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AD HOC TECHNICAL EXPERT GROUP ON MARINE AND COASTAL PROTECTED AREAS
Second meeting
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Item 3 of the provisional agenda*

REPORT OF THE THIRD REGIONAL WORKSHOP ON SUSTAINABLE USE OF BIOLOGICAL DIVERSITY, 18-21 FEBRUARY 2002 – SALINAS, ECUADOR

INTRODUCTION

A. Background

1. In paragraph 3 of decision V/24 adopted at its fifth meeting, the Conference of the Parties, *inter alia*:

> "Request[ed] the Executive Secretary to assemble (…) practical principles, operational guidelines and associated instruments, and guidance specific to sectors and biomes, which would assist Parties and Governments to develop ways to achieve the sustainable use of biological diversity, within the framework of the ecosystem approach …".

2. In response to that request, the Executive Secretary convened a series of three regional workshops on sustainable use of biological diversity, with financial support provided by the Government of the Netherlands. The first workshop was held in Maputo, Mozambique, from 24 to 27 September 2001. The second workshop was held in Hanoi, Vietnam, from 9 to 12 January 2002. The third workshop was held in Salinas, Ecuador, from 18 to 21 2002.

3. The purpose of the workshops is to develop practical principles, and operational guidelines for the sustainable use of biological diversity. The Maputo Workshop focused on key elements relating, in particular, to the sustainable use of dryland resources and wildlife utilization in Africa. The Hanoi workshop focused on forest biological diversity, including timber and non-wood forest products, with

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/…

reference to agricultural biological diversity. The Salinas Workshop focused on marine biological and freshwater fisheries.

B. Attendance

4. The meeting was attended by 31 government-nominated experts, representatives of organizations and indigenous groups and resource persons (see UNEP/CBD/WS-Sustainable Use/INF/1/Rev.1).

5. Experts from the following countries attended the workshop: Antigua and Barbuda, Argentina, Bolivia, Colombia, Cuba, Ecuador, Ghana, Guatemala, Jamaica, Mexico, The Netherlands, Panama, Peru, Russian Federation, Venezuela, Viet Nam.

6. The following intergovernmental and non-governmental organizations were also represented in the workshop: Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Food and Agriculture Organization of the United Nations (FAO), The World Conservation Union (IUCN) - and the World Wide Fund (WWF) for Nature.

ITEM 1. OPENING OF THE MEETING

7. The Workshop was opened by the representative of the Executive Secretary of the Convention on Biological Diversity at 9:30 a.m., on Monday 18 February 2002.

8. Introductory statements were made by a member of the Secretariat of the Convention on Biological Diversity and Mr. Hans Thiel, Vice-Minister, Ministry of the Environment of Ecuador, on behalf of the host government.

9. In his statement, the representative of the Secretariat of the Convention on Biological Diversity expressed his appreciation to the Government of Ecuador for hosting the meeting, to the Government of the Netherlands for its financial support and to the University of Wageningen for its scientific support to the Workshop. He reminded that participants had been selected on the basis of their extensive and diverse expertise on sustainable use of marine and freshwater biological diversity and stressed the importance of having such a meeting in a country rich in biological diversity, which offers an ideal setting for the work of the experts and the presentation of case studies. He emphasized that participants had a very challenging task: the development of guidelines which, once adopted, could provide practical guidance to Governments in the implementation of sustainable use programs.

10. In his statement, Mr. Hans Thiel welcomed participants to the meeting and to Ecuador. He discussed the challenges of the sustainable use of biological diversity and purpose of the meeting being to develop understanding of what sustainable use really means. This is often clear in the minds of scientists but more difficult for other levels of society to understand. To this end, a first step would be to arrive at a common agreement on the use of terms that apply to sustainable use issues. It would then be necessary to develop clear and simple criteria, principles and guidelines which would help decision makers to better manage these issues and implement relevant provisions.

ITEM 2. ORGANIZATIONAL MATTERS

2.1. Officers

11. At the opening session of the Workshop, on 18 February 2002, participants elected Mr. Hans Thiel, Vice-Minister, Ministry of the Environment of Ecuador, as chair of the meeting.

2.2. Adoption of the agenda

12. The Workshop adopted the following agenda on the basis of the provisional agenda proposed in document UNEP/CBD/WS-Sustainable Use/3/1/Rev.1:

1. Opening of the meeting.

2. Organizational matters

   2.1. Election of officers;

   2.2. Adoption of the agenda;

   2.3. Organization of work.

3. Introduction to the Convention on Biological Diversity, mandate of the three workshops and possible mandate of a final fourth meeting.

4. Feedback from the first and second regional workshops on sustainable use of biological diversity held in Maputo, Mozambique and Hanoi, Vietnam.

5. Consideration of practical ways for measuring components of biodiversity and their decline.

6. Presentation of case-studies from the region.

7. Consideration of the Maputo and Hanoi guiding principles on sustainable use of biological diversity, development of the Salinas guiding principles and development of operational guidelines, with focus on marine and freshwater fisheries.

8. Other matters.

9. Adoption of the report.

10. Closure of the meeting

2.3. Organization of work

13. At its opening plenary meeting, the Workshop decided to establish two working groups for the consideration of item 7, on the understanding that the results of their deliberations would be brought together in a final report to be agreed in plenary. Other agenda items were considered in plenary.

ITEM 3. INTRODUCTION TO THE CONVENTION ON BIOLOGICAL DIVERSITY AND MANDATE OF THE THREE WORKSHOPS AND POSSIBLE MANDATE OF A FINAL FOURTH MEETING.

14. A member of the Secretariat introduced the history, structure and function of the Convention on Biological Diversity and its main objectives. Attention was drawn to the specific objective relating to sustainable use and to the mandate of the three meetings as called for in the decisions of the Conference of the Parties. Since the Subsidiary Body on Technical, Technological and Scientific Advice of the Convention (SBSTTA) requested the organisation of a fourth synthesizing workshop, she also elaborated on the possible mandate of this final meeting.

ITEM 4: FEEDBACK FROM THE FIRST AND SECOND REGIONAL WORKSHOPS

15. Dr. Malan Lindeque from CITES provided an overview of the deliberations in Maputo. That meeting discussed the major issues pertaining to sustainable use in the African region with particular emphasis on dryland biological diversity. The consideration of some specific institutional and cultural contexts have had a strong influence on the principles produced at this meeting. For example, land tenure, ownership and access to natural resources as well as the continued utilisation of perverse incentives by governments were considered to be pressing issues.

16. The representative of CITES concluded that, regardless of the specificity of the regional context and the resources analysed, some common threads have emerged which can lead the group of experts to the definition of some universally applicable guidelines promoting the sustainable use of resources.

17. Ms. Viet Hong Pham Dinh, from the National Environmental Agency of the Ministry of Science, Technology and Environment of Vietnam reported on the workshop held in Hanoi which focussed on the sustainable use of forest biological diversity, including timber and non-timber forest products. Participants noted there was a need to define some terms and concepts contained in the Convention to further clarify the intentions related to sustainable use. They further suggested a vision which would also assist in this clarification.

18. In her conclusions, Ms. Pham Dinh presented the recommendations from the expert group in Hanoi to the Subsidiary Body on Scientific, Technical and Technological Advice, to the Secretariat of the Convention on Biological Diversity and to the current meeting in Ecuador.

ITEM 5: CONSIDERATION OF PRACTICAL WAYS FOR MEASURING COMPONENTS OF BIODIVERSITY AND THEIR DECLINE

19. Ms. Maria Elena Zaccagnini from IUCN presented the analytical framework for the assessment of factors that influence sustainability of use of wild living natural resources. She explained the work carried out by a Sustainable Use Specialist Group (SUSG) technical advisory committee which developed a model of a multidisciplinary approach to empirically characterize the sustainable use of living natural resources from the ecological, social, economic, political and cultural points of view. This model describes four main internal factors (usable living natural resources, user population, socio-political-institutional and economic) and external factors and their interactions such as natural disasters, global economic, social and environmental constraints.

