



IUCN Environmental Law Centre
IUCN Biodiversity Programme

A Guide to the Convention on Biological Diversity

Lyle Glowka, Françoise Burhenne-Guilmin
and Hugh Synge in collaboration with
Jeffrey A. McNeely and Lothar Gündling

Environmental Policy and Law Paper No. 30

A Guide to the Convention on Biological Diversity

IUCN - The World Conservation Union

Founded in 1948, The World Conservation Union brings together States, government agencies and a diverse range of non-governmental organizations in a unique world partnership: over 842 members in all, spread across some 132 countries.

As a Union, IUCN seeks to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. A central secretariat coordinates the IUCN Programme and serves the Union membership, representing their views on the world stage and providing them with the strategies, services, scientific knowledge and technical support they need to achieve their goals. Through its six Commissions, IUCN draws together over 6000 expert volunteers in project teams and action groups, focusing in particular on species and biodiversity conservation and the management of habitats and natural resources. The Union has helped many countries to prepare National Conservation Strategies, and demonstrates the application of its knowledge through the field projects it supervises. Operations are increasingly decentralized and are carried forward by an expanding network of regional and country offices, located principally in developing countries.

The World Conservation Union builds on the strengths of its members, networks and partners to enhance their capacity and to support global alliances to safeguard natural resources at local, regional and global levels.

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The views of the authors expressed in this publication do not necessarily reflect those of IUCN.

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Editorial Note

The primary goal of *A Guide to the Convention on Biological Diversity* is to explain the Convention's text. Where appropriate, options for implementing a Convention article are provided. In many instances, these suggestions draw on existing environmental policy documents and action plans such as the *World Conservation Strategy*, *Caring for the Earth*, the *Global Biodiversity Strategy* and *Agenda 21*. We have tried to make the *Guide* as objective as possible in order to avoid prejudging the Convention's future interpretation by the Parties, whether collectively or individually.

The *Guide* has been designed as a reference document for anyone desiring more information on the Convention on Biological Diversity and possible steps for its implementation. This book is not meant to be read "cover to cover". We hope that the table of contents, pagination, index and the cross-references made in the commentary will give the reader easy access to the *Guide* itself and provide a comprehensive view of what could be involved with fulfilling the Convention or its individual articles. A bibliography provides references to materials used in the commentary.

We hope to update the *Guide* when appropriate with supplemental materials, especially to reflect decisions taken by the Conference of the Parties. If you would like to comment on how to improve the *Guide*, or send us information that would be useful in future editions, please write to: Dr. Françoise Burhenne-Guilmin, Head, IUCN Environmental Law Centre, Adenauerallee 214, Bonn D-53113 GERMANY. TEL: 49.228.2692.231; FAX: 49.228.2692.250; E-MAIL: elcb@hq.iucn.org.

Foreword

The Convention on Biological Diversity marks an historic commitment. It is a commitment by the nations of the world to conserve biological diversity, to use biological resources sustainably and to share equitably the benefits arising from the use of genetic resources. It is the first global agreement to address comprehensively all aspects of biological diversity—genetic resources, species and ecosystems.

The Convention entered into force on 29 December 1993, a bare eighteen months after it was opened for signature at the 1992 United Nations Conference on Environment and Development in Rio de Janeiro. The Contracting Parties to the Convention now need to face the big challenge—the challenge to implement, realizing that the Convention's goal-oriented nature gives them the flexibility to address the wide-ranging and complicated tasks of conserving biological diversity and sustainably using biological resources.

As a first step in facilitating the implementation process, IUCN presents *A Guide to the Convention on Biological Diversity*. The aim is to promote greater understanding of the Convention's text and its possible implications. The *Guide* explains the Convention and highlights some of the scientific, technical and legal issues upon which it is founded. Wherever it was felt necessary or beneficial to the understanding and implications of an article analyzed, the commentary presents possible approaches or options for its implementation.

This volume, however, is not a handbook or strategy on how to conserve biological diversity or how to use biological resources sustainably. IUCN has contributed to or written a number of major documents to this purpose and, in particular, IUCN worked in partnership with the World Resources Institute and the United Nations Environment Programme (UNEP) to prepare the *Global Biodiversity Strategy* (1992). We also prepared jointly with UNEP and the World Wide Fund for Nature the *World Conservation Strategy* (1980), followed by *Caring for the Earth* (1991), which placed conservation in the wider framework of achieving sustainable living within nature's limits.

We will do all we can to help the Parties implement the Convention on Biological Diversity. Already we are receiving requests almost daily from our members—governments, government agencies and non-governmental organizations—for advice on the Convention and assistance in preparing strategies, plans and legislation for its implementation. The *Guide* is one response. Our networks, manuals, guidelines and other technical expertise are also available to support this effort.

We hope that the *Guide's* analyses will be useful to those involved with implementing the Convention on Biological Diversity, as well as those interested in biodiversity in general. We also hope to update the *Guide* when the need arises, especially to reflect decisions taken by the Conference of the Parties.

A Guide to the Convention on Biological Diversity is a joint publication of the IUCN Environmental Law Programme and the IUCN Biodiversity Programme. We are very grateful to the Government of Switzerland, specifically the Direction de la Coopération au Développement et de l'Aide humanitaire (DDA), for generously providing the financial support which made the *Guide* possible.

I would also like to thank my predecessor, Dr. Martin W. Holdgate who, from the *Guide's* inception by the Environmental Law Centre, took a strong personal interest in its completion.

David McDowell
Director General, IUCN - The World Conservation Union

Authors' Note to the Second English Printing of the Guide

When the Convention on Biological Diversity first entered into force for 30 Parties on 29 December 1993, few people imagined that over 150 States would have ratified it less than three years later. By the time the Third Meeting of the Conference of Parties closes in Buenos Aires, Argentina in November 1996, the Convention on Biological Diversity will be one of the most widely ratified international treaties on *any* environmental issue.

Perhaps its greatest achievement so far has been to generate an enormous amount of interest in biodiversity at the national level. The Convention has helped to instigate a political climate in many developed and developing countries where, for the first time, biodiversity is seen as a critically important environment and development issue.

There are two main reasons for this. First, unlike other international agreements which set strict concrete targets for national action or require their parties to fulfil concrete specific actions, the Convention takes a flexible country-driven approach to implementation.

Second, the Convention requires Parties to prepare national biodiversity strategies and action plans. Most countries preparing such plans have used participatory processes which have broadened public support for action on biodiversity issues beyond the more traditional conservation community. These processes have inevitably involved a broad range of constituencies that depend on biodiversity and which have not had a voice in national policy and decision-making processes on the issue until now. The convergence of governmental and public interests is, in some cases, leading to the substantial re-alignment of national policies with the Convention's broad goals.

It is still too early to tell how this more receptive political climate will translate into action on the ground, where it matters most. However, we see the Convention's broad political acceptance at the national level as the departure point for addressing the full range of issues its implementation raises. The loss of biodiversity is an insidious problem whose roots lie in socio-economics. And, unlike other problems, in many cases quick technological fixes will not provide solutions.

Although the main focus of the Convention is at the national level, progress has also been made at the global level. The sheer number of ratifications demonstrates the international community's recognition that global biodiversity loss is a major environment and development issue for both developed and developing countries which must be addressed as the world enters a new millennium. Furthermore, the Convention's Conference of Parties (COP) has now met three times, facilitating the sharing of the views from a diverse range of constituencies.

While the Convention's fast start has not surprised us, the *Guide's* popularity has. Released in November 1994, the *Guide's* first printing in English was made possible by the generosity of the Swiss Government's Direction de la Coopération au Développement et de l'Aide humanitaire (DDA). IUCN has now distributed almost 5000 English language copies of the *Guide* world-wide. Swiss DDA has also made possible the *Guide's* translation into Spanish and French as well as the printing of three thousand copies each, available by the end of 1996. An Arabic version will follow in early 1997. While we are very grateful for Swiss DDA's support, especially for this second English printing, some have not waited for us to translate and distribute the *Guide* into their local language. Instead, they have done it themselves, as was the case in South Korea. This kind of initiative is most exciting and we certainly hope it continues. We are also excited by and have begun to explore the possibilities of making the *Guide* electronically available through the Internet.

This second English printing, and the other language versions, reprints the original 1994 version of the *Guide* almost word for word. Very minor revisions, however, have been introduced in the commentaries for articles 8(j), 15(3) and (5) and Box 13 to help clarify ambiguous points and remedy factual oversights.

We have been very encouraged by the 1994 *Guide's* success as it parallels the deepening interest in biodiversity in general, and the Convention on Biological Diversity in particular. However, we do realize the need for the *Guide* to be updated periodically. We hope to do this in the near future. At least for the moment though, we are confident that the 1994 edition will remain useful for a few more years to come.

Lyle Glowka, Françoise Burhenne-Guilmin, Hugh Synge
Bonn, November 1996

Acknowledgments

The *Guide* is the product of a long process which started in early 1993. After informal meetings and consultations within the IUCN secretariat, a preliminary draft was completed in June 1993 and circulated internally within the IUCN structure for comment. With the comments received, a first draft was subsequently prepared and widely circulated in October 1993 for broader outside comments. It was distributed to IUCN staff, all IUCN Commissions and all members of the IUCN Commission on Environmental Law. It was also distributed in October to participants of the Global Biodiversity Forum which took place at IUCN headquarters and to the first meeting of the Intergovernmental Committee for the Convention on Biological Diversity.

Two training workshops were held in November 1993 to obtain further feedback on the *Guide* and better tailor it to national and regional contexts. The first workshop, organized in Islamabad, Pakistan by IUCN's Pakistan Country Office, used the *Guide* as the basis to introduce and explain the Convention to a multi-disciplinary group of governmental and non-governmental experts, foster discussion on the Convention among the workshop participants, and obtain comments on how to improve the *Guide*. The second workshop, organized by IUCN's South American Regional Office, took place in Quito, Ecuador. The participants were governmental and non-governmental legal experts from the South American region, including Argentina, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay and Venezuela. This workshop focused on national legislation needed for implementing the Convention and provided comments on the legal aspects of the *Guide*. We are grateful to all of the workshop participants for their time, as well as their insight. We heartily thank our IUCN colleagues in Pakistan and Quito, in particular Aban Marker Kabraji, (Pakistan Country Representative in Islamabad), and Luis Castello (IUCN Representative, Regional Office for South America in Quito) for making these workshops a success. Our special thanks also to Parvez Hassan, Chairman of the IUCN Commission on Environmental Law, for his skilled leadership and thoughtful comments during the Pakistan workshop.

Many people have assisted us with the *Guide* by providing thoughtful verbal or written comments, responding to our questions or sending us documents. In this regard, we would like to especially acknowledge Wale AJAI (Lagos, Nigeria), Marc AUER (Bonn, Germany), George AYAD (Rome, Italy), Amb. Julio BARBOSA (Buenos Aires, Argentina), Hyacinth BILLINGS (Washington, DC, United States of America), Simone BILDERBEEK (Amsterdam, The Netherlands), Ron BISSET (Gland, Switzerland), Alan E. BOYLE (London, United Kingdom), Ulf CARLSSON (Nairobi, Kenya), Manab CHAKRABORTY (Geneva, Switzerland), Melinda CHANDLER (Washington, DC, USA), Anne DUFFY (Gland, Switzerland), Martin H. EDWARDS (Kingston, Canada), Jose ESQUINAS-ALCAZAR (Rome, Italy), Jose Enrique GARRIDO (Madrid, Spain), A. Ghafoor GHAZNAWI (Paris, France), L. Val GIDDINGS (Hyattsville, USA), Wendy GOLDSTEIN (Gland, Switzerland), Frank P. GRAD (New York, USA), Alistair GRAHAM (Tasmania, Australia), Barry GREENGRASS (Geneva, Switzerland), Anil K. GUPTA (Vastrapur, India), André HEITZ (Geneva, Switzerland), Gudrun HENNE (Berlin, Germany), Vernon HEYWOOD (Richmond, UK), William IRWIN (Washington, DC, USA), Silvia JAQUENOD DE ZSOGON (Madrid, Spain), Calestous JUMA (Nairobi, Kenya), Aidar KARATABANOV (Nairobi, Kenya), Lee A. KIMBALL (Washington, DC, USA), Ken KING (Washington, DC, USA), Veit KOESTER (Copenhagen, Denmark), William LESSER (Geneva, Switzerland), Arturo MARTINEZ (Geneva, Switzerland), Fiona McCONNELL (London, UK), Nikki MEITH (Gland, Switzerland), Usha MENON (New Delhi, India), Gabriel MICHANEK (Uppsala, Sweden), Kenton R. MILLER (Washington, DC, USA), Patti MOORE (Bonn, Germany), Gonzalo MORALES (Caracas, Venezuela), Sylvia MOSS (Cave Hill, Barbados), Richard N. MOTT (Washington, DC, USA), John MUGABE (Maastricht, The Netherlands), Daniel NAVID (Gland, Switzerland), Hon. Justice J.D. OGUNDERE (Benin-City, Benin), Adrian OTTEN (Geneva, Switzerland), Michel PIMBERT (Gland, Switzerland), Walter V. REID

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Denise Schmitz and Maaïke Bourgeois, at the IUCN Environmental Law Centre, have provided tireless secretarial support with the seemingly endless revision of the *Guide's* commentary.

Finally, we want to extend our deep appreciation to Martin W. Holdgate, out-going Director-General of IUCN, who provided the intellectual support to get the project off the ground and running.

Our thanks go to all of these people, and others, for their assistance with the *Guide*. We, however, remain responsible for any weaknesses that remain.

*Lyle Glowka
Françoise Burhenne-Guilmin
Hugh Synge
September 1994*

Introduction¹

On 22 May 1992, in Nairobi, the nations of the world adopted a global Convention on Biological Diversity. Later, on 5 June 1992, at the UN Conference on Environment and Development in Rio de Janeiro, a record number of over 150 States signed it. Approximately 18 months later, on 29 December 1993, the Convention entered into force.

The treaty is a landmark in the environment and development field, as it takes for the first time a comprehensive rather than a sectoral approach to conservation of the Earth's biodiversity and sustainable use of biological resources. It recognizes the vital point made in the *World Conservation Strategy* (1980), *Caring for the Earth* (1991), the *Global Biodiversity Strategy* (1992) and many other international documents that both biodiversity and biological resources should be conserved for reasons of ethics, economic benefit and indeed human survival. It implicitly accepts the telling point that the environmental impact which future generations may most regret about our time is the loss of biodiversity, in part because most of it—for example loss of species—cannot be reversed.

The Convention, however, goes beyond the conservation of biodiversity *per se* and the sustainable use of biological resources, to encompass such issues as access to genetic resources, sharing of benefits from the use of genetic material and access to technology, including biotechnology.

The fact that biological diversity is unevenly distributed around the globe is also recognized in the Convention. The North, biologically poorer, has depleted its biodiversity reserves over time, but such reserves are still found in the biologically rich South. If biodiversity is to be conserved, this imposes a heavier burden on the South, at a time when the use of biological resources is of paramount importance for developing countries in achieving development. The Convention recognizes that this burden, in turn, can only be alleviated by additional contributions (not only financial) from the industrialized North and through increased partnership between both developed and developing countries.

n The Character of the Convention

The Convention on Biological Diversity is a framework agreement in two senses. In the first sense, it leaves it up to individual Parties to determine how most of its provisions are to be implemented. This is because its provisions are mostly expressed as overall goals and policies, rather than as hard and precise obligations as in, for example, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Nor does it tend to set targets, as does, for example, the recent European Council Directive on the Protection of Natural and Semi-natural Habitats and of Wild Fauna and Flora, which lists hundreds of species that should be brought back to "satisfactory levels". Instead, the emphasis in the Convention on Biological Diversity is to place the main decision-making at the national level: unlike other treaties related to the conservation of biological diversity, there are no lists, no annexes of accepted sites or of species to be protected.

With regard to the provisions on conservation and sustainable use, the focus on action at the national level is emphasized by two crucial articles—article 1 which sets out the Convention's objectives, including the conservation of biological diversity and the sustainable use of its components, and article 6 which requires each Party to develop national strategies, plans or programmes for conservation of biodiversity and sustainable use of biological resources. It will often be the case that the Parties will have to go beyond the substantive provisions in the later articles to achieve the overall objectives in article 1.

The later articles set out the policies to be followed. Article 8 sets out the major policies for effective *in-situ* conservation of biological diversity, giving Parties a set of goals against which to match their own laws and policies. Article 9 does the same for *ex-situ* conservation, article 10 for sustainable use of biological resources and article 14 for environmental impact assessment. These goals are buttressed by less detailed commitments on research and training (article 12) and on education and awareness (article 13).

¹ The introduction is adapted from an article previously published by Françoise Burhenne-Guilmin and Susan Casey-Lefkowitz in the 1992 Yearbook of International Environmental Law.

The articles on access to genetic resources (article 15) and access to and transfer of technology (article 16), complex and imprecise as they are, also leave much to each Contracting Party to decide regarding their implementation. The financial articles (article 20, 21 and 39) were, to an extent, purposely left vague for the Conference of the Parties to later clarify; this part of the Convention's text simply reflects the level of agreement that could be achieved in time for the deadline of signature at UNCED in Rio de Janeiro on June 5, 1992.

That the Convention is a framework agreement is evident in the second sense because emphasis is placed on the possibility for the Conference of the Parties to further negotiate annexes and protocols.

n Origin and History

Well before the intergovernmental negotiations began under the aegis of the United Nations Environment Programme (UNEP), international experts had been promoting the idea of a global convention on biological diversity and working to develop elements for such an instrument.

Following recommendations from its General Assemblies, in particular in 1984 and 1987, IUCN -The World Conservation Union had been exploring the possibilities for a treaty on the subject and from 1984 to 1989 had prepared successive drafts of articles for inclusion in a treaty. The IUCN draft articles, which were prepared by IUCN's Commission on Environmental Law and the IUCN Environmental Law Centre with help from numerous experts, notably the Joint IUCN/WWF Plant Advisory Group, concentrated on the global action needed to conserve biodiversity at the genetic, species and ecosystem levels, and focused on *in-situ* conservation within and outside protected areas; it also included the provision of a funding mechanism to alleviate the inequality of the conservation burden between the North and the South, already reflecting at the time the view that a convention without new and additional funding would not be worth pursuing.

In 1987, the UNEP Governing Council recognized the need to increase and streamline international efforts to protect biological diversity. It therefore established an *ad hoc* working group to investigate "the desirability and possible form of an umbrella convention to rationalize current activities in this field, and to address other areas which might fall under such a convention" (UNEP Governing Council Res. 14/26(1987)).

The first meeting of the group in late 1988 concluded that the existing conventions addressed specific questions of biodiversity conservation but, because of their piecemeal nature, did not adequately meet the needs of conserving biodiversity worldwide. At the global level, the

existing conventions covered only internationally important natural sites (the World Heritage Convention), the specific threat of trade in endangered species (CITES), a specific ecosystem type (the Ramsar or Wetlands Convention) and a group of species (the Migratory Species Convention). In addition, there were various regional conventions on the conservation of nature and natural resources, some more comprehensive than others. Even taken together, these international accords could not ensure global conservation of biodiversity and so the group concluded that one or more additional legally binding mechanisms were needed at global level.

It soon became clear that the concept of developing an umbrella convention which would absorb or consolidate the existing conventions was legally and technically impossible. By early 1990, the *ad hoc* working group had reached a consensus that a new global treaty on biodiversity conservation was urgently needed—in the form of a framework treaty, building upon existing conventions.

In discussions on the scope of the Convention, it rapidly became apparent that many States were not prepared to consider only the conservation aspects in the strict sense. Some States also were not prepared to limit the discussion to wild resources. The scope for the Convention was gradually broadened to include all aspects and facets of biodiversity namely: *in-situ* and *ex-situ* conservation of wild and domesticated species, sustainable use of biological resources, access to genetic resources and to relevant technology, including biotechnology, access to benefits derived from such technology, safety of activities related to modified living organisms and provision of new and additional financial support.

With the draft articles developed by IUCN, and the later ones developed by FAO before them for consideration, as well as a number of studies commissioned by UNEP, the working group prepared a large number of elements for possible inclusion in a global treaty on biological diversity. The UNEP Secretariat, assisted by a small group of legal experts, then prepared a first draft of the convention based on all the "elements" that had been produced so far.

The formal negotiating process started in February 1991, when the group was renamed the Intergovernmental Negotiating Committee for a Convention on Biological Diversity (INC).

The main issues were divided between two working groups for discussion article by article. Working Group I dealt with general issues, such as the fundamental principles, general obligations, measures for *in-situ* and *ex-situ* conservation and the relationship with other legal instruments. Working Group II dealt with issues of access to genetic resources and relevant technologies, technology transfer, technical assistance, financial mechanisms and international cooperation. Progress

was slow and negotiation difficult, especially during the final negotiating sessions. As time passed, the self-imposed deadline for signature of the Convention—the UNCED Conference in June 1992—was approaching with alarming speed.

The negotiations were often close to breaking down. Even on 22 May, the final day of the final negotiating session in Nairobi, it was not clear until the last moment whether the Convention would be adopted. Had the UNCED deadline not been present, it is unlikely that a convention would have been adopted on that date. Yet in spite of this fact, and in spite of the tensions in the negotiation, the number of signatures to the Convention in Rio on 5 June was unprecedented. The entry into force of the Convention, only 18 months after it was adopted was equally stunning.

n The Issues Covered by the Convention

The Convention can be hailed as a landmark from several points of view. It is the first time that biodiversity, as such, is comprehensively addressed, and the first time that genetic diversity is specifically covered in a binding global treaty. It is also the first time that the conservation of biodiversity is recognized as the common concern of humankind.

By including issues of access and use of genetic resources, as well as technology transfer and biosafety, the Convention demonstrates a will to address all aspects of biodiversity. By creating a mechanism to provide funds to developing countries to help them implement the Convention, the need for new and additional resources to flow from North to South is also addressed.

The major issues of the Convention are discussed below in summary form and elaborated in detail in the commentary on the individual articles.

A. National Sovereignty and the Common Concern of Humankind

The proposition that biodiversity should be considered as the "common heritage" of humankind was rejected at an early stage, since most components of biological diversity are situated in areas under national jurisdiction. Instead, a firm emphasis was placed on sovereign rights over biological resources, while recognizing that the conservation of biological diversity is a "common concern" of humankind. "Common concern" implies a common responsibility to the issue based on its paramount importance to the international community as a whole.

The sovereign rights of States over their natural resources are referred to in the preamble and twice in the main text. Article 3 reproduces *verbatim* Principle 21 of

the Stockholm Declaration, recognizing that States have the sovereign right to exploit their own resources pursuant to their own environmental policies. Article 15, on access to genetic resources, again recalls the sovereign rights of States over their natural resources as a basis for the authority to determine access to genetic resources.

However, this emphasis on national sovereignty is balanced by duties deriving both from sovereignty itself and from the fact that the conservation of biodiversity is a common concern to the entire international community. Indeed, it is significant that the preamble affirms first that the conservation of biological diversity is a common concern of humankind and only thereafter reaffirms that States have sovereign rights over their own biological resources.

Emphasis is also placed on the responsibilities of States towards biological resources within their jurisdiction. The preamble makes clear that States are responsible for conserving their biodiversity and for using the biological resources constituting this biodiversity in a sustainable manner; this is also emphasized by the acceptance of detailed responsibilities and obligations on these matters, as for instance in article 6 (General Measures for Conservation and Sustainable Use), article 8 (*In-situ* Conservation) and article 10 (Sustainable Use of Components of Biological Diversity).

B. Conservation and Sustainable Use

The Convention contains a series of far-reaching obligations related to the conservation of biological diversity and the sustainable use of its components.

On the strategic planning side, as already mentioned, the Convention creates obligations to develop national strategies and plans, to integrate the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies, as well as into national decision-making (articles 6 and 10).

To base their activities on good science, each Party undertakes to identify important components of biodiversity and to identify priorities which may need special conservation measures, or which may offer the greatest potential for sustainable use. Processes and categories of activities which may have significant adverse effects on conservation and use are also to be identified and monitored (article 7).

Emphasis is given to *in-situ* conservation with obligations which constitute a comprehensive agenda, and call for measures ranging from the establishment of a system of protected areas to the rehabilitation of degraded ecosystems and recovery of threatened species, the protection of natural habitats and the maintenance of viable populations of species in natural surroundings (article 8).

Ex-situ conservation measures are also called for, principally to complement the *in-situ* measures (article 9).

Obligations on the sustainable use of biological resources are interwoven into a number of articles, and are also the specific subject of article 10. Parties undertake to regulate or manage biological resources for conservation and sustainable use and to encourage the development of methods for sustainable use.

The role of indigenous and local communities in conserving biodiversity is recognized in the preamble; the importance of maintaining their knowledge and practices relevant to the conservation of biodiversity and the sustainable use of its components is also recognized, as is the need to encourage equitable sharing of benefits derived from the use of their knowledge and innovations (article 8(j) and article 10(c)).

Finally, measures for research and training (article 12) and for public education and awareness (article 13) are required. So too is the use of techniques, such as impact assessment (article 14(1)(a) and (b)) and contingency measures for emergency situations, in support of national decision-making (article 14(l)(c)-(e)).

Four points can be made about these obligations. First, the Convention consistently makes a distinction between conservation and sustainable use. There was much debate in the negotiations about this. Many advocated that conservation should be used as a broad term which includes the concept of sustainable use, as in the *World Conservation Strategy*. In the end, sustainable use was included as a separate term and defined in article 2, to emphasize the overwhelming importance that countries, especially developing countries, attach to the use of their biological resources. By contrast, conservation is purposely not defined and is used in the Convention sometimes in a broad and sometimes in a restricted sense.

On the whole, in spite of its haziness regarding the term conservation, the Convention does justice to modern conservation thinking. Not only does it consistently recognize that sustainable use of living resources and the ecosystems of which they are a part is a prerequisite for biodiversity conservation, it also acknowledges the need for certain components to be given special care and treatment. Thus, the provisions on conservation and sustainable use reflect the full spectrum of measures needed to achieve the overall goal of the Convention.

Second, the obligations often concern individual biological resources rather than diversity *per se*. Although the conservation of the Earth's biodiversity is the fundamental goal of the treaty, this can only be achieved by implementing different sets of obligations on its different elements—ecosystems, species and genetic resources—and generally on the biological resources that may be seen as the source of biodiversity. Thus, one can argue that the Convention, because it addresses the use of

biological resources, has a wider aim than some would like to acknowledge or than the title connotes.

Through its attention to the components of biodiversity, the Convention addresses the causes rather than the symptoms of the loss of biodiversity, while at the same time becoming a major instrument in the context of sustainable development. This comprehensive approach, beyond biodiversity *per se*, makes the Convention important to all States, not only those particularly rich in biodiversity: all of the Earth's biological resources, as components of biodiversity, fall under its terms.

Third, the obligations of the Convention, dealing with conservation and sustainable use, are far-reaching when taken in their pure form, without qualifiers. This is why most of the articles have been prefaced by phrases limiting their application. The purpose of most qualifiers is to make the level of implementation commensurate to the capacities of each Party to meet the obligation at hand. At times, explicit distinctions are made between what is expected from developed and developing country Parties, as in, for example, article 20 on financial resources.

These qualifiers have met with considerable criticism. However, the need to differentiate between the capabilities of developed and developing country Parties has long been recognized. Such qualifiers, which are usually disliked for the elasticity they introduce in a legally binding text, are almost inherent in global conservation conventions with broad goals. The necessity to attune the obligations in Conventions to what is possible, practicable, necessary or appropriate was first illustrated in the 1982 United Nations Convention on the Law of the Sea, the first of this type. From both a substantive and a drafting point of view, the alternative to using such qualifiers would, in any case, be to weaken the obligation itself. After all, much more important than the qualifier is the will and the means to carry out the requirements of implementation.

The fourth point is the focus on national action, which has already been touched upon. Efforts geared at establishing international mechanisms to set priorities met with considerable resistance and were perceived by the Group of 77 developing countries as attempts of the developed countries to influence or even dictate action on biological resources under their jurisdiction. Tools such as global lists were rejected as they were seen as instruments to short-circuit national priorities and to impose globally determined ones both on conservation generally and on the protection of specific sites and species in particular. The global lists controversy was the focal point of this sensitivity and the debate ultimately resulted in the word "global" being removed from all parts of the text.

The emphasis on national action and priority-setting is desirable from several points of view. First, it is at the national and sub-national levels that biodiversity can effectively be conserved and biological resources efficiently managed. Second, States are more likely to adhere to priorities developed at the national level, rather than to ones established with mainly global concerns in mind. Third, the conservation of biodiversity and the sustainable use of biological resources is so complex and so multi-faceted an issue that the exact tasks can only be determined and carried out at the national, or indeed local, level. Of all environmental problems, it is probably the least amenable to top-down solutions.

However, what may be lacking as a result, is the consistency of approach and the harmonization of goals that coordination and common priority setting at the international level can bring. If each Party sets its conservation priorities based on potentially differing criteria, the need for global consistency, which generated the Convention in the first place, might not be fulfilled. The fact that a measure of priority-setting can be achieved through the financial mechanism is only a palliative. The positive role of the Conference of the Parties to guide and promote harmonized approaches may become a crucial one.

C. The Access Issues

Access-related issues were some of the thorniest in the negotiation of the Convention. In order to be willing to discuss and eventually take on the conservation obligations, developing countries made certain demands of their own. Not only did they press for the Convention to become more directly use-oriented, but many made their participation in the negotiations conditional on the inclusion in the Convention of obligations and measures on three types of access: access to genetic resources, which they wished to have recognized as subject to national authority; access to relevant technology, stressing that it includes biotechnology; and access for the providing States to benefits ultimately gained from the use of genetic material in the development of biotechnology.

Until the negotiation of the Convention, the principle of free access to genetic resources had prevailed and is recognized in the FAO Undertaking on Plant Genetic Resources of 1983, which, however, in the context of a mounting controversy over genetic resources control, has remained a non-binding instrument. Since the early 1980s, several countries restricted access to the genetic resources under their jurisdiction, and the calls of developing nations for national controls over genetic resources have become increasingly louder. During the negotiation of the Convention on Biological Diversity, this point of view prevailed. As a result, article 15 recognizes that the authority to determine access to genetic resources rests with the national governments and is subject to national legislation.

This evolution is based on the view that there is no legal reason to exempt genetic resources from the principle of national sovereignty over natural resources. But it is also grounded in practical reasoning: control over access to genetic resources gives the providing Party the opportunity to negotiate the mutually agreed terms for fair and equitable sharing of benefits required by article 15(7).

That these issues are intertwined is not new and their concurrent discussion has only intensified during the past decade: increased progress in biotechnology has provoked greater attention to the value of genetic resources, while the protection developed in industrialized nations through intellectual property rights over the resulting products exacerbated the debate, and expanded it well beyond the narrow scope of new plant varieties to which it had previously been limited.

Today, the trend is for industrialized nations to extend intellectual property protection, including patents, to a wide spectrum of living organisms. These property systems reward human ingenuity, but ignore nature's handiwork—the value of the raw material that is manipulated. They also fail to take into consideration the informal contribution of indigenous peoples and farmers to the maintenance and development of genetic diversity through years of cultivation and husbandry.

