity in agricultural and farming systems at the landscape and field levels;

(i) Improve methods for conserving components of biological diversity in *ex situ* conservation facilities and improve systems for cooperation among such institutions;

(j) Develop methods for integration *ex situ* and *in situ* conservation;

(k) Develop the scientific basis of restoration ecology;

(l) Evaluate effectiveness of current approaches to conservation and restoration, including traditional methods;

(m) Apply appropriate traditional technology in conservation and restoration;

(n) Develop methods for conservation and restoration of coastal and estuarine areas (e.g., mangroves);

(o) Develop methods for restoration of ecosystems, including, inter alia, methods for recovery and re-introduction of species;

(p) Develop methods for bioregional management;

(q) Develop different models to facilitate understanding and implementation of conservation and restoration programmes.

6. Development of criteria and methods for sustainable use of components of biological diversity (Articles 8 (c), 8 (i) and 10)

6.1 *Objective*

Establish criteria and methods for sustainable use of biological resources.

6.2 ***Examples of facilitating research activities***

(a) Identify biological resources being exploited (drawing on work being carried out under programme area 1) and the full range of uses and values of those resources;

(b) Analyze the cultural, educational, recreational, spiritual and other uses, socio-cultural dimension and market values of components of biological diversity;

(c) Develop economic methods to value biological diversity and its components in relation to rural communities, and components traded outside conventional market systems, considering and reflecting local conditions;

(d) Quantify and characterize the current and potential demand for biological resources;

(e) Identify major users of biological resources;

(f) Develop methods for assessing the resource base in major life sectors (e.g., agriculture, forestry, fisheries, etc.) and environmental factors relevant to enhancing its management;

(g) Determine the sustainability of ecosystems/landscapes containing agricultural habitats, or linking agricultural habitats to surrounding areas;

(h) Determine the needs of users to sustainably manage biological resources;

(i) Analyze the constraints on sustainable use of components of biological diversity caused by policy, legislation, economy, and social factors;

(j) Assess the rate of consumption of biological resources;

(k) Develop methods to distinguish natural fluctuations from the effects of use/harvesting;

(l) Determine genetic, population and ecosystem effects of selective harvesting;

(m) Determine capacities for harvesting and commercial trade;

(n) Develop improved uses of biological resources involving (refer also to programme areas 7 and 8):

(i) Greater efficiency and less waste;

(ii) Optimum circulation of nutrients and energy;

(iii) Non-destructive uses;

(iv) Biotechnological methods;

(v) Consultations with indigenous peoples;

(vi) Fair and equitable sharing of the benefits arising out of the utilization of genetic resources;

(o) Strengthen research on the sustainable use of micro-organisms;

(p) Develop inter-disciplinary approaches to integrate ecology and other sciences, as well as traditional knowledge;

(q) Develop bio-regional methods for the sustainable management of national and transboundary biological resources on an integrated ecosystem basis;

(r) Develop standard methodologies for inter-site comparisons.

7. Screening of biological resources for potential use (Articles 5, 7 (a) and 10 (e))

7.1 ***Objective***

Screen and apply biological resources to a broad range of uses.

7.2 ***Examples of facilitating research activities***

(a) Define clearly national needs for biological resources and relevant institutions that can screen and apply biological resources to various uses;

(b) Establish or strengthen institutions for screening and application of biological resources to a broad range of uses;

(c) Develop effective methods for building national capacity for commercial screening purposes and identifying alternatives to biological diversity uses through market surveys;

(d) Develop a list of appropriate technologies for screening biological resources with respect to *ex situ* conservation;

(e) Develop effective methods for evaluating chemical, photochemical and physiological properties of biological materials;

(f) Identify potential uses of species and chemical compounds;

(g) Develop research on traditional uses of components of biological diversity and on documenting traditional knowledge;

(h) Promote the use of ethnopharmaceutical products through *ex situ* micro- and macro-propagation biotechnology;

(i) Establish and enhance incentives for biological diversity prospecting, while regulating collection of specimens, ensuring that the resource base is not depleted.

8. Studies on ethnobiology and adaption of traditional knowledge and skills (Articles 8 (j) and 10 (c))

8.1 ***Objectives***

(a) Identify traditional knowledge;

(b) Develop means to maintain traditional knowledge;

(c) Identify means to apply traditional knowledge to conservation of biological diversity and sustainable use of its components.