20. She specifically presented the structure within the model which linked principles with criteria, indicators and verifiers for the four main internal factors and which would lead to practical guidelines for measuring progress in sustainable use programs. She concluded by underlining the importance of the definition of users and scale to conduct an effective analysis of the use of biological diversity.

ITEM 6: PRESENTATION OF CASE-STUDIES FROM THE REGION

21. The following countries and international organizations presented case studies on the sustainable use of biological diversity: Ecuador, Panama, Mexico and Peru, and FAO.

22. Mr. Eduardo Moreira of the Ministry of the Environment of Ecuador discussed the situation of coastal and marine resources of Ecuador and the actions undertaken by the government to promote the

sustainable use of mangroves. An agreement for the sustainable use and custody of mangrove areas invited communities using this resources to be directly involved in their management and promoted their traditional uses.

23. Mr. Luis Arriaga Ochoa, an Ecuadorian biologist, introduced the ten policy priorities for the sustainable use of marine and coastal resources in Ecuador: land-use planning; sustainable use of mangroves and conservation of marine and coastal biodiversity; sustainable fisheries development; monitoring of biological resources; reduction of pollution; biosafety and invasive alien species; protected areas; awareness raising; education programmes and eco-tourism. A plan of action has been proposed to address these policy areas and it has been discussed and promoted by different stakeholders. The main goal of the plan is the establishment of effective actions and policies for the long-term sustainable use of coastal and marine biodiversity. The goal could be achieved through the collaboration of local, sub-national and national stakeholder and with the support of national and international organizations.

24. Mr. Scott A. Muller from the Osiskun Foundation of Panama described the delicate balance that exists between complex ecosystems and their human inhabitants. He illustrated his points with the case of the Osiskun Marine reserve as a key example. After a brief history of the Kuna society in Panama, he presented the plans for the establishment of a marine protected area utilizing education and research to protect the marine resources of Kuna Yala, which runs along 140-miles coastline north east the coast of Panama. He observed that, within the Osiskun reserve, the valuation of biodiversity is accomplished through the utilization of the components of marine biodiversity to increase "connectance", the identification of concrete functional complementarities, between microagents (educational, economic, social and environmental systems). It is this microagent interdependency that creates an endogenous stable state of the system.

25. He concluded by stressing that sustainable use is not about the struggle for right or wrong, but rather the struggle for balance. The concept of change, risk and uncertainty are important variables for effective integrated environmental and development planning. Enabling this balance requires "connectance" between various systems. The valuation of biodiversity means not just the preservation of ecological integrity but the preservation of a process which allows for the emergence of self organisation itself.

26. Ms. Mary Belle Cruz Ayala from the Union General Obrero, Campesina y Popular A.C. of Mexico presented a progamme for responsible fisheries and use of marine natural resources in the Baja California Sur in the north-west of Mexico. This state includes up to 70% of the endemic cacti species of Mexico, sites for migratory birds and mangroves. The project's main objectives are the implementation of new activities, such as aquaculture and ecotourism, to reduce fishing pressure and the improvement of socio-economic conditions for local communities. The program addresses the problem of lack of adequate management of endemic species by diminishing fishing pressure over some species thus recovering stock of commercial species and other associated species.

27. Ms. Carmen Yamashiro Guinoza from the Insituto del Mar of Peru described the status of commercial and non-commercial marine and freshwater biological resources in Peru. Catches and biomass of the main commercial resources were presented and a study on new, potentially valuable resources recently introduced to the market was also outlined. In particular the case of the Paracas National Reserve, the only Peruvian protected area in marine ecosystems, was brought as a significant example of improved conservation management. The concentration of heterogeneous activities in the marine coastal area affecting the park caused some environmental problems that have been addressed in a management plan presented in 1994. Within this context, instruments and tools to protect biodiversity were also developed.

28. Information was also provided by Mr. Bisessar Chakalall of FAO. He described the FAO approaches to sustainable use of marine and freshwater fisheries. A specific reference was made to the discussion held in the Reykjavik meeting and the FAO paper circulated at this meeting (UNEP/CBD/WS-Sustainable Use/3/3). In particular, attention was drawn to item 10 of the Reykjavik Declaration to develop technical guidance for best practices bearing in mind ecosystem considerations in fisheries management. He noted that the 24th Session of the FAO Committee on Fisheries has also requested FAO to develop guidelines for introducing ecosystem approaches to fisheries management. He also drew attention to similar FAO efforts in developing ecosystem approaches through the code of conduct for responsible fisheries and related plans of action for sustainable fisheries and suggested collaboration and close consultation in these areas with the Convention on Biological Diversity, for the development of complementary guidelines.

ITEM 7: CONSIDERATION OF THE MAPUTO AND HANOI GUIDING PRINCIPLES, DEVELOPMENT OF THE SALINAS GUIDING PRINCIPLES AND DEVELOPMENT OF OPERATIONAL GUIDELINES, WITH FOCUS ON MARINE AND FRESHWATER FISHERIES

29. Before splitting into two working groups, the Workshop took up agenda item 9 at the 1st plenary session of the meeting, on Monday, 18 February 2002. In addressing the item, the Workshop had before it a note by the Executive Secretary (UNEP/CBD/WS-Sustainable Use/3/5) and a short introduction was provided by the Moderator, Dr. Herbert Prins.

30. Dr. Prins from Wageningen University explained the tasks required of the two working groups, emphasizing the importance of developing a product based on experiences of the experts in marine ecosystems and fisheries. He also explained how the two working groups would operate in the course of the meeting.

31. During Dr. Prins' introduction one participant pointed out that, in his opinion, the principles were more focussed on the production rather than consumption of resources and the final consumer was not considered in the principles. According to him, too much emphasis was also put on legal aspects for the control of resources rather than their adaptive management.

32. One of the resource persons, Dr. David Lawson, from the Parks and Wildlife Commission of the Northern Territory of Australia, explained the role of the resource persons in assisting the working groups in achieving their objectives in this workshop.

Working Group I was chaired by Dr. Herbert Prins, assisted by Dr. Malan Lindeque from CITES while Working Group II was chaired by Dr. David Lawson with the assistance of Mr. Scott Muller from Panama. The two working groups met five times, after which a drafting group was established to integrate the result of this work in a single document. The "Salinas Principles and Practical Implementation Guidelines for the Sustainable Use of Biological Diversity", contained in annex I below, were discussed and agreed in two plenary meetings on Thursday, 21 February 2002. Recommendations coming from the group of experts are contained in annex II below.

ITEM 8. OTHER MATTERS

33. There were no other matters.

ITEM 9. ADOPTION OF THE REPORT

34. The present report was adopted at the third plenary meeting, on Thursday 21 February 2002, on the basis of the draft report prepared and presented by the chair.

ITEM 10. CLOSURE OF THE MEETING

35. Following the customary exchange of courtesies, the Workshop was closed at 5:30 p.m. on Thursday, 21 February 2002 by Mr. Hector Ayon, Vice-Minister for Coastal and Marine Areas, of the Ministry of Environment of Ecuador.

Annex I

SALINAS PRINCIPLES AND PRACTICAL IMPLEMENTATION GUIDELINES FOR THE SUSTAINABLE USE OF BIOLOGICAL DIVERSITY.

1. Background and use of terms

The Convention recognizes the need of the sustainable use of biological diversity, but for this exercise, the terminology is not sufficiently specific. Indeed, "sustainable use **of biological diversity**" is mentioned in many articles (Table 1), in other articles the Convention mentions "sustainable use **of its components**" (Table 1), and in the main article dealing with sustainable use, namely Article 10, but also elsewhere (Table 1), the convention refers to the "sustainable use **of biological resources**".