In the negotiations, the goal of the Group of 77 was to ensure that the value and contribution of the raw material itself be properly recognized. One possible route for the Convention would have been to require contributions from the users of the genetic material to an international fund for biodiversity conservation and sustainable use, independent of the origin of the material. Instead, following the national orientation of the Convention, articles 15, 16 and 19 require that access to results and benefits be given on a bilateral level, so that those Parties providing the genetic material obtain a fair and equitable share of the benefits when and if these are realized. The arrangement is to be decided in each individual situation according to mutually agreed terms.

But, to effectively implement the letter, let alone the spirit, of these provisions will not be easy, and in practice there will be many difficulties at the implementation stage. The obligations under articles 15(7), 16(3) and 19(2) leave considerable discretion with the Party. In addition, the identification of material from which the benefit derives is not a simple matter, especially as it may be a decade or more before the benefit is realized and as the genetic material used may have been gathered from several sources.

Even more difficult was to find an acceptable compromise regarding the broader issue of access to and transfer of technologies. The resulting text reflects the importance developed countries place on intellectual property rights, but nevertheless creates a basic obligation to

undertake to provide, or facilitate access to and transfer of, technology, including biotechnology.

Finally, the provisions on technology transfer and on access to benefits of biotechnology are limited by the definition of genetic resources in article 15(3). The result excludes from the scope of the Convention genetic resources placed in gene banks and other *ex-situ* facilities before the entry into force of the Convention.

D. Funding

It was never questioned in the negotiations that a flow of resources from the North to the South was needed to achieve the various goals of the Convention. Several innovative methods to achieve this had been discussed during the early stages, including an international fund based on fees levied on the use of biological, and especially genetic, resources in the North. Others, such as the creation of an international corporation, in which Parties could invest through buying shares, were considered during the negotiation process.

In the end, the negotiators chose to create a more classical financial mechanism to be fed by contributions of the developed country Parties for the exclusive use of the developing country Parties. The funds which, according to article 20 on financial resources, are to be new and additional, will be applied to enable developing country parties to meet the agreed full incremental costs to them of the measures needed to implement the Convention's obligations. The agreement on what exactly these costs are is to be made bilaterally between each developing country Party and the institution chosen to handle the financial mechanism.

The notion of incremental cost in this Convention poses problems. The situation with biodiversity is different from that of ozone depletion, where the concept of incremental cost has been used with some success. But in the context of the Convention on Biological Diversity, incremental costs are much more difficult to determine. However, as mentioned earlier, under article 20(2) the incremental costs to be met have to be agreed upon, which makes the financial obligations considerably more realistic.

The Conference of the Parties determines the amount of financial resources needed periodically and the contributions have to take into account the need for predictability, adequacy and timely flow of funds in order to meet the Convention's obligations. This provision, which caused great fears of an open financial commitment among the developed countries, was hotly debated and, at the very last moment, nearly caused the Convention not to be adopted. A joint interpretive statement at the time of adopting the Convention text on the part of 19 developed countries provided their interpretation of the adopted language for the record.

The financial mechanism, set out in article 21, provides financial resources to developing countries on a grant or concessional basis, under the authority of the Conference of the Parties to which it is directly accountable. The Global Environment Facility (GEF) was named in article 39 of the Convention as the institutional structure operating the financial mechanism on an interim basis and conditional on restructuring. There was an enormous reluctance among the developing countries to accept this solution, as they felt that the GEF did not operate in a transparent and democratic manner as required under article 21(1).

n Implementation

As already noted, the main thrust of implementation is at the national level. Each Party has much to do, considering the spectrum of actions Parties have to undertake and the wide range of policies they have to review. How they can do this is not the main subject of this volume, which is essentially an explanation of the Convention article by article. Nonetheless, whenever it was felt necessary or beneficial to the understanding and implications of the articles analyzed, the commentary does present general ideas on how a Party could approach the implementation of a particular obligation.

The success of national action, seen from a global perspective, will depend on the will of both the developed and developing country Parties to meet their obligations. Therefore, at this stage in the process, both in essence hold the success of each other in their hands. The level of implementation and enforcement will be the ultimate test of whether the compromise achieved during the Convention negotiation was a true success or an illusion.

At the international level, the machinery provided for in the Convention to steer and assist its implementation has to be set in motion. The Conference of the Parties, its Subsidiary Body on Scientific Technical and Technological Advice and the Secretariat all have key roles to play.

The financial mechanism must also be set in motion and, thus, steps must be taken to either adequately restructure the Global Environment Facility or to decide upon another institutional structure to perform the task of managing it. A pressing issue is to prepare the detailed criteria and guidelines for eligibility for access to and use of the financial resources which article 21 (2) requires the Conference of the Parties to determine.

Many other crucial tasks lie ahead, such as considering the need for further negotiation of certain issues through the preparation of protocols. Article 19(3) requires consideration to be given to a protocol on the safe transfer, handling and use of any living modified organism resulting from biotechnology that may have an adverse effect

on the conservation and sustainable use of biological diversity. Other protocols may become needed as implementation efforts proceed.

In order to prepare the operational phase of the implementation process, interim mechanisms and measures were called for by Resolution 2 of the Conference for the Adoption of the Convention (see appendix). An Intergovernmental Committee for the Convention on Biological Diversity (ICCBD) was established to operate until the first meeting of the Conference of the Parties at the end of 1994.

The first meeting of the ICCBD, in Geneva in October 1993, was preceded by the meetings of four experts panels convened by the UNEP Executive Director for advice in preparing the work of the ICCBD. UNEP also created an interim secretariat. The ICCBD is scheduled to meet at least one more time in 1994 in anticipation of the first meeting of the Conference of the Parties.

In both the interim and operational phase, it is important to draw from available expertise, as well as to build on existing activities. A number of international governmental and non-governmental organizations have worked on biodiversity issues for decades and it is essential to harness their knowledge and expertise in support of the implementation process. UNEP, FAO, UNESCO and IUCN have much to contribute, as have the World Resources Institute (WRI) and other international organizations with a sectoral focus. Initiatives such as the *Global Biodiversity Strategy* will enable Parties to make implementation decisions with the best background information to hand. Of equal importance is to link these implementation efforts to existing programmes, including those which are emerging from the implementation of *Agenda 21*, such as the UNDP-sponsored Capacity 21. These initiatives should not simply

exist parallel to the implementation of the Convention, but should play an integral part in the process and vice versa.

In the same vein, the relationship between the Convention on Biological Diversity and other conventions in the field should be reconsidered and links established to enable effective cooperation and coordination. The original reason for promoting a convention on biological diversity—to fill in the gaps of the existing fragmentary regime while building upon the existing conventions—should not be lost from sight at this stage. There are a considerable number of global and regional instruments directly relevant to biodiversity and both their achievements and potential must be taken into account and integrated to the maximum extent possible in the process of implementation. The problems inherent in trying to effectively link existing treaties in a particular field are difficult. Imaginative steps are required if the overall goal of the Convention, which is to lead to a truly comprehensive and integrated regime, is to be realized.

Finally, at both the national and international level, non-governmental organizations have an important role to play in the Convention's implementation. This was specifically recognized in preambular paragraph 14 which stresses "the importance of... the non-governmental sector for the conservation of biological diversity and the sustainable use of its components".

The growth of NGO interest for the Convention, in both developed and developing countries, bodes well for the Convention's implementation, and it is to be hoped that Parties will take full advantage of the knowledge, skills and commitment of NGOs in their country, as well as regionally and globally, to help them implement the Convention

Preamble

In any convention, the preamble is part of the legal agreement, but it does not itself establish binding obligations. Instead, it is where the negotiating States set out their concerns and motivations. In particular it is where they outline the issues to be addressed and justify the need for a convention.

Because of its unique character, the preamble to a convention often contains paragraphs reflecting thinking that is progressive in the sense that its implications go beyond the obligations in the substantive articles that follow. In effect, such paragraphs may be deemed not yet ripe for specific obligations, as there is not yet a consensus among States on their exact content, but their inclusion may be an important step in the development of customary international law or the specific obligations of future agreements, such as protocols. Preambular paragraph 12 on traditional lifestyles (see below) is an example of this. The preamble to the Convention on Biological Diversity is particularly long and detailed, since many of the principles found in draft article 3 were moved here at a late stage of negotiation.

Some short notes on the various paragraphs of the preamble are given below. Many of the themes mentioned are discussed in greater depth in the sections on the substantive articles that follow.

The Contracting Parties,

Conscious of the intrinsic value of biological diversity and of the ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values of biological diversity and its components,

Of the many different values of biodiversity listed, it is noteworthy that for the first time, the *intrinsic value of biological diversity* is recognized in a binding international instrument. This is a very important innovation, and may be seen as acknowledging the inherent right of all components of biodiversity to exist independent of their value to humankind. One regional treaty which references the *intrinsic value of species* is the Convention on the Conservation of European Wildlife and Natural Habitats (Berne, 1979). By contrast, the World Charter for Nature (UNGA Res. 37/7 (1982)), a non-binding instrument, refers to every life form as unique and warranting respect regardless of its worth to humans.

Conscious also of the importance of biological diversity for evolution and for maintaining life sustaining systems in the biosphere,

This paragraph recognizes two utilitarian reasons for conserving biodiversity. The first is evolution. A wide pool of diversity is valuable because it keeps evolutionary options open. Specifically, if populations become small and fragmented, they become vulnerable to inbreeding in which they lose, rather than gain, variability, leading to extinction instead of further evolution .

Second, this paragraph recognizes the great importance of living organisms in maintaining ecosystem structure and function (see Box 4). In particular, diversity among living organisms improves the capacity for living systems to adapt to variations in the physical components of the biosphere, such as climate changes. The role of biological diversity in maintaining ecosystem structure and function is very poorly understood, so the Convention's emphasis on this could be very valuable.

Affirming that the conservation of biological diversity is a common concern of humankind,

Reaffirming that States have sovereign rights over their own biological resources,

Reaffirming also that States are responsible for conserving their biological diversity and for using their biological resources in a sustainable manner,

Concerned that biological diversity is being significantly reduced by certain human activities,

Aware of the general lack of information and knowledge regarding biological diversity and of the urgent need to develop scientific, technical and institutional capacities to provide the basic understanding upon which to plan and implement appropriate measures,

Noting that it is vital to anticipate, prevent and attack the causes of significant reduction or loss of biological diversity at source,

The "common concern of humankind" is used here in the preamble to emphasize that *all* humanity has an interest ensuring the conservation of biological diversity because biological diversity is essential to sustaining *all* life on earth. Conservation is not an exclusive national affair; it is an issue which has also to be addressed by concerted international action, including the adoption of international legal instruments.

In tandem with affirming the conservation of biological diversity as the common concern of humankind, the Convention stresses the existing sovereignty of States. This is why the preamble reaffirms States' sovereign rights over "their" biological resources. In this case, the word "their" refers not to property rights, but is a short way to refer to biological resources found under the jurisdiction of a particular State. But, as the text goes on to affirm, these sovereign rights also bring with them responsibilities: States are responsible for conserving the biological diversity in areas within their jurisdiction and for ensuring that, when biological resources are used, the use is sustainable. The third paragraph, then, provides the critical link between States' sovereign rights over their biological resources and the common concern all humanity shares in ensuring that biological diversity is conserved.

This paragraph recognizes not only that biodiversity is being lost, but also that humans are the cause of much of that loss.

There is, in fact, a vast amount of data on biodiversity and on the functioning of biological systems, but not enough information in a form that decision-makers can use. For most countries, therefore, the issue is not so much whether the data exist, but how they can be assembled in a meaningful form for the purposes of the Convention. This problem is aggravated by the fact that most of the information on biodiversity, in particular on the classification and distribution of species, and much of the research capacity, is in developed countries, whereas the greater part of biodiversity is in developing countries. It is also aggravated by the lack of data on the socio-economic aspects of biodiversity, for example on its economic and social value and the costs to society of its loss. The goal is to support the acquisition of the knowledge needed to implement the Convention—and on a time scale that matches the urgency of the need. This is one important reason why the paragraph emphasizes the need to build scientific, technical and institutional capacity.

This paragraph recognizes that, as always, it is necessary in the long run to deal with the causes of problems and not only the symptoms—and to do so early. Good information is vital for this approach. The causes for loss of biodiversity include widespread poverty in some countries, excessive consumption in others, inequitable trade patterns, climate change, pollution and competition between humans and other species.

Noting also that where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat,

Noting further that the fundamental requirement for the conservation of biological diversity is the *in-situ* conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings,

Noting further that *ex-situ* measures, preferably in the country of origin, also have an important role to play,

Recognizing the close and traditional dependence of many indigenous and local communities embodying traditional lifestyles on biological resources, and the desirability of sharing equitably benefits arising from the use of traditional knowledge, innovations and practices relevant to the conservation of biological diversity and the sustainable use of its components,

The need for better information is tempered with a recognition that we need to act when threats to biodiversity become apparent and not wait until exhaustive scientific studies have been completed. The reaction of States to the threat of climate change or to the depletion of the ozone layer are examples of this approach, as in both of these cases there may be long-standing adverse effects to the environment if action is postponed until full scientific certainty is attained. A similar concern lies with the loss of biodiversity. Together with the preceding paragraph, preambular paragraph 9 reflects such a "precautionary approach", and closely parallels principle 15 of the Rio Declaration. With new threats to biodiversity, such as those from building a dam or clear cutting an old growth forest, there might be an important implication of a precautionary approach: in certain instances, the burden could be placed onto those who propose a project to prove it will not significantly reduce or cause significant loss of biological diversity.

The next 2 paragraphs set out the crucial balance between *in-situ* ("on-site") and *ex-situ* ("off-site") approaches to conserving biodiversity (see the discussion of article 8 (*In-situ* Conservation) and article 9 (*Ex-situ* Conservation)). By giving the prime role to the *in-situ* approach, the Convention accepts the argument that biological diversity should be conserved in the natural and human-influenced systems where it occurs and can continue to evolve. It recognizes that biodiversity cannot be conserved adequately by *ex-situ* measures alone, such as in a world gene bank. Nevertheless, *ex-situ* approaches have a valuable role to play: in particular they provide an "insurance policy" against species or genetic resource extinction in nature. They are often valuable in recovery programmes for endangered species, provided the species is later reintroduced, and they are a good way to make propagating material of useful plants and animals readily available. They are particularly important for the plants needed for agriculture, especially domesticated plants which cannot normally survive in nature unaided.

The phrase "preferably in the country of origin" encourages developing and maintaining *ex-situ* facilities in developing countries, from where many important genetic resources originate.

This paragraph recognizes the connection many communities have to their traditional access to biological resources and particularly looks forward to article 8(j) (respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities), and article 10(c) (encourage customary use of biological resources). It also recognizes that their knowledge of biological resources, and their techniques for using them, may be valuable to others. In recognizing the desirability of sharing the benefits equitably, the paragraph implies that such communities should receive benefits when techniques or knowledge from their traditional practices become more widely used. The form, magnitude and means of dispersing the benefits remain to be determined.

The phrase "embodying traditional lifestyles" seems to preclude *this paragraph from applying to people recently descended from communities "embodying traditional lifestyles", who no longer live in that way themselves.*

Recognizing also the vital role that women play in the conservation and sustainable use of biological diversity and affirming the need for the full participation of women at all levels of policy-making and implementation for biological diversity conservation,

Stressing the importance of, and the need to promote, international, regional and global cooperation among States and intergovernmental organizations and the non-governmental sector for the conservation of biological diversity and the sustainable use of its components,

Acknowledging that the provision of new and additional financial resources and appropriate access to relevant technologies can be expected to make a substantial difference in the world's ability to address the loss of biological diversity,

Acknowledging further that special provision is required to meet the needs of developing countries, including the provision of new and additional financial resources and appropriate access to relevant technologies,

This paragraph reflects current recognition of and thinking on the importance of women in environment and development issues, and is actually stronger than a parallel statement in the Rio Declaration (Principle 20). In developing countries, in particular, rural women often sow and harvest the crops, maintaining the valuable seed from year to year. They often are more active than men in local economies, which usually involve a wider use of species than those traded in regional or international markets. And in some societies, it is the women who regulate the take of wild species to ensure that it can be sustained.

Here, the States recognize the need to collaborate widely with each other and with multilateral organizations if they are to be successful in their efforts. Cooperation is important for implementing national measures to conserve biological diversity and sustainably use its components. In a transfrontier context, impacts in one State, such as pollution, may affect biodiversity in another; some species migrate between States and populations of many more are shared, making collaboration in their conservation essential. Finally, the Convention's obligations on sharing of technology and on sharing the benefits derived from the use of genetic material by definition require cooperation between States.

The reference to the non-governmental sector in a convention is innovative, and includes business, academia, citizens groups, as well as national and international non-governmental organizations (NGOs). The NGO community includes a large proportion of the world's leading scientists on biodiversity and has played a major role in advocating the need to conserve biodiversity. It could provide much help to Parties in implementing the Convention. As recognized by the UN Conference on Environment and Development in Rio, NGOs can bring commitment, innovation, clarity of purpose and practical knowledge to environment and development issues (see Box 23). Their contribution could be particularly useful in biodiversity issues, since much of the action needed has to be taken at the local level. In particular, Parties could rely on committed citizen groups at the village or community level to implement some of the provisions of the Convention.

This and the next two paragraphs should be taken together. The first makes the novel and significant point that *all* States, developing and developed, need "new and additional financial resources" to slow the loss of biological diversity (see the discussion of article 20 (Financial Resources)). It is also noteworthy—and a major theme of the Convention—that technology is seen as vital in addressing the loss of biodiversity. These include both traditional and modern, informal and formal, "soft" and "hard" technologies—from fermentation to gene-splicing, from traditional seed storage to cryo-preservation (see Box 3).

The next paragraph then addresses the specific needs of developing countries. Significantly, the paragraph declares that it is not only "new and additional" finance that is needed. Access to technology (see article 16) is specifically called for, and the word "including" implies the need for other forms of assistance, such as scientific and technical cooperation (see article 18).

Noting in this regard the special conditions of the least developed countries and small island States,

The third paragraph then gives special emphasis to the needs of two sets of countries—the least developed countries and small island States (see article 20(5)-(7)). The phrase "in this regard" may be interpreted as referring back to the previous two paragraphs, and orients this paragraph towards the provision of finance and other assistance.

The inclusion of small island States is noteworthy. Some of these are among the least developed countries, and many of them, because of their small size, lack the institutions and professional expertise of larger countries. One person often has to do the jobs that many experts would do in a larger country.

Islands, too, especially those in the tropics and those far from the mainland, often contain high proportions of endemic species, that is, species not found elsewhere in the world, and so of international importance. Also, island biodiversity is often under great pressure and threat, partly because of the pressure on limited land and partly because the endemic plants and animals tend to be particularly vulnerable to disturbance and to being out-competed by introduced invasive species (see article 8(h)). In addition, climate change and associated sea-level rise are also potent threats, jeopardizing the very existence of some low-lying island States.

Acknowledging that substantial investments are required to conserve biological diversity and that there is the expectation of a broad range of environmental, economic and social benefits from those investments,

This very important paragraph recognizes that significant resources are needed to conserve biodiversity, but that those investments will also have real and substantial development benefits. This is because conservation and development reinforce each other; neither can succeed in the long term without the other. It is worth noting, also, that much of the loss of biodiversity is an incidental effect of past investment in exploiting biological resources in unsustainable ways. Some of the many examples include building timber mills with excessive capacity, over-investing in fishing fleets and providing subsidies for converting natural habitats into agricultural land in situations of food surplus. "New and additional" funding will not nearly be enough to turn the tide especially as national budgets become increasingly overstretched. What is needed therefore is to revise the ways in which public and private funds are currently spent in so far as they affect the exploitation of biological resources so that conservation can be accomplished quickly, efficiently and with the least cost possible (see the discussion of article 20(1)).

Recognizing that economic and social development and poverty eradication are the first and overriding priorities of developing countries,

The first of the next two paragraphs recognizes that the allocation of more resources for biodiversity conservation does not alter the order of priority in developing countries—economic and social development comes first (see article 20(4)). Nonetheless, the second paragraph—and the Convention's adoption by many developing countries—acknowledges that the conservation of biological diversity and the sustainable use of its components contributes to economic and social development.

Aware that conservation and sustainable use of biological diversity is of critical importance for meeting the food, health and other needs of the growing world population, for which purpose access to and sharing of both genetic resources and technologies are essential,

Noting that, ultimately, the conservation and sustainable use of biological diversity will strengthen friendly relations among States and contribute to peace for humankind,

Desiring to enhance and complement existing international arrangements for the conservation of biological diversity and sustainable use of its components, and

Determined to conserve and sustainably use biological diversity for the benefit of present and future generations,

Have agreed as follows:

This paragraph goes some way towards recognizing the principle of ecological security—that the peace and stability of a nation depend not only on its conventional military defense, but also on its environmental stability. Environmental degradation within a country can result in social collapse and appalling human tragedies, leading to disputes within and between nations and even war. In particular, over-exploitation of resources shared between nations, such as water supplies and fish stocks, can also lead to conflict. Therefore, avoiding environmental degradation, such as by stemming the losses of biodiversity, contributes to peace and harmony between nations.

There are, of course, many other global and regional agreements in the field of biodiversity. At the global level, these are the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar, 1971), the World Heritage Convention (Paris, 1972), the Convention on International Trade in Endangered Species of Wild Fauna and Flora—CITES (Washington, 1972) and the Migratory Species Convention (Bonn, 1979) (see Box 21). They each deal with a particular aspect of biodiversity conservation and, in consequence, contain more detailed obligations than the Convention on Biological Diversity.

Other than article 22, this paragraph is the main statement about the Convention's relationship to those other agreements. It makes the point that the Convention on Biological Diversity should enhance and complement the other conventions and, by implication, should not compete with them and does not substitute for them.

The paragraph simply pledges support for the existing framework. The practical liaison between this Convention and those on specific aspects of biodiversity, and the extent to which activities under all these conventions can be coordinated, is left open, and will have to be worked out later (articles 23 and 24 address these matters).

This paragraph makes two important points: first, conservation of biodiversity and sustainable use of its components should be accomplished for the benefit of people; second, that the actions taken in our time must not jeopardize the opportunities and benefits for future generations of people. This paragraph builds on the conclusions of the World Commission on Environment and Development (WCED) in *Our Common Future*.

Article 1. Objective

The objectives of this Convention, to be pursued in accordance with its relevant provisions, are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.

This article states the objectives of the Convention and covers its main themes. It sets out the objectives as:

- the conservation of biological diversity (articles 6-9, 11 and 14);
- the sustainable use of its components (articles 6, 10 and 14); and
- the fair and equitable sharing of the benefits arising from the use of genetic resources, including by appropriate
 - access to genetic resources (article 15), taking into account all rights over those resources;
 - transfer of relevant technologies (articles 16 and 19), taking into account all rights to technologies; and
 - funding (articles 20 & 21).

In this way the article sets out the balance of the Convention—between conservation, sustainable use and the sharing of benefits. This is the heart of the political agreement upon which the Convention is founded.

In the latter part, the article indicates three means of sharing benefits:

- "Appropriate access to genetic resources". The word "appropriate" heralds the conditions of access dealt with in article 15, which recognizes that national governments have the right to set the terms of access to genetic resources in the wild, in community use and in *ex-situ* collections under their jurisdiction.
- "Appropriate transfer of relevant technologies" foretells article 16. The word "appropriate" reflects the balance of article 16 that technology transfer will have to take into consideration a series of factors. "Appropriate" also implies the need for further negotiation while, the word "relevant" indicates that not all technologies are covered.
- "Appropriate funding" looks forward to the financial provisions of the Convention in articles 20 and 21. Here the word "appropriate", envisages a degree of negotiation: those articles reflect the wish of developing countries to ensure that the full incremental costs of the measures they take to

implement the Convention are covered by transfers of funds from the developed country Parties; those Parties, in turn, are unable to accept open-ended commitments, and thus will only meet "agreed" full incremental costs and will determine their level of contributions.

In a convention, the article on objectives outlines the framework within which actions have to be taken, setting the basis for the subsequent articles with their more specific obligations. The Convention's implementation, as well as its further development, have to conform to these objectives. The objectives also provide a point of reference or bench-mark for monitoring implementation.

For all of these reasons, article 1 is important for all those involved in the Convention, principally the institutions set up by the Convention, for example the Conference of Parties, the Secretariat, subsidiary bodies and/or working groups, as well as the national policy-makers and institutions charged with implementing the Convention. It is also highly relevant for NGOs, which have a great role to play in helping governments implement the Convention (see preambular paragraph 14 and Box 23).

By providing an overall sense of direction, this article helps to:

- Ensure that balanced decisions are taken. Where one activity under the Convention may conflict with another, the article may provide some safeguard that all interests are considered. It would not, for example, conform with this article to pursue policies of access to genetic resources without considering the fair and equitable sharing of the benefits derived from their use.
- Resolve cases of divergent interpretation, conflicts of interests and settling disputes.

The international law of treaties provides another application for an article on objectives. Once a convention has been signed, a signatory State is, pending the Convention's entry into force in that State (see article 36(3)), already under an obligation not to act contrary to the objectives of that convention (see article 18 of the Convention on the Law of Treaties (Vienna, 1969)). This is a very general rule, however, which leaves considerable discretion to the State concerned.

Article 2. Use of Terms

For the purposes of this Convention:

The purpose of definitions in a legal document is to give an agreed, specific meaning to certain terms which may recur throughout the text. Thus the terms below are always used in the Convention with the meaning given here in article 2.

"Biological diversity" means the variability among living organisms 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.

In other words, biological diversity (or "biodiversity") is the variability of life in all forms, levels and combinations. It is not the sum of all ecosystems, species and genetic material. Rather, it represents the variability within and among them. It is, therefore, an *attribute* of life, contrasting with "biological resources", which are the tangible biotic components of ecosystems (see the definition of biological resources).

The Convention's definition of "biological diversity" includes all of its manifestations. Therefore, in addition to terrestrial biodiversity, the Convention covers marine and other aquatic biodiversity as well.

Biological diversity is most conveniently, but not exclusively, described in terms of three conceptual levels:

- Ecosystem diversity: the variety and frequency of different ecosystems, (see the definition of "ecosystem");
- Species diversity: the frequency and diversity of different species (see Box 1), such as the tiger or the date palm;
- Genetic diversity: the frequency and diversity of different genes and/or genomes. In the definition of biological diversity, genetic diversity is represented by the phrase "the diversity within species". It includes

"Biological resources" includes genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with actual or potential use or value for humanity.

Whereas biological diversity is an attribute of life, biological resources are real entities, such as a seed or a gene, elephants or their tusks, maize growing in a field or a shoal of fish. Even though the definition refers to biological resources as the biotic components of ecosystems, the Convention's actual use of the term seems to extend the definition to cover ecosystems.

"Biological resources" are defined in terms of their actual or potential use or value to humans. Thus, in the context of the Convention, biological resources are not

At times, the meaning may differ from normal usage. Most terms are, of course, readily understood and are not defined in this article. A notable omission is a definition for "conservation" which is discussed at the end of the commentary for this article.

the variation both within a population and between populations (see the discussion of "genetic material", genetic resources and Box 5).

In places the Convention refers to the three conceptual levels of diversity as "components" of biological diversity. In other places, however, the Convention uses the phrase "components of biological diversity" to refer to specific tangible entities, such as biological resources and specific ecosystems, such as a coral reef.

While the Convention defines biological diversity in a scientific sense, that is, in terms of the variability of life and the variety of systems in which life exists, by necessity a Party's efforts to fulfil the Convention's legal obligations will focus on the tangible manifestations of biological diversity such as genetic material, populations of species and ecosystems. As an attribute of life, biological diversity can indeed only be conserved by conserving and sustainably using biological resources and ecosystems.

Because species embody genetic diversity and their populations are the biotic components of ecosystems, they are bound to play an important role in the Convention's implementation. The term "species", however, is not defined in article 2 (see Box 1).

all of the Earth's genetic resources, organisms and their parts or populations, but only a subset of them.

Although the Convention's use of the term implies that the biotic components of ecosystems are only biological resources when a particular use is known or likely, it can be argued that virtually all have some kind of actual or potential value for human use. In terms of direct use, scientists in many cases neither know their actual values, nor can they predict which will become valuable to humans in the future.

Box 1. Species and Species Diversity

For two centuries biologists have been debating what a "species" is. The most widely held view is eloquently presented in E.O. Wilson's book *The Diversity of Life*, where a species is described as a population of organisms which are able to interbreed freely under natural conditions. A species represents a group of organisms which has evolved distinct inheritable features and occupies a unique geographical area. Species usually do not freely interbreed with other species. This is facilitated by many factors including genetic divergence, different behaviour and biological needs, as well as geographic locale.

More specifically, "species" is one of the levels used by taxonomists—the scientists who compare, classify and name organisms—to describe the hierarchy of life forms on Earth. The hierarchy is a human concept which attempts to reflect evolutionary descent. In descending order of rank and inclusiveness the standard taxonomic hierarchy is kingdom (plants, animals, fungi, protista and blue-green algae), division (botany) or phylum (zoology), class, order, family, genus, species and sub-species, variety (botany) and form (botany). Each group contains the entirety of one or more groups at the lower level. Species come below the level of genus and above the level of subspecies. Two species in the same genus are more closely related than two genera in the same family. Taxonomists attempt to ascertain evolutionary relationships by studying the physical, behavioural and genetic and chemical similarity of individual organisms.

The Convention may use the word "species" in the scientific sense—not including the other ranks below it. On the other hand, many legal texts, notably the Convention on International Trade in Endangered Species of Wild Fauna and Flora (see Box 21), define "species" to include the taxonomic ranks below it, such as subspecies, varieties and distinct populations. The internal logic of the Convention, and legal precedent, suggests that the latter, all-embracing meaning is the one intended here.

"Species diversity" is used to describe the variety of species—whether wild or domesticated—within a geographical area. There are many different ways to measure species diversity. One example includes measuring species richness—an enumeration of the species occurring within a particular sample area. Except for comparing biodiversity on a large scale, species richness figures are of limited value to biologists. Measures of species richness are the basis for the observation that diversity increases with decreasing latitude on Earth (tropical areas are richer in species than temperate areas) (Groombridge, 1992).

The relative abundance of species in various categories (sometimes called taxic diversity) can also be determined. The categories might include size classes, trophic levels, taxonomic groups or morphology types. For example, an area with a greater number of closely related species is not as diverse as the same area with the same number of species which are not closely related. The *Global Biodiversity Strategy* uses the example of an island with two species of birds and one species of lizard. This island has greater taxic diversity than the same island with three species of birds and no species of lizard.

Nor can we be sure which biotic components of ecosystems are of indirect value to humans, in particular which living organisms provide the ecosystem functions and services upon which all life on Earth, including humans, depends (see Box 4). For example, fungal mycelia called mycorrhiza, are essential for the uptake of nutrients for

many trees and crops; we have very limited information on which fungal species are important for this essential function. For all of these reasons, it is prudent to consider that all biotic components of ecosystems are of potential use or value to humans.

'Biotechnology' means any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use.