8.2 ***Examples of facilitating research activities***

(a) Improve methods for recording, compiling and maintaining traditional knowledge;

(b) Establish and strengthen ethnobiological databases;

(c) Develop methods to strengthen the capacity to validate, rehabilitate, integrate and transfer information about traditional knowledge and technologies on conservation and sustainable use of biological diversity components;

(d) Devise methods to appraise and make good use of traditional knowledge, while ensuring that the local communities where such knowledge originates benefit in the event of its being applied by other cultures;

(e) Develop systems to protect ownership by or compensation or rewards to local and indigenous peoples;

(f) Analyze legal mechanisms for the exchange of biological resources;

(g) Identify and maintain communities, cultures and areas of ethnobiological importance and the processes that threaten their continuity, cohesion and development;

(h) Identify causes of ethnobiological knowledge loss and identify remedial measures.

9. Research into the safe handling of living modified organisms (LMOs) resulting from biotechnology (Articles 8 (g), 19 (3) and (4))

9.1 ***Objectives***

(a) Identify elements of LMOs representing potential threats to biological diversity;

(b) Mitigate potential adverse effects of LMOs on biological diversity and its components.

9.2 ***Examples of facilitating research activities***

(a) Assess the characteristics of LMOs to identify potential threats to biological diversity;

(b) Extrapolate, where appropriate, knowledge on alien-organism introduction to assist in identifying potential threats of LMOs to biological diversity;

(c) Develop methods for monitoring and assessing the spread and impact of LMOs and alien genes;

(d) Develop methods to minimize threats or undesirable impacts of LMOs, including modifying LMOs to ensure safety outside target areas of use;

(e) Develop and disseminate criteria and techniques for safe handling of LMOs, where necessary;

(f) Study possible components of the development of technical guidelines on biosafety.

10. Studies on potential threats and impacts of introduction or release of alien organisms on biological diversity (Article 8 (h))

10.1 ***Objectives***

(a) Identify alien organisms representing potential threats to biological-diversity;

(b) Understand, control, mitigate and prevent adverse effects of alien organisms on biological-diversity components.

10.2 ***Examples of facilitating research activities***

(a) Inventory the establishment and monitor the spread of alien organisms;

(b) Analyze the ecological and socio-economic impacts of alien organisms, both positive and negative impacts, including secondary effects;

(c) Determine gene-flow levels among introduced and native populations and their impacts;

(d) Analyze the effects of organisms introduced to enhance productivity;

(e) Identify ecosystems, including agro-ecosystems, that are most affected by introduced species;

(f) Analyze the vulnerability of islands and fragmented habitats to invasions;

(g) Develop environmentally sound methods of control and eradicate alien organisms, bearing in mind:

(i) That prevention is the most cost-effective method of control of alien organisms;

(ii) The importance of an ecosystem approach supported by legal and administrative measures;

(iii) The importance of developing policy regulations based on scientific information regarding introduction of alien species;

(iv) The importance of regional cooperation, since invasive organisms are not confined by political boundaries;

(h) Investigate the possible use of indigenous species and varieties to replace alien species in production (e.g., cultivated and domesticated) systems;

(i) Identify and analyze the characteristics of biological agents used in control practices and determine the global impacts of these agents;

(j) Establish guidelines on how to prevent undesirable releases and introductions;

(k) Establish and maintain an international database on invasive species, and on researchers and institutions involved in the field.

11. Incentives and disincentives (Article 11)

Identify disincentives and economically and socially sound incentives for consideration for conservation of biological diversity and the sustainable use of its components.

12. Integrated decision-making (Articles 6 (b) and 10 (a))

12.1 *Objective*

Biological-diversity conservation and sustainable use of biological resources must be integrated with economic, social and cultural goals.

12.2 *Examples of facilitating research activities*

(a) Identify and develop methods to consider ecological, economic, social and cultural values or goals in the formulation and implementation of major policies, plans, and programmes related to biological diversity;

(b) Identify and develop methods to allow all interested parties to plan biological-resource use in a given area over specified periods of time;

(c) Develop monitoring approaches and methodology to determine the impacts of decisions and provide the basis for any adjustments;

(d) Identify and develop processes for multi-stakeholder participation to develop and implement public policies and programmes related to biological diversity.