"Biological resources" as given in Article 2 of the Convention, '*includes genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with actual or potential use or value for humanity'*.

The definition of "**components of biological diversity**" is not provided in Article 2, and the definition of "**biological diversity**" should be further clarified for operational purposes. In Article 2, "*biological diversity means the variability among **living** organisms [*emphasis added*] from all sources including,* inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems*". 'Variability' according to the Oxford Dictionary is derived from the word "*variable 1. that can be varied or adapted …; (Bot. & Zool., of species) including individuals or groups that depart from the type*". In this context, it is suggested to use the word "Variety": *1. being various, diversity, absence of monotony or uniformity*").

In this respect the Conference of Parties' Decision V/5/Appendix/1 is enlightening, where **agricultural biodiversity** was defined as *"Agricultural biodiversity is a broad term that includes all components of biological diversity of relevance to food and agriculture, and all components of biological diversity that constitute the agro-ecosystem: the variety and variability of animals, plants and micro-organisms, at the genetic, species and ecosystem levels, which are necessary to sustain key functions of the agro-ecosystem, its structure and processes …".*

Following this example, it is proposed to adopt as working definition of biodiversity: *"biodiversity means the variety and variability of animals, plants and micro-organisms, at the genetic, species and ecosystem levels*".

In this context, "components of biodiversity" can be defined as

- (a) genetic material,
- (b) populations,
- (c) species,
- (d) communities,
- (e) undifferentiated vegetation cover, forest, coral reefs, and other aggregate terms that denote the other biotic components of ecosystems. [Footnote: The component 6(e) is inspired by the definition in Article 2 of "biological resources" and by COP V/23 activity 7b ("*The sustainable use or husbandry of plant and animal biomass …*").]

Table 1. Use of the term "***sustainable use of …***" in the different articles of the Convention of Biological Diversity. In the use of this term in the Convention, three different descriptions of "sustainable use" can be found.

Sustainable use **of biological diversity**	Sustainable use **of components of biological diversity**	Sustainable use **of biological resources**
articles in the Convention: 5, 6a, 6b, 7c, 8g, 8j, 12b, 13b, 16-1, 17-1, 21-4, 25-2c, 25-2d	*articles in the Convention*: 1, 7a, 7b, 8i, 11, 12a, Annex I/1, 2, 3	*articles in the Convention*: 8c, 10a, 10b, 10c, 10e, 12c
defined in article 2 as: "variability of living organisms from all sources"	***Not** defined in article 2* Decision V/23 on the sustainable use of dry lands, "operational objective, 8" may be of use (q.v.).	*defined in article 2 as*: - genetic resources - organisms and parts thereof - populations - other **biotic** components of ecosystems

The Salinas workshop took as its starting point the definitions of components of biological diversity developed in Hanoi, as outlined below:

Sustainable use is defined in Article 2 of the Convention as:

"Sustainable use means the use of ***components***[1] *of biological diversity in a way and at a rate that does not lead to the* ***long-term***[2] ***decline***[3] *of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations*".

The workshop in Hanoi defined the three key phrases in the definition of the Convention text:

Key phrase 1

Five *components* of biodiversity are recognized:

a) Genetic material
b) Populations
c) Species
d) Communities
e) Other aggregate terms (e.g. "vegetation")

Key phrase 2

Long-term means five human generations or 100 years.

This time frame is intended to be used as a moving window and refers primarily to the future use potential of a resource by people. This time span approximates the present generation, parents and grandparents, children and grandchildren as a realistic human timescale for resource use. The management of biological resources requires a shorter time period linked to the life history of the species concerned. Whenever

one or more indicators show that a form of use is not likely to be sustainable, remedial action should be taken.

Key phrase 3

Decline is defined in the context of each of the five recognized components of biological diversity:

a) *Genetic material*

"A measurable reduction in any appropriate measure of genetic diversity in a population".

b) *Populations*

"A measurable reduction in the distribution and numbers of individuals of a population or increase in fragmentation or decrease in size of population range".

c) *Species*

"A measurable reduction of the total number of individuals, populations or geographical races of a species or increase in fragmentation or decrease in size of a species' range below the limits necessary for the maintenance of viable populations".

d) *Communities*

"A measurable reduction of the number, variety and composition of species within a defined management area".

e) *Other aggregate terms (e.g. "vegetation")*

"A measurable reduction in the extent or amount of the biotic component within the management area; a measurable decrease in the provision of ecosystem services and goods".

In other words, the definition of Article 2 can now be operationalized for each component of biological diversity:

a) Genetic material:

"*Sustainable use means the use of* **genetic material** *in a way and at a rate that does not lead to* **a measurable reduction in any appropriate measure of genetic diversity in a population** within **five human generations or 100 years, whichever is shorter**, *thereby maintaining its potential to meet the needs and aspirations of present and future generations.*"

b) Population:

"*Sustainable use means the use of* **a population** *in a way and at a rate that does not lead to the* **measurable reduction in the distribution and numbers of individuals of a population or increase in fragmentation or decrease in size of population range** within **five human generations or 100 years, whichever is shorter**, *thereby maintaining its potential to meet the needs and aspirations of present and future generations.*"

c) Species:

"*Sustainable use means the use of* **a species** *in a way and at a rate that does not lead to* **a measurable reduction of the total number of individuals, populations or geographical races of a species or increase in fragmentation or decrease in size of a species' range below the limits necessary for the maintenance of viable populations** within **five human generations or 100 years,**

whichever is shorter, *thereby maintaining its potential to meet the needs and aspirations of present and future generations*".

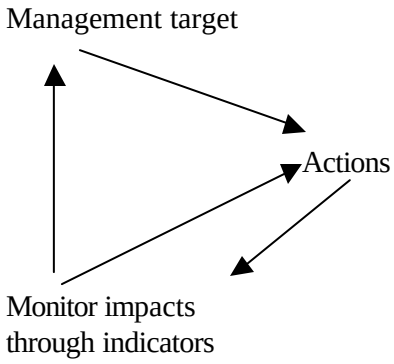
d) Communities:
"*Sustainable use means the use of* **a community** *in a way and at a rate that does not lead to* **a measurable reduction of the number, variety and composition of species within a defined management area** witin **five human generations or 100 years, whichever is shorter**, *thereby maintaining its potential to meet the needs and aspirations of present and future generations*".

e) Other aggregate terms (e.g. "vegetation"):
"*Sustainable use means the use of* **vegetation [phytomass]** *in a way and at a rate that does not lead to* **a measurable reduction in the extent or amount of the [vegetation cover] within the management area; a measurable decrease in the provision of ecosystem services and goods** within **five human generations or 100 years, whichever is shorter**, *thereby maintaining its potential to meet the needs and aspirations of present and future generations*".

The measurement of aspects of decline, as contained in the definitions developed in Hanoi, was discussed by the Salinas workshop also in the context of adaptive management.

2. Adaptive management

Adaptive management, as schematically presented below in its simplest form, has been identified as the most appropriate approach toward the management of biological resources because of its ability to deal with uncertainty and natural variation (more flexible than other systems), its iterative nature (acquires information on the biological resource through the management cycle), and its feedback mechanisms (see Decision V/6: Ecosystem Approach Principle 9 i.e. 'Management must recognize that change is inevitable'). Adaptive management can be applied at each component of biological diversity, and the appropriateness of each component will be defined by the scale of the management programme and its potential impacts. Adaptive management systems should operate within the context of a higher order of policy objective concerning the use of biological resources, and should strive to integrate diverse or conflicting objectives into a single target for management action.