This definition is designed to include both present and future technologies and processes that use biological

systems or parts of them, whether the technologies are conventional or new (see Box 3).

Box 2. The Importance of Biological Diversity and the Threats from its Loss

The Earth's genes, species, and ecosystems are the product of over 3 billion years of evolution, and are the basis for the survival of our own species. Biological diversity—the measure of the variation in genes, species and ecosystems—is valuable because future practical uses and values are unpredictable, because variety is inherently interesting and more attractive and because our understanding of ecosystems is insufficient to be certain of the impact of removing any component.

The available evidence indicates that human activities are eroding biological resources—the biotic components of ecosystems with actual or potential use to humanity—and greatly reducing the planet's biological diversity. Estimating precise rates of loss, or even the current status of species, is challenging because no systematic monitoring system is in place and much baseline information is lacking. Few data are available on which genes or species are particularly important in the functioning of ecosystems, so it is difficult to specify the extent to which people are suffering from the loss of biological diversity. Since the ecological roles played by many species or populations are still only partly known, the wisest course is to take a "precautionary approach" (see preambular paragraph 9) and avoid actions that needlessly reduce biological diversity.

The environment is presently already heavily utilised by people and, according to a UNEP expert panel, "food, fibre, ornamental plants, and raw (biomaterials) account for roughly half of the world's economy" (UNEP, 1993a). But given the projected growth in population and economic activity, the rate of loss of biodiversity is far more likely to increase than stabilize. It has been estimated that almost 40 percent of the Earth's net primary terrestrial photosynthetic productivity is now directly consumed, converted or wasted as a result of human activities (Vitousek, et al, 1986). It might be concluded that major habitat changes and associated losses of biodiversity are the inevitable price we pay for progress as humans become an ever more dominant species. Society has cause for concern when habitats are degraded to lower productivity, especially when accompanied by species losses which can have worldwide ramifications on ecosystem functioning and food security.

The loss of biodiversity is due above all to economic factors, especially the low values given to biodiversity and ecological functions such as watershed protection, nutrient cycling, pollution control, soil formation, photosynthesis and evolution. Biodiversity is very much a cross-sectoral issue, and virtually all sectors have an interest in its conservation and the sustainable use of its components. Biological resources are renewable and with proper management can support human needs indefinitely. These resources, and the diversity of the systems which support them, are therefore the essential foundation of sustainable development. No single nation can by itself ensure that biological resources are managed to provide sustainable supplies of products; rather, international cooperation is required between all States and various sectors, ranging from research to tourism. The conclusion of the Convention on Biological Diversity represents a first step in achieving this goal.

"Country of origin of genetic resources" means the country which possesses those genetic resources in *in-situ* conditions.

Combining this definition with the definitions for "*in-situ* conditions" and "genetic resources", the country of origin for wild genetic resources is that where they exist within ecosystems and natural habitats. For domesticated or cultivated genetic resources, the country of origin is the one where they have developed their distinctive properties. Although clear for endemic species and for many recent crops, in some cases the country of origin may be difficult and expensive to determine, at least with current technologies such as restriction fragment length polymorphism (RFLP) analysis (see Box 10).

For genetic resources in the wild, the Convention's definition does not fit with the usual scientific usage

which would normally restrict the term to the country where they evolved. However, many species exist in ecosystems as apparently natural, self-maintaining populations outside their original ranges (that is, ranges prior to the recent era of human translocation), and the country where these species are now living in *in-situ* conditions would be considered under the Convention as the country of origin.

Although the term was extensively used in drafts of the Convention, in the final text it only appears three times—in preambular paragraph 11 (to emphasize the location of *ex-situ* collections), in article 9 (same purpose) and in article 15(3) (which—for purposes of article 15 (Access to Genetic Resources), article 16 (Access to and

Transfer of Technology) and article 19 (Handling of Biotechnology and Distribution of Its Benefits)—in part defines "genetic resources being provided by a Contracting Party" as genetic resources provided by Parties which are "countries of origin of such

resources"). In most instances, "Party providing genetic resources" (or some variation) has been used in the Convention's text, although the term "country providing genetic resources" is defined below.

Box 3. About Biotechnology

Humans have been manipulating organisms—and exploiting their biological processes to make or do things—for thousands of years. The earliest forms of biotechnology—selectively breeding animals and plants and using microorganisms to make, among other things, wine, beer, bread, cheese or soy products—have been adapted by many, if not all, societies around the world and steadily improved over time. These traditional or conventional techniques are still used today in rural areas and industry alike and differ merely in sophistication and scale.

In the last twenty-five years, new, more powerful techniques have emerged to supplement the traditional techniques. Some of these new techniques—tissue culture, cell fusion, embryo transfer, recombinant DNA technology and novel bioprocessing techniques—have enabled scientists to grow whole organisms from single cells, fuse different cell types to create hybrids with the qualities of both parent cells, impregnate animals with embryos from other valuable animals, isolate genes from one organism and insert them into another and process things, such as food and waste, more efficiently.

Some modern biotechnological techniques are presently being used to help conserve biological diversity and sustainably use its components, in particular, genetic resources. For example, new methods have been developed to store genetic material. In addition, modern molecular diagnostics have allowed gene banks and breeders to identify new accessions, screen them for disease and identify potentially useful genes (IPGRI, 1993).

But to many people genetic engineering *is* biotechnology. With genetic engineering techniques, a gene for a particular trait from one organism can be directly inserted into another, even if the two organisms are not from the same species. This is a major advance over conventional plant and animal breeding where traits can only be imparted to organisms indirectly and then usually between organisms of the same species. The potential power of genetic engineering has captured the imagination of many, and heightened concern over the ethics of its use, safety for humans and the environment and the socio-economic impacts of its products.

Biotechnology potentially offers great benefits to both developed and developing countries, enabling biological resources to make much greater contributions to human welfare. Many people, however, are concerned that greater use of the products of biotechnology is not without risks to biological diversity and human health. Such risks will have to be identified and appropriately managed or controlled before new products enter the environment (see the discussion of article 8(g) (regulate, manage or control the risks associated with the use and release of living modified organisms) and article 19 (Handling of Biotechnology and Distribution of Its Benefits)).

"Country providing genetic resources" means the country supplying genetic resources collected from *in-situ* sources, including populations of both wild and domesticated species, or taken from *ex-situ* sources, which may or may not have originated in that country.

The definition seems quite clear: the "country providing genetic resources" is quite simply that, irrespective of from where the country obtained the genetic resources. The definition is thus independent of the ultimate origin

of the genetic resources. The term itself is not used at all in the Convention, although variations of it, such as "Party providing genetic resources", are used.

Box 4. Ecosystem Structure and Function

Plants, animals and micro-organisms are the living (or biotic) components of an ecosystem. They interact with each other in, for example, food webs, and with light, water, air, minerals and nutrients. These interactions are the basis of an ecosystem's "functioning" which, taken together with the functions of other ecosystems, provide "services" upon which all life on earth depends. Some of these services include maintaining the balance of atmospheric gases, recycling nutrients, regulating climate, maintaining hydrological cycles and creating soil (Ehrlich, 1988).

Even the simplest ecosystems are complex to understand. Beyond simple models of overall processes, we have fragmentary knowledge of how individual ecosystems function, how different ecosystems may interact with each other and which ecosystems are critical to the services most vital to life on earth. We also do not know the exact role individual species may play in ecosystems. Some species may be "keystones" whose presence can influence the composition of the community and, in turn, may affect the ecosystem's functions. Others may not be as important, but we simply do not yet know. Recent studies, however, suggest that there is a correlation between species diversity and the stability and resiliency of an ecosystem (Pennist, 1994).

The threats to ecosystem structure and function are, in many ways, the same as those which threaten species. Habitat loss and fragmentation from urbanization, agriculture and development projects, such as dams and roads, are the major threats (WRI, IUCN & UNEP, 1992). Over-exploitation of plants and animals from fishing and hunting for human food, and trade in animals and plants are also significant threats. Air, water and soil pollution are major threats in industrialized countries and will increasingly become threats in the developing countries. More subtle threats may include the introduction of alien (i.e. non-indigenous) species and global atmospheric changes such as climate change and stratospheric ozone depletion.

"Domesticated or cultivated species" means species in which the evolutionary process has been influenced by humans to meet their needs.

Over centuries, humans have adapted particular wild plants, animals and microbes to meet human needs. The process of selection and breeding has made many of these organisms very different from their wild state, both in genetic composition and their particular characteristics. These differences are inheritable, as they are the result of genetic changes. It is these kinds of organisms that the Convention defines as "domesticated or cultivated".

The definition includes industrial crops like rubber and oil palm. It includes the agricultural land-races—the local, highly diverse crop varieties developed in traditional, locally adapted agricultural systems by human and selected for over long periods of time. Conserving these land-races is extremely important for modern

breeding programmes to maintain the productivity of modern crop cultivars. It includes animal breeds developed by farmers and, for example, micro-organisms used by brewers and bakers.

In contrast, the definition excludes wild species which are used by humans in their wild state—such as timber, medicinal plants and rattans taken from the forest—or which are removed from the wild but kept in a genetically unaltered state. Examples of the latter would be salmon taken from the wild and used in fish farms, or Caribbean pines planted on tropical uplands from seed collected in the wild. The Convention makes, then, a narrower definition of "domesticated or cultivated" than might be generally supposed.

"Ecosystem" means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

An ecosystem is an interacting system of biotic (living) and abiotic (non-living) components, which together form a functional unit (see Box 4). Non-living components include sunlight, air, water, minerals and nutrients. The term implies a partly bounded system, with most of the

interactions inside it. Ecosystems can be small and ephemeral, for example, water-filled tree holes or rotting logs on a forest floor or large and long-lived like forests or lakes.

Ecosystems commonly exist within ecosystems. Consequently, the user of the term has to define the level used in each case. Biologists are often concerned with small-scale ecosystems, but for conservation purposes larger

units (such as particular forests, grasslands or coral reefs) are generally used. The Convention is likely to be mostly concerned with larger units.

Box 5. Genes and the Importance of Genetic Diversity

Genes are the principal units of heredity, passed from an organism to its offspring. They are composed of nucleic acids and are found along an organism's chromosomes, in the plasmids of bacteria and in other extra-chromosomal forms as well. Genes, either individually or in groups, orchestrate a myriad of processes in every living organism. They also contribute many different attributes to an organism such as its physical appearance, its ability to repel attack from other organisms or survive drought. A person might have a gene for brown eyes or dark hair. A butterfly might have a gene for wing color or chemical scent that helps it find a mate. A potato plant may have a single gene, or a group of genes, for resistance to a certain insect or for a particularly large and nutritious tuber.

The importance of diversity at the gene level—genetic diversity—stems from a simple fact of life: every individual of a species that originates from sexual reproduction has a slightly different combination of genes. Genetic diversity is the genetic variation within living organisms, that is, the genetic differences among populations of a single species and those among individuals within a population.

One important aspect of genetic diversity is that it allows species to adapt over time to the environmental stresses they face. Not every population or individual has the gene or combination of genes that enable it to survive in a particular environmental context. The loss of individuals and populations through, among other things, habitat destruction narrows the gene pool of a species (sometimes called genetic erosion) and restricts its adaptational or evolutionary options. Therefore, if maintained, genetic diversity increases the chances for a species' survival.

Genetic diversity has been used and, in some cases, increased by humans for thousands of years, especially in agriculture. In much the same way that genetic diversity helps a species to survive, humans, especially indigenous and local communities, have relied on genetic diversity to create a wide range of genetically diverse crops, animals and microbes which have enhanced their own survival. Farmers have domesticated wild animals and have bred them for desirable characteristics such as size, coat thickness or disease resistance. Similarly, farmers have domesticated hundreds of species of plants which, over time, they have bred to create tens of thousands of varieties with desirable characteristics such as seed colour, flavour, fruit size or disease resistance. Modern breeders also rely on genetic diversity. For example, it was only a few plants from one tiny population of wild rice that provided the gene for resistance to grassy stunt virus and so saved the Asian hybrid rice crop whose genotype (that is, a particular combination of genes) made it susceptible to disease.

For these reasons, the effective conservation of genetic diversity has to go much further than mere species conservation: it is not sufficient to conserve a few viable populations of a species, since those populations may neither have the genetic diversity needed for the species' own survival nor that of humans.

"Ex-situ conservation" means the conservation of components of biological diversity outside their natural habitats.

In other words, conservation in zoos, aquaria, botanic gardens and gene banks. The definition also includes biological resources domesticated in areas other than those where they had developed their distinctive

properties and maintained on farms or ranches which have not contributed to the development of those properties (for example, the fields of wheat and barley in the farms of Northern Europe).

"Genetic material" means any material of plant, animal, microbial or other origin containing functional units of heredity.

"Genetic resources" means genetic material of actual or potential value.

The Convention uses the term "genetic material" for any portion of an organism that contains functional units of heredity. "Functional units of heredity" include all genetic

elements containing DNA (deoxyribonucleic acid) and, in some cases, RNA (ribonucleic acid). For example, "genetic material" includes seeds, cuttings, sperm or

individual organisms. It also includes DNA extracted from a plant, animal or microbe such as a chromosome, a gene, a bacterial plasmid or any part of these. It would not, however, include a biochemical extract if the extract did not contain functional units of heredity.

The Convention uses "genetic material" in a scientific sense unrelated to actual or potential value, while "genetic resources" is defined by reference to utility. The definition adopted makes it clear that "genetic resources" are a subset of "genetic material".

"Habitat" means the place or type of site where an organism or population naturally occurs.

The concept of habitat is important when considering the *in-situ* conservation of a species. Species (or populations) occur in a variety of ecosystems (as that

The distinction between the two terms on the basis of whether or not the material is "of actual or potential value" seems to signify that genetic material only becomes a genetic resource when a use can be ascribed to it or is likely. But, of course, it can be argued that virtually all genetic material is potentially valuable at least until proven otherwise. Therefore, whether such a narrow view is justified might be questioned.

term is defined in the Convention), but in a distinctive type of habitat (called its "habitat type"). The range of habitats occupied varies greatly from species to species.

"In-situ conditions" means conditions where genetic resources exist within ecosystems and natural habitats, and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties.

"In-situ conservation" means the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties.

The Convention recognizes that biodiversity loss occurs both in natural ecosystems and human created agro-ecosystems. This is exemplified in the definitions for "*in-situ* conditions" and "*in-situ* conservation".

Thus, the definition of the term "*in-situ* conditions" extends to both wild *and* domesticated or cultivated genetic resources. Wild genetic resources occur *in-situ* where they exist in natural surroundings such as ecosystems and habitats. In contrast, domesticated or cultivated species occur *in-situ* where they exist in "the surroundings where they have developed their distinctive characteristics". The term itself is used only once in the Convention in the definition of "country of origin of genetic resources".

The Convention's definition of "*in-situ* conservation" goes beyond a set of techniques to maintain and recover

viable populations of wild species in nature within their known natural range. It extends to the conservation of actual ecosystems, as well as the natural habitats that populations of species depend on. This definition, then, implicitly recognizes that *in-situ* species conservation cannot be successful without conserving the areas where populations of species exist, and it parallels the obligations in article 8 (*In-situ* Conservation).

With respect to the *in-situ* conservation of domesticated or cultivated species, the phrase "in the surroundings where they have developed their distinctive properties" refers to those areas where humans have created agricultural systems in which they have, in turn, developed identifiable plant varieties (known as land-races) and animal breeds. This applies whether or not those plants and animals are reproductively isolated from the wild populations from which they originated.

"Protected area" means a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives.

The Convention defines a protected area as

- (1) a geographically defined area
- (2) designated or regulated and managed
- (3) to achieve specific conservation objectives.

A common attribute of traditional protected areas is that they are geographically defined—in the sense that their location, and more precisely their boundaries, are clearly delineated or established. The boundaries are typically provided first in legislation, and then, in many cases, translated into something concrete on the ground—

Box 6. IUCN Protected Area Management Categories

Through its Commission on National Parks and Protected Areas (CNPPA), IUCN has guided the international categorization of protected areas since 1969. In 1978, IUCN published the CNPPA report, *Categories, Objectives and Criteria for Protected Areas*, which proposed a system of 10 protected area management categories. The system has subsequently been incorporated into the national legislation of many States and it has been used worldwide by protected area managers. It has also been the basis for the organizational structure of the *UN List of National Parks and Protected Areas*. IUCN has since revised the original system, retaining the first five categories and adding a new category six. The result has been released as *Guidelines for Protected Area Management Categories*. The *Guidelines* provide general advice on the protected area management categories, describe the categories and provide examples demonstrating the categories' application.

The precise purposes for which protected areas are managed differ greatly. The main management purposes include: scientific research, protecting wilderness, preserving species and genetic diversity (see Boxes 1 and 5), maintaining ecosystem services (see Box 4), protecting specific natural and cultural features, tourism and recreation, education, sustainable use of resources from natural ecosystems and maintaining cultural and traditional attributes. From these main management objectives, six distinct protected area categories have been identified as areas mainly managed for:

Strict Protection:	Protected areas managed mainly for science or wilderness protection (sometimes called strict nature reserve/wilderness areas) (Category I).
Ecosystem Conservation and Tourism:	Protected areas managed mainly for ecosystem conservation and recreation (sometimes called national parks) (Category II).
Conservation of Natural Features:	Protected areas managed mainly for conservation of specific natural features (sometimes called natural monuments) (Category III).
Conservation Through Active Management:	Protected areas managed mainly for conservation through management intervention (sometimes called habitat/species management areas) (Category IV).
Landscape/Seascape Conservation and Recreation:	Protected areas managed mainly for landscape/ seascape conservation and recreation (sometimes called protected landscape/seascapes) (Category V).
Sustainable Use of Natural Ecosystems:	Protected areas managed mainly for the sustainable use of natural ecosystems (sometimes called managed resource protected areas) (Category VI).

Protected areas that are part of international networks, such as biosphere reserves (see Box 11), or which are recognized under international conventions, such as the World Heritage Convention (Paris, 1972) and the Wetlands Convention (Ramsar, 1971), can fall into any of the above categories and are no longer treated as separate categories in their own right.

A great deal of confusion has surrounded the 1978 system because national names for protected areas may vary. For example, "national park" means different things in different States. In fact, globally over 140 names have been applied to protected areas of various types. As a result, IUCN categories are defined by the objectives of management, not by the title of the area. Protected areas should be established, according to national legislation, to meet objectives consistent with national, local or private goals and needs. They can only then be labelled with an IUCN category according to the management objectives pursued. Finally, the IUCN management categories should in no way be considered as a "driving" mechanism for governments or organizations in deciding the purposes of potential protected areas.

signs, a fence or some other physical markings. Boundaries are also typically depicted on maps.

The Convention's use of the phrase "designated or regulated and managed" introduces confusion to the protected area definition in two ways. First, the word "designated" is not defined and its meaning is difficult to infer. For example, in the broadest sense, any area can be designated as a protected area whether by a public or private landholder. An important consideration, however, is whether the designation confers legal protection to an area and enables it to contribute to specific conservation objectives.

Second, the use of the word "or" introduces an antithesis which implies that a protected area can be designated, but does not have to be regulated and managed, and vice versa, even though specific conservation objectives need to be achieved. Hence the word "or" in the definition is puzzling—"and" would probably have been a more appropriate word to use.

"Regional economic integration organization" means an organization constituted by sovereign States of a given region, to which its member States have transferred competence in respect of matters governed by this Convention and which has been duly authorized, in accordance with its internal procedures, to sign, ratify, accept, approve or accede to it.

The European Union is the best known example of a regional economic integration organization, but similar structures are emerging in other parts of the world as well.

The division of competencies between the Union and its member States is determined by the treaties establishing the three European Communities. Most important in the area of conservation is the treaty to establish the "European

Finally, according to the Convention, all protected areas should "achieve specific conservation objectives". As the commentary in Box 6 notes, this flexible terminology reflects the fact that the purposes for which protected areas are established vary greatly.

Irrespective of the somewhat confusing aspects of this definition, its scope includes areas established to conserve both wild *and* domesticated species. It could include, for example, areas designated to protect traditional agricultural systems maintaining genetic-resources. It would not include, however, areas which are not geographically delineated or designated. For example, some States protect certain habitat types or geographical features, such as wetlands, regardless of where they occur although, in practice, the distinction between the two systems is becoming increasingly blurred (see the discussion of article 8(d) (promote the protection of ecosystems)).

Economic Community" (since formation of the Union simply called the "European Community") which transferred competence from the member States to it in some subjects covered by the Convention on Biological Diversity. The European Economic Community ratified the Convention on 21 December 1993.

The division of competencies is particularly relevant to article 31(2) (Right to Vote).

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

This is a difficult definition for what is normally seen as a rather simple concept. It may be read to mean that, under the Convention, use of the components of biological diversity, in particular biological resources, is only "sustainable use" if:

- (a) it can be sustained indefinitely—in other words it does not cause any significant decline in the resource, and
- (b) it does not harm other components of biodiversity (such as when the taking of one target species incidentally affects other species). This dual meaning is important and goes beyond what may be assumed to be the term's normal usage.

It is worth noting that this definition is ecosystem—rather than species—oriented, and is a significant departure from the concept of sustainable yield, which refers to the taking of a single species and does not necessarily consider its interrelationship with other species.

Use of the components of biological diversity, whether or not sustainable, can be consumptive—for example, catching fish—or non-consumptive—for example, visiting a national park. Non-consumptive uses are not necessarily sustainable. Tourism in national parks, for example, is at times far from sustainable, in both senses of the Convention's definition. The discussion of article 10 (Sustainable Use of the Components of Biological Diversity) expands on the sustainable use concept in more detail.

"Technology" includes biotechnology.

In the early stages of the Convention negotiations, delegations debated not only whether technology transfer would be dealt within the Convention but, if so, what classes of technology would be covered. By clarifying that technology includes biotechnology, the Convention

explicitly recognizes what some delegations claimed was self-evident (see the discussion of article 15 (Access to Genetic Resources), article 16 (Access to and Transfer of Technology) and article 19 (Handling of Biotechnology and Distribution of Its Benefits)).

Conservation

The term "conservation" is not defined in the Convention. The Convention uses it in slightly different manner than other environmental texts such as the *World Conservation Strategy*, *Caring for the Earth* and the *Global Biodiversity Strategy*.

The Convention refers to "conservation of biological diversity" and to "sustainable use of its components" (or sometimes of biological resources) separately, rather than interpreting the latter as part of the former. The intention was not to imply that the two concepts are in reality separable. Rather, the separation has its origins in

the wishes of the developing countries who wanted to emphasize the importance of using the components of biological diversity, albeit in a sustainable way. They were particularly concerned that the term "conservation", if used in the Convention on its own, could shift emphasis to the term's preservation aspects. Using both the terms "conservation" and "sustainable use" throughout the Convention—and in this *Guide*—stresses the need to achieve a fair balance between these various objectives.

Article 3. Principle

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.

The legal nature and significance of "principles" in an international convention are a matter of controversy. There is no consensus on what distinguishes "principles" from obligations and rights. Some argue that "principles" are not directly applicable and are merely concepts without much legal effect unless expressed as concrete obligations and rights later in a convention's text. This issue of legal theory cannot be dealt with here in depth; it is suggested that "principles", despite their very general nature, are rules which are fundamental and basic to more specific and concrete obligations and rights. They constitute a general framework within which the measures to achieve the objectives of the Convention have to be taken.

The principle found here is enshrined in a binding article of an international agreement for the first time—twenty years after it was first articulated as Principle 21 in the non-binding Stockholm Declaration of the United Nations Conference on the Human Environment, adopted in 1972. Used in soft law since 1972, the principle has often been understood as a defence for national sovereignty "against" the growing intrusiveness of international environmental policy and law.

The principle recognizes the "sovereign right" of States to exploit their own resources according to their own environmental policies. "Sovereign rights" of States are rights recognized under international law for specific purposes, in this case the exploitation of resources. There are, however, two important limitations.

First, the right to exploit resources is linked to responsibility to ensure transboundary environmental protection. States have to ensure that activities on their territory or under their control including, for example, on the continental shelf, in the fishery zone or economic zone, do not damage other States or areas beyond national jurisdiction, that is, the high seas, the deep sea-bed or outer space. In international law this "no harm principle" has come to be understood as requiring States to do their best to prevent "significant transboundary harm" and has

been typically associated with environmental damage from water and air pollution.

Second, the "sovereign right" must also be exercised "in accordance with the Charter of the United Nations and the principles of international law". States have to take into account the various obligations in the UN Charter to cooperate; these obligations include, *inter alia*, promoting higher standards of living and seeking solutions to international economic, social and health problems. These objectives cannot be achieved without due regard for environmental conservation.

Even more important may be the reference to the "principles of international law". Today, these principles unquestionably also comprise principles of environmental protection and conservation at both the international and national levels. They are derived from numerous international instruments adopted during the past two decades and customary international law. They imply basic obligations for all States to protect their environment, to use natural resources sustainably and to prevent environmental damage. At the international level, in addition to being bound to ensure that their activities do not cause environmental damage in other States and areas beyond national jurisdiction, States are to inform and consult each other about, for example, certain activities which may result in the creation of transfrontier hazards; they are also bound to cooperate to conserve shared resources and areas beyond national jurisdiction.

To summarize this article, the commitments and obligations laid down in the Convention do not infringe upon the rights of Contracting Parties to exploit their "own" resources (those resources located in areas within the limits of their national jurisdiction and which they can regulate). While they have the freedom to choose the appropriate regime to regulate exploitation, they also have to observe their obligations on transfrontier environmental protection, as well as the UN Charter and the principles of environmental protection which are part of international law.

Article 4. Jurisdictional Scope

Subject to the rights of other States, and except as otherwise expressly provided in this Convention, the provisions of this Convention apply, in relation to each Contracting Party:

- (a) **In the case of components of biological diversity, in areas within the limits of its national jurisdiction; and**
- (b) **In the case of processes and activities, regardless of where their effects occur, carried out under its jurisdiction or control, within the area of its national jurisdiction or beyond the limits of national jurisdiction.**

Article 5. Cooperation

Each Contracting Party shall, as far as possible and as appropriate, cooperate with other Contracting Parties, directly or, where appropriate, through competent international organizations, in respect of areas beyond national jurisdiction and on other matters of mutual interest, for the conservation and sustainable use of biodiversity.

Up until the final negotiating session," when a small group of lawyers took up the issue and reviewed the Convention's text, the scope of the Convention's obligations had been the focus of very little debate (Chandler, 1993). The silence in the conference room and the draft Convention text created a number of ambiguities which some States found unacceptable.

For example, some States feared that the Convention could be interpreted to require a Party to take steps to conserve *biological diversity within the sovereign territory* of another Party (Chandler, 1993). The scope of a Party's obligations in the marine environment, particularly with regard to the high seas, was also in doubt.

The purpose of both article 4 (Jurisdictional Scope) and article 5 (Cooperation) is to address these outstanding issues by clarifying in what instances, and in what geographical areas, a Party is obliged to act. Therefore, the two articles need to be read together. But it should be recognized that by indicating where or how each type of obligation applies, neither article innovates, but simply applies existing rules of international law to the subject matter of the Convention.

The Convention's substantive conservation and sustainable use obligations are primarily directed towards (1) the components of biological diversity (see the

discussion of "biological diversity" in article 2) and (2) the processes and activities which can affect them and, consequently, biological diversity. The explanation of articles 4 and 5 is clearest if these two categories are kept in mind, but it must be acknowledged that these distinctions are in some way arbitrary since the components of biological diversity are necessarily affected by human processes and activities.

For areas within the limits of its national jurisdiction, a State *can determine rules for the areas in question and the resources found there*, such as the components of biological diversity. It can also regulate all processes and activities occurring there—whether by nationals or foreigners. These powers derive from a State's sovereignty over territory, or sovereign rights in areas of national jurisdiction beyond the territorial sea. The scope of power varies and is more limited in maritime zones (see Box 7).

The situation is different for areas beyond the limits of national jurisdiction. These areas are sometimes referred to as the global commons—areas outside the sovereignty of *any* State—such as the high seas and the upper atmosphere. In these areas, States by definition have no territorial jurisdiction. Parties, therefore, may only regulate the activities of their nationals within these areas to achieve the objectives of the Convention.

Components of Biological Diversity

According to article 4(a), a Party's obligation to implement those Convention provisions which apply to the components of biological diversity is limited to areas within the limits of national jurisdiction.

Article 5 requires Parties to cooperate directly or through competent international organizations in areas beyond national jurisdiction and where there is a "matter of mutual interest" in order to conserve and sustainably use biological diversity in these areas. For example, Parties should cooperate to conserve and sustainably use the living resources of the high seas, such as fisheries.

Matters of mutual interest involving the components of biological diversity may also include issues associated with migratory species and shared resources. In addition, matters of mutual interest could involve any Convention obligation which deals with the components of biological diversity within national jurisdiction and which Parties bilaterally or multilaterally agree to cooperate on.

According to article 5, the Contracting Parties must cooperate directly or, where appropriate, through

competent international organizations. "Competent international organizations" generally are inter-governmental organizations, such as UN technical agencies, but any international organization concerned with a matter covered by the Convention could be considered a "competent international organization".

Processes and Activities

According to article 4(b), a Party must implement the Convention's provisions dealing with processes and activities for (1) areas within its national jurisdiction or (2) areas beyond the limits of national jurisdiction, to the extent that the activities or processes are carried out under the Party's jurisdiction or control.

Article 5's obligation to cooperate also applies to processes and activities in areas beyond the limits of national jurisdiction and to other matters of mutual interest. As article 4 of the Convention does not explicitly require a Party to regulate the activities of its nationals operating in another Party's jurisdiction (Chandler, 1993), this is one area that is eligible for cooperation under article 5, that is, if considered by the Parties concerned as a "matter of mutual interest".

Box 7. Areas Within the Limits of National Jurisdiction

Areas within the limits of a State's national jurisdiction are (1) the land territory within its internationally recognized borders and, (2) for any coastal State, its territorial waters, as well as the various maritime zones adjacent to them (for example the fishery zone, exclusive economic zone and the continental shelf).

The jurisdiction of a State over its land territory is only limited by the rights of other States to exercise the same jurisdiction over their own territory, or by obligations under international law. In contrast, the rights of States over the maritime zones varies: the geographical limits, as well as the rights and obligations of the coastal States with regard to each of them, are defined by the law of the sea.

Article 6. General Measures for Conservation and Sustainable Use

Article 6 may be one of the most far-reaching articles in the Convention on Biological Diversity. Its obligations:

- developing national biodiversity strategies, plans or programmes (article 6(a)), and
- integrating the conservation of biological diversity and the sustainable use of its components into relevant sectoral and cross-sectoral plans, programmes and policies (article 6(b))

are critical steps which must be undertaken for each Party to effectively conserve biological diversity and sustainably use its components.

Because the substance of article 6 is about planning, it is relevant to almost every substantive article in the Convention, most notably article 10(a) which requires Parties to integrate consideration of the conservation and sustainable use of biological resources into national decision-makings.

Each Contracting Party shall, in accordance with its particular conditions and capabilities:

- (a) Develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programmes which shall reflect, *inter alia*, the measures set out in this Convention relevant to the Contracting Party concerned; and**

Paragraph (a) requires each Contracting Party to prepare or adapt national strategies, plans or programmes to reflect the measures set out in the Convention for the conservation of biodiversity and the sustainable use of its components. It essentially creates an obligation for national planning—to prepare a blueprint which, at minimum, reflects how the obligations of the Convention will be fulfilled and how its objectives will be achieved.