Successful application of adaptive management is strongly dependent on monitoring. Uncertainty about the appropriateness of monitoring techniques, limited skills and resources for monitoring, and the long-term sustainability of monitoring programmes can be regarded as constraints. Ecosystem-based management

of biological resources will also require the commitment of additional resources for monitoring. The monitoring component in adaptive management systems should therefore be designed and refined to ensure that these constraints are addressed. Some initial observations in this regard are that:

- the scale of monitoring should match the scale of management, but should not ignore 'downstream' effects of management (see Ecosystem Approach Principle 3);
- the cost of monitoring should be internalized (the resource user should contribute significantly) to ensure the maintenance of monitoring programmes (see Ecosystem Approach Principle 4);
- resource users should participate in the design and implementation of the monitoring system (see Ecosystem Approach Principle 2);
- local and traditional knowledge of resources should be incorporated into monitoring systems, (and the use of such local and traditional knowledge in the management of biological resources may promote the maintenance of local and traditional knowledge systems, e.g. in the mapping of resources by communities) (see Ecosystem Approach Principle 11);
- monitoring systems should be appropriate, cost-effective and achievable (see Ecosystem Approach Principle 12);
- monitoring systems and the evaluation of the results of monitoring should involve a transparent and consultative process (see Ecosystem Approach Principle 11);
- the integrity of monitoring systems can be enhanced by measures for long-term data warehousing.

It is often advisable that monitoring be conducted at three levels, i.e.:

- monitoring the status of the component of biological diversity that is the focus of the management programme (in order to obtain information about its status independently from any harvest programme);
- monitoring the offtake (in order to obtain detailed information about the biological characteristics of the component harvested, and trends in characteristics such as age and sex distribution and fecundity);
- monitoring harvest effort (in order to determine changes in the yield per unit effort as an index of the impact of the management programme, taking into account improvements in technology relating to the efficiency of harvesting).

Monitoring at these three levels need not be conducted at the same frequency and by the same agencies, but the combination of monitoring at these three levels may result in a greater probability that use-related impacts will be detected and that monitoring systems will be maintained in the long-term. Monitoring at multiple levels is particularly important in cases where limited information is available about the current status of the component of biological diversity that is being used, or to avoid bias resulting from information derived as the result of harvesting (harvesting is most often targeted at specific components only).

It is also important to consider other impacts on a resource, e.g. illegal offtakes, and to use all other relevant sources of information to verify conclusions about the trends in resource status and recommendations concerning its management.

3. Desirable properties of indicators

Indicators of the status and trends of biological diversity are important in a monitoring programme. Recommendation III/5, endorsed by the Conference of the Parties at its 4th meeting (decision IV/1A), and decision V/7 provide for the development of a set of principles for designing national-level monitoring and indicators, addressing issues such as:

i) the way that indicators relate to management questions;
ii) the ability to show trends;
iii) the ability to distinguish between natural and human-induced change;
iv) the ability to provide reliable results (i.e. through the establishment of standard methodologies);
v) the degree to which indicators are amenable to straightforward interpretation; and
vi) the question of baselines for measurement, in light of the fact that application of a pre-industrial baseline may often prove problematic.

The workshop noted that adaptive management does not rely on knowing pre-industrial baselines and has used the issues outlined in recommendation III/5 as a starting point, but has added the ability to distinguish between external and internal causes of change. The workshop has identified the following desirable properties of indicators. The validity of indicators will be enhanced if they have as many of the following properties as possible, i.e. if they are:

- *unequivocal and reliable descriptor of a specific measurable characteristic*: This property describes the bare essence of an 'indicator'(see issue i and iv);

- *sensitive to changes in components and systems subject to impact of use*: An ideal indicator should detect a signal of real change fast and reliably and should be robust (i.e. so that a measuring error does not affect the interpretation) (see issue ii and iv);

- *cost-effective*: The costs of measuring the indicator should be proportional to the benefit from using the biological resource;

- *amenable to the use of appropriate technology*: Some technologies may become outdated due to rapid technological changes, but many user groups, including local and indigenous ones, readily accept new technologies (see issue iv);

- *repeatable*: The aim of using indicator is to determine whether there are long-term negative trends in the availability of the biological resource, and the measurement of any indicator should accordingly be repeatable. It is therefore imperative that the measurement is cost-effective and amenable to using appropriate technology (see issue ii);

- *relevant to the impact of management*: The purpose of using indicators is to measure the impact of management on the status of a biological resource, and, ideally, it should enable the resource manager to distinguish between natural and human-induced change. It is consequently important that the measurements are conducive to sound analysis (see issue i and iv);

- *acceptable to all stakeholders by mutual agreement*: The repeatability of measurement often depends on the fact that measurement has to be carried out by resource managers who, in many cases, will be people living with the resource. The data that are collected should, on the other hand, be open to sound analysis and acceptable as reliable descriptors of change. Data should be accessible for inspection by either higher authorities or by other interested parties including groups of civic society;

- *user-friendly for resource managers/users*: Methods for measuring indicators should be user-friendly or users may lose their interest and cease measuring, which negatively affects repeatability;

- *appropriate to the scale of management*: The measurement of indicators should not result in making statements at the "wrong" scale; if resource management has to take place at e.g. a large scale and indicator measurement takes place at a small scale, then trend analysis may sometimes lead to "false alarm" or to a 'false sense of security';

- *appropriate to the social and cultural contexts of resource managers/users*: The repeatability and accuracy of measurement of an indicator will be enhanced if the indicator is meaningful in the social and cultural contexts of resource managers/users;

- *able to show trends*: This property is a fundamental requirement of an indicator that has been selected to be able to detect trends in the state of a biological resource (see issue ii);

- *conducive to sound analysis*: Sound analysis often may mean proper statistical analysis but as there are other knowledge systems that do not rely on classical statistical methods or Bayesian methods, other ways of sound analysis may be envisaged too (see issue v).

4. Indicators of the impact of use of components of biological diversity

Indicators were identified for each component of biological diversity because each of these five components can be subject to use. The assessment of the sustainability of use on a particular component will largely depend on the scale and extent of use. The components of biological diversity are nested. Indicators of sustainability should be applied to the component of biological diversity that approximates the unit of management.

The indicators outlined below are considered to be suitable to demonstrate the impact of use**,** and refer to the biological status of each component of biological diversity. Other indicators should nevertheless also be developed to determine the sustainability of a use regime in its interdependence with socio-economic and political factors and the impacts of external factors (e.g. pollution, climate change, structural poverty or other factors beyond control of the users) on a resource.

a. Genetic material

The sustainable use of genetic material has not received enough attention internationally, but there are several examples of unsustainable use of genetic material through the intentional or unintentional manipulation of populations, primarily through *ex situ* production (e.g. mariculture, agriculture, stock enhancement). The rapidly expanding knowledge of genetic variation within populations or species makes it possible to determine if the use of genetically identifiable components of populations or species is sustainable.

The definition used is, "*Sustainable use means the use of genetic material in a way and at a rate that does not lead to a measurable reduction in any appropriate measure of genetic diversity in a population within five human generations or 100 years, thereby maintaining its potential to meet the needs and aspirations of present and future generations.*"

GENETIC MATERAL

Elements of decline *Indicator*

Genetic diversity	- genetic variation - frequency of rare alleles - phenotypic variation

b. Population

The term 'population' is defined geographically in the context of a particular management regime as the number of individuals of a species in a specific management area. In the context of Article 2, an amendment is proposed to the definition of sustainable use of populations developed in Hanoi, i.e. '*Sustainable use means the use of a population in a way and rate that does not lead to a measurable reduction in population size, extent of distribution, increase in fragmentation or unfavourable changes in population structure within five human generations or 100 years, thereby maintaining its potential to meet the needs and aspirations of present and future generations.*'.