"Strategies, plans or programmes" are not themselves defined, but strategies set out specific recommendations or steps for national actions to conserve biodiversity and sustainably use its components (see Box 8). Plans (sometimes called action plans or management plans) explain how a strategy's specific recommendations will be achieved. Programmes implement strategies and plans. Although the Convention may not reflect this, in practice these three activities typically reflect a chronological series of steps.

Furthermore, even though they are discrete steps, developing biodiversity strategies, plans or programmes should be undertaken as part of an overall "strategy cycle". That is, a repeating process by which a biodiversity strategy is developed, plans and programmes derived, and then, after a period of programme implementation, the biodiversity strategy is reassessed. Improvements or adjustments are made and the cycle repeats itself.

One advantage of this technique is that it emphasizes process, rather than final product or outcome. Another advantage is that the strategy cycle allows new information to be taken into consideration and used as appropriate, whether that information is strictly environmental or

from other sectors such as transport, health or trade. A strategy cycle may also facilitate a Party's efforts to integrate the conservation of biological diversity and the sustainable use of its components into relevant sectoral and cross-sectoral plans, programmes and policies (see paragraph (b) of this article).

The salient point that should not be overlooked is that strategies, plans or programmes are the mechanisms through which a Party can organize and implement its approach to biodiversity conservation and the sustainable use of its components, a complex and multi-faceted task involving many sectors of government, as well as the private sector. And the process of developing them is just as important as their implementation. In fact, their successful implementation may very much depend on the process leading to their development.

For example, all three undertakings must reflect a consensus for action among the various constituencies which use or affect biodiversity. This observation coincides with an important point borne out by IUCN's experience with National Conservation Strategies and emphasized by a UNEP expert panel: the preparation and implementation of effective national biodiversity strategies, plans or programmes requires a highly participatory process, especially involving the people and economic sectors most affected (UNEP, 1993a). Community leaders, representatives of environment and development NGOs, representatives of industry and trade unions all have much to contribute, both to the process and to the quality of the result. In this way, preparing a strategy, plan or programme also becomes a way of building the political and social consensus needed to make the changes necessary in society and national life.

Box 8. National Biodiversity Strategies

In many cases, a national biodiversity strategy (NBS) will be the centrepiece of a Party's efforts to fulfil the Convention's obligations, including the integration of sectoral and cross-sectoral plans, programmes and policies called for in article 6(b). Its primary function is to make specific recommendations for national action on conserving biological diversity and sustainably using its components. These recommendations should result in plans and programmes which will be detailed, contain time-frames and budgets, and will be targeted directly at particular sectoral and cross-sectoral aspects of conservation and sustainable use.

An NBS is an effective tool for determining priorities, especially when a Party has limited resources at its disposal. To do this an NBS, among other things, must:

- identify areas for action;
- identify obstacles, such as national capacity, finances, technology, conflicting policies, inadequate laws or institutions;
- identify relevant government sectors and affected constituencies, such as local communities, business and industry;
- identify cost-effective solutions; and
- assign tasks (IUCN, UNEP & WWF, 1991).

An NBS might, for example, outline the uses of biological resources which need to be controlled, or list species to be the subject to recovery plans. In so doing, it could provide a baseline or reference point against which progress can be monitored and assessed. It will encourage collaboration between different sectors of government and will focus the attention of both governmental agencies and the public on the issues involved. Finally, an NBS will also provide an opportunity to prioritize national funding and, in the case of developing countries, will be useful for informing donors of national needs and priorities to conserve biological diversity.

An NBS needs to go beyond a national environmental profile or biodiversity country study. It could draw on or incorporate existing national environmental strategies, plans or programmes, but its distinguishing feature is the specific recommendations it makes for national action to conserve biodiversity and sustainably use its components. Biodiversity country studies (see Box 9) could, however, be a useful basis for developing an NBS, although they may not be relevant for all Parties.

There is no set formula for preparing an NBS. There must be a compromise between producing it quickly so that the process of implementing plans and programmes can begin, while at the same time ensuring that the strategy is well prepared and has included the participation of all interested constituencies. Some general guidelines which can be followed include:

- Establishing a focal point such as a National Biodiversity Unit;
- Establishing a Technical Secretariat; and
- Balancing the NBS between descriptive information, analysis of options and proposed actions.

A National Biodiversity Unit can act as a steering committee for developing the NBS. It should be a multi-sectoral, multi-disciplinary team created for the task. It could be established by legislation (see the discussion of article 6(a)). This team will provide overall policy guidance for the strategy process. It will require input from academic and research institutions which can furnish biologists, ecologists, economists, demographers and land-use planners. It will also require input from a wide range of government agencies including the relevant social, financial and policy sectors, as well as natural resource authorities (agriculture, fisheries, forestry and wildlife departments). Local community organizations and non-governmental organizations, for example conservation and humanitarian organizations, should also have a role.

The National Biodiversity Unit could be organised into working groups responsible for providing data for the various sections of the NBS. Ideally, expatriate inputs should be kept to a minimum so that national expertise is used and developed as much as possible.

Because most members of the National Biodiversity Unit are very likely to be busy professionals who can only devote a portion of their time to this process, it may be necessary to create a small, permanent Technical

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Box 8. National Biodiversity Strategies

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Secretariat with responsibility for organising, coordinating and managing the NBS. The Secretariat staff should also be multi-disciplinary with expertise drawn from a range of sectors.

The Technical Secretariat could prepare a draft NBS. This could then be circulated to government ministers, members of parliament, interested constituencies and governmental agencies, international agencies and the mass media for comment. Workshops could be organized throughout the country to introduce the draft NBS and solicit input from local communities and other constituencies. Information gathered during the workshops would be used to produce a final NBS draft. The final draft could ultimately be submitted by the National Biodiversity Unit to the cabinet, and possibly to the legislature as well, to gain a much needed political endorsement and a political commitment to implement it.

Once the NBS is finalized the National Biodiversity Unit, with support from the Technical Secretariat, must launch the strategy with the public (see article 13 (Public Education and Awareness)). A diversified approach is needed which includes using appropriate media. Plans and programmes need to be developed for key sectors or regions with the help of individual ministries, states or provinces, local communities, NGOs and the business and industry communities. The National Biodiversity Unit needs to monitor the implementation of the plans and programmes developed and the progress made. Its reports could serve as the basis for a Party to report back to the Convention's Conference of Parties thereby fulfilling article 26 (Reports). The results of the process need to be evaluated and the process itself continued, regularly reviewed and revised, as appropriate, as part of a biodiversity strategy cycle (see the discussion of article 6(a)).

Paragraph (a) refers to "national strategies, plans or programmes". Yet the word "national" does not necessarily mean "nationwide". In some Parties, a sub-national or local level approach might be more appropriate. For example, a Party may wish to prepare a series of sub-national strategies, plans or programmes, adopting each at the national level so that together they cover the entire national territory. In countries with decentralized systems of government, the constitution or other laws may require planning at the sub-national level for land use or the use of natural resources. In these cases, "national" strategies, plans or programmes can only integrate a series of sub-national strategies, plans or programmes.

In addition, if the biodiversity in one part of its territory is more acutely threatened than in another part, it may be appropriate for a Party to undertake a strategy, plan or programme for the former part. Similarly, a Party could prepare a series of sectoral strategies, plans or programmes, for example, for plants, animals, or for critical habitats—the sum of which may fulfil the article's obligations.

Whether through one comprehensive approach, or through the sum of several approaches, paragraph (a) enables a Party to choose to develop new approaches or to adapt others which may exist. This is necessary because few Parties will have to start the process from scratch. In the last decade, more than 220 national environmental studies have been completed in 110 countries.

Furthermore, many, if not most, Parties have already developed or are in the process of developing conservation strategies or action plans, including:

- National Strategies for Sustainable Development (see *Agenda 21* (Chapter 8.7)).
- National Conservation Strategies. (Since 1980, with guidance from IUCN, UNEP and WWF, over 50 nations have developed National Conservation Strategies; some of these strategies are now evolving into National Strategies for Sustainability, in the light of *Agenda 21* (Chapter 8.7) and *Caring for the Earth*.)
- National Environmental Action Plans associated with World Bank funding.
- Multi-sectoral or sectoral action plans, such as tropical forestry action plans.

The conservation of biodiversity and the sustainable use of its components inevitably will be major components of these activities and they, in turn, could be adapted as national biodiversity strategies, plans or programmes. Conversely, it is also important that other strategies, plans or programmes, such as those on sustainable development, conform with the Convention's objectives. To do this will require coordination and integration, the issue which paragraph (b) of article 6 addresses.

Furthermore, existing global and regional strategies, plans or programmes can and should be drawn on to prepare those at the national and sub-national level wherever possible. These might include the *Global Biodiversity Strategy*, the *Botanic Gardens Conservation Strategy*, the *World Zoo Conservation Strategy*, the *Guidelines for the Conservation of Medicinal Plants*, the strategy proposed in the book *Global Marine Biological Diversity* or IUCN Species Action Plans.

Paragraph (a) does not specifically mention laws, regulations or other means to ensure that national strategies, plans or programmes are implemented once they have been developed. It is an unfortunate fact that it is quite common for governments to adopt various approaches for environmental action without providing the legal tools, let alone the necessary funds, to implement and enforce them.

Of course, some actions can be undertaken voluntarily such as, for example, a study of a fishery's sustainable use. Other actions can be implemented by administrative decision or by a simple budgetary allocation. Undertaking a research and training programme or initiating a public awareness campaign may be good examples.

Many actions, however, will undoubtedly need to be anchored in legislation. Examples of these might include establishing off-take controls for fishing or forestry. Restrictions on wild plant collecting and wild animal

hunting, establishing and maintaining protected areas or conserving valuable habitats on private land all need to be legislatively based and, in some cases, enforced.

Because a national biodiversity strategy must address all sectors relevant to conserving biological diversity and sustainably using its components, by necessity it should also identify existing relevant legislation and areas where legislation is needed.

Legislation should also be implemented which anchors or institutionalizes a biodiversity strategy cycle described earlier. For example, legislation should require biodiversity strategies, plans or programmes to be created. It should also require their implementation and subsequent modification as part of the cycle. Legislation could also create a multi-disciplinary institutional focal point or oversight mechanism with the legal authority to coordinate the creation of biodiversity strategies, plans or programmes, ensure their implementation and facilitate their revision as part of the strategy cycle (see Box 8).

(b) Integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies.

Biodiversity cannot be maintained and the use of biological resources put on a sustainable basis by nature conservation and natural resource agencies alone. The policies of transport ministries (for example, road-building policies), agriculture ministries (for example, land-clearance policies) and health ministries (for example, medicinal plant policies), to name but a few, have a major impact on biodiversity conservation and on the sustainable use of biological resources, as do the decisions of the finance and planning ministries.

Article 6(b) is an obligation which is a cornerstone of the broader one in article 10(a). Article 10(a) requires each Contracting Party to integrate the conservation and sustainable use of biological resources into national decision-making. Article 6(b) reinforces this by requiring a Party to integrate the conservation and sustainable use of biodiversity into relevant sectoral plans, programmes and policies.

The basis for integrated decision-making is also generally expressed in chapter 8 of *Agenda 21* (Integrating Environment and Development in Decision-making). Article 6(b) and article 10(a) reflect the understanding that biodiversity conservation and sustainable use of the components of biological diversity can only be effective through an integrative approach in which the national plans, programmes and policies of such diverse sectors as health care, development, trade and economic policy

take into consideration biodiversity conservation and the sustainable use of its components.

A national biodiversity strategy should provide the basis to improve policy integration and coordination, as it should identify opportunities for integration at the national and sub-national levels. Integration could then be fostered and coordinated through a multi-disciplinary focal point whose members could be drawn from the public and private sectors. Indeed, this coordinating mechanism could evolve from the focal point established to create a national biodiversity strategy (see the discussion in Box 8 and paragraph (a) of this article). Legislation could provide this institutional mechanism with the legal authority it needs to seek coordination, ensure the implementation of biodiversity strategies, plans or programmes and facilitate their revision as part of a biodiversity strategy cycle.

Integration will also be facilitated by grafting the biodiversity strategy cycle onto other strategy cycles, for example, those for economic planning (see the discussion of paragraph (a) of this article). Only a few States have attempted to do this with other environmental strategy cycles, but the indications are that grafting is a particularly powerful route, possibly the only route, to achieve sustainable development and to build environmental concerns into relevant sectors and national decision-making.

Article 7. Identification and Monitoring

This article is about the ordering and use of information on biological diversity and biological resources. It requires Parties to:

- identify the components of biodiversity important for conservation and sustainable use (article 7(a));
- monitor the components of biological diversity (article 7(b));
- identify and monitor processes and categories of activities having or likely to have significant adverse impacts on the conservation and sustainable use of biodiversity (article 7(c)); and
- maintain and organize the data derived from identification and monitoring activities (article 7(d)).

Identification and monitoring will involve a combination of new data generation, gathering together existing information and the ordering that needs to occur to ensure that all information is accessible and usable for conserving biodiversity and sustainably using its components.

The last point is important. Implicit in article 7 is the assumption that the information is to be gathered for it to be used. Indeed, identification and monitoring are tools for action, not ends in themselves. Information generated will be needed for all of the substantive conservation and sustainable use articles in the Convention.

The beginning of article 7 makes it clear that the objectives of articles 8, 9 and 10—that is, *in-situ* conservation of biological diversity, *ex-situ* conservation and sustainable use of the components of

biological diversity—should, in particular, guide a Party's collection, presentation and use of the information. The results of identification and monitoring will also be important in relation to:

- developing strategies, plans and programmes (article 6(b));
- integrating conservation and sustainable use into sectoral and cross-sectoral plans, programmes or policies (article 6(b));
- undertaking environmental impact assessment (article 14(a) and (b)); and
- negotiating access agreements, including benefit-sharing (article 15(7)).

Identification and monitoring should not be viewed as a discrete one time process. Parties will need to develop their capacity to undertake it on a long term, sustainable basis. The major limiting factors are the lack of:

- financial resources;
- trained personnel; and
- equipment, including appropriate computerized databases.

In many cases useful information does already exist. If it can be gathered and organized it could be sufficient for effective action, or at least initial action. In addition, where there is a lack of full scientific certainty, the need for more information should not be used as an excuse to delay action (see preambular paragraph 9).

Each Contracting Party shall, as far as possible and as appropriate, in particular for the purposes of Articles 8 to 10:

- (a) Identify components of biological diversity important for its conservation and sustainable use having regard to the indicative list of categories set down in Annex I;**

Paragraph (a) requires a Party to identify the components of biodiversity important for biodiversity's conservation and sustainable use. It does not require *full* inventories to be prepared of *all* the components of biodiversity found within a Party's jurisdiction. Even if it did, given the fact that only about 10% of the world's estimated 4-12 million species have been identified, it would be highly improbable that a Party could identify all the species of animals, plants and micro-organisms within its jurisdiction within a reasonable period of time. Yet many countries have prepared accounts of ecosystems, as well as higher plants and vertebrate animals.

In setting out to fulfil paragraph (a), a Party is to take into consideration the indicative list of biodiversity components presented in Annex I. These are categorized in terms of:

- ecosystems and habitats;
- species and communities; and
- described genomes and genes of social, scientific or economic importance.

The three categories correspond to the three conceptual levels of biodiversity which are ecosystem diversity, species diversity and genetic diversity.

Annex I provides guidance as to the nature of the components to be identified and monitored by a Party. These are characterized in terms of:

- distinctiveness;
- richness;
- representativeness;

- economic and cultural importance or potential; and
- the extent to which they are threatened.

According to an expert panel convened by UNEP, the list in Annex I reflects "the needs of both future and present generations and a wide range of values, many of which may be difficult to assess" (UNEP, 1993c). These include:

- medicinal values;
- agricultural values;
- economic, social, scientific, cultural values; and
- values associated with key evolutionary and biological processes.

Annex I

IDENTIFICATION AND MONITORING

1. Ecosystems and habitats: containing high diversity, large numbers of endemic or threatened species, or wilderness; required by migratory species; of social, economic, cultural or scientific importance; or, which are representative, unique or associated with key evolutionary or other biological processes;
2. Species and communities which are: threatened; wild relatives of domesticated or cultivated species; of medicinal, agricultural or other economic value; or social, scientific or cultural importance; or importance for research into the conservation and sustainable use of biological diversity, such as indicator species; and
3. Described genomes and genes of social, scientific or economic importance.

To meet the Convention's general objectives with limited financial and technical resources it will be necessary for Parties to prioritize action. In fact, the Annex I list describes those components of biological diversity likely to be important for a Party attempting to set priorities. A country study on biological diversity (see Box 9) may be the vehicle to assist a Party in this because one aspect of the country study process is to identify gaps in knowledge.

Prioritizing might lead a Party to identify important ecosystems and habitats to ensure that biological diversity is conserved first within those areas. Threatened species and communities within these areas could also then be identified so that their threats can be removed and, if necessary, rehabilitation steps can be taken.

While it was decided not to include in the Convention an obligation to create global lists of, for example, biogeographic areas, threatened species or other globally

important components of biological diversity, a Party may find national lists useful in setting national priorities and implementing some aspects of the Convention. For example, national lists may be particularly useful when used in conjunction with legislation (see, for example, article 8(d) (promote the protection of ecosystems) and article 8(k) (legislation or regulation for the protection of threatened species and populations)).

Components of biological diversity important for sustainable use need to be identified as well. This includes useful or potentially useful genes or groups of genes. This could be particularly important for identifying the status of plants and animals used in traditional agriculture by indigenous and local communities. In fact, the knowledge of these communities could be extremely important in all aspects of fulfilling paragraph (a) (see article 8(j)).

- (b) Monitor, through sampling and other techniques, the components of biological diversity identified pursuant to subparagraph (a) above, paying particular attention to those requiring urgent conservation measures and those which offer the greatest potential for sustainable use;**

Paragraph (b) goes one step further in the sequence of action, calling on each Party to monitor the components of biodiversity identified in paragraph (a). Emphasis is placed on components of biodiversity which require:

- urgent conservation measures, and
- which offer the greatest potential for sustainable use.

Box 9. Country Studies on Biological Diversity

A number of countries have prepared country studies on biological diversity. Facilitated by UNEP and by contributions from various donor countries, country studies are national assessments of biological diversity, its importance to the national economy and the range of factors which threaten it. A country study collects "hard data" and could provide an important start for developing a national biodiversity strategy, as well as for plans and programmes developed from the strategy (see article 6(a) and Box 8).

It is not absolutely necessary to do a country study but, because it gives baseline information, its primary advantage is its extreme usefulness as a tool in monitoring a country's progress addressing biodiversity loss and moving towards sustainable use of the components of biodiversity. UNEP has prepared a synthesis of the experience gained up until April 1992. This focused on the 10 studies accomplished by that time for Bahamas, Canada, Costa Rica, Germany, Indonesia, Kenya, Nigeria, Poland, Thailand and Uganda.

UNEP has also prepared a detailed document—*Guidelines/or Country Studies on Biological Diversity*—which should be referred to for more specific information on preparing a biodiversity country study. In general, some of the tasks involved with preparing a country study include:

- identifying the components of biodiversity important for conservation and sustainable use;
- collecting and evaluating data needed to effectively monitor the components of biological diversity;
- identifying the processes and activities which threaten biological diversity;
- evaluating the potential economic implications of conserving and sustainably using biological resources;
- determining the economic values of biological and genetic resources; and
- suggesting priority actions for conserving and sustainably using biological diversity.

The *Guidelines* also describe how the country study process can contribute to the implementation of the Convention on Biological Diversity. A country study may be useful in:

1. Gathering and analysing data to identify gaps and potential data conflicts (articles 6 and 7);
2. Formulating strategies and plans based on the data (articles 6, 10, 11, 12, 13 and 14);
3. Implementing strategies and plans (articles 6, 7, 8, 9, 10, 11, 12, 13 and 14);
4. Evaluating the effectiveness of action taken against targets set in plans (article 7(b)); and
5. Reporting to the Conference of Parties on national measures taken (article 26).

Inventorying biological resources and assessing their conservation status and economic potential is an enormous and complex task. The *Guidelines* set out twenty guiding principles to assist countries in planning their country study. These stress that the initial country study should concentrate on readily available data, rather than attempting to achieve comprehensive coverage through new research. The very process of data-gathering will do much towards revealing gaps in knowledge which can be addressed later in the priorities assessment, strategic planning and action phases of the process. Step four indicates that the country study should be viewed as an on-going, evolving process.

The UNEP *Guidelines* are not intended as an inflexible set of rules as a country may want to approach a study in its own way. The *Guidelines* are merely intended to assist countries to assess the status and value of biological resources found within their jurisdiction.

The Convention does not define "monitor", but it does specify that monitoring is to occur by sampling and other techniques.

Monitoring is the measurement of a situation in a time series. Whereas there has been a great deal of effort on inventory and on listing threatened species and ecosystems, much less effort has gone into monitoring their status at regular intervals.

The overall emphasis on priorities indicates monitoring systems should be oriented to policy-making and management which will allow the Convention to be more effectively implemented. One difficulty will be that many existing databases are not geared towards identifying the priorities needed for implementing this

paragraph—namely those components of biological diversity that require urgent conservation measures and those which offer the greatest potential for sustainable use.

Another difficulty encountered with monitoring is the need for sustainability in terms of personnel and financial resources. Trained personnel are often needed but turnover is sometimes high. Finally, monitoring is time consuming and costly, while long term funding is often difficult to secure.

Thus, implementing effective monitoring programmes to complement identification may require innovative national initiatives and international cooperation, especially for developing countries. In almost all Parties

there are limited funds and personnel available. Parties could develop programmes which train local people to take part in identification and monitoring programmes and whose activities are supervised by trained professionals. This, in turn could build community

involvement in, as well as understanding and support for, biodiversity conservation activities (see article 13 (Public Education and Awareness)). Parties could also work with NGOs in this regard.

(c) Identify processes and categories of activities which have or are likely to have significant adverse impacts on the conservation and sustainable use of biological diversity, and monitor their effects through sampling and other techniques; and

Paragraph (c) requires a Party to:

- identify processes and categories of activities which or are likely to have significant adverse impacts on conservation and sustainable use, and
- monitor, through sampling and other techniques, their effects.

While this paragraph is important in itself, its particular significance is revealed in article 8(1). Article 8(1) requires Parties to regulate or manage the identified processes and activities if they are found to have a significant adverse effect on biological diversity. The additional obligation to monitor these effects means that the success or failure of action taken pursuant to the Convention will be more determinable.

Taken together, the two paragraphs are innovative in international law. They are a vital part of the Convention, since identifying and then controlling the impact of harmful processes and activities is one of the most important steps Parties can take to reduce the continuing loss of biodiversity.

Many of the harmful activities and processes posing the greatest *direct* threats to biological diversity are well known. They include:

- deforestation;
- unsustainable agriculture;
- drainage or filling of wetlands;
- the spread of invasive introduced species;
- urbanization; and

(d) Maintain and organize, by any mechanism data, derived from identification and monitoring activities pursuant to subparagraphs (a), (b) and (c) above.

Implementing article 7 may generate large amounts of information. Animal, plant and microbial specimens will be collected as well. Paragraph (d) requires Parties to maintain and organize data produced from undertaking the activities specified in the article's preceding paragraphs.

An important point is that policy-makers and managers, even educators, do not need data *per se*, but information derived from the data. It follows that, in addition to maintaining, storing and organizing data, Parties will need to develop the capacity to analyze, evaluate and

- the pollution.

They are likely to differ from Party to Party although, in most parts of the world, habitat destroying activities are likely to rank as the principal problem. Biological resources tend to be threatened by over-use as well. For example, fisheries in the North Sea are threatened by the cumulative effect of over-fishing for many years, the impact of pollution and the loss of coastal wetlands as breeding areas. Impacts tend to be cumulative and their sum is usually not additive but non-linear.

The *indirect* or underlying causes of biodiversity loss are less well known and are more difficult to monitor and assess, let alone change. According to a UNEP expert panel these include:

- the international economic climate, including trade and currency exchange rates;
- government economic policies such as subsidies and taxation;
- property rights (land tenure); and
- market influences (UNEP, 1993a).

Unsustainable high population growth and resource consumption, structural adjustment policies, the effect of commodity prices, the steadily narrowing spectrum of traded products from agriculture, forestry and fisheries, and inadequate land management are also to blame. The *Global Biodiversity Strategy* provides a detailed analysis of them.

disseminate it in a usable form. To accomplish this, biodiversity information and monitoring centres could be created (see the *Global Biodiversity Strategy*).

In addition to disseminating biodiversity information to user groups such as scientists, policy-makers, the general public and industry, national or sub-national biodiversity information and monitoring centres could be focal points for coordinating biodiversity identification and monitoring activities within a Party. A national centre could:

- coordinate national and sub-national biological inventories;

- coordinate existing and new specimen collections; and
- create and manage databases.

The strong trend to create conservation databases during the 1980s met with mixed results. Many complex and expensive systems have proved unworkable in practice

and have been abandoned. A common difficulty has been the absence of an effective data capture network. Developing such a network has proved extremely difficult at the global level, though should prove easier for Parties at the national level.

Box 10. Biodiversity—What We Do and Do Not Know

Ecosystem Diversity

We have good knowledge of the broad distribution and extent of the world's biomes and their component major ecosystems. Because of their species composition and/or physical characteristics these large scale biogeographical features can be detected and mapped from satellite images and aerial photographs. The world's biomes and large scale ecosystems are actually aggregates of a natural continuum of local ecosystems, habitats and communities whose boundaries may be difficult to define (Groombridge, 1992). The inability, in some cases, to accurately define these as discrete ecological units has made it difficult and, sometimes controversial, to estimate the rates of change of ecosystems. It follows that this limitation has implications for ecosystem management. For example, estimates of global loss of tropical forests during the 1980s have varied greatly from one researcher to another, and recent evidence suggests that some may have been overestimated. In addition, we still have much to learn about how ecosystems function and which natural processes and species are vital to the survival and productivity of a particular ecosystem (see Box 4).

Species Diversity

At the level of species, our knowledge is uneven—both by group of organism (or taxa) and by country. The species of mammals (c. 4300 species), birds (c. 9700 species), amphibians and reptiles (over 10,500 species) are well known; only about 1–2 new bird species are discovered each year, for example. It is estimated that about 85–90% of the circa 250,000 species of higher plants are known. Our knowledge of lower plants, fungi, invertebrates and micro-organisms, however, is much less. These organisms make up the majority of species on earth, and in consequence we do not even know the nearest order of magnitude of the number of species in most of these groups.

Overall, some 1.7 million species have been described, but estimates of the total number of species on earth remain conjectural. *Global Biodiversity: Status of the Earth's Living Resources*, published by the World Conservation Monitoring Centre (WCMC) adopts a "working figure" of 12.5 million species, and a minimum of around 8 million (Groombridge, 1992). The report is sceptical of the much higher estimates often quoted of 30 million species or more, but such estimates may depend much on esoteric questions of the species concept as applied to micro-organisms.

In general, the countries richest in species are the ones where scientific knowledge on individual species is least. This is partly due to the limitations of financial, technical and human resources available—the countries with most species are nearly all developing countries—and partly due to the inherent difficulty of identifying plants and animals in species-rich environments. Thus, two-thirds of all higher plants are tropical, and of them, half grow in tropical Latin America, yet some of these plant-rich countries are also among those least known botanically.

To ensure that the conservation needs of each species are addressed, it is necessary to know not only what species exist but their biogeography, that is, where each of them occurs. It is also important to understand the phylogenetic relationships between species, to identify and understand the local assemblages of a particular species, to identify and understand species' adaptations to their environment and the ecological interactions of species. In particular, in the tropics, much of our knowledge on individual species is based on a few collections made many years ago and not on a full evaluation. This is a further impediment to conservation action.

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Box 10. Biodiversity—What We Do and Do Not Know

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Scientists have been classifying species for over 200 years, and at current rates of progress may take several hundred more years to classify all organisms. However, the speed of loss of natural habitats means that information of which species occur where is needed *now*. Therefore, scientists have found various short-cuts to provide the more urgent information needed for biodiversity conservation without classifying every species first. These methods tend to take advantage of the fact that species diversity is spread very unevenly over the earth. They have tended to take one of two forms, or a combination of both:

- (a) Predicting richness of less-known organisms, by using known patterns of better characterized organisms. In other words, if an area is very rich in birds, it is probably rich in other forms of life also. Recent evidence indicates, however, that no taxon is necessarily a good indicator of the diversity of another, so any predictions need to be confirmed by on-the-ground studies.
- (b) Using rapid assessment techniques in areas likely to be rich in biodiversity. For example, in one technique, the number of different tree species are counted, without identifying the name of each one. Overall species diversity can be predicted from this.

The value of these approaches is that they identify *areas*. In species-rich countries, the best way—indeed the only practical way—to conserve biodiversity is to protect the natural vegetation of selected areas, rather than to take measures for individual species one by one.

Genetic Diversity

Unlike ecosystems and species, genetic diversity is not amenable to inventory at a global level. Every species represents a vast collection of genes, and only a tiny fraction of these genes are likely to be valuable to people. Even so, national inventories of microbial, plant and animal populations can be used as a surrogate, in lieu of direct measurement, to estimate the genetic diversity of a particular species. Sophisticated DNA analysis techniques, such as restriction fragment length polymorphism (RFLP) analysis, though still expensive, may be useful in studying the genetic characteristics of species populations, and identifying and inventorying previously undescribed species (UNEP, 1990a).

Some Parties may wish to integrate all their biodiversity information into a single database at one site, perhaps under the management of a national biodiversity information and monitoring centre. Others, especially those with established institutions working on particular biodiversity topics, such as gene banks and natural history museums, may wish to keep the information separate. The national herbarium, for example, could maintain the database on which plant species occur in the country and their locations, whereas the gene bank could maintain the database on which of those species were conserved *ex-situ* in the national seed bank and elsewhere.

One possible advantage to the latter approach is that emerging international standards for data tend to be sectoral in nature. For example, the International Working Group on Taxonomic Databases for the Plant Sciences (TDWG) has prepared an internationally agreed standard on how plant names should be stored in databases, another compatible standard on how to transfer records from one computer to another on plants

growing in botanic gardens, and a range of other standards in preparation.

Parties may feel that some review of present activities in the development of national conservation databases may be appropriate, with the aim of providing technical help and finding a common way forward. Of all aspects of biodiversity conservation, databases need agreed standards—to provide Parties with the very technical and specialized knowledge needed to save them "reinventing the wheel", and to ensure that the databases that do emerge are compatible with each other. Parties therefore need to develop standardized transfer formats and agreed taxonomies to enable databases to be compatible with each other. The temptation is for countries to go it alone, but the long-term interest will be better served by a slower and more complex process of agreeing international norms and standards for at least some purposes.

Article 8. *In-situ* Conservation

Article 8 provides the main set of Convention obligations to conserve biological diversity. In fact, the Convention recognizes *in-situ* conservation as the primary approach for biodiversity conservation.