This definition contains four elements of change that may result from unsustainable use. Indicators of these elements of change are considered to be practical or proxy measures of change in these elements. The indicators outlined below are considered to apply to a wide range of biological resources and use regimes, but monitoring systems will inevitably require a degree of site and case specificity. (Note: The extent of occurrence refers to the total measured area of occurrence of a species based on the outer limits of its distribution. Area of occupancy refers to the actual area of range occupied by a species, and will generally be less (but never more) than the extent of occurrence).

POPULATIONS

Elements of decline	*Indicator*
Population size	- number of individuals (and other indices of abundance) - biomass or volume - density
Extent of distribution	- extent of occurrence (sq. km) - area of occupancy (presence/absence) - area of habitat loss - evenness of distribution
Fragmentation	- number of sub-populations - area of habitat loss -change in habitat
Population structure	- age structure - sex ratio
Production potential	- reproductive success and recruitment - fecundity - physical/physiological condition

c. Species

Most forms of use seem to focus at the population level but it will be appropriate to determine if use is sustainable at species level if the boundaries of populations are unknown, if all populations of a species is subject to the same use regime, or if it appears to be appropriate for other reasons to assess the impacts from the use resources at the species level, e.g. a societal obligation to ensure that species persist as potential resources for future generations.

The following definition is used: '*Sustainable use means the use of a species in a way and at a rate that does not lead to a measurable reduction of the total number of individuals, populations or geographical races of a species or increase in fragmentation or decrease in size of a species' range below the limits necessary for the maintenance of viable populations within five human generations or 100 years, thereby maintaining its potential to meet the needs and aspirations of present and future generations.'*

SPECIES

Elements of decline	*Indicator*
Population size	- number of individuals (and other indices of abundance) - biomass or volume - density
Geographical races, populations, and subspecies	- number of geographical races - number of populations - number of sub-species
Viability of populations	- extent of decline and proximity to thresholds of viability
Fragmentation	- number of fragments and distance between fragments
Extent of distribution	- extent of occurrence - area of occupancy - area of habitat loss

d. Communities

Impacts from use can be considered at two levels at least, i.e. the effect of the harvesting of a species on other species in the same community, and the effect of multi-species harvesting on a particular community. Species interactions within communities are likely to be complex and are often poorly known.

The definition used is: '*Sustainable use means the use of a community in a way and at a rate that does not lead to a measurable reduction of the number, variety and composition of species within a defined management area within five human generations or 100 years, thereby maintaining its potential to meet the needs and aspirations of present and future generations.'*

COMMUNITIES

Elements of decline	*Indicator*
Number of species (species richness)	- total number of species per specified management area
Variety of species (diversity of species)	- appropriate index of community diversity - species/biomass relationship - species/abundance relationship
Composition of species	- changes in species inventories - predators and top predators as indicator species - structurally dominant species - trophic relationships - bio-monitors (e.g. diet of selected species)
Community stress	- any appropriate indicator of stress (e.g. invasive species - decline in extent - increase in fragmentation - mass mortality

e. Other aggregate terms

The working group recommends, instead of other aggregate terms, to use the term 'ecosystem' and 'habitats' in their popular or non-scientific meaning, in order to avoid confusion and a proliferation of terminology. The definition of the sustainable use of 'other aggregate terms' developed in Hanoi is therefore amended as follows: *'Sustainable use of ecosystems means the use of ecosystems in a way and at a rate that does not lead to a measurable reduction in the extent or amount of the biotic component within the management area or a measurable decrease in the provision of ecosystem services, as measured over a period of five human generations or 100 year, thereby maintaining its potential to meet the needs and aspirations of present and future generations'*. This amended definition does not refer to 'ecosystem goods', because ecosystem goods have been comprehensively covered in the other components of biological diversity (i.e. populations, species and communities).

The enormous variation in type and scale of ecosystems implies that indicators need to be case-specific. Some general indicators that may be applicable in common types of ecosystems are nevertheless provided below, noting also that most of these indicators are suitable for large areas and can be used relatively inexpensively through remote sensing.

It is of interest that the monitoring of the ability of ecosystems to provide services in particular, and goods to a lesser extent, is covered by other multilateral environmental agreements as well (e.g. UNCCD, UNFCC). It would be valuable to harmonize monitoring protocols developed by different agreements.

ECOSYSTEM

Elements of decline	*Indicator*
Extent and amount of biotic services that can be provided	-components and ecosystem - coverage (e.g. vegetation, coral reefs) - fragmentation (including measures of distribution, heterogeneity and connectivity) - fractal dimension - standing biomass - albedo, spectral reflectance - turbidity, light penetration - primary production - etc.

5. Axioms

Axioms, as used here, are considered universal truths. They are provided in this format to establish a common ground in relation to which a series of principles derived from this workshop are presented. They have been developed in the context of marine ecosystems and they have been inspired by the work of the Maputo and Hanoi Workshops. These axioms are intimately linked together and must be taken in total context. It should be noted that in the axioms and principles the rationale statement is included to aid in the interpretation of the particular axiom or principle.

Ecological context

1. *Ecosystems, ecological processes within them and genetic variation change over time whether or not they are used.*

   Rationale: The fossil record clearly shows that ecosystems change and the species within them evolve over time in the absence of human influence and use.

2. *Sustaining biological diversity along with resilience of ecosystems depends on maintaining ecological processes and species abundance above thresholds needed for long-term viability.*

   Rationale: Ecosystems can continue to function when some processes or components are degraded or missing. However, if such degradation continues there will come a point beyond which an ecosystem cannot function and its processes will break down. It is obviously important that such 'thresholds of viability' are not exceeded. The problem is that these thresholds are unknown and therefore it is prudent to prevent losses of ecosystem components and function wherever possible.
   Just as ecosystems cannot continue to function with increasing losses of components so the components themselves (such as biological diversity) cannot survive without the ecological functions necessary to keep those components alive. Once again there will be thresholds below which such ecological functions and species numbers and diversity must not drop lest ecosystem collapse occurs.

3. *It is possible to use biological diversity with ecological processes, species and genetic variability remaining above thresholds needed for long-term viability*

Rationale: Since they first evolved humans have been using biological diversity. For the greater part of human history such use has not led to any loss of ecological processes, species or genetic diversity as long as the use was within sustainable limits.

4. *Sustainable use of biological diversity is a means to conserve genetic variability, species, habitat and ecosystems.*

Rationale: If sustainable use of biological diversity is prevented in a particular area then that area may be converted to another use and the biological diversity removed. So encouraging sustainable use is a way of maintaining habitats and ecosystems, the species within these habitats and the genetic variability within the species.

5. *Sustainable use is crucial for the survival of threatened species.*

Rationale: The saltwater crocodile in northern Australia has been brought back from the brink of extinction by sustainable use of their populations. White Rhino have likewise benefited from sustainable use of populations which were at low levels. If these uses were prevented then the conservation status of the animals would most likely decline.

Social context

6. *Biological diversity is used.*

Rationale: Humans use biological diversity every day in numerous ways. For example, fisheries is one of the most important economic activities for indigenous and local communities. Harvesting of natural and cultivated plants and wild and domestic animals for food and other products, timber for building materials, extraction of chemicals for drugs and the use of plant products for clothing are all examples of such daily use.

7. *Survival of people and cultures is dependent on direct and indirect uses of biological diversity.*

Rationale: The basic necessities of life such as food and shelter are produced either directly or indirectly from using biological diversity. Increasingly other uses such as pharmaceuticals for disease prevention and cure are becoming evident and are also met from using biological diversity. Some people and their cultures depend more directly on the uses of biological diversity for their livelihoods

8. *Current human population growth and consumptive and productive patterns are placing increasing demands on biological diversity, the consequences of which may have immediate effects or impacts but may only become apparent in the future.*

Rationale: Disease prevention and increased food production have resulted in greatly increased human population growth. This, coupled with a desire to improve living conditions has led to human populations using a greater variety and amounts of natural resources, including biological diversity and at increasing rates. There is a difference between ecological time scales and socio-political time

scales and therefore there is a delay between decisions made today regarding the use of biological diversity and their outcomes and effects.