This article addresses the conservation of ecosystems, wild species and genetic diversity. It also covers the *in-situ* conservation of human created plant varieties and

animal breeds. Of particular interest is the balance struck between conservation measures envisaged both within and beyond protected areas.

Implementing this article should also draw upon the results of identification and monitoring carried under article 7.

Each Contracting Party shall, as far as possible and as appropriate:

- (a) Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity;**
- (b) Develop, where necessary, guidelines for the selection, establishment and management of protected areas or areas where special measures need to be taken to conserve biological diversity;**

Protected areas form a central element of any national strategy to conserve biodiversity. Well known as national parks and nature reserves, they also encompass more recent concepts such as sustainable use reserves, wilderness areas and heritage sites. With proper management to effectively conserve biological diversity, a good network of protected areas forms perhaps the pinnacle of a nation's efforts to protect biodiversity, ensuring that the most valuable sites and representative populations of important species are conserved in a variety of ways. The network complements other measures taken to conserve biodiversity *outside* protected areas.

A great deal is known about how to set up and manage protected areas, and much has already been achieved. For example, virtually every country in the world now has one or more national parks. Recently, the Fourth World Congress on National Parks and Protected Areas (Caracas 1992) brought together nearly 2000 leading protected area experts to review progress and agree new approaches to protected area management.

Paragraphs (a) and (b) contain an unusual implied antithesis between "protected areas" (as defined in article 2) and "areas where special measures need to be taken to conserve biological diversity". As noted under article 2, the meaning of the former is clear. The meaning of the latter is unclear.

A Party needs a mixture of types of protected areas managed for different objectives, though the right mix will be different for each Party (see Box 6). In addition, a mixture of large and small areas is needed: a few large areas are easier to protect and have greater ecological integrity, but many smaller areas may often contain a greater number of species and ecosystems, and may be better able to meet the needs of local communities.

Protected areas in all IUCN categories (see Box 6) are relevant to the Convention, though the *primary* aim of areas in Categories I to IV can be—and usually is—biodiversity conservation, and the primary aim of areas in Category V and the new Category VI is sustainable use, usually of biological resources.

Few protected areas have been declared so far to protect genetic resources. Genetic resource reserves may often be quite small, protecting a particular population, and may be particularly suitable for wild relatives of crops and for crops harvested from nature, such as Brazil-nut trees and rattan palms. For many useful plants whose survival depends on human intervention, for example as plants of fields or field margins, management will have to ensure continuity of traditional activities (see article 8(j) (respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities) and article 10(c) (protect and encourage customary use of biological resources)).

The word "system" in paragraph (a) implies that the protected areas of a Party or region should be chosen in a logical way, and together should form *a network*, in which the various components conserve different portions of biological diversity. New protected areas should be considered in the light of what additional elements they will contribute to the network. In some countries the first—and often the largest—protected areas were chosen to protect outstanding areas of scenery or to conserve large animals, rather than for their contribution to biodiversity conservation. An important first step, therefore, is to make a *system plan*, which states the objectives of the national network, outlines what each existing protected area contributes to achieving those objectives, identifies gaps and provides a plan of action to fill the gaps.

Parties have limited resources for conservation and in any case the choice of land for protected areas is limited by what land is available and is not needed for other purposes. In choosing the areas for protection, Parties will wish to take into account the fact that some places contain exceptional species richness. For example, about 221 sites, termed endemic bird areas, covering a mere 2% of the Earth's surface, contain 96% of all birds with breeding ranges of less than 50,000 sq. km—and include the sites of 70% of all threatened bird species (Bibby, *et al.*, 1992). Parties could undertake national studies on similar lines, not just for birds, but for all groups of species, to identify their most species-rich sites. If protected areas are well chosen to include areas of high biodiversity, they may not need to comprise a large proportion of Party's territory. Surveys of biodiversity are vital in selecting areas for protection (see article

Implementing paragraphs (a) and (b) requires a firm legal base under which government authorities can establish and manage protected areas. And, once the protected areas are established, they need to be managed, usually by full-time staff on site. Experience has shown that it is vitally important to prepare and agree a *management plan* that implements a *conservation strategy* for the protected area. Producing the strategy and plan is an opportunity for all involved—conservation agencies, local people, tourist agencies, etc.—to get together and agree on the best way forward.

It is also important to acknowledge that there should be protected areas other than those set-up and managed by the government. Many cultures have traditions in which local communities establish protected areas, such as the sacred groves in India and Africa. Maintaining such traditions can make a great contribution to conserving biodiversity and ensures that management is done where it matters most—at the local level (see article 10(c) (promote and encourage customary use of biological resources)).

In many developed countries, non-governmental organizations (NGOs) own and manage nature reserves, in

(c) Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to assuring their conservation and sustainable use;

Paragraph (c) obliges each Party to ensure that biological resources important for the conservation of biological diversity are conserved and sustainably used by regulating or managing them. This obligation is independent of location and therefore applies to all areas within a Party's jurisdiction, not only within protected areas.

The paragraph is particularly important as it is the only part of the Convention which clearly requires a Party to regulate or manage biological resources. Article 10 (Sustainable Use of Components of Biological Diversity) surprisingly does not provide such an obligation. However, article 10(b) does require measures to be adopted

some cases comparable in size and importance to those of the government conservation service. Providing grants and creating incentives for private landowners to donate land to reputable NGOs to set up protected areas for key sites may be a valuable supplement to national protected area systems. Such measures may be a more effective and less expensive option for governments than trying to set up and manage such reserves themselves.

Protected areas may be designated by States in the implementation of other existing international Conventions, usually to emphasize their international importance. Under the World Heritage Convention (Paris, 1972), for example, States make commitments to the international community to effectively protect the sites they have proposed and the World Heritage Committee has designated. Similar protection may also be afforded by regional agreements, such as regional conventions, or legal instruments of regional economic integration organizations (see the definition in article 2).

In setting up protected areas Parties will need to consider the issue of climate change in general and the provisions of the recently entered into force United Nations Framework Convention on Climate Change (New York, 1992) in particular. Scientists predict that global warming could change the vegetation type for up to two-thirds of the earth's land surface, possibly rendering the protected areas established to conserve biodiversity ineffective, since the individual plants and animals each was set up to protect could no longer survive there. Therefore, effective conservation of biodiversity requires:

- (a) Effective control of greenhouse gases, such as carbon dioxide, methane and chloro-fluorocarbons, which contribute to global warming.
- (b) Establishing a larger protected area estate than would otherwise be the case, with emphasis on creating corridors and "stepping-stones" between protected areas, so as to enable species to move with shifting climate.

relating to the use of biological resources to avoid or minimize adverse impacts to biological diversity *in toto*. In contrast, paragraph (c) focuses on the resource itself.

"Regulate or manage" implies control of all activities which could affect the biological resources concerned. Therefore, the scope of the obligation is potentially broad. Direct use or taking such as hunting and harvesting is obviously included, but so are activities which have indirect effects or other impacts on the biological resources considered, such as those from pollution or tourism.

Examples of measures a Party could implement to regulate or manage biological resources include:

- subjecting biological resource users to off-take or harvesting controls;
- instituting trade controls, where appropriate, to accompany taking controls;
- controlling air or water pollution; and
- controlling tourism and related industries.

The regulatory or management actions a Party takes should, in most instances, include:

- information;
- management plans;
- legislation; and
- incentive measures.

Depending on the biological resource considered, regulators or managers may be faced with many uncertainties as to the best approach to take. Information is needed as a foundation for informed regulatory or management decision-making. But a lack of information should not be used as a basis for inaction, and a precautionary approach dictates that less information should generate more conservative actions (see preambular paragraph 9).

Information is needed for day to day decision-making. It is also needed for establishing an overall regulatory or management programme for a particular biological resource with which decision-making should conform. The basis for such plans or programmes could originate from a national biodiversity strategy (see Box 8 and article 6(a)).

Furthermore, effective regulatory or management actions will very often depend on creating an effective legal framework to which they can be anchored and in which they can be implemented and, if necessary, enforced. Finally, regulatory or management actions will be enhanced by applying an appropriate mix of incentive and disincentive measures, and eliminating "perverse" incentives (see the discussion of article 11 (Incentive Measures)). The phrase in the paragraph's text which qualifies biological resources—"important for the conservation of biological diversity"—was added late in the negotiations and is somewhat unusual. It implies that the paragraph's obligation does not extend to all biological resources. However, because the variation in every biological resource is itself a part of biological diversity, the conservation and sustainable use of each biological resource contributes to the conservation of biological diversity. Furthermore, a precautionary approach counsels against such a division, especially since we still have much to learn about which species are vital to the functioning of particular ecosystems.

(d) Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings;

Paragraph (d) requires each Party to promote ecosystem and species protection. Species' populations should be protected in nature ("natural surroundings"). By implication, the obligation extends to genetic resources since in nature they exist as "viable populations".

In contrast to paragraph (a) of this article, under which Parties are obliged to set up a system of protected areas for biodiversity conservation, paragraph (d) refers to *all* areas: those within and outside protected areas, on both public and private land.

Many States have legislation on conservation of vertebrate animal species. Legislation to protect invertebrates, plants or micro-organisms is much less common.

Legislation to protect individual habitat types and ecosystems is not common either. Some of the most threatened ecosystems and habitat types include:

- fresh waters, such as rivers and lakes;
- coastal areas;
- wetlands;
- coral reefs;
- oceanic islands;
- temperate moist forests;
- temperate grasslands;

- tropical dry forests; and
- tropical moist forests.

One way to protect ecosystems and habitats outside traditional protected areas is through legislatively based planning controls. In Denmark, for example, a permit is required for any significant alteration to certain defined habitat types, such as marshes or peat bogs, whether or not the habitat site is on private land. In France, the local *prefet* (the central government representative in the *departement*) can issue orders establishing an *arrêté de biotope* to protect the habitat of any species on a special schedule; the *prefet* may prohibit or regulate a wide range of activities, such as vehicle traffic, farming, drainage or construction. In both the Danish and French systems, no compensation is paid to the land-owner for loss of use as a result of the restrictions.

In Sweden, legislation identifies certain habitat types protected throughout the country. Many types of activities which may harm the habitats so protected are prohibited. There are no exceptions and, as a result, there is no permit system. If a land use is considerably restricted as a result of these prohibitions, the landowner must be compensated.

In all three examples, the habitats which are protected are not "protected areas" in the traditional sense of the

term, as there is no site specific designation. In practice, however, these habitats are protected areas in all but name: in many cases, the protection afforded and the goals to be achieved are similar to those of traditional protected areas. In fact, the distinction between both systems is becoming more blurred as the legal controls extended to habitat types are refined.

The term "viable population" is worthy of comment. IUCN has defined a viable population as one which:

- maintains its genetic diversity;
- maintains its potential for evolutionary adaptation; and
- faces minimal risk of extinction or extirpation from demographic fluctuations, environmental variation and potential catastrophe, including over-use (IUCN, 1994a).

The viability of a population depends partly on population genetics (the variability in the population's gene

pool) and partly on population demographics (its size). When a population is below a certain size, it can no longer adapt to selective pressures. Once it is below the so-called Minimum Viable Population (MVP), evolution stops and the risk of short-term extinction greatly increases. Even if the population is protected from harmful external impacts, if it is below MVP size extinction is still likely. In these cases, the way to avoid extinction is to increase the population rapidly above MVP size.

Maintaining viable populations is not only necessary outside protected areas but also within them. In both cases, special management measures may be required to ensure the survival of the species or the continued existence of habitat critical to the species' survival. To be most effective these may have to be anchored in legislation (see for example article 8(k) (threatened species legislation)). Therefore, it is important to ensure that integrative and coordinated measures are taken for species and habitat conservation and sustainable use.

(e) Promote environmentally sound and sustainable development in areas adjacent to protected areas with a view to furthering protection of these areas;

Protected areas can be found in a wide variety of settings relative to human beings. Sometimes they are in remote areas with low human population density. At the other end of the spectrum they could be situated close to major urban areas or in areas where population is growing rapidly. In the latter cases, the activities of the human population could well determine the protected area's viability and effectiveness, especially if, in adjacent areas, human population is rising, poverty may predominate, resources are being overused, industry exists or urbanization is expanding. Some or all of these human-based development threats face protected areas in developed and developing countries alike.

Paragraph (e) implicitly recognizes that the activities which occur in the areas adjacent to protected areas may be critical to the protected area's success. One reason for this is that adjacent communities ultimately control the protected area's fate. In theory, if the local population is negatively affected by the protected area, then the protected area may be destined to fail because its establishment does not benefit the affected communities. For example, in some instances local people have lost traditional rights to gather products or graze animals or the ability to develop properties. However, if that which local people have lost is replaced where possible, and other forms of development compatible with the goals of the protected area are promoted in adjacent areas, then the protected area may be successful.

On the one hand, this paragraph commits Parties to promote development in areas adjacent to protected areas where appropriate. On the other hand, it commits Parties to ensure that development in these areas does not undermine conservation within the protected area

itself. To achieve this, development must be environmentally sound and sustainable.

A possible model for Parties to follow is that of the biosphere reserve, developed and promoted by the UNESCO Man and the Biosphere Programme (see Box 11).

Biosphere reserves are designed to be models for sustainable resource use, as well as for conservation, and typically contain a fully protected core zone surrounded by an extensive "sustainable use" or "support" zone.

To ensure that development is environmentally sound, is sustainable and supports the objectives of the protected area, adjacent areas must be subject to a legal regime which requires land use planning and control. This should take into consideration the levels of biodiversity in both the protected area and the adjacent area, local population densities as well as existing land uses. Environmental impact assessment for proposed projects and development programmes should be required as part of the review and approval process to ensure that the goals of the protected area are not contravened and biological diversity is conserved (see the discussion of article 14(1) and Box 12).

The managers of a particular protected area should have a strong voice in the development plans for adjacent areas. Indeed, development and administration of adjacent areas must be closely linked to a protected area and both areas should be viewed as one planning unit.

Close coordination and integrated decision-making must be established and maintained between these managers, governmental development agencies and local communities. A multi-disciplinary oversight or coordinating group, composed of these groups and

NGO representatives, could be established for each protected area where it has been determined adjacent development could be undertaken. This group would have the legal authority to act as a focal point for development proposals and their approval in adjacent areas, and could monitor the impacts of development on the protected area and the adjacent area.

In many cases, the majority of land adjacent to a protected area may be community or individually owned. Measures taken to regulate or manage land use practices in these areas should be instituted in combination with measures which act as incentives and disincentives (see article 11 (Incentives Measures)). These would help to

encourage appropriate development and discourage that which is inappropriate. They should be implemented in combination with the removal or minimization of "perverse" incentives which encourage the loss of biological diversity.

Some incentives could be quite independent of the protected area, such as installing health centres, providing schooling or training or implementing tax measures which encourage a particular land use. Others might relate to the protected area itself. These could include concessions for hotels and restaurants, jobs for guides and wardens, and the sharing of park facilities like roads and health care with local people.

Box 11. Biosphere Reserves

Established within the framework of UNESCO's interdisciplinary Programme on Man and the Biosphere (MAB), biosphere reserves in terrestrial and coastal environments constitute a unique category of protected area. Their development is oriented and supported by an action plan established in 1984, formally adopted by UNESCO and UNEP, and supported by FAO and IUCN. Each biosphere reserve is conceived to fulfil:

- A conservation role, protecting locally-occurring genetic resources, plant and animal species, and ecosystems and landscapes of value to maintain biological diversity and life-support systems;
- A development role, combining conservation objectives with the sustainable use of ecosystem resources to benefit local communities; and
- A logistic role, providing research, monitoring, education and training opportunities and facilities for local, regional and worldwide purposes, through exchanges organized within the framework of an international network which links all biosphere reserves under the auspices of UNESCO.

Each biosphere reserve is managed with these three roles in mind and is designed around a particular zonation pattern which includes a core area (or areas) devoted to strict protection, a delineated buffer zone where only activities compatible with conservation objectives can take place, and a transition zone where sustainable resource management is practised by co-operating local communities.

Biosphere reserves are recognized at the international level by UNESCO as important for conserving biological diversity and furthering scientific knowledge, technical competence and human values necessary for sustainable resource management and use.

At the national level, countries develop action plans for their biosphere reserves which outline management objectives and ensure a coherent policy for conservation and monitoring.

The biosphere reserves—at present 324 situated in 82 countries—form an international network facilitating co-operation, research and monitoring, as well as the mutual sharing of experiences, exchange of technical information and personnel.

The necessity to reinforce the network's functioning led the General Conference of UNESCO to decide to create a statutory framework for the network which should be formalized in 1995. Before then, at the invitation of Spain, UNESCO will organize an international conference of experts, to be held in Seville in March 1995, to evaluate the implementation of the 1984 Action Plan, and create a new Action Plan for Biosphere Reserves. The new Action Plan will draw on the experiences gained from implementing the 1984 Action Plan and will reflect new developments since the 1992 United Nations Conference on Environment and Development.

Source: UNESCO, Programme on Man and the Biosphere

(f) Rehabilitate and restore degraded ecosystems and promote the recovery of threatened species, *inter alia*, through the development and implementation of plans or other management strategies;

Most areas important for biodiversity are not pristine in the strict sense of never having been exposed to human activities, but have been influenced by humans, often to the detriment of biological diversity. Paragraph (f) requires each Party to:

- rehabilitate and restore degraded ecosystems, and
- promote the recovery of threatened species.

Reflected here is the belief that the conservation of biological diversity is not only about looking after famous wildlife sites and other remote and relatively untouched areas. It is also about revitalizing degraded ecosystems and restoring flora and fauna. This can be on a small scale, such as revegetating derelict factory sites on the edge of cities in post-industrial societies, it can be about restoring a polluted river or the productivity of a fishery or it can cover large plans to re-establish trees in land converted to pasture or desert. Such a high proportion of the earth's surface has been wasted that pressure on particular wild places could be greatly eased if the damaged areas are brought back to productive health, benefitting nature, biodiversity and above all the communities who live on or on the edge of those degraded areas.

Rehabilitating and restoring ecosystems (sometimes called restoration ecology) is a fairly new discipline which relies on natural succession and, in some cases, active human intervention, such as planting trees, removing introduced species, using controlled burns and re-introducing predators, to bring degraded areas back to productivity and to secure biodiversity. It has typically been accomplished on a small-scale for mines, temperate forests and wetlands such as salt marshes and mangrove swamps. Larger scale applications are fewer in number, with perhaps the best known example being the on-going restoration of dry tropical forest in Costa Rica's Guanacaste National Park.

Restoration ecology is an applied science which requires an in-depth knowledge of the structure and function of the original ecosystem as well as time, human resources capacity and financial resources. Success for both small and large projects is not guaranteed, especially if the original damaging inputs like pollution or unsustainable use, and the "perverse" incentives which may encourage them (see the discussion of article 11), have not been identified and minimized or eliminated. For all of these reasons, implementing this part of paragraph (f) may require other Convention articles to be implemented. These could include:

- article 7 (Identification and Monitoring);
- article 12 (Research and Training);
- article 17 (Exchange of Information); and
- article 18 (Scientific and Technical Cooperation).

Article 10(d) recognizes that remedial action in degraded areas may be developed and implemented at the local level. If supported by a Party, local people may be the most motivated to undertake remedial action and secure the undertaking's success because they have the most to gain in the long run.

Paragraph (f) uses the phrase "rehabilitate and restore" presumably because the drafters felt that there was some significant difference between them. It is true that the two words are sometimes used distinctively—"rehabilitate" meaning "bring back to productive use" and "restore" meaning "bring back to the original condition". This distinction is not, however, altogether useful, if only because total restoration of land to its original inferred condition is rarely practicable, and in any case, ecosystems are so dynamic that choosing any point of time to represent an "original" state is highly arbitrary. In this paragraph, the joint use of the two terms might be explained as meaning, "so far as possible, bring disturbed and damaged systems back towards their natural condition, or at least the condition in which they are capable of sustained productive use".

A cautionary note should be added on the concept of "naturalness". The dynamic nature of ecosystems makes the choice of what time is to be considered "natural" also an arbitrary one. Also, virtually all ecosystems in the world have been altered by humans, both positively and negatively. The removal of large predators (such as the wolf in most of Northern Europe) and herbivores (such as the mammoth) makes it impossible to recreate ecosystems such as they would have been in the absence of humans—if indeed that is desirable.

Under this paragraph Parties are also obliged to *promote* the recovery of threatened species. As an affirmative commitment, this obligation is novel and is an important feature of the Convention. Other international agreements tend to oblige their parties to "protect" species, but do not necessarily require positive steps for their recovery.

While Parties cannot guarantee the recovery of threatened species, because that is beyond human control or in some cases may be prohibitively expensive, the commitment to promote recovery is an important one. Of course, species recovery measures will be aided by measures to protect ecosystems and natural habitats (see the discussion of article 8(d)), as well as the measures undertaken pursuant to this paragraph to restore and rehabilitate degraded ecosystems, since most species extinctions are due to habitat destruction.

In many cases, threatened species need remedial efforts beyond removing the external threats and impacts if they are to survive. For example, as noted in the discussion of population viability (see article 8(d)), small populations need to be rapidly increased so as to minimize inbreeding.

Captive breeding for animals and artificial propagation of plants followed by immediate re-introduction can be vital in bringing this about.

According to this paragraph, recovery plans and management strategies are the methods by which these objectives are to be achieved. Although many action plans for threatened species have been prepared (IUCN's Species Survival Commission has been particularly active with this) for example, individual recovery plans have been made for only a tiny proportion of the tens of thousands of known threatened species of animals and plants.

In the past the temptation has been to gather large amounts of data and then not act upon it. The Convention encourages Parties to act early. The action required very much depends on the organism concerned. Some large

mammals vulnerable to poaching may require large sums of money and the efforts, often life-long, of hundreds of dedicated people. Yet not all threatened species are expensive to save. Quite modest efforts in managing small rare plant sites may be sufficient to take care of some endangered plants. One person can effectively monitor, supervise and promote actions to save tens, in some cases as many as 100, endangered plant species, especially if many of them grow in the same locations.

The recovery of threatened species requires the same Convention articles to be implemented or drawn upon as previously noted for ecosystem rehabilitation and restoration. Recovery measures should be anchored in legislation or other regulatory measures called for in paragraph (k) of this article to protect threatened species and article 9(d).

(g) Establish or maintain means to regulate, manage or control the risks associated with the use and release of living modified organisms resulting from biotechnology which are likely to have adverse environmental impacts that could affect the conservation and sustainable use of biological diversity, taking also into account the risks to human health;

Paragraph (g) requires each Contracting Party to take steps to regulate, manage or control the risks to biological diversity and human health posed by the use and release of living modified organisms (LMOs) likely to have adverse environmental impacts. Parties may implement a programme to address the risks through a hierarchy of measures—regulation, management or other means of control.

The Convention does not define "living modified organisms resulting from biotechnology". The concept is very broad, covering all organisms—whether plants, animals or microbes—resulting from biotechnology that are alive.

There are two distinct categories of LMOs. The first category includes organisms whose genetic material has been modified by traditional or conventional techniques, such as plant breeding or artificial insemination.

LMOs also include organisms whose genetic material is more directly modified through, for example, recombinant DNA technology. These are the organisms that are generally associated with the term "genetically modified organisms" (GMOs). GMOs, therefore, are a narrower category of LMO. They can be either dead or alive, but this paragraph's obligations only apply to those that are alive.

The extent to which LMOs developed from the techniques of modern biotechnology, such as GMOs, actually present risks to the environment, and consequently to biodiversity and human health, is controversial and opinions differ on their existence and magnitude.

During the Convention negotiations there was much discussion as to whether and how to deal with the use and release of GMOs into the environment. The view that prevailed in the negotiations is that many of the

concerns directed towards GMOs—such as the risk of invasiveness, the spread of introduced traits, selection for resistant organisms from biopesticides and the production of toxic by-products in food—may be, in some circumstances, equally applicable to traditionally developed or bred organisms.

A general concern which applies to all LMOs used in agriculture, for example, is displacement of traditional animal breeds and plant varieties resulting from the use of modern breeds and varieties. This in turn could cause genetic erosion, land degradation, increased need for and use of external inputs such as fertilizers, biocides and antibiotics, as well as socio-economic dislocations, all of which could affect biodiversity and human health.

These reasons in the end led the negotiators to replace the term "genetically modified organisms", used in earlier drafts of this paragraph, with "living modified organisms", even though this substitution greatly increased the scope of the paragraph's obligation.

The intent of the obligation is for Contracting Parties to approach the potential environmental and health risks of LMOs, not only GMOs, in a rational, precautionary manner based on the assessment and subsequent regulation, management or control of the risks.

There is a large body of policy guidance on GMOs developed through the Organization for Economic Cooperation and Development (OECD), FAO, UNIDO and WHO which *a fortiori* could be used in formulating approaches to implementing this paragraph for all LMOs. Reviewing this information, and the experiences of other States, may be particularly necessary as the wide range of LMOs, and the varying degree of risks they may present, has implications for the scope and effectiveness of the programme a Party might create.

Controls should be premised on the likelihood an organism will have adverse environmental impacts that could affect biological diversity or present a risk to human health. Assessing the likelihood of risk could be guided by three primary criteria:

- familiarity with the organism and its characteristics;
- the organism's contemplated application; and
- the environment into which the organism will or could be released (Persley, *et al*, 1992).

Implementing an effective programme may require drawing on a broad range of disciplines including the

biological sciences, economics and law, something which developing countries may not have the financial, technical or human resources to accomplish. Cooperative or collaborative efforts with other States, however, could enable Parties to supplement their capabilities.

The mechanisms established under this paragraph could also provide the means through which the Parties fulfil their obligations under article 19(4). Article 19(4) requires each Contracting Party or their nationals to provide information on available use, safety and environmental impact information for a particular LMO when it is exported to another Party.

(h) Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species;

A serious threat to biodiversity—second only to habitat loss—is alien species (sometimes called exotic, introduced, non-indigenous or non-native species). The threats of alien species to biodiversity are well documented. Some species, when introduced into an area where they are not native

- compete with other species for space and food;
- become predators of other species;
- destroy or degrade habitat; and
- transmit disease and parasites (IUCN, UNEP & WWF, 1980).

Invasive alien species present a particularly great threat on oceanic islands, where many ecosystems have evolved in the absence of grazing or predatory land mammals. The introduction of these kinds of animals, both accidentally and intentionally, can cause severe ecological disruption and in some instances (such as on Philip Island, off Australia) have even turned native forested land into desert. European colonizers in the 18th and 19th centuries introduced land mammals, such as goats, sheep, pigs and cats to many oceanic islands, with devastating ecological consequences, while the inadvertent introduction of rats and mice also had a severe impact on ground-nesting birds. There were no natural predators, parasites or diseases to control these animals. Nor had the native plants on such islands developed defence mechanisms against grazing animals, such as thorns or an unpalatable taste.

Equally damaging have been introduced plants, often brought in as ornamentals for growing in gardens. On some islands, introduced plants have displaced the native forests in all but a few small enclaves. Examples of these plants that threaten other plants include brambles (*Rubus* spp.) on the Juan Fernandez Islands (Chile) and New Zealand Flax (*Phormium tenax*) on St Helena. Islands like Mauritius and Hawaii are some of the worst affected. Mediterranean-type floras, particularly in the plant-rich Cape region of South Africa, have been particularly

badly hit. Australia and New Zealand also have severe problems of plant and animal introductions. Even if efforts to conserve habitats succeed, the alien species problem is likely to get worse and to spread on continental land masses, in freshwater systems and in coastal waters.

A particularly intractable problem has been the spread of alien species in freshwater and coastal systems. Intentional introductions of fish species, such as the Nile perch in Lake Victoria, in many cases have devastated native populations of fish.

Once an invasive species has taken hold, eradication can be very expensive or even impossible using current methods. For example, the accidental introduction of the zebra mussel from the discharge of a ship's ballast water into the North American Great Lakes, and its subsequent population explosion, will annually cost hundreds of millions of dollars to manage (International Joint Commission & the Great Lakes Fishing Commission, 1990).

Goats and other large mammals can be reduced quite easily, and even eradicated on small islands, but small mammals and invasive plants can be almost impossible to eradicate. The cost of finding and introducing natural parasites and predators for the large number of invasive species is also prohibitive, bearing in mind the safety considerations for other species. The introduction of control animals has generally been a further unmitigated disaster—cats for example were introduced to several islands in the hope that they would control rats and mice, but they found the native seabirds more tasty and much easier to catch. Because of the threats biological control agents pose to other species and ecosystems FAO is developing a code of conduct on their use (Beaumont, 1993).

It is, therefore, absolutely vital that Parties and non-Parties prevent the further introduction of invasive species. The States most vulnerable to such invasion are the ones which have already suffered, in particular, island nations. All Parties should review their quarantine legislation,

regulations and practices so as to ensure that plants or animals (or living parts of them such as seed) are not introduced if there is a risk that they might become harmful. Prevention is easier, and far cheaper than cure. The extent to which damaging introductions still continues to occur shows that the controls in many countries are far from adequate.

At the international level, article 196 (Use of Technologies or Introduction of Alien or New Species) of the United Nations Convention on the Law of the Sea (Montego Bay, 1982) requires States to take all measures necessary to prevent, reduce and control intentional or accidental introduction of alien or new species in the marine environment. *Agenda 21* (Chapter 17.30 (a)(vi) (Oceans and Seas)) directs States to consider adopting appropriate rules on ballast water discharge to prevent the spread of non-indigenous organisms.

The other measures taken internationally focus on plant and animal "pests" and pathogens. One example is the International Plant Protection Convention which establishes a system of export certificates designed to confirm that exported plant items are insect free and conform to the importing State's phyto-sanitary regulations. The International Office of Epizootics has established health and sanitary guidelines for the export and import of animals (UNEP, 1993d).

Several States have introduced national legislation to address the alien species problem. Attention has generally focused on the import of exotic species from outside the country, although in some States it may be necessary to establish controls on introductions from one part of the country to another. It may be particularly important to prevent introductions into protected areas, as well. Controls must address the two categories of introductions:

- voluntary introductions, and

(i) Endeavour to provide the conditions needed for compatibility between present uses and the conservation of biological diversity and the sustainable use of its components;

The wording of paragraph (i) is somewhat unclear and, because it focuses on use, it may have been better placed in article 10 (Sustainable Use of Components of Biological Diversity).

Whereas a Convention can impose obligations for the future, it is often more difficult to change present activities, in particular the on-going use of biological resources such as fish and forests, even if they are not

- involuntary or accidental introductions (de Klemm, 1993b).

A regulatory programme to control voluntary introductions must be based on a permit system. The general philosophy of such a system is to grant a permit only when there is reasonable certainty that the introduction will not cause significant harm to ecosystems, habitats or species of the country or regions in which the introduction is contemplated (de Klemm, 1993b). The system is usually risk-based and, therefore, could be extended to living modified organisms (see the discussion of article 8(g) and article 19(4)), since both alien species and the introduction of LMOs involve issues of biosafety or biosecurity.

Accidental introductions of organisms are more difficult to prevent through a regulatory programme. Australia, however, is contemplating national legislation to regulate the discharge of ship ballast water into its coastal waters. The keeping, transport and sale of exotic organisms could be subject to a permit, if they have entered the country.

If a damaging introduction does occur, quick action is vital to control it. In particular, it may be possible to eradicate an invasive plant before it spreads far. Therefore governments should give the appropriate agencies the jurisdictional power and capacity—and rapid access to funds—to control an introduction before it can spread.

In general more priority is needed to control alien organisms. An international initiative is needed in this vital, but rather neglected field. In particular, a model is needed which could predict which species would be likely to become invasive and where.

There is also a great need for all Parties to highlight to the general public the possible dangers of alien species. Public education and awareness campaigns will help in this regard (see article 13 (Public Education and Awareness)).

sustainable. Independent from the legal question of existing or acquired rights, livelihoods may be put at risk and it may take time to implement the changes needed. Parties may have to provide incentives (see the discussion of article 11) to those affected to encourage more appropriate or sustainable use, rather than impose an immediate change by law. This is presumably why the paragraph's phrasing is not very committal.

(j) Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote

their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices;

The linkages between humans and biodiversity are as old as humans themselves, and any efforts to conserve biological diversity and sustainably use its components must take into consideration the interface between culture and biological resources. Well before the rise of modern global society, communities throughout the world prospered by husbanding biological resources in their attempts to adapt to local environmental conditions.

In the process a sophisticated and wide ranging body of knowledge, innovations and practices developed, inextricably linked to the use of biological resources. It enabled many communities to live within the limits of their local environment and contributed to their cultural and spiritual identity as well.

The accelerated loss of biological diversity represents not only a loss of genes, species and ecosystems, it also tears at the very fabric of human cultural diversity which has co-evolved with, and depends on, their continued existence. As the communities, languages and practices of indigenous and local peoples die out, lost forever is the vast library of knowledge accumulated, in some cases, over thousands of years. This is occurring at a time when "modern" society is just beginning to understand and appreciate the potential value of traditional knowledge, innovations and practices for its own survival (WCED, 1987).

While the Convention on Biological Diversity recognizes in several places that indigenous and local communities have close links to biological resources (see preambular paragraph 12, article 10(c) (protecting and encouraging customary use of biological resources)), preambular paragraph 13 (role of women in biodiversity conservation), article 8(j) is the primary Convention obligation addressing the knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles. Subject to its national legislation, a Contracting Party is required to:

- respect, preserve and maintain the knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant to the conservation and sustainable use of biological diversity;
- promote the wider application of traditional knowledge, innovations and practices with the approval and involvement of their holders; and
- encourage the equitable sharing of benefits arising from the use of traditional knowledge, innovations and practices.

The unusual proviso of subjecting a Party's international obligation to national legislation was inserted during the negotiations to preserve the legal relationships some States have previously established with indigenous

peoples through treaties and national legislation (Chandler, 1993). Strictly speaking, however, the paragraph's objectives could be defeated, since the wording implies that all national legislation, including future rules, will take precedence. Furthermore, as noted in the commentary for preambular paragraph 12, the phrase "indigenous and local communities embodying traditional lifestyles" reflects a wish to exclude article 8(j) from applying to people of traditional descent, but who no longer live in traditional communities.

Very often government policies have resulted in the loss of cultural and biological diversity. Therefore, the first step towards fulfilling article 8(j) is for a Party to identify and eliminate the impact of those policies which may contribute to the loss of biological diversity through the erosion of cultural diversity.

Protecting and encouraging customary use of biological resources compatible with conservation and sustainable use is one obvious way to conserve traditional knowledge (see the discussion of article 10(c)). Other actions to be considered include:

- eliminating "perverse" incentives which encourage the over-exploitation of agricultural, forest and fisheries resources, the displacement of traditional practices, plant varieties and animal breeds and the destruction of ecosystems (see the discussion of article 11);
- creating a system of incentives and disincentives which encourage traditional practices and innovation, as well as their use; or
- undertaking ethno-biological research programmes to identify and record traditional knowledge, innovations and practices (see the discussion of article 12(b)).

The second part of article 8(j) requires a Party to promote the wider application of traditional knowledge, innovations and practices. This obligation echoes other relevant Convention articles such as article 17(2) (exchange of indigenous and traditional knowledge) and article 18(4) (cooperate in the development and use of indigenous and traditional technologies).

A significant qualification to the obligation is that promotion is to be undertaken with the approval and involvement of the holders of such information. The "holders" could be the community itself or, depending on the circumstances, an individual within the community, for example a shaman or farmer.

The third part of article 8(j) requires Parties to encourage the equitable sharing of benefits arising from the use of traditional knowledge, innovations and practices. Taken together, these two obligations acknowledge the great economic and non-economic value of traditional

knowledge, innovations and practices to modern society and recognize that the holders are entitled to decide how to share the information and for what benefit.

Modern society has already benefited from traditional knowledge and innovations with few, if any, direct benefits having gone back to traditional communities. For example, virtually all plant derived drugs used in modern Western medicine were discovered from their use in traditional societies, not by random screening. Furthermore, modern plant and animal breeders very often rely on the genetic diversity found in traditional landraces and animal breeds developed by countless generations of traditional farmers to create modern hybrid seeds and improved animal stock. Modern society will continue to benefit from the collection, dissemination and application of traditional knowledge, innovations and practices relevant to:

- plants and animals useful for food, medicines, dyes, fibres and biocides, and
- agricultural, forestry, fisheries, soil and water management techniques.

The challenge will be for Parties to develop appropriate policies and legislation which will promote wider application of such knowledge, innovations and practices, while at the same time ensuring the holders' consent and encouraging the equitable sharing of benefits. Providing for this could prove difficult in part because the knowledge, innovations or practices concerned may not be confined to a single community or person, posing problems of deciding precisely whom should benefit and how. Options could include:

- enacting legislation requiring approval of and benefit-sharing with traditional communities (perhaps to coincide with genetic resources access legislation—see the discussion of article 15);

(k) Develop or maintain necessary legislation and/or other regulatory provisions for the protection of threatened species and populations;

This paragraph obliges Parties to provide legislation needed to protect threatened species and populations. The term "legislation" normally includes "regulatory provisions", but the separate mention of the latter in this paragraph emphasizes the fact that many States already have framework legislation under which detailed regulations could be adopted to implement this provision.

Paragraph (k) is a particularly important aspect of the Convention since legislation is essential to prevent the loss of threatened species. This fact is echoed in article 9(d). Article 9(d) requires Parties to regulate or manage collection of biological resources for *ex-situ* conservation purposes because it was perceived that such collection might further endanger threatened ecosystems and species.

- enacting special legislative or other measures to better enable traditional communities to protect and control their knowledge, innovations and practices, such as plant varieties;
- working with professional associations to establish ethical guidelines and codes of conduct for the collection and dissemination of, as well as benefit-sharing for, traditional knowledge, innovations and practices;
- establishing outreach programmes to educate traditional communities on how to negotiate benefit-sharing agreements;
- working with NGOs and local institutions to identify potential benefits and direct appropriate benefits back into a community;
- raising public awareness of the values of traditional knowledge, innovations and practices; and
- cooperating with other States to implement Farmers' Rights as part of the FAO Global System for the Conservation and Utilization of Plant Genetic Resources (see Box 13).

Finally, depending on the circumstances, some of the options a Party may choose to undertake to fulfil article 8(j) may need to be implemented in conjunction with policies or legislation which provide individuals and communities, whether indigenous or local, certain rights under the law. Among others, these could be associated with land, culture, intellectual property, legal recognition, legal personality and the right to associate. The explicit or implicit guarantee of these will help individuals and communities maintain their knowledge, innovations and practices, clarify control over such information and help to ensure that those who profit from using this information equitably share the benefits from that use.

Laws to protect individual threatened species were some of the first measures taken by States to protect biodiversity. Early laws tended to protect individual plants or animals from impacts specific to them, such as hunting or fishing in the case of animals, and uprooting or picking in the case of plants. In some instances, however, such laws have proven to be insufficient since for many species, the greatest danger comes not from deliberate taking, but from destruction of the habitats where they live.

As a result, recent laws have tended also to cover the protection of the sites where threatened species still occur. An additional benefit from this is that protecting one threatened species by conserving its habitat often safeguards many other species and inevitably contributes to the conservation of ecosystems.

Habitat protection should be one aspect of any legislation promulgated pursuant to paragraph (k), since the requirement is to protect populations. Parties will have to develop progressive provisions to accomplish this, including the use of incentives (see article 11), and planning constraints or land-use controls (see paragraph (d) of article 8) since, in most cases, it is not possible to make the habitat of every threatened species into a protected area.

Protection laws for plants are particularly inadequate and are therefore in need of attention. In many States, plants are treated as private property and so can be freely removed by the owners of the land where they grow. In others they are treated as free products of nature and so can be collected by anyone almost anywhere. However, the protection of the habitats of threatened plants is often easier than the protection of threatened animal habitats,

because the plants do not move and many of them occupy only small areas. Another area in need of attention is protective legislation and accompanying measures for invertebrates (de Klemm and Shine, 1993).

To achieve the objectives of the Convention, the legislation should be linked to requirements for environmental impact assessments (see article 14) and provide for the preparation of recovery plans, to restore populations to previous ranges and densities, as required in article 8(f). Finally, if it has not already done so, a Party should ratify and implement through national legislation the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (Washington, 1973); where CITES has already been ratified, the effectiveness of existing legislative measures should be reviewed and improvements made where appropriate.

(l) Where a significant adverse effect on biological diversity has been determined pursuant to Article 7, regulate or manage the relevant processes and categories of activities; and

Article 7(c) requires Parties to identify the processes and categories of activities which have or are likely to have significant adverse impacts on the conservation and sustainable use of biodiversity. Paragraph (l) of article 8 then obliges them to "regulate or manage" the processes and categories of activities that have been identified under 7(c).

The combined effect of articles 7(c) and 8(l) is very wide. Many factors lead to significant adverse effects on biological diversity, including pollution, urbanization, the building of transport links, monocultural and intensive agriculture, soil erosion and plantation forestry. The word "significant" gives some discretion to Parties, in both this paragraph and in article 7(c), to determine the processes and activities concerned, but the obligation could be far-reaching for virtually all Parties, giving many opportunities for implementation.

Of particular concern is the need to ensure that data derived from identification and monitoring activities is in a form which can be readily used by decision-makers for management activities. This point is highlighted in the *Guide's* commentary for article 12(b) (research which contributes to conservation and sustainable use) and in that for article 7 (Identification and Monitoring).

There are, of course, already existing international agreements on many of these activities, such as the Climate Convention (New York, 1992), the Protocol on Substances that Deplete the Ozone Layer (Montreal, 1987), the Convention on Long-Range Transboundary Air Pollution (Geneva, 1979) and the various international agreements on ocean pollution and fisheries, as well as numerous national laws and regulations.

(m) Cooperate in providing financial and other support for *in-situ* conservation outlined in subparagraphs (a) to (l) above, particularly to developing countries.

Paragraph (m) is about financial and other types of cooperation. Cooperation should occur between all Parties to the Convention, but the paragraph particularly emphasizes support to developing countries. Furthermore, the emphasis is on direct bilateral support from one Party to another to implement paragraphs (a) through (l), not on multilateral financing under the Convention's financial mechanism (see articles 20 and 21).

The phrase "financial and other support" means that cooperation could be in cash or in-kind. And, since the implementation of article 8 requires Parties to implement or draw on other articles of the Convention, support could, for example, extend to identification and

monitoring (article 7) research and training (article 12), public education (article 13) or sharing of technical knowledge (articles 17 and 18).

Many developed countries already supply bilateral development assistance to developing countries. One unfortunate aspect of assistance is that it has tended to create long term needs for operational and other kinds of support in countries whose budgets cannot afford a sustained effort after the aid terminates. A critical goal of bilateral aid therefore should be to develop local capacity which can be maintained on a sustained basis.

Furthermore, there has to be better communication between the donor and the recipient country to ensure

that aid truly meets the recipient's priorities and needs. Recipient countries can determine their biodiversity priorities and needs by undertaking a national biodiversity strategy (see Box 8) and developing relevant action plans or programmes. They should also ensure that the conservation of biological diversity is integrated into national decision-making (article 10(a)) and, in particular, that it is integrated into relevant sectoral and cross-sectoral plans, programmes and policies (article 6(b)), thus paving the way for aid to also do the same.

One important observation relevant to both donors and recipients is that single, stand alone biodiversity related projects will probably have very little impact on a Party's overall biodiversity effort. A good strategy, then, may be

to finance biodiversity projects as part of larger development projects (McNeely, 1988). For example, if dam construction is planned, then a portion of the project's financing should be dedicated to maintaining the watershed above the dam. Identification and monitoring programmes, research and training programmes and public education and awareness should also be financed as part of the project.

Finally, consideration should also be given to supporting international and national NGOs to act as agents for and partners with donors and recipients, respectively, to increase the effectiveness of aid and promote grass roots involvement and support.

Article 9. *Ex-situ* Conservation

In addition to *in-situ* conservation measures, in some cases the components of biological diversity can also be conserved *ex-situ*, that is, outside their natural habitats.

Ex-situ conservation of the components of biological diversity—genetic resources, as well as wild and cultivated or domesticated species—draws on a diverse, growing body of techniques and facilities. Some of these include:

- gene banks such as seed banks, field banks and sperm and ova banks;
- in-vitro plant tissue and microbial culture collections;
- captive breeding of animals and artificial propagation of plants, with possible re-introduction into the wild; and
- collecting living organisms for zoos, aquaria and botanic gardens for research and public education and awareness.

Ex-situ conservation provides excellent opportunities for research on the components of biological diversity conserved. A variety of institutions, for example, seed banks, microbial resources centres, zoos, aquaria and botanic gardens, both at the international and national levels, are involved with research.

Some of these same institutions also play a central role in public education and awareness, primarily by bringing members of the general public into contact with plants and animals they may not normally come in contact with. For example, it is estimated that worldwide annual visits to zoos is over 600 million (World Zoo Organization and IUCN, 1993). While the figure may include repeated visits, it clearly demonstrates the great potential for *ex-situ* conservation facilities to be at the forefront of educating the public on the biodiversity issue.

Each Contracting Party shall, as far as possible and as appropriate, and predominantly for the purpose of complementing *in-situ* measures:

- (a) **Adopt measures for the *ex-situ* conservation of components of biological diversity, preferably in the country of origin of such components;**

Paragraph (a) requires each Contracting Party to adopt a set of unspecified measures to conserve the components of biological diversity *ex-situ*. This is to be accomplished bearing in mind that *ex-situ* measures are to primarily complement *in-situ* measures.

Ex-situ measures have been, perhaps, most extensively applied to conserve cultivated and domesticated species of plants and animals. *Ex-situ* conservation techniques, such as seed banks, field gene banks and *in-vitro*

Article 9 is the Convention article dealing with *ex-situ* conservation. Its chapeau makes it very clear that *ex-situ* conservation measures should predominately complement *in-situ* approaches. In other words, conserving genetic and species diversity *in-situ* should be a Party's primary objective; *ex-situ* conservation measures should support *in-situ* measures.

The Convention thus rejects the argument made by some that the main approach of biodiversity conservation should be through *ex-situ* measures, such as establishing some form of global gene bank. Even if practicable, such a "technical fix" would suffer from a number of shortcomings including a lack of comprehensiveness, technical difficulties and great expense. Instead, a comprehensive, integrated approach is implied by this article and article 8 (*In-situ* Conservation), where the positive attributes of both *in-situ* and *ex-situ* conservation techniques are to be drawn on as appropriate.

The *Global Biodiversity Strategy*, the *Botanic Gardens Conservation Strategy*, the *World Zoo Conservation Strategy*, and other references cited in the bibliography, support the notion of an integrated approach. They also give Parties a clear rationale for *ex-situ* conservation, a general outline of what measures are needed and an explanation of the various techniques involved.

Therefore, the commentary which follows is general and these other documents should be consulted for further information. It should be kept in mind that, in addition to article 8, this article's implementation is related to other articles in the Convention. Some of the most directly relevant are article 7 (Identification and Monitoring), article 12 (Research and Training) and article 16 (Access to and Transfer of Technology).

storage, have been the primary conservation approach for agriculturally important plant varieties, such as farmer developed land-races and other crop cultivars.

According to the *Global Biodiversity Strategy*, however, there are many other groups which need to be conserved *ex-situ*. Some of these include:

- wild relatives of cultivated plants and domesticated animals;
- micro-organisms;

- tree species;
- medicinal plants;
- plant crops of local and regional importance; and
- ornamental plant species.

Paragraph (a) specifies that *ex-situ* conservation should preferably be in the country of origin (see the definition in article 2). This is significant since, historically, most *ex-situ* conservation has been far away from the country of origin. *Far ex-situ* conservation of wild plants at least, evidence is growing that *ex-situ* conservation in seed banks may be more effective if accomplished on a relatively small scale, in particular, for the plants of an individual country or island, rather than in institutions located elsewhere.

But whether the components of biological diversity can be conserved *ex-situ* in the country of origin depends primarily on the availability of adequate facilities, trained personnel and financial resources. Furthermore, there is little point in duplicating efforts elsewhere.

For these reasons, one implication of paragraph (a), is that each Party should set priorities for *ex-situ* conservation measures, primarily because some *ex-situ* techniques tend to be expensive. Some considerations might include:

- identifying those species and genetic resources which require *ex-situ* measures (see article 7 (Identification and Monitoring), in particular Annex I);

(b) Establish and maintain facilities for *ex-situ* conservation of and research on plants, animals and micro-organisms, preferably in the country of origin of genetic resources;

This paragraph requires Parties to provide or maintain facilities for *ex-situ* conservation. While paragraph (a) is directed to the components of biological diversity, the focus of paragraph (b) is on *ex-situ* conservation facilities for genetic resources.

The phrasing in this paragraph, the previous paragraph and the beginning of the article implies that every Party should have its own *ex-situ* conservation facilities. However, this may not be a realistic goal for small countries, where facilities shared with neighbouring countries may be more appropriate by allowing the partners to share costs and expertise. Depending on the joint facility's mission, supplemental legal arrangements might need to be devised to work out in advance questions of access to genetic resources and the sharing of benefits arising from their subsequent use (see the discussion of article 15).

Most of the emphasis on *ex-situ* facilities has been on seed banks acting as repositories for the genetic resources of major plant food crops. The main institutions in this area are the International Agriculture Research Centres

- evaluating the present capacity to undertake *ex-situ* conservation in terms of available financial resources, redundancies and gaps in infrastructure and the availability of trained personnel (see paragraph (b) of this article and article 12 (Research and Training));
- evaluating the effectiveness of existing measures to regulate or manage the collection of biological resources from natural habitats (see paragraph (d) of this article); and
- identifying potential areas for cooperation with other Parties (see paragraph (e) of this article).

Priority setting could be initiated in the context of completing a national biodiversity strategy (see Box 8).

An important policy issue, generally applicable to gene banks, which needs to be addressed by most if not all Parties, is the question of access to genetic resources conserved *ex-situ* and the sharing of benefits derived from their subsequent use (see the discussion of article 15). This is intimately related to the issue of who owns accessions stored off-site, whether in international gene banks whose collections are held in-trust for the benefit of the global community, national gene banks committed to improving local agriculture or even private gene banks stocked with accessions of a particular species. This is particularly a problem for genetic resources not acquired in accordance with the Convention (see the discussion of article 15(3) and Resolution 3 of the Nairobi Final Act in appendix). As a result, each Party will need to carefully examine the issues at the international, national and private sector levels.

(IARC), run under the aegis of the Consultative Group on International Agricultural Research (CGIAR), and the growing number of national seed banks.

For crops such as cocoa, whose seeds cannot be stored in seed banks, field gene banks are an alternative to seed banks. Field gene banks contain living collections of plants managed for breeding. They are, however, vulnerable to disease epidemics and are expensive to maintain. Another possible alternative is *in-vitro* tissue culture collections, where plant cells are typically grown under controlled conditions. With the proper conditions whole plants can be grown from the cells (IPGRI, 1993).

For wild plant species, the main institutions are botanic gardens. The main institutions for *ex-situ* of conservation of wild animal species are zoos and aquaria. Some important plant and animal collections of great value to biodiversity conservation are also in private hands, and Parties need to ensure that these are operated under standards of protection and management that at least meet international standards. For micro-organisms, the

main institutions are the 23 Microbiological Resources Centres (MIRCEN) located throughout the world.

Ex-situ conservation facilities are ideal places for researchers to study plants, animals and micro-organisms in controlled conditions. Paragraph (b) recognizes this and implies that the *ex-situ* facilities which a Party establishes or maintains should also facilitate research on the accessions that they hold. Research could have at least two objectives. First, the research undertaken at a facility should include that necessary for *ex-situ* conservation itself. This is needed for plants, animals and micro-organisms. For example, the *Global Biodiversity Strategy* notes that, for plant genetic resources, improvements are needed in collecting, storage and regeneration techniques,

germplasm evaluation, documentation and information systems. All of these areas are ripe for applied research.

Second, information on genetic resources stored *ex-situ* can add value to the collection, at a time when biotechnology increasingly needs new genetic material and organisms. For example, research on the accessions of a seed bank could more accurately characterize them. The information might be valuable to a potential commercial user who may be willing to pay for an accession and the information generated for it. Therefore, the information could be marketed to users as part of the service to provide an accession. Commercial payment for accessions could then be used to support the facility and expand, as well as characterize, other accessions.

(c) Adopt measures for the recovery and rehabilitation of threatened species and for their reintroduction into their natural habitats under appropriate conditions;

Paragraph (c) complements article 8(0) (rehabilitate and restore degraded ecosystems and promote the recovery of threatened species). Paragraph (c) acknowledges that one reason to establish *ex-situ* facilities is to facilitate the recovery of threatened species. It reinforces the view that effective recovery of many threatened species needs an integrated approach, involving both *in-situ* and *ex-situ* conservation techniques.

The paragraph actually goes beyond article 8(f) by introducing a further element, reintroduction. It implies that the ultimate purpose of some *ex-situ* conservation measures for wild, as opposed to domesticated and cultivated, species is to reintroduce them into the wild.

For wild animal species, the particular value of *ex-situ* approaches—essentially captive breeding—is to bulk up endangered species' populations. When a population is very low, it is vital to increase it as fast as possible to minimize genetic erosion (see the discussion of article 8(f)). Captive breeding can achieve this. It is also vital to reintroduce the animals back into the wild as soon as possible, particularly for behavioural reasons and to ensure that they are exposed to the forces of evolution.

Captive breeding has already saved some animals from extinction, notably the Arabian Oryx, which has been reintroduced from captive-bred populations, and has the potential to contribute to the survival of many more. Also, some animals, like the Prewalski Horse, are only known in captivity; without captive breeding, this species would be extinct.

The situation is somewhat different for wild plant species. Like captive breeding for animals, artificial propagation is important for bulking up populations of endangered species for reintroduction, and it can usually be done more quickly. Using techniques such as seed propagation and tissue culture, one individual plant specimen can give rise to thousands of individuals in a short period

of time. Also, the behavioural difficulties characteristic of reintroduced animals do not occur in plants. It is, however, necessary to ensure that the genetic constituency of the plants has not been modified from propagation.

With large animals in captive breeding, the reintroduction should be in the short-term; with many plants, whose seeds can be stored in seed banks for as much as a hundred years without loss of viability, it is practical to see *ex-situ* measures also as a long-term insurance policy, used not only for species in need of immediate recovery, but for a wider range of species which could conceivably suffer depredations and loss in future years.

Of course, the success of recovery, rehabilitation and reintroduction programmes is dependent on many variables. Species recovery and management plans are important prerequisites to help coordinate the response (see the discussion of article 8(0)). Equally important is removing, or at least minimizing, the pressures which led to the species' decline in the first place, whether from such impacts as loss of habitat, hunting pressure or pollution. Legislation may be required in this regard (see the discussion of article 8(l)). In addition, the possibility for *ex-situ* conservation measures should not be used as an excuse for converting a threatened species' natural habitat to some other use.

Legislation may be required to protect reintroduced species from new pressures or threats (see the discussion of article 8(k)).

Conversely, steps may need to be taken to ensure that reintroduced species do not harm existing populations or other species and ecosystems. In this regard, plant and animal quarantine regulations should ensure that reintroduced species do not spread disease. Finally, the success of a particular reintroduction is very dependent on the support of local people (see the discussion of article

(d) Regulate and manage collection of biological resources from natural habitats for *ex-situ* conservation purposes so as not to threaten ecosystems and *in-situ* populations of species, except where special temporary *ex-situ* measures are required under subparagraph (c) above; and

This paragraph essentially means that collecting samples of species and genetic resources for *ex-situ* conservation should not endanger those species and genetic resources, nor should other species and genetic resources be harmed, nor the ecosystem concerned damaged. This is a well-established conservation principle and guidelines have been prepared for collection of plants and animals both at the international level and within professional societies.

For example, in late 1993 the FAO Conference adopted an international code of conduct for plant germplasm collecting and transfer (FAO, 1993b). The code of conduct is now part of FAO's Global System for the Conservation and Utilization of Plant Genetic Resources (see Box 13). Among other things, the code emphasizes that collectors, providers, curators and users of plant germplasm have a shared responsibility to minimize the adverse effects of collecting in the evolution of agricultural plant biodiversity and the environment.

The problem that paragraph (d) addresses is more acute with animals than for wild plants, since many plants can be propagated from seed or cuttings, and so usually the samples taken do not significantly reduce wild populations. With cultivated plants, such as crop varieties, the samples are taken from farm fields and gardens. In this case, the goal of paragraph (d) should be to minimize the risk of genetic erosion, the loss of genetic diversity.

Requiring a permit to collect all species under a Party's jurisdiction could be a first step towards implementing this paragraph. A possible legislative route for this could be through existing legislation which regulates the taking of species. Licenses for collecting threatened species could be handled through the legislation required under article 8(k). In addition, any genetic resources access legislation should also include provisions reflecting the intent of this paragraph (see the discussion of article 15 (Access to Genetic Resources)). The permit-issuing authority, which could be an administrative agency of the Party, would be required to ensure that the conditions of this paragraph, and any other conditions deemed necessary, are adhered to.

Timely recognition of declining animal populations that may need captive breeding or plants which need propagation is needed. For example, the IUCN Policy Statement on Captive Breeding makes the important point that the vulnerability of small animal populations has been consistently underestimated and the removal of individuals for captive breeding has tended to be left to the last moment, when the removal of the animals concerned reduces the wild population proportionately far more than it would have done earlier. This implies, however, that regulation and management in all cases require accurate information on the populations and ecosystems concerned so the degree to which proposed collecting threatens them can be determined by the relevant State administrative agency.

(e) Cooperate in providing financial and other support for *ex-situ* conservation outlined in subparagraphs (a) to (d) above and in the establishment and maintenance of *ex-situ* conservation facilities in developing countries.

Like article 8(m), this paragraph is about financial and other types of cooperation. In fact, the two paragraphs are very similarly worded and the general commentary for article 8(m) on funding can be referred to for more information.

Three points are salient for paragraph (e). First, as with article 8(m), the phrase "financial and other support" means that cooperation could be in cash or in-kind. And, since the implementation of article 9 requires Parties to implement or draw on other articles of the Convention, support could extend to research and training (article 12), public education and awareness (article 13) or sharing of technical knowledge (articles 17 and 18).

Second, the scope of cooperation extends to the establishment and maintenance of *ex-situ* conservation facilities in developing countries. In almost all areas of *ex-situ* conservation, adequate facilities are lacking, but particularly in developing countries. For example, there is an uneven distribution of botanic gardens and zoos around

the world. The current distribution is inversely proportional to the level of global biodiversity: northern countries as a group, with less diversity, tend to have many more botanic gardens and zoos than southern countries, although their biodiversity is far greater (WRI, IUCN and UNEP, 1992).

The situation may be somewhat better for crop related plant genetic resources because, since 1975, the International Plant Genetic Resources Institute (formerly the International Board for Plant Genetic Resources) has provided technical assistance to national plant genetic resources programmes. According to IPGRI, this has resulted in the establishment of *ex-situ* conservation facilities for the international and national storage of germplasm for particular crops, in over 100 countries (IPGRI, 1993).

Finally, the mission of *ex-situ* facilities, such as gene banks, is a long-term commitment to the conservation of biodiversity. Unfortunately, they are very susceptible to

natural disasters, civil unrest and war, power failures and inadequate financial resources. In many cases, developing countries have had to rely on outside financial support from donors to fund their facilities (IPGRI, 1993). Problems develop when funding is only for a short period of time.

Through cooperation, Parties should seek to develop innovative ways to provide continuous funding for gene banks. The *Global Biodiversity Strategy* suggests that

trust funds or endowments could be established for important collections. These could help cover recurrent expenses for trained personnel, collection management or acquisition. Also, just as with *in-situ* conservation, development assistance budgets for projects which unavoidably adversely effect or destroy biodiversity should allocate sufficient funds for *ex-situ* conservation measures of the species or genetic resources which lie in the path of development.

Article 10. Sustainable Use of Components of Biological Diversity

Sustainably using the components of biological diversity is a theme which occurs throughout the Convention on Biological Diversity, indeed, it is one of the Convention's primary objectives (see article 1 (Objective)). Article 10 is the focus of the Convention's sustainable use requirements, in particular article 10(b) (adopt measures related to the use of biological resources to avoid or minimize adverse impacts on biological diversity). But sustainable use is also emphasized in article 8 (*In-situ* Conservation), particularly article 8(c) (regulate or manage biological resources to ensure their conservation and sustainable use) and article 8(i) (compatibility between present uses and the conservation of biodiversity and sustainable use of its components).

Sustainability is now viewed as the guiding principle for development. This has been reflected in documents such as the *World Conservation Strategy*, the Brundtland Commission's report *Our Common Future, Caring for the Earth*, the *Global Biodiversity Strategy and Agenda 21*. Furthermore, development and environment have been recognized as inextricably connected—the extent of the former being dependent on the quality of the latter. Because of the heavy dependence of national economies on genetic material, species and ecosystems, the conservation of biological diversity and the sustainable use of its components, as for all other renewable resources, are increasingly viewed as a pre-condition to sustainable development and, therefore, are its cornerstones.

People in all countries use the components of biological diversity in a myriad of ways. Uses of species and ecosystems can be economic (cash or subsistence) or non-economic (cultural or religious). Uses can also be distinguished as consumptive or non-consumptive, though it must be realized that there is sometimes only a fine line of distinction between the two.

Consumptive uses of species include, among others, gathering, harvesting or hunting animals and plants for food, medicine, clothing, shelter, timber, fuel and fibre. Consumptive uses of ecosystems include converting a forest to grazing land, draining a wetland for a road, dynamiting a coral reef for building materials or discharging pollutants into a river. Some non-consumptive uses of both species and ecosystems include plant and animal breeding, the use of sacred sites for cultural and religious practices and some recreational uses.

The contours of just what constitutes "sustainable use" of species and ecosystems are still being defined. Sustainability may involve ecological, economic, social and political factors (IUCN, 1994a). All uses can be sustainable or unsustainable depending on the particular circumstances of a given situation. One point is clear: the very nature of the components of biological diversity and the ever increasing external demands placed on them by human use, most notably driven by population growth and

patterns of over-consumption will require the contours to be continuously evaluated and re-defined over time.