9. *Maintenance of biological diversity is enhanced when the people living with it derive benefits from its sustainable use.*

Rationale: If people are prevented from using biological diversity in their local area then that area may be converted to another use and the biological diversity removed. People who live with biological resources often have to endure adverse effects from those resources. This is most evident where people share space with large, potentially dangerous animals. In order to conserve such species any use of them must allow for benefits from the use to flow to those local people who suffer from the presence of those animals with livestock and crops destroyed and lives lost. If no benefit is seen to come from such species then local people will not view them as a resource but as a menace and treat then accordingly by trying to eliminate them.

10. *The balance between and the means of conserving and sustainably utilizing biodiversity varies and depends on societal choice.*

Rationale: What may be acceptable sustainable use of biological diversity in one area may not be acceptable in another. The acceptance of use may depend heavily on the culturally or socially accepted norms of the society in which the particular use takes place. For example hunting may be acceptable in one culture but not in another.

Economic Context

11. *Sustainable use of biological diversity is a means of realizing its market and non-market values.*

Rationale: If a component of biological diversity is used for human benefit then it is often more highly valued than a component that has no benefit to humans. This value may be monetary but could equally be ecological, aesthetic, cultural or social. When a component is valued, then humans can make the necessary effort to sustain its use.

12. *Biological diversity has an intrinsic limit to any benefits and services it can provide.*

Rationale: Systems dependent on cycling of finite resources have limits on what products can be extracted from them. Biological systems are no different, there are finite amounts of resources contained within such systems and consequently limits on the amounts of those resources that can be used. Although certain limits can be extended to some degree through technological breakthroughs, there are still limits originated by exogenous resources availability and accessibility. Consequences of overuse only become apparent sometime in the future so it is prudent to adopt a precautionary attitude and assume that there are limits to use of biological diversity.

6. Principles and Practical Implementation Guidelines

The following principles provide a framework of key factors or conditions which governments, resource managers and other interested stakeholders should consider to optimise the sustainability of uses of biological diversity. Progress towards sustainability will require the political will to bring about changes to create the necessary enabling environment at all levels of government and bureaucracy. The practical implementation guidelines is developed from suggestions for implementation from the Hanoi workshop and is intended to be a functional advice on the implementation of the particular principle. It is likely that such guidance will be further expanded in the future as case studies about sustainable use in different biomes are examined.

Legal and Policy Framework

1. Sustainability of uses of biological diversity will be enhanced when governments delegate rights, responsibility and accountability to those who use and/or manage biological resources.

Rationale: Resources viewed as common property are often over utilised as people try to maximise their personal benefits from the resource while it is available. Resources that are [owned] [in custody of] [or used] by individual people or communities are generally used more responsibly because their need to maximise benefits before someone else removes the resources. Therefore sustainability is enhanced if Governments grant 'rights' or 'stewardship' authority, responsibility and accountability to the people who use and manage the resource.

Practical Implementation Guidelines

- Review existing legislation and regulations in order to see if it is possible to delegate these rights.
- **I**n case it is not possible, the relevant legislation should be amended as necessary, preferably through a process of public participation**.**
- Consider local customs and traditions (and customary law where recognized) when drafting or amending legislation and regulations.
- Keep enabling legislation and associated procedures for legal uses as simple, transparent, and accessible as possible.
- Clarify issues of tenure and ownership.

2. Sustainability of uses of biological diversity will be enhanced if those who conserve, use or manage biological resources are sufficiently empowered and supported by established rights to be responsible and accountable for their use.

Rationale: To reinforce local rights or stewardship of biological diversity and responsibility for its conservation, resource users must participate in making decisions about the resource use and have the authority to carry out any actions arising from those decisions.

Practical Implementation Guidelines:

- The necessary capacity and sufficient means, financial resources and subsidies should be provided to those conserving, managing or using biological diversity in order that they can meet responsibility requirements.

3. Sustainability of uses of biological diversity will be enhanced when supportive incentives, policies, laws, and institutions are in place at all levels of governance and that there are effective linkages between these levels.

Rationale: There is little point in developing a use structure at village or community level if the national law prohibits the use of the resource or an international agreement severely limits access to free markets. There must be clear and effective linkages at and between different jurisdictional levels to enable a 'pathway' to be developed which allows use of a resource to proceed from collection or harvest through to final markets without impediment.

Practical Implementation Guidelines:

- Identify the supportive incentives, policies, laws and institutions in place.
- Identify any overlaps, omissions and contradictions.
- Initiate concrete actions that resolve overlaps, fill in omissions and eliminate contradictions.
- Strengthen and/or create cooperative /supportive linkages between all levels of governance.

4. Sustainability of uses of biological diversity will be enhanced if national and international policies, laws and regulations that distort markets, promote habitat alteration or destruction, and unsustainable use are identified and removed or adjusted.

Rationale: National and international policies can act in previously unforeseen ways to promote unsustainable use. For example, giving developing countries preferential access to markets in developed nations for food commodities has caused serious biological diversity conservation problems associated with the alteration of habitats in those producing countries.

Practical Implementation Guidelines:

- Pay attention to over regulation of uses of biological diversity, because it can increase costs, foreclose opportunities, and encourage unregulated uses thus decreasing sustainability of uses.
- Likewise, lack of governmental control of uses may decrease sustainability of uses.

Management Framework

It should be remembered that small steps in improving management may result in greater improvements in sustainability of biological diversity uses. It should also be recognized that unrealistically high standards frustrate and undermine adoption of practices that will promote sustainability. It is better to set realistic standards that positively reinforce wise practices and promote capacity development.

5. Sustainability of uses of biological diversity will be enhanced if managerial regimes are compatible with the ecological and socio-economic scale of the use and impacts.

Rationale: If fish are being harvested from a lake and that lake is on the property of a single individual then it is that individual who should share in the authority to make management decisions about that harvesting. Likewise if neighbouring countries share a resource then appropriate authority would include representation from those states and all should participate in the management decisions about that resource and be accountable for the use.

Practical Implementation Guidelines:

- Assemble baseline information related to the proposed use.
- Define the management objectives for the resource being used.
- Divulge draft management plans and integrate public participation to best insure ecological and socio-economic sustainability.
- Assess the uncertainties of the plan.
- Link responsibility and accountability to the ecological/geographic scale of use (as reflected in Principles 2 and 7 of the Principles of Ecosystem Approach).

6. Sustainability of uses of biological diversity will be enhanced if arrangements for international œooperation are facilitated where multi-national decision-making and coordination are needed.

Rationale: If a resource is shared between two or more countries then it is advisable to have a bilateral or multilateral agreement between those states to determine how the resource will be used and in what amounts. Absence of such agreements can lead to each state implementing separate management regimes which, when taken together, may mean that the resource is over-utilised.

Practical Implementation Guidelines:

- It is particularly important to make arrangements for international cooperation when the distribution of populations or communities/habitats being used span two or more nations.
- Promote multinational technical committees to prepare recommendations for the sustainable use of shared resources.

7. Sustainability of uses of biological diversity will be enhanced when national and international policies and decisions affecting the use of biological resources are supported by sound1 scientific information and take full account of these guiding principles.

Rationale: International conventions and national decisions that affect use should always apply the best scientific information on which to base decisions and be aware of the local circumstances where a use is undertaken.