IUCN is devoting considerable effort to developing the concepts of sustainable use of the components of biological diversity, particularly the sustainable use of wild species. The Sustainable Use of Wildlife Programme assists countries and local communities in developing the means to ensure the sustainability of their uses of wildlife. The foundation of this work is a set of *Guidelines for the Ecological Sustainability of Non-consumptive and Consumptive Uses of Wild Species*. These are still in draft form.

The draft *Guidelines* are premised on a number of concepts basic to sustainable use. Two ideas are fundamental. They are that the sustainable use of wild species has the potential to provide:

- development benefits by assuring the long term supply of valuable resources to people, and enabling the recovery of species and populations depleted by overuse; and
- conservation benefits by conserving not only particular species, but also associated ecosystems and species.

According to the draft *Guidelines*, the use of a particular species is likely to be sustainable if:

- (a) it does not reduce the future use potential of the target population or impair its long-term viability;
- (b) it is compatible with maintenance of the long-term viability of supporting and dependent ecosystems; and
- (c) it does not reduce the future use potential or impair the long-term viability of other species.

Other considerations that should be taken into account are avoiding wasteful use and protecting animals from cruelty and avoidable suffering.

Even though they are primarily directed towards the sustainable use of wild species, the draft *Guidelines* are holistic in that they are species and ecosystem based. For example, guideline (a) focuses on the impacts to the species being used. On the other hand, guidelines (b) and (c) weigh a particular species' use against the impacts the use has on ecosystems and other species.

The IUCN draft also outlines four general requirements for fulfilling the sustainable use guidelines proposed:

- information;
- management;
- law; and
- incentives.

Indeed, the four requirements happen to coincide with a number of Convention obligations, including taking a precautionary approach, where appropriate.

Accurate information is the foundation upon which decision-making is premised. Therefore, as a pre-condition to adopting appropriate sustainable use measures, Parties need generally to gather information on species and ecosystems, their relationships, their uses and the social, cultural and economic factors affecting their use. This coincides with article 7 (Identification and Monitoring), article 8(j) (indigenous and local knowledge), article 10(c) (customary uses), article 12 (Research and Training), article 17 (Exchange of Information) and article 18 (Technical and Scientific Cooperation). Of course, what constitutes adequate information is a judgement which will vary with the circumstances (IUCN, 1994a). But a lack of information should not be used as an excuse for inaction, and a precautionary approach dictates that less information should generate more conservative actions (IUCN, 1994a).

An important corollary to information gathering is information dissemination. Information dissemination can be used to build awareness of and support for the implementation of measures to minimize adverse impacts on biological diversity within the public sector (politicians and civil servants) and private sector (individuals and business/industry). Article 13 encourages public education and awareness.

Managing the components of biological diversity, in particular by regulating their use, is one very obvious measure Parties can take to ensure that they are conserved and sustainably used and adverse impacts to biological diversity are avoided or minimized.

Management and regulatory measures, both outside and within protected areas, should be pursuant to management plans. They also need to be responsive to change and recognize the insufficiencies of available information (IUCN, 1994a).

Effective sustainable use measures will depend on instituting an effective legal framework within which the goals of (1) conserving and sustainably using the components of biological diversity and (2) avoiding or minimizing adverse impacts to biological diversity can be prescribed, implemented and, if need be, enforced. Legislation will also be necessary to establish clear rules on jurisdiction and responsibilities amongst agencies and permitted users, as well as on issues of ownership of biological resources.

A pre-requisite to enacting effective new law is identifying gaps and conflicts in existing legislation. In tandem with this exercise, a Party should also accomplish a complete review of existing administrative policies to identify additional gaps and conflicts. Completing a national biodiversity strategy (see Box 8) can help with this.

Finally, where appropriate, sustainable use measures should be implemented in combination with incentives and disincentives to encourage uses of the components of biological diversity that avoid or minimize adverse impacts on biological diversity and discourage those which do not. These must be used in combination with the elimination of "perverse" incentives which encourage unsustainable use of biological resources and adverse impacts on biological diversity (see the discussion of article 11 (Incentive Measures)).

Each Contracting Party shall, as far as possible and as appropriate:

(a) Integrate consideration of the conservation and sustainable use of biological resources into national decision-making:

Paragraph (a) requires each Contracting Party to integrate conservation and sustainable use considerations into national decision-making. Article 6(b) reinforces this requirement. Article 6(b) acknowledges that integration must occur within "relevant sectoral or cross-sectoral plans, programmes and policies". Fulfilling these two obligations will, at minimum, lead a Party to:

- develop anticipatory policies towards the conservation of biological diversity and the sustainable use of its components (IUCN, UNEP & WWF, 1980);
- establish better coordination between relevant agencies and levels of government (IUCN, UNEP and WWF, 1980); and
- re-assess measures of national income to take into account the depletion of biological resources (McNeely, 1988).

The philosophy behind integrating conservation and sustainable use considerations into national decision-making is quite simple: it is hoped that such actions will instigate a shift from reactive to anticipatory environmental policies by incorporating conservation and sustainable use considerations early in the decision-making process.

In this regard, fulfilling article 10(a) requires a Party to draw on and fulfil some of the Convention's other obligations. In particular, a Party will need to undertake research (articles 7 and 12) to better understand the full values of, demands on and limitations of biological resources. A Party will also have to initiate planning through national biodiversity strategies, plans, or programmes (article 6(a)), conduct environmental impact assessment for its proposed projects (article 14(a)) and consider the environmental impacts of proposed programmes and policies on biological diversity (article

A fundamental constraint placed on enacting anticipatory environmental policies lies in the organization of government itself. Whereas natural systems function in an integrated manner, governments tend to be organized by sectors (McNeely, 1988). The sectoral nature of government encourages a fragmented approach to biological resource management which is accentuated by limited budgetary and staff resources, poor coordination, as well as conflicting mandates and jurisdictions between agencies and between different levels of government. Narrow sectoral policies encourage conflict between agencies and their policies, and overlook other sectors which may rely on or derive benefits from biological diversity (IUCN, UNEP & WWF, 1980).

At a minimum then, integrating cross-sectoral approaches to conservation and sustainable use into national decision-making will require an examination of how governmental institutions and legislation address biological resource management in the first place. Developing a national biodiversity strategy (see Box 8) is the first step towards understanding and addressing this. In turn, this could lead to establishing a national mechanism to oversee and coordinate governmental policies and actions which could directly or indirectly affect biodiversity (see the discussion of article 6(b)). It could also ensure that all agencies, that is, their officials, and levels of government are aware of the importance of biological diversity and how their decisions affect its conservation and the sustainable use of its components.

(b) Adopt measures relating to the use of biological resources to avoid or minimize adverse impacts on biological diversity;

The call in paragraph (a) for integrating consideration of the conservation and sustainable use of biological resources into national decision-making is just one of many measures Parties need to take to ultimately avoid or minimize adverse impacts on biological diversity. Paragraph (b) requires Parties to adopt other unspecified measures relating to the present or future use of biological resources to avoid or minimize such impacts.

To understand the meaning of paragraph (b) requires it to be contrasted with article 8(c), which is related, but whose focus is different. Article 8(c) requires each Party to regulate or manage biological resources to assure their conservation and sustainable use. That is, if it is important for biological diversity conservation efforts, a biological resource is to be regulated or managed to assure that it is conserved and sustainably used.

In contrast, paragraph (b) requires each Party to take the necessary steps to ensure that the use of a biological resource does not adversely impact biological diversity *in toto*. The distinction is that article 8(c) focuses on harm to the resource itself, whereas paragraph (b) focuses on the harm which occurs to biological diversity, in general, when a biological resource is used. Paragraph (b), therefore, can be viewed as taking an "ecosystems approach" to biological resources use.

Many national decisions are premised on economics. But historically the full contributions of biological resources and the conservation of biological diversity to national economies have not been taken into consideration when national decisions are made. One primary reason for this is the failure of conventional measures of national income to recognize the unsustainable depletion of biological resources as a *loss* of a country's wealth. Countries have tended to draw down their biological wealth faster than it can be replaced.

In contrast, sustainable use involves what has been simplistically described in financial terms as "living on the interest of biological wealth rather than on the capital". While many debate whether this ideal can ever be truly attained, there is enormous room for improving national accounting methods. Improvements will depend on:

- (1) appropriate pricing of biological resources in the marketplace reflecting their total value;
- (2) reflecting the benefits of protecting natural areas in cost-benefit analyses;
- (3) ensuring that those who benefit from exploiting biological resources pay the full social and economic costs of their actions; and
- (4) adjusting discount rates used in economic planning systems to discourage biological resource depletion (McNeely, 1988).

Some examples may help to further clarify paragraph (b). The take of most biological resources will have some effect on other species and, therefore, biological diversity, whether from the incidental taking of non-target species or because of the links between species such as in food webs or other interactions such as pollination or seed dispersal. But the take of some biological resources will have more effect than the take of others. Examples where the effect on other species is high include logging in tropical moist forests since such logging can impact many endemic species, seining for some species of tuna with a consequent incidental loss of dolphin, seining for shrimp which incidentally takes marine turtles and large-scale fishing for krill since it may deplete the food of some whale species.

Keeping in mind the importance of a precautionary approach, it will be difficult to adopt appropriate measures without information on species and ecosystems, their relationships and the uses they are subject to, including the factors which affect those uses whether they are social, cultural and economic.

With this information, biological resources can be managed, and their uses regulated, pursuant to management plans and programmes devised to avoid or minimize

adverse impacts to biological diversity. Other relevant measures might include:

- minimizing habitat destruction and fragmentation, and
- reducing incidental impacts to non-target species.

To be effective, management plans, programmes or

other measures may have to be legislatively anchored to ensure that they are implemented and, if necessary, enforced. In addition, these measures should be implemented in conjunction with an appropriate mix of incentive and disincentives, and the elimination of "perverse incentives" (see the discussion of article 11 (Incentive Measures)).

(c) Protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements;

Many of today's indigenous and local communities have and still do use terrestrial, marine and aquatic biological resources for a variety of economic, cultural and religious purposes. Cultural control mechanisms and a rich library of traditional knowledge have co-evolved with the customary use of biological resources helping some communities avoid over-exploitation and adapt to living within the limits imposed by their availability (McNeely, 1993b). Some examples of cultural controls, to name just a few, include:

- self-imposed hunting restrictions;
- lineal ownership of land, grazing rights, forest resources or fishing areas;
- rotational use of hunting, agricultural and fishing areas;
- taboos on hunting or harvesting certain species;
- limitations on forest clearance;
- protection of special forest groves for religious reasons; and
- use of particular agricultural, forestry and fishing techniques or technologies which lower the impact of the use or even increase biological diversity (McNeely, 1993b).

In preambular paragraph 12 the Convention on Biological Diversity recognizes the close and traditional dependence many indigenous and local communities have with biological resources. In addition, preambular paragraph 13 recognizes the vital role women play in the conservation of biological diversity and the sustainable use of its components. Article 10(c) requires Contracting Parties to protect and encourage customary uses of biological resources derived from traditional cultural practices which are compatible with the requirements of biological diversity conservation or the sustainable use of its components.

The traditional knowledge, innovations and practices of indigenous and local communities directly derive from the customary use of biological resources. Therefore, article 10(c) should be read in conjunction with article 8(j) which encourages Parties to respect, preserve and maintain the knowledge, innovations and practices of indigenous and local communities relevant to conservation

and sustainable use, promote their wider application with the holders' approval and encourage the equitable sharing of benefits arising from their utilization. Article 17(2) (exchange of indigenous and traditional knowledge) and article 18(d) (cooperate to develop and use indigenous and traditional technologies) are also relevant.

As a Party strives to fulfil article 10(c) it may be helpful to recognize the nexus between local populations and biological resources: local people ultimately control the fate of biological resources both inside and outside protected areas (Forster, 1993). However, customary use, traditional knowledge and accompanying traditional management structures have been steadily eroded by many factors, especially as national and global economies have emerged. Greatly complicating matters are problems arising from rapid population growth, poverty, tourism and the depletion of biological diversity.

New forms of more centralized government have also had a role to play. Modern laws, institutions and biological resource management practices rarely recognize customary uses and are foreign to such indigenous and local community norms as communal ownership and community dispute settlement. For example, the nationalization of wild animal species combined with hunting bans, and the creation of protected areas designed to exclude rather than include surrounding populations, disenfranchise indigenous and local communities from the biological resources on which they may depend for their economic survival and cultural identity. Traditional hunting of a protected species becomes poaching. Traditional shifting agriculture in a protected area becomes illegal encroachment in a national park.

With losses of access to these resources, the checks and balances of the traditional resource management system break down. Instead of being encouraged to sustainably use biological resources, local people become hostile to a distant authority which imposes restrictions on them for benefits which do not seem to accrue locally (Forster, 1993).

A Contracting Party's primary goal should be to encourage governmental policies which minimize or eliminate the antagonism and competition between government and local communities over control and management of

biological resources. With foresight, appropriate customary uses, traditional knowledge and cultural institutions could supplement more recent modern practices and institutions to achieve specific management goals.

In some cases, more appropriate biological resources management could involve delegating day to day management responsibility from the national to the sub-national or local levels, where local communities offer extensive manpower and a wealth of traditional knowledge. This could be undertaken while allowing compatible customary uses to be encouraged and maintained within a local framework of checks and balances, supplemented by supervisory controls at an appropriate higher level to ensure that the community does not go astray in its responsibilities. Communities can also be encouraged with appropriate incentives (see article 11 (Incentive Measures)).

Modern techniques and practices could be introduced, as appropriate, to help communities overcome problems they have not traditionally have had to deal with such as over-population, tourism or restoring degraded landscapes to productive uses.

(d) Support local populations to develop and implement remedial action in degraded areas where biological diversity has been reduced; and

Paragraph (d) recognizes that remedial action in degraded areas may be best developed and implemented at the local level. Local populations' proximity to and use of biological resources mean that they may have the most to gain if remedial efforts are successful. Therefore, if provided with the appropriate support, local people may be the most motivated to undertake the remedial action and secure its success, as well as ensure that an area does not again slip into a degraded condition.

Remedial actions tend to be labour intensive and, depending on the extent of the remediation, potentially costly. As a result, without governmental support it may not be possible for local people to undertake remedial action, even though in the long term such actions may turn out to be quite cost-effective (McNeely, 1988). The primary task of government should be to provide a framework which encourages remedial action and assists local populations in carrying it out.

A first step in the remediation process is to help local communities develop a remedial action plan. In order to secure the interest and cooperation of local communities, their full participation in any action plan's development should be ensured. This will build awareness within the community, help develop a sense of responsibility towards the project and could bring to light new information important for the remediation's success.

A fundamental, if not self-evident, goal of the action plan should be to identify the reasons why an area became degraded in the first place. In many cases local problems may have had their origins in national policies which

The decision to initiate such an approach naturally rests with the national government which, of course, remains ultimately responsible for fulfilling the obligations of the Convention. This decentralized approach could be attractive to national resource management agencies for more than one reason, particularly when budgetary and personnel resources are over-stretched.

The first steps to achieving this include:

- identifying and amending current national laws, institutions and policies which promote conflict, competition and disenfranchisement;
- identifying customary uses and traditional knowledge compatible with conservation or sustainable use requirements;
- establishing mechanisms for effective community participation in management decisions which affect them, such as establishing a protected area; and
- strengthening community level institutions.

actually encouraged degradation. Identifying and eliminating these perverse incentives (see the discussion of article 11) is imperative and will help local populations ensure that the area will not become degraded again in the future. Other steps which could be taken are outlined in the commentary for article 10(c).

Another important step is to identify the traditional capacity of the local community to cope with similar problems it has faced in the past. Because of their close and traditional dependence on biological resources, communities embodying traditional lifestyles may have developed practices, knowledge and institutional mechanisms which could be drawn on to contribute to the remediation effort.

In instances where traditional knowledge is lacking or needs to be supplemented, government support could aim to build capacity in the community. Some measures could include:

- education and awareness (in local languages);
- skills training;
- transfer of necessary technology or materials;
- organizational or administrative support; and
- financial assistance.

Financing will play an important part in most if not all remedial efforts. Governments can assist in this regard by providing low or no interest loans or matching funds. Other useful measures of support could be financial incentives such as subsidies, tax concessions or in-kind

incentives such as work for food. Incentives could also be used to cultivate partnerships between local communities and others such as universities, banks, religious groups and non-governmental organizations (IUCN,

UNEP & WWF, 1991). Aid from donors and international organizations—in the form of money, technology or technical assistance—might also be sought by the home government.

(e) Encourage cooperation between its governmental authorities and its private sector in developing methods for sustainable uses of biological resources.

Paragraph (e) recognizes the need for cooperation between the private sector and government to attain the sustainable use of biological resources. Here, cooperation implies that the cooperating parties share a common recognition that the sustainable use of biological resources is desirable for the country—socially, economically and environmentally.

A threshold issue in fulfilling this obligation is defining the "private sector". Business and industry come to mind immediately. But non-governmental organizations and institutions, as well as individuals, are also part of the private sector.

Business and industry have a particularly important role to play: biological resources are used in a myriad of ways to produce products for human consumption. In still too many instances, production processes are inefficient, and therefore unsustainable, not only in terms of the

taking and consuming of biological resources, but in the kinds and amounts of waste produced. Non-consumptive industries such as eco-tourism also have direct and indirect impact on biological resources. Many in the industrial and business sectors now are taking measures, individually and jointly, to produce goods and services in environmentally "friendly" ways. This paragraph recognizes that such efforts will be enhanced through the cooperation of government with the private sector with a view to developing new production technologies to harvest and use raw biological resources more efficiently and generate less waste and pollution.

Government can encourage this with a combination of incentives and legislation. Industry can encourage this with voluntary codes of conduct, implementation of best management practices or self imposed internal policies. Individuals can influence all of this in their purchasing decisions, as well as their consumption habits.

Article 11. Incentive Measures

Each Contracting Party shall, as far as possible and as appropriate, adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity.

Contracting Parties have at their disposal a wide variety of tools to foster the conservation of biological diversity and the sustainable use of its components. However, these tools—traditionally relying on command and control mechanisms—have not been sufficient for conserving the level of biological diversity required for the welfare of society (McNeely, 1988). The primary shortcoming has been the failure to adequately address the underlying national and international economic forces which drive biodiversity loss at the local level. In recent years, applying economic instruments to environmental problems has gained wider acceptance. The Convention on Biological Diversity reflects this trend.

Article 11 requires each Party to adopt measures which act as incentives to conserve biological diversity and sustainably use its components. The measures adopted should be economically and socially sound.

The Convention's wording is subtle and even a little deceptive. Even though the article is entitled "incentive measures" the obligation is not to create incentive programmes *per se*. Rather, the obligation is to adopt measures which act as incentives or, more precisely, encourage conservation and sustainable use. Furthermore, the Convention recognizes that each Party's conditions may vary: what measures are economically and socially sound for one may not be the same for another. Indeed, what is actually needed is a comprehensive system of incentive *and* disincentive measures, tailored to a Party's particular circumstances, which supplements and supports the command and control mechanisms mentioned above, while at the same time eliminating or minimizing incentives which encourage the loss of biological diversity.

Incentives encourage desired behaviour. In the context of the Convention, they are any inducement which is specifically intended to incite or motivate governments, business and industry or local people, to conserve biological diversity and sustainably use its components. They can be applied at the local, national and international levels.

Some incentives are direct (cash or in-kind). Direct cash incentives to conserve biological diversity include, for example, a loan to a farmer to help cover the costs of introducing "integrated pest management" techniques, a subsidy to landowners to manage the land in a certain way (as with the support paid to some farmers in the European Union) or to refrain from changing the present land-use (as with designated Sites of Special Scientific Interest in the United Kingdom). Governments can also provide grants for landowners to restore threatened or damaged habitats, as with the Countryside Stewardship Scheme in England and Wales.

In-kind direct incentives to conserve biological diversity might include granting to a local community access to a protected area for customary uses compatible with the area's conservation objectives, providing seedlings to a local forest restoration project or technology transfer between Parties to the Convention.

Other incentives to conserve biological diversity are indirect. These incentives require no direct or specific budgetary appropriation for conservation and can be fiscal, service or socially based. Fiscal incentive measures include tax exemptions or deductions targeted at conserving particular habitat types such as wetlands. In Minnesota, for example, wetlands and natural prairie lands are exempt from land tax. Another fiscal measure could be a debt for nature swap.

Service-oriented incentive measures to conserve biological diversity include public education or technical assistance programmes, such as agricultural, forestry or fisheries extension programmes. Examples of social incentive measures, designed to improve quality of life, include land tenure reform, community institution building or access to family planning services.

In contrast, disincentives discourage undesirable behaviour. In the context of the Convention, they are any inducement or mechanism designed to discourage the depletion of biological diversity. As such they are the complementary "stick" to the "carrot" offered by incentives. Taxes or other charges are typical delivery mechanisms for disincentives, motivating citizens or business to modify environmentally "unfriendly" behaviour. Fiscal disincentives have often been used in the pollution field (for example through emission or effluent charges) but may, of course, be used to discourage any other type of environmental harm, including the loss of biological diversity. Taxes or other charges can, for example, be put on certain types of land uses. Many traditional cultures and communities have developed their own strong and particularly effective mechanisms of disincentives as well, including the use of public opinion and taboos.

Some incentives actually encourage biological diversity's depletion or create obstacles to its conservation. These can be called "perverse" incentives. For example, some countries still pay grants for land-clearance long after it has ceased to benefit the nation. Subsidies on the price of farm products have usually proved particularly damaging to biodiversity, by encouraging destruction of natural habitats, even on land marginally suited for agriculture, and replacement of variable, locally adapted varieties with modern standardized ones. Also, subsidies to fishermen to improve their vessels have often proved disastrous, only giving the fishermen the means to take far too much of

the fish stock than can be produced each year, without putting in place suitable control mechanisms. As for species, bounties on killing predatory animals like wolves have greatly increased the demise of such animals and have at times been shown to be unnecessary.

Such incentives are very often instituted for perfectly valid political or social reasons but, by externalizing environmental considerations, they contribute to the inadvertent loss of biological diversity. In these instances, the system has, in effect, failed to take an integrated approach to incentive and disincentive policies established on behalf of other sectors which impact biodiversity. Through their policies and programmes, bilateral and multi-lateral development agencies have often created similar situations.

These "perverse" incentives not only directly cost governments large amounts of money, but they exact a further hidden indirect cost on national economies from the species over-exploitation or ecosystem degradation which they encourage. Therefore, any system of incentives and disincentives under the Convention requires the identification of perverse incentives, and consideration of the ways and means to eliminate or minimize their negative impacts on biological diversity.

Developing a comprehensive system of incentives and disincentives, and eliminating perverse incentives, requires a better quantification of biological diversity's total value: the sum of its direct values (consumptive and productive use values) and indirect values (non-consumptive use, option and existence values). The goal should be to identify the maximum benefit derived from

the many direct and indirect uses of the components of biological diversity, both within protected areas and outside of them. This in turn will give policy-makers additional information they need to identify the true costs and benefits of particular policy choices.

Article 11 recognizes that the circumstances peculiar to each Contracting Party will likely result in the creation of different mixes of incentives and disincentives. The most successful applications however, will be those which build upon a number of different policies, levels of government and levels of action (local, national and international), while recognizing that incentive and disincentive mechanisms are not alternatives to conservation laws and other traditional regulatory techniques, but rather a means to support and complement these techniques.

Devising national biodiversity strategies (see Box 8 and article 6(a)), identifying the direct causes of biodiversity loss (article 7(c)) and integrating conservation and sustainable use into sectoral and cross-sectoral plans, programmes and policies, as well as national decision-making (articles 6(b) and 10(a)) will help Parties identify perverse incentives and the opportunities to create a coordinated system of incentive and disincentive mechanisms. Other attributes of success include:

- anchoring the mechanisms in legislation;
- creating a flexible system which can be easily adapted to changing conditions; and
- monitoring the system's effectiveness, modifying it as appropriate.

Article 12. Research and Training

Research, in the broadest sense of the term, is the gathering and application of knowledge. Existing knowledge and technology are no doubt sufficient to undertake many of the measures called for by the Convention on Biological Diversity (WRI, IUCN and UNEP, 1992). However, there are extensive gaps in this knowledge (UNEP, 1993a). The most important gaps may exist at the interface between biological diversity, conservation, sustainable use and development (WRI, IUCN & UNEP, 1992). Inadequate understanding of this very complex area may ultimately impede humanity's ability to effectively conserve biological diversity and reap its many as yet untapped benefits.

Biodiversity related research, conservation management

and other activities simply cannot effectively take place without adequately trained people. A lack of human capacity exists in all countries, but the shortage of trained personnel is decidedly greater in developing countries.

Because of its focus on research and training, article 12 is directly relevant to almost every substantive obligation in the Convention on Biological Diversity, in particular, article 7. Therefore, article 12 can be viewed as one of the Convention's cornerstones. It addresses human capacity building (scientific and technical training) in paragraph (a). Paragraph (b) focuses on research. International cooperation to apply biodiversity related research is treated in paragraph (c).

The Contracting Parties, taking into account the special needs of developing countries, shall:

- (a) **Establish and maintain programmes for scientific and technical education and training in measures for the identification, conservation and sustainable use of biological diversity and its components and provide support for such education and training for the specific needs of developing countries;**

A lack of trained personnel is a major constraint which limits the implementation of effective conservation and sustainable use measures in all countries. Paragraph (a) requires Parties to establish and maintain scientific and technical education programmes to identify, conserve and sustainably use biological diversity and its components. A Party may wish to direct training towards three categories of people: professionals, technicians and the users of biological resources, in particular, people in local communities, businesses and industries (IUCN, UNEP and WWF, 1980).

Biodiversity conservation and sustainable use involves the interaction of social and ecological processes (WRI, IUCN & UNEP, 1992). Consequently, a Party's capacity at the professional level may need to be enhanced not only in the natural sciences, but in the social sciences as well. Furthermore, there is a decided need for researchers and managers who can take research results and apply them to solving problems in the field.

In the natural sciences there is a need for:

- taxonomists;
- applied ecologists;
- biotechnologists;
- conservation biologists; and
- in-situ and *ex-situ* conservation managers.

In the social sciences there is a need for:

- anthropologists;
- environmental economists;

- environmental lawyers;
- geographers;
- political scientists; and
- sociologists.

Education and training programmes for professionals need to be established and maintained at universities at the undergraduate and graduate levels.

At the technical level, there is great demand for people to support biodiversity related laboratory and field activities. Just a few examples of the many needs to be met include:

- agricultural, forestry and fisheries field extension officers;
- environmental impact assessment specialists;
- computer and database managers;
- protected area managers;
- taxonomic assistants; and
- technicians for biotechnology laboratories and *ex-situ* conservation facilities.

Programmes at this level may best combine formal training with practice-oriented in-service training (IUCN, WWF&UNEP, 1980).

At the user level are people in local communities, businesses or industries, such as, farmers, pastoralists, fishermen, loggers and miners. Extension services can greatly help these groups learn about and apply

biodiversity conservation and sustainable use techniques. Programmes at this level need to be carefully tailored to ensure that participants understand the need, purpose and expected results of the techniques proposed (IUCN, WWF & UNEP, 1980).

One of the first steps to be undertaken to fulfil paragraph (a) is to identify and review existing scientific and technical education and training programmes. This can be accomplished as part of the process to develop a national biodiversity strategy (see Box 8) and will be helpful in identifying the needs in a Party's existing system.

Developing countries especially need to develop their training capacity. Paragraph (a) recognizes this and requires Parties to support education and training for the specific needs of developing countries. Support can take many forms including:

- twinning (pairing) and staff exchange opportunities between universities, zoos, botanic gardens and aquaria in developed and developing countries that share similar research emphases;

(b) Promote and encourage research which contributes to the conservation and sustainable use of biological diversity, particularly in developing countries, *inter alia*, in accordance with decisions of the Conference of the Parties taken in consequence of recommendations of the Subsidiary Body on Scientific, Technical and Technological Advice; and

Paragraph (b) requires Parties to promote and encourage research which contributes to the conservation of biological diversity and the sustainable use of its components. Emphasis is placed on research which would contribute to conservation and sustainable use in developing countries.

The national research needs of each Party will vary, but paragraph (b) indicates that their priorities could be influenced by decisions taken by the Conference of the Parties (see the discussion of article 23) as a result of recommendations from the Subsidiary Body on Scientific, Technical and Technological Advice (see the discussion of article 25).

Research needs are great in developed and developing countries. Financial and technical resources are typically limiting factors. Very often matters are complicated by a failure to recognize that research and management are complementary processes that should lead to more effective techniques for conserving biological diversity and sustainably using its components (Harmon, (in press)).

There are three broad overlapping research areas which draw on both the natural and social sciences:

- identifying and monitoring the components of biological diversity (see article 7);
- identifying and monitoring ecosystem functions and human interactions with ecosystems and species; and

- twinning and staff exchange between protected areas in developed and developing countries with similar habitats, landscapes or management problems;
- organizing and financing training courses;
- establishing professional and technical networks;
- providing scholarship opportunities to universities or training centres in developed or developing countries;
- providing training materials or other specialized literature; and
- providing laboratory and other research equipment.

Other Convention provisions relevant to scientific and educational training include article 13 (Public Education and Awareness), article 15(6) (scientific research with the Party providing genetic resources), article 16(4) (facilitating joint development of private sector technologies), article 17 (Exchange of Information), article 18 (Technical and Scientific Cooperation), and article 19(1) (effective participation in biotechnological research for Parties providing genetic resources).

- managing biological resources and the processes and activities which affect them (IUCN, WWF & UNEP, 1980).

To make the most effective use of limited resources, a Party should consider identifying its national biodiversity research priorities. The first steps in this process could include undertaking a biodiversity country study (see Box 9) to gather existing information and identify gaps, and completing a national biodiversity strategy (see Box 8) to identify other needs and capabilities.

From this a national biodiversity research and management action plan could be developed. Such a plan would serve to:

- identify research and management needs;
- rank research and management priorities;
- lay out schedules for accomplishing the priorities;
- provide a framework for relating research to specific management actions; and
- provide a mechanism for re-evaluating and modifying research and management needs as conditions change.

It would in effect represent a point of reference for the government, the scientific community and international aid donors (IUCN, WWF and UNEP, 1980). To ensure that

the plan represents a consensus on national research and management needs, it should be developed through a process which facilitates participation by the relevant public and private sector constituencies.

Finally, it should be recognized that research, like biological resources management, ultimately takes place in a specific socio-political setting (IUCN, WWF and UNEP, 1980). Therefore, sustained research programmes, often will require support from the

general public, political leaders and biological resources managers. Researchers can develop a constituency by effectively communicating the importance of research proposals and their results to the general public and political leaders through the popular press or by making public presentations. Support for research can also be developed within management circles by better tailoring research programmes and results to the needs of biological resources managers.

(c) In keeping with the provisions of Articles 16, 18 and 20, promote and cooperate in the use of scientific advances in biological diversity research in developing methods for conservation and sustainable use of biological resources.