Practical Implementation Guidelines:

- Review of traditional and other available knowledge in decision making.
- Design mechanisms to disseminate and explain scientific research results to all policy and decision makers.
- Incorporate review of latest scientific information into resource use policy decision making.

8. Sustainability of uses of biological diversity will be enhanced when national and international policies recognize and take into account all values derived from the use of biological diversity and the market forces affecting the use.

1 Participants underlined the need to broad the concept of "sound" so that it includes economic, social, political and other knowledge domains.

Rationale: The intrinsic economic value of biological diversity has often been ignored in pursuing economic development. Recent work in calculating the potential costs of replacing natural systems with man-made alternatives has shown that such natural systems should be valued very highly. It follows that national and international policies that guide trade and development should compare the real value of natural systems against any intended replacement uses before such development is undertaken. For instance, mangroves serve as fish nursery, erosion and storm surge alleviation, carbon sequestration, spawning. Coral reefs provide protection for juvenile fish and many species as well as coastal zone protection.

Practical Implementation Guidelines:

- Promote economic valuation studies of the environmental services of natural ecosystems.
- Incorporate this information in policy and decision making processes.
- Consider this principle in relation to land use/habitat conversion tradeoffs.
- Governments should consider how national "green" accounts can accommodate these values.
- Recognize that market forces are not always sufficient to improve living conditions or increase sustainability in the use of components of biological diversity.

9. Optimal benefits from all ecosystems will be obtained when all the appropriate administrative, market, and/or communal mechanisms involved in guiding financial and human resources allocation are directed towards implementing a more efficient ecosystem based resource management.

Rationale: Implementation of use programs are limited by the available human and financial resources. It is often necessary therefore, to priorities where these resources can best be used. In carrying out this prioritization it is important that this is not only an administrative process but also takes into account market and communal mechanisms.

Practical Implementation Guidelines:

- Critically assess the available financial and personnel resources.
- Establish appropriate administrative and communal mechanisms necessary for determining priorities
- Promote technical studies to establish reference points. (*fishery specific)
- Determine effective regulations using these studies via a process of interdisciplinary consultative meetings

10. Sustainability of uses of biological diversity will be enhanced if efficiencies in selectivity of harvest with environmentally friendly equipment, processing, marketing, and use of products are increased to enhance socio-economic and ecological benefits.

Rationale: All aspects of the sustainable use of biological diversity should be as efficient as possible to minimize waste and maximize returns from that use. These returns should be used to enhance peoples' livelihoods and protect habitats and communities that contain the used biological diversity.

Practical Implementation Guidelines:

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- Identify inefficiencies and costs in current methods.
- Conduct research and development into improved methods.

- Promote more efficient transportation of components of biodiversity.
- Quickly adopt improved and environmentally friendly methodologies and equipment.
- Promote the interchange of experiences.
- Evaluate the use of new technologies for possible negative impacts on sustainable use of biodiversity before introduced.
- Facilitate access to market for producing communities to optimize benefits.

11. Sustainability of uses of biological diversity will be enhanced if an interdisciplinary, participatory approach is applied at different levels of governance related to the use.

Rationale: Sustainability of use depends on factors other than purely biological parameters of the resource being utilized. It is recognized that social, cultural, political and economic factors are equally important. It is therefore necessary to take all of such factors into consideration and involve the stakeholders and the expertise of people experienced in these different fields, at all levels of decision making.

Practical Implementation Guidelines:

- Identify stakeholders and experienced experts.
- Consider socio-economic, political, biological, ecological, institutional, religious and cultural factors at the individual, community, sub-national, national, regional and international levels in an interdisciplinary approach.
- Use the term "interdisciplinary, participatory approach" to mean that the specialists in the social, economic, biological and other disciplines, including traditional knowledge necessary to optimize sustainability of uses, engage in resource management simultaneously in direct communication with each other.
- Use participatory management planning when ever possible.
- Apply expertise to common goals and not to disciplinary goals.

12. Sustainability of uses of biological diversity will be enhanced if effective communications are in place between and among stakeholders, including resource managers, at the individual, community, sub-national, national, regional and international levels.

Rationale: Effective communications between all stakeholders are necessary to ensure that decisions are based on the best information and that new information about the resource that could affect the use is disseminated quickly.

Practical Implementation Guidelines:

- Identify stakeholders.
- Make communications interactive between and among stakeholders at the individual, community, sub-national, national, regional and international levels.
- Ensure governments provide adequate channels of negotiations so that potential conflicts arising from the participatory involvement of all people can be quickly and satisfactorily resolved.

13. Sustainability of uses of biological diversity will be enhanced if adaptive management is practised and relies on sound science which must include traditional and local knowledge, and an iterative process of timely and transparent feedback derived from monitoring the use, the socio-economic effects, the resources and ecological changes.

Rationale: Biological systems and the economic and social factors that can affect the sustainability of use of biological diversity are all highly variable. It is not possible to have up-front knowledge of all aspects of such systems before a use of biological diversity begins so it is necessary to have in place an effective system which allows the use to take place but which monitors the effects of that use and allows adjustment of the use as necessary. It is preferable to use all sources of information about a resource when deciding how it can be used. There may be good scientific information about a resource and its use may seem feasible but the use may be against cultural beliefs or social norms of the society in which the use will take place. Under such circumstances the use will not be sustainable. In many societies traditional and local knowledge has led to much use of biological diversity being sustainable over long time periods without detriment to the environment or the resource. Incorporation of such knowledge into modern use systems can do much to avoid inappropriate use of a resource.

Practical Implementation Guidelines:

- Compile best available information and knowledge.
- Assess uncertainties / margin of error.
- Design monitoring mechanisms.
- Conduct periodic review.
- Establish user friendly database when possible.
- Use participatory management and planning processes.
- Develop and implement explicit management plans.
- Integrate protected areas into the system of monitoring involving comparison of similar components of biodiversity under use and protection.

14. Sustainability of uses of biological diversity will be enhanced when management goals and practices do not compromise ecosystem functions and are implemented with [precaution ?] and care.

Rationale: Use of any resource must take into account the functions that resource may fulfil within the ecosystem in which it occurs and that use must not adversely affect ecosystem functions. For example, it may be possible to selectively harvest trees in a watershed for the timber resource. Clear felling in the watershed could lead to erosion of soil and impairment of the water filtration function of the ecosystem. Avoidance of this situation would involve setting conservative cutting quotas with appropriate harvesting techniques and monitoring the effects of the harvest as it occurs. For instance, the shrimping industry has developed nets that can separate out juveniles and bycatch and reduce the negative effects to the benthic and other associated communities.

Practical Implementation Guidelines:

- Apply the "precautionary principle" as provided in paragraph 15 of the Rio Declaration.

15. Sustainability of uses of biological diversity will be enhanced when research into all aspects of the use and conservation of biological diversity is promoted and supported.

Rationale: Government and private and public sector research into natural resource management technology and techniques use is vital to promote sustainability. Further, to enhance incentives that promote sustainability there is need to discover new commodities, open up new economic opportunities for stakeholders and formulate new conservation approaches.

Practical Implementation Guidelines

- Allocate/ensure adequate financial resources.
- Encourage active collaboration between scientific investigation and traditional knowledge.
- Encourage international cooperation and technology transfer.
- Coordinate research between various sectors.
- Exchange information.
- Disseminate and explain scientific research results to all stakeholders when possible.

16. Sustainability of uses of biological diversity will be enhanced when the contribution and needs of those who live with and are impacted by the use and conservation of biological diversity, in particular indigenous peoples and local communities, are appropriately reflected in the distribution of the benefits from the use of those resources.

Rationale: Local people often shoulder significant costs or forego benefits of potential use of biological diversity, in order to ensure or enhance benefits accruing to others. Many fisheries are over-exploited and often times regulations are ignored because there are no alternatives, there is no respect for the regulations, they are not enforced, or people do not identify with the impacts of overuse. Management regimes are enhanced when constructive programs that benefit local communities are implemented, such as capacity training that can provide income alternatives, or assistance in switching to multi-species fisheries or sustainable aquaculture, etc.

Practical Implementation Guidelines:

- Identify needs of stakeholders.
- Promote good governance.
- Create alternatives to alleviate over exploited resources.
- Do not assume that illegal use practices are unsustainable.
- Consider ways to bring uncontrolled (or illegal, but sustainable) use of biological resources into a legal and sustainable use framework.
- Consider local customs and traditions (and customary law where recognized) when drafting new legislation and regulations.
- Build necessary capacity.

- Use participatory planning and management.

17. Sustainability of uses of biological diversity will be enhanced if the costs of those who manage biological diversity, in particular wild living resources, are appropriately reflected in the distribution of the benefits from the use of those resources.

Rationale: The management of natural resources incurs costs. If these costs are not adequately covered then management will decline and the amount and value of the natural resources may also decline. It is necessary to ensure that some of the benefits from use flow to the local natural resource management authorities so that essential management to sustain the resources is maintained. Such benefits may be direct, such as entrance fees from visitors to a National Park paid directly to the Park management authority or indirect, such as stumpage tax revenue from timber harvesting paid by loggers which flows through a national treasury to a local forest service. In some cases license fees for fishing rights are paid directly to management authority, or to the national treasury.

Practical Implementation Guidelines:

- Identify resource managers and management authorities.
- Determine management costs and benefits.
- Present breakdowns of revenues and expenditures.
- Allocate sufficient resources.
- Create mechanisms to invest revenues on biodiversity management.

18. Sustainability of uses of biological diversity will be enhanced if provisions are made for mitigation, remediation, compensation, and/or rehabilitation if losses of biological diversity as a result of use are identified.

Rationale: Selective felling of trees in a watershed may be permitted if the removal does no lasting damage to that watershed. To ensure that there is no damage, provision should be made for using appropriate methods to minimize damage and timely repair of any damage that may occur. If certain areas are necessary for development purposes then there should be adequate provision of protected areas containing representative samples of the biological diversity of the area. These protected areas should be linked to minimize losses of biological diversity. If those losses of biological diversity cannot be avoided, then adequate ecological remediation and/or rehabilitation should be attempted as well as socio-economic compensation.

Practical Implementation Guidelines:

- Recognize the illegal and unsustainable use of biodiversity that takes place.
- Undertake assessment of illegal harvesting and use.
- Review existing legislation and regulations.
- Ensure adequate enforcement capability.
- Ensure that offenders pay for remediation.
- Enable legislation and associated procedures for legal uses as simple, transparent, and accessible as possible.

- Stop and prevent illegal uses of components of biological diversity.
- Stop and prevent illegal trade in the components of biological diversity.
- Ensure the penalties for unsustainable, illegal uses exceed the potential profit of the use.
- Develop mechanisms for compliance and redress.

19. Sustainability of uses of biological diversity will be enhanced when appropriate measures are taken for the protection of biological resources and remediation of the harmful effects of pollution, fire, civil and armed conflicts, displaced people and other externally derived impacts.

Rationale: This is often difficult to achieve as loss of biological diversity to these effects is largely as a result of unplanned incidents which are unrelated to the use of biological diversity. Contingency planning to protect biological diversity within management areas from such incidents should be made and such planning will invariably be area specific. As a general observation, these effects derive from outside of the management area and are generally the cause of people's activities.

Practical Implementation Guidelines:

- Identify and assess potential threats.
- Develop guidelines.
- Make contingency plans and implement as necessary.

20. Sustainability of uses of biological diversity will be enhanced when a long-term process of education and public awareness is implemented.

Rationale: Many people are unaware of the connectivity between different parts of biological diversity and, in seeking to maximize their benefits from that diversity, may not realize the ultimate effects of their actions. It is necessary to engage people in education and awareness of the long-term benefits of the conservation of biological diversity in order for them then to strive for sustainability of any use of that biological diversity.

Practical Implementation Guidelines:

- Plan education and public awareness activities concerning: management, values of sustainable use, changing consumptive patterns and the value of biodiversity in the lives of people.
- Plan education and public awareness activities at all levels of the chain of production and consumption.
- Allocate adequate resources for necessary education .
- Conduct research on effective education methods.
- Apply appropriate education methods.
- Place emphasis on the environmental education of children with formal and informal methods.

21. Sustainable management of biological diversity is crucial for the conservation of some habitats.

Rationale: Some habitats depend on management for their survival. For example, agricultural upland meadows in central Europe are maintained by grazing of stock in appropriate densities. Many tropical savanna woodlands need regular fire events to promote seedling establishment.

Annex II

RECOMMENDATIONS

Noting the collaborative efforts and synergies developed during the three workshops by the CONVENTION ON BIOLOGICAL DIVERSITY and other international organizations such as CITES, FAO, IUCN, WWF and Indigenous Peoples, the participants in the Workshop recommended that:

(a) As called for by SBSTTA recommendation VII/3, a fourth workshop be organized for the further development of operational guidelines for the sustainable use of biological diversity. The terms of reference of the workshop could include the following:

(i) Integration of the sets of practical guiding principles and operational guidelines developed in Maputo, Hanoi and Salinas in one consolidated text; assessment of general applicability and specification of areas of application; formulation of guidance concerning the implementation of principles and guidelines in the consolidated document (action plan); addressing the issues of compliance and redress and linking compliance with accountability for biodiversity management; expansion of the associated instruments of indicators and preliminary outline of a monitoring system to include sociological, economic and political factors;

(ii) Consideration and inclusion, as appropriate, of other relevant principles, guidelines, criteria and codes of conducts for the sustainable use of biological resources developed by other international agencies (i.e. FAO, ITTO, etc.); identification and development of processes needed for the understanding of liability and redress; consideration of the third objective of the convention, the fair and equitable sharing arising out of the utilization of biological resources;

(iii) Provision of advice concerning the elaboration of management plans at time scales appropriate to the life history and the conservation or management needs of species or populations;

(iv) Provision of advice on mechanisms to promote sustainable use of components of biological diversity that are subject to multiple jurisdictions (e.g. A resource shared between different countries, or migratory species moving across national jurisdictions), also taking into account the practical experience on this issue developed in other multilateral agreements;

(v) Identification of areas where current knowledge needs to be developed so to increase the understanding of the concept of sustainability including, *inter alia*:

a. development of a better understanding of the functional relationships between different components of biological diversity in the context of sustainable use, especially at community level, and the relevance of keystone species, dominant species or 'redundant' species (ecological equivalents) as indicators of change due to use; and

b. development of indicators for external influences (e.g. pollution, natural disasters-poverty, foreign debt,) and development of the socio-economic sustainability of a use regime, in order to complement indicators of change in the biological status of resources and its relationship to human livelihoods.

(b) In preparing for the fourth meeting, the Executive Secretary of the Convention on Biological Diversity :

(i) collect comments from Parties and interested organizations on the output of the workshops for consideration in the 4th workshop;

(ii) compile information on good practices of adaptive management and monitoring systems for dissemination through the CHM;

(iii) request the secretariats of other organizations to provide information on relevant principles, guidelines, criteria and codes of conducts of these organizations relevant to sustainable use of biodiversity.

(c) the Executive Secretary report to the Commission on Sustainable Development on results achieved to date for inclusion of the guidelines in the follow-up process of WSSD;

(d) future work on sustainable use be developed in collaboration with relevant international agencies to enhance interagency collaboration, avoid unnecessary duplication of efforts and promote harmonization;

(e) SBSTTA consider indicators of sustainable use of biodiversity in its work on indicators.