This paragraph requires Parties to cooperate in applying the advances of research to developing methods to conserve biological diversity and sustainably using its components. Specifically mentioned are articles 16 (Access to and Transfer of Technology), 18 (Scientific and Technical Cooperation) and 20 (Financial Resources).

Paragraph (c) recognizes the importance of translating research results into applied action in the field. While there is always a need for financial support to do this (hence the reference to article 20), there is also a very

great need for cooperation between Parties to build national capacity through hard and soft technology transfer, human capacity building and institution building, especially in developing countries. This is why articles 16 and 18 are also referenced in the paragraph.

Cooperation can take many forms, some of which have already been mentioned in the commentary for paragraph (b). In addition to providing financial support, Parties can also facilitate joint research programmes, joint ventures and exchange information.

Article 13. Public Education and Awareness

The public's lack of awareness of the importance of biological diversity—its relevance to every day life, the benefits from the use of its components and the consequences of its loss—is a major constraint which must be overcome if biodiversity conservation and sustainable use efforts are to succeed. Indeed, efforts to conserve biological diversity cannot succeed without the general public's understanding *and* support.

A combination of formal and informal education could foster greater public understanding of the intersections biological diversity has with almost every aspect of daily life, and how individual action ultimately relates back to

its depletion. Also, greater public understanding would lead to greater public support for the important measures which need to be implemented to conserve biodiversity.

Article 13 reflects the well accepted principle that environmental education and awareness is vital to safeguarding the natural environment. Though it is entitled "Public Education and Awareness", the essence of article 13 is really about furthering human understanding of biodiversity through formal and informal education. Therefore, the commentary for paragraph (a) treats public education and awareness in terms of formal and informal education.

The Contracting Parties shall:

- (a) **Promote and encourage understanding of the importance of, and the measures required for, the conservation of biological diversity, as well as its propagation through media, and the inclusion of these topics in educational programmes; and**

The goal of paragraph (a) is to foster understanding of

- biological diversity and its importance, and
- the measures required for its conservation

through different media and through educational programmes. In fulfilling this obligation each Contracting Party has a vast array of options to choose from. However, understanding can be fostered through two primary means: formal and informal education. As a result, the approaches a Party takes should reflect these two mutually reinforcing mechanisms.

One way to select practicable options, and help tailor an effective course of action responsive to a Party's particular needs, may be to incorporate formal and informal public education concerns into the process of developing a national biodiversity strategy leading to a biodiversity education action plan. In addition to being a very good public awareness building exercise, such a course of action may be a particularly good way to uncover the strengths and weaknesses of existing environmental education programmes, as well as cultural, traditional and religious values, knowledge and practices which could lend themselves to the successful implementation of paragraph (a).

Formal Education

Formal education is that associated with the classroom. There is undoubtedly a need to develop university level biodiversity related education. In fact, article 12 (Research and Training) addresses some of this need with its emphasis on training biodiversity specialists. However programmes implemented at the primary and secondary school levels could reach many more young

people at an age when they are most receptive (WRI, IUCN&UNEP, 1992).

Merely requiring a pupil to take an ecology or biology course will probably not be sufficient for developing a proper understanding of biodiversity's many facets. Therefore an important first step, perhaps to be undertaken as part of a national biodiversity strategy or within a Party's overall environmental education strategy or plan, is to assess national curricula for primary and secondary schools and determine where biodiversity related topics can be brought in. The interdisciplinary nature of biodiversity means that it can be "infused" into many different topics for classroom discussion, without necessarily devoting individual course work to it.

The *Global Biodiversity Strategy* suggests that in partnership with teachers, NGOs and national ministries of education and the environment, national curricula should be developed which:

- emphasize biodiversity's contributions to community health and welfare;
- emphasize biodiversity's contributions to the health of ecosystems; and
- tie ecological, economic and social themes together (WRI, IUCN & UNEP, 1992).

The *Global Biodiversity Strategy* gives more specific guidance on such national curricula. It also emphasizes that locally developed curricula, directly relevant to students' surroundings, should supplement national ones.

In addition to work on curricula, Parties should also develop course materials relevant to conservation and sustainable use, and build appropriate partnerships to

develop these materials. Finally, emphasis must also be placed on making teachers themselves more aware of biodiversity.

Informal Education

Informal education takes place outside of the classroom. While important in its own right, informal education can be useful in supplementing more formal educational experiences. In fact, since informal education mechanisms may already exist in many communities and households, encouraging and promoting them can be a very cost-effective way to increase the level of education and awareness on biological diversity.

Therefore, one aspect of a national biodiversity strategy should be to identify informal education mechanisms to further promote and encourage them, recognizing that informal education can occur through a variety of means including:

- cultural and religious practices;
- oral traditions;
- local community assistance programmes for agriculture, health-care or literacy;
- public awareness campaigns;
- citizen-based conservation work programmes;
- affiliations with wildlife, nature and garden clubs;
- affiliations with environmental organizations; and
- displays at national parks, zoos, botanic gardens and aquaria.

Within a particular society, informal education can be directed at different sectors or people, for example, the government or private sectors, adults or children or even males or females. Appropriate groups may include:

- legislators and administrators;
- development practitioners including industry, business and the trades;
- professional bodies;
- consumers; and
- local communities dependent on biological resources.

Informal education achieves its results primarily through the use of different media. The use of various modern

media such as radio, TV, film, newspapers, books and advertisements come to mind immediately. Traditional media, such as ceremonies, folklore, oral traditions and the popular arts, as well as religious organizations, could also be particularly useful and should not be overlooked.

A Contracting Party may choose to develop a general informal education programme or more specialized or sectoral information campaigns designed with a particular goal in mind. Promoting the former might be part of developing a national biodiversity strategy or designating a particular day as national biodiversity day. Examples of the latter could be heightening public awareness of the dangers of introduced exotic species, the needs for a particular environmental law or working with a local community adjacent to a protected area to develop greater awareness and understanding of the needs for the protected area (IUCN, WWF & UNEP, 1980).

Many Parties may not have the financial, technical or human resources to develop and execute an effective informal education programme. Therefore, developing partnerships with the private sector, including NGOs, business, zoos, botanic gardens, aquaria, natural history museums and libraries, may be an effective way to achieve particular goals.

For example, zoos, botanic gardens and aquaria have unique facilities which are compatible with educational goals and are particularly well-suited to educating diverse groups of people. One statistic demonstrates the potential reach of these facilities: over 600 million people visit zoos each year (World Zoo Organization and IUCN, 1993). NGOs may be able to bring to the partnership expertise in particular biodiversity issues as well as contacts with local communities. Business could bring to the partnership financing, access to advertising, public relations or communications expertise, as well as access to newspapers, television and radio.

Evaluating the success of a particular programme or project is critical to developing more effective and cost-effective activities in the future. A fundamental attribute of successful informal education (and more formal educational programmes as well) may be the ability to communicate a message on biodiversity to which people can relate, and adapting that message overtime, when appropriate. The techniques used to accomplish this will be different for each Party as different societies have different relationships to the biological resources on which they depend.

(b) Cooperate, as appropriate, with other States and international organizations in developing educational and public awareness programmes, with respect to conservation and sustainable use of biological diversity.

Paragraph (b) calls on the Contracting Parties to cooperate with other States and with international organizations to develop educational and public awareness programmes in the area of conservation and sustainable use of biological

diversity. In so doing, it should be kept in mind that each country has its own unique qualities, conditions and circumstances. Consequently, cooperation programmes should be tailored to recognize and complement these.

There are many different ways in which Parties can cooperate with other States and international organizations. For example, programmes between States can be established bilaterally to enhance educational curricula, provide technical assistance and provide exchange experiences and training for teachers and students.

Parties can also draw on the expertise of international organizations and NGOs, for example, the International Environmental Education Programme (IEEP) of UNESCO and UNEP.

Article 14. Impact Assessment and Minimizing Adverse Impacts

Article 14 deals with four different areas. Paragraphs 1(a) and (b) concern environmental impact assessment of a Party's proposed projects, programmes and policies. Paragraphs 1 (c) and (d) deal with transfrontier cooperation, in particular notification, information, consultation

and emergencies. Emergency planning, including international cooperation, is addressed in paragraph 1(e). Finally, paragraph 2 touches on the issue of liability for damage to biological diversity.

1. Each Contracting Party, as far as possible and as appropriate, shall:

(a) Introduce appropriate procedures requiring environmental impact assessment of its proposed projects that are likely to have significant adverse effects on biological diversity with a view to avoiding or minimizing such effects and, where appropriate, allow for public participation in such procedures;

Paragraph 1 (a) applies to all Parties. Only those Parties currently without procedures requiring environmental impact assessment (EIA) for their proposed projects which are likely to cause significant adverse effects on biological diversity can be required to *introduce* them. Those Parties with established procedures requiring EIA should, however, *review* them to ensure that effects on biodiversity are taken into consideration. In both cases, the ultimate goal of the paragraph is to use EIA to avoid or minimize significant adverse effects on biological diversity (see also Box 12).

The Convention does not define the terms "its projects". "Its" refers to the Contracting Party itself, in particular, the government. "Projects" usually means some discrete activity undertaken by a Party, perhaps as part of a development program, such as building a dam, draining a wetland to create agricultural land or building a motorway.

While the scope of this paragraph clearly applies to a Party's projects, a Party has wide discretion in determining which projects—whether public, private or both—require EIA. A Party could establish a certain threshold level of government involvement in private projects as a criterion for requiring an EIA. For example, an EIA could be required if a government permit is required before a construction project can begin (Chandler, 1993).

Different aspects of a particular project—for example, the type of project, its scale, the natural resources required to operate it, site selection, displacement and resettlement of local populations and what types of pollution will be produced—will have different direct and indirect effects on biological diversity in the immediate project area and in surrounding areas. It is also important to consider the compliance of all these different aspects with existing legislation; particularly legislation pertinent, in the broadest sense, to biological diversity conservation. Therefore, in relation to biological diversity, three purposes of an EIA would be to identify in advance:

- what aspects of the project are likely to have significant adverse effects on biological diversity at the genetic, species and ecosystem levels;
- what steps could be taken to avoid or minimize significant adverse effects; and
- whether the proposed project complies with existing environmental legislation.

Site selection for a project is particularly important for biodiversity conservation; unlike other environmental impacts which can be minimized, such as air or water pollution, once a site is chosen it will be difficult, if not impossible, to reduce substantially the project's direct effects on biodiversity.

Avoiding particular sites is the only sure way of minimizing direct adverse effects to biodiversity. Therefore, one goal of an EIA should be to identify available sites within a particular area, then, after considering biodiversity and other environmental impacts, select an appropriate project site which will eliminate or minimize adverse effects.

This highlights that it will be difficult to assess a project's impacts on biodiversity without having basic information on the components of biological diversity to begin with. Article 7 (Identification and Monitoring), as well as article 12(b) (research) and article 17 (Exchange of Information) are relevant articles which should be drawn on to increase a Party's capacity to gather information relevant to the EIA process—whether to undertake its own EIAs or review the accuracy of those completed by others. Another necessary prerequisite to either conducting or reviewing EIAs is adequate expertise. Trained people who can undertake or review EIAs are needed in both the public and private sectors (see article 12(a) (training)).

To be most effective, EIA must be applied early in the project's design process and, along with economics and engineering, should be the third component of every project's feasibility study.

Its usefulness as a *planning tool* should not be dismissed, even when it may be difficult to quantify a project's adverse effects on biological diversity. In these instances, a precautionary approach must be applied.

Paragraph 1(a) emphasizes the importance of public participation in the EIA procedures established. "Public participation" includes all government agencies concerned, as well as private parties such as citizens, business and NGOs.

Worldwide, the modern trend is towards greater public involvement in not only EIA, but also in the overall decision-making process for proposed projects. In those States with established EIA procedures, the level of public participation varies.

Opening up the EIA process to other governmental agencies and private parties with particular expertise or concerns often brings to light new facts about the environmental effects of a project. Therefore, public participation should occur not just at the stage of commenting on the final EIA report, but also in initially setting the EIA's scope and in commenting on the draft (or interim) EIA report. In the process, capacity within the public and private sectors will be developed.

In most situations, national legislation will be needed to implement the EIA requirement.

At minimum, it should clearly establish:

- what projects will be subjected to EIA, for example, whether public or private;
- the procedure to be followed, including, for what part of the project's design phase the EIA will be required;
- who will be required to undertake the EIA, the project proponent or an independent body;
- who will review the EIA;
- the assessment criteria to be used to determine significant adverse effects on biodiversity;
- the requirement to review the proposed project's compliance with existing environmental law;
- the requirement to address possible alternatives to the project and why the proposed project is the preferred alternative;

(b) Introduce appropriate arrangements to ensure that the environmental consequences of its programmes and policies that are likely to have significant adverse impacts on biological diversity are duly taken into account;

Paragraph 1(b) extends only the concept underlying environmental impact assessment to all programmes and policies of government. It complements article 1 (a) (integrate consideration of conservation and sustainable use of biological resources into national decision making) and article 6(b) (integrate conservation and sustainable use of biological diversity into relevant sectoral and cross-sectoral plans, programmes and policies).

- the requirement to present options to avoid or minimize adverse effects;
- the form and level of public participation;
- the form of the report to be produced;
- the effects of the EIA results on the project approval procedure; and
- a procedure to evaluate the impact of the project after it is completed;

Because it is difficult to single out *a priori* those projects which do need careful consideration, a two-step procedure could be created involving:

- a short, informal preliminary evaluation of the likelihood of significant adverse environmental effects, including significant adverse effects on biological diversity, and
- a more complete environmental assessment if there is a likelihood of significant adverse effects (de Klemm, 1993b).

Some States have facilitated the assessment by creating lists of categories and sizes of projects presumed to have significant adverse environmental effects and lists of areas of special importance or sensitivity that could be threatened by a project. But procedures relying on lists need to incorporate a mechanism whereby unanticipated cases can be addressed. For example, even a "minor" project could adversely impact biological diversity if, for example, it threatens the last remaining wild population of an agriculturally important plant variety.

To encourage governmental compliance with the environmental assessment procedures promulgated, national legislation should also include a right of action and legal standing for private parties.

This right of action should be based on both procedural and substantive grounds. For example, a private party should be able to procedurally challenge in court a decision not to complete an EIA. On substantive grounds, a private party should also be able to challenge an EIA's content or the conclusions an EIA reaches, although maintaining an appropriate margin of discretion on the part of the competent authorities is necessary.

Paragraph 1 (b) covers, for example, areas such as trade, taxation, agriculture, fisheries, environment, energy, and transport, indeed *any* programme or policy that could have environmental consequences likely to have significant adverse impacts on biological diversity. Therefore, this is a very novel obligation, which calls for considerable changes in the way government programmes and policies are developed and implemented. It clearly extends beyond the requirement

in paragraph 1(a) to undertake environmental impact assessment on projects; in fact it fills any gaps or ambiguities created by the use of the word "projects". For many Parties implementing paragraph 1(b) will require a substantial advance in environmental practice, since few even undertake EIA on individual government sponsored projects. Some countries, however, such as Canada, the Netherlands and the United States, have started moving in this direction, at least in so far as subjecting *new* programmes and policies to environmental assessment. The European Community is

also developing its own approach. The challenge for Parties will be to ensure the environmental assessment of all new *and* existing programmes and policies to enable the environmental consequences likely to have significant adverse impacts on biological diversity to be considered and then acted upon.

Effectively implementing the requirements of this paragraph will require national legislation to ensure that the environmental consequences of the programmes and policies on biological diversity are considered.

Box 12. What is an Environmental Impact Assessment?

Environmental impact assessment (EIA) is a procedure typically used to identify the environmental effects of a proposed project and to plan appropriate measures to reduce or eliminate its adverse effects. The environment in the widest sense, including effects on human health, property and local livelihoods, as well as on society at large, is considered.

In many jurisdictions where EIA procedures are required, they apply only to government sponsored projects. In some jurisdictions, environmental assessment procedures have been extended to both government *and* private sector projects. Projects subject to EIAs may include, for example, building a hydroelectric dam or a factory, irrigating a large valley, developing a harbour, establishing a protected area or constructing a new housing development. The EIA report outlines potential environmental problems and identifies measures to decrease a project's adverse environmental effects.

The EIA's overall objectives are two-fold:

- to provide decision-makers with information on a proposed project's environmental effects, to permit an informed decision on whether the project should go ahead; and
- to produce environmentally sound projects whenever possible.

A project's design usually involves five stages: (1) needs identification; (2) pre-feasibility study; (3) feasibility study; (4) appraisal; and (5) approval. The tendency has been to complete the EIA late in the design process—after the main outline of the project has been planned—often a time when it is too expensive to redesign or not go ahead with a project. This defeated the purpose of the EIA. The EIA is like an economic analysis or an engineering feasibility study, tools with which most decision-makers are familiar. The EIA is the environmental equivalent of these techniques, ensuring that environmental considerations are included in the design and approval of projects. Therefore to gain the maximum benefit, the trend is for EIAs to be started at the *earliest* possible stages of the design process to enable them to influence design from the beginning and encourage consideration of alternatives. For example, in the past, an EIA for an electricity generation project might only have sought to mitigate a large dam's environmental damage; today by conducting an EIA at an earlier design stage, it can be used to determine whether a dam is the best way to generate the electricity, and whether less environmentally damaging alternatives are available and practicable. The EIA should, therefore, be started early and influence all five stages of the design.

EIA reports increasingly incorporate recommendations. Institutional and technical capacity, as well as public participation, are needed to ensure recommendations are fully implemented. A feed-back mechanism is also needed to ensure deficiencies are corrected. And finally, an audit should be undertaken *after* the project has been completed, to ensure the full application of provisions agreed upon and to learn lessons for the future. Public participation in the EIA process can ensure many aspects of this.

In developing countries (as well as in Canada and the United States), EIAs were introduced to assess the possible harm of individual development projects. But in the frequent absence of effective planning systems, they soon assumed a greater importance as a tool for strategic planning, sometimes called strategic environmental assessments (SEA).

EIAs are most often used for projects, but can be used and adapted to aid the preparation and assessment of development programmes and policies, for example, multiple land use plans and sectoral investment plans. They can also be adapted to assess technologies proposed for transfer (see article 16 (Access to and Transfer of Technology)).

- (c) **Promote, on the basis of reciprocity, notification, exchange of information and consultation on activities under their jurisdiction or control which are likely to significantly affect adversely the biological diversity of other States or areas beyond the limits of national jurisdiction, by encouraging the conclusion of bilateral, regional or multilateral arrangements, as appropriate;**
- (d) **In the case of imminent or grave danger or damage, originating under its jurisdiction or control, to biological diversity within the area under jurisdiction of other States or in areas beyond the limits of national jurisdiction, notify immediately the potentially affected States of such danger or damage, as well as initiate action to prevent or minimize such danger or damage; and**

Paragraphs 1 (c) and (d) deal with transfrontier cooperation for the protection of biodiversity. Provisions on transfrontier cooperation today are a usual feature of international environmental agreements. A recent and significant illustration of this is the Convention on Environmental Assessment in a Transboundary Context (Espoo, 1991). It has been signed by 29 States and the European Economic Community, but has yet to enter into force. In an increasing number of instances, transfrontier cooperation is also an obligation under general (customary) international environmental law.

Paragraph 1(c) addresses the procedural obligations of notification, exchange of information and consultation concerning activities with potential transboundary effects. The provision refers to activities under the jurisdiction or control of a Contracting Party, which means all activities in the State territory, the marine areas up to the seaward limits of the exclusive economic zone or the continental shelf (wherever the seaward limit of the continental shelf lies beyond 200 nautical miles), and on ships, planes and installations registered in the State. The obligation exists to the extent that

impact on biodiversity in other States or beyond the limits of national jurisdictions (the high seas) may occur (see the discussion of Article 4 (Jurisdictional Scope) and Article 5 (Cooperation) and Box 7).

The paragraph is fairly weak as it only requires Parties to "promote" notification, exchange of information and consultation; this is reinforced by the reference to "encouraging the conclusion of bilateral, regional or multilateral arrangements as appropriate". The obligation to "promote" transfrontier cooperation "by encouraging" arrangements is considerably less stringent than in other international agreements or even under general international law.

Paragraph 1(d) deals with the specific case of emergencies. Parties are to notify other potentially affected States, even if they are not Parties to the Convention, when actions under their jurisdiction or control threaten to cause or actually cause damage to biological diversity within the jurisdiction of another State, or within areas beyond the limits of national jurisdiction.

- (e) **Promote national arrangements for emergency responses to activities or events, whether caused naturally or otherwise, which present a grave and imminent danger to biological diversity and encourage international cooperation to supplement such national efforts and, where appropriate and agreed by the States or regional economic integration organizations concerned, to establish joint contingency plans.**

Paragraph 1(e) concerns contingency planning at national and international levels for responses to emergencies which present a grave and imminent danger to biological diversity. The provision does not directly

require the preparation of contingency plans; rather, the focus of this obligation is the *promotion* of national arrangements and the *encouragement* of international cooperation.

2. **The Conference of the Parties shall examine, on the basis of studies to be carried out, the issue of liability and redress, including restoration and compensation, for damage to biological diversity, except where such liability is a purely internal matter.**

Paragraph 2 deals with liability and redress. The vagueness of its wording makes it difficult to assess the para-

graph's scope. As is the case in many other multilateral treaties, the consideration of "the issue of liability" is

postponed by this paragraph to a later date (see, for example, the Convention on Long-Range Transboundary Air Pollution (Geneva, 1979); the UN Convention on the Law of the Sea (Montego Bay, 1982); the Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel, 1989)).

The Convention on Biological Diversity is even more timid in this regard than other conventions: not only does it require Parties simply to "examine" the issue, but to do so only after studies are completed. The development and negotiation of a regime on "liability and redress, including restoration and compensation" can therefore only take place after completing this two step process.

The terms "except where such liability is a purely internal matter", at the end of the paragraph, are not entirely clear. The intention was most likely to exclude any question of liability or redress which is restricted to a particular jurisdiction, that is, has no transfrontier element.

The paragraph also very generally speaks of "the issue of liability and redress". This leaves ample room for speculation as to whether the provision refers to liability under international law, or liability under domestic law, or to both. Since the focus of the paragraph is on transboundary effects, and since transboundary liability and redress may be a matter of both international and domestic law, the intention is probably to require States to consider both international and domestic law regimes of liability and redress.

To sum up, paragraph 2 may be seen as requiring Parties to examine collectively, and after the completion of pertinent studies, the development of legal regimes for transboundary liability and redress, including restoration and compensation at both the international and domestic levels.

Article 15. Access to Genetic Resources

Article 15 is about rights and obligations regarding access to genetic resources and their subsequent use. While recognizing the authority of individual governments to determine access, Parties are to endeavour to create conditions which facilitate access to genetic resources by other Contracting Parties for environmentally sound uses and minimize restrictions contrary to the Convention's objectives. The first two paragraphs of article 15 strike a balance between the rights of individual governments to determine access and their obligations to facilitate access by other Parties.

Two paragraphs of article 15 also address the return of benefits derived from subsequent use of genetic resources.

1. Recognizing the sovereign rights of States over their natural resources, the authority to determine access to genetic resources rests with the national governments and is subject to national legislation.

Paragraph 1 affirms the authority governments have to determine access to genetic resources, subject to national legislation, and recognizes that this authority derives from a State's sovereign rights over its natural resources.

Genetic resources can be samples of plant, animal or microbial origin containing functional units of heredity (see the definition in article 2). In the context of the Convention, genetic resources are biological resources needed or used for their genetic material and not for their other attributes. For example, access to a forest for timber extraction or hunting would not be covered by article 15.

The Convention on Biological Diversity is the first international instrument which acknowledges a State's

2. Each Contracting Party shall endeavour to create conditions to facilitate access to genetic resources for environmentally sound uses by other Contracting Parties and not to impose restrictions that run counter to the objectives of this Convention.

In exercising their sovereign rights to determine access to genetic resources, Contracting Parties are to endeavour to facilitate access by other Contracting Parties. This suggests that Parties are to extend special treatment to each other and this may serve as an incentive for other States to join the Convention.

The article, however, appears only to apply to access for environmentally sound uses. What constitutes such use is left to the discretion of the Contracting Party supplying the genetic resource.

Parties also must not place restrictions on genetic resource access which run counter to the Convention's objectives (see article 1). Unrestricted access to genetic

These benefits include possible participation in scientific research based on the genetic resources supplied (article 15(6)), the fair and equitable sharing of research and development results and commercial and other benefits arising from the use of the genetic resources (article 15(7)). Subsequent articles address more specific benefits: (a) access to and transfer of technology using the genetic resources (article 16(3)); (b) participation in biotechnological research activities based on the genetic resources (article 19(1)); and (c) priority access to the results and benefits arising from biotechnological use of the genetic resources provided (article 19(2)).

sovereign rights over the *genetic resources* within its jurisdiction and the resulting authority to regulate and control access.

While reaffirming a State's right to exercise jurisdiction over genetic resources, article 15 does not grant the State a property right over these resources, even though the word "their" appears in this paragraph. "Their" is a short way to refer natural resources under a State's jurisdiction (see Box 7). Indeed, questions of ownership are not addressed by the text of the Convention, but are determined by national law. Ownership will be especially relevant to future legislation on access to genetic resources.

resources, sometimes referred to as free or unimpeded exchange, has long been a prevailing concept, at least for plant genetic resources. The concept derives from general international acceptance of the principle that such genetic resources are a heritage of human kind and should be available to anyone for any purpose. Both notions were expressly recognized in article 1 of the 1983 FAO International Undertaking on Plant Genetic Resources, a non-binding document to which a significant number of States have adhered (see Box 13).

Over the years since the Undertaking was first completed, governments have attempted to define the meaning of "access without restriction" to plant genetic resources. This has been complicated by 3 factors:

- the Undertaking's broad definition of plant genetic resources which extends to natural and human developed plant varieties and the special genetic stocks developed by breeders;
- intellectual property rights (such as plant breeders' rights and patents (see Box 15)) over plant varieties and genetic material (such as isolated genes) which could restrict others' use of germ-plasm; and
- the increased imposition of national controls to limit physical access to plant germplasm located in *in-situ* and *ex-situ* conditions within a State's jurisdiction.

Subsequent annexes to the Undertaking have addressed some aspects of the access issue and are, therefore, instructive to highlight here. They indicate that the Undertaking's original goal of unrestricted access has been steadily narrowed over time. The adhering States acknowledge that the "conditions of access to plant genetic resources need further clarification" (Annex III, Resolution 3/91, 1991). The Undertaking's annexes presently recognize that:

- Both farmers and breeders have the discretion to make their breeding lines and breeding materials available to others (Annex III, Resolution 3/91, 1991).
- Plant Breeders' Rights are not incompatible with the Undertaking (Annex I, Resolution 4/89, 1989).
- A State adhering to the Undertaking may impose only those minimum restrictions on the free exchange of plant genetic resources as are necessary for it to conform to its national and international obligations (Annex I, Resolution 4/89, 1989).
- "Free access" does not necessarily mean access free of charge. It could be on the basis of mutual exchange or on mutually agreed terms as well (article 5 and Annex I, Resolution 4/89, 1989).
- Nations have sovereign rights over their plant genetic resources (Annex III, Resolution 3/91, 1991).

The debate on what constitutes a restriction on access to plant genetic resources shifted to the negotiations of the

Convention on Biological Diversity and, since the Convention's entry into force, the debate is now relevant to the Convention's implementation. In this forum, however, the debate extends to *all* genetic resources—plant, animal or microbial.

Resolving the access restriction issue takes on its full importance when it is realized that today no State is completely self-sufficient in genetic resources, particularly for plant genetic resources needed for agriculture, whether from *in-situ* or *ex-situ* sources. All States are interdependent. It is, therefore, essential to maintain the flow of genetic resources between all States.

In the process of fulfilling paragraph 2, a Party should review its present policies and possible existing legislation on access to genetic resources for both *in-situ* and *ex-situ* sources.

Steps a Party could take to create conditions to facilitate access and eliminate or minimize restrictions on genetic resources counter to the Convention's objectives could include:

- developing a uniform policy on genetic resource access issues;
- creating a legislative framework to uniformly address genetic resource access issues, establish clear competencies in this area and unify genetic resource access procedures;
- promoting the unrestricted exchange of genetic resources for research and non-commercial purposes such as customary or traditional exchange; and
- providing incentives to encourage inventors and breeders to limit the scope of intellectual property protection extended to innovations incorporating genetic material provided by another Party to ensure that customary, and where appropriate other, uses within that country remain unimpeded.

The *Guide's* commentary for paragraphs 4 through 7 of article 15 discusses this issue further.

3. For the purpose of this Convention, the genetic resources being provided by a Contracting Party, as referred to in this Article and Articles 16 and 19, are only those that are provided by Contracting Parties that are countries of origin of such resources or by the Parties that have acquired the genetic resources in accordance with this Convention.

Paragraph 3 defines the genetic resources covered by articles 15, 16 and 19 restricting them to only those:

- (1) provided by Parties that are countries of origin (see the definition and discussion in article 2), or
- (2) provided by Parties that have acquired the genetic resources in accordance with this Convention.

Only these two categories of genetic resources entitle a

provider to benefits under the Convention. The latter category requires some explanation as it *excludes* two distinct cases:

- resources acquired prior to the Convention's entry into force from the provider of genetic resources, and
- resources acquired illegally from the country of origin after the Convention's entry into force.

Box 13. The FAO Global System for the Conservation and Utilization of Plant Genetic Resources

The Global System was established in 1983 by the Food and Agriculture Organization of the United Nations (FAO) to coordinate—primarily for food and agricultural production—the conservation and use of plant genetic resources at the molecular, population, species and ecosystem levels. One hundred and forty States participate in the Global System. It includes two institutional components: the Commission on Plant Genetic Resources (CPGR) and the International Undertaking on Plant Genetic Resources.

The CPGR is an intergovernmental forum of donors and users of plant genetic resources, technology and funds. One hundred and twenty-three States are members.

The International Undertaking on Plant Genetic Resources is a non-binding agreement whose objective is to ensure the exploration, collection, conservation, evaluation, utilization and availability of plant genetic resources of present or future economic importance. The Undertaking is premised on the "principle that plant genetic resources are a heritage of mankind and consequently should be available without restriction" (article 1). States adhering to the Undertaking are to make plant genetic resource samples available for scientific research, plant breeding or genetic resource conservation "free of charge, on the basis of mutual exchange or on mutually agreed terms" (article 5). The Undertaking has subsequently been qualified by three annexes which recognize, among other things, the compatibility of the Undertaking with national systems of breeders' rights (see Box 15) and the understanding that free access does not mean free of charge (Annex I, Resolution 4/89, 1989), the concept of Farmers' Rights (Annex II, Resolution 5/89, 1989) and the Undertaking's compatibility with sovereign rights over plant genetic resources (Annex III, Resolution 3/91, 1991). In order to implement Farmers' Rights, an International Fund for Plant Genetic Resources was also subsequently requested by the adhering States to be established (Annex III, Resolution 3/91, 1991). The Undertaking has been adhered to by 110 States.

To complement the Undertaking, international agreements have been or are being negotiated in three areas through the CPGR. The International Code of Conduct for Plant Germplasm Collecting and Transfer provides guidelines for collecting and transferring plant genetic resources to facilitate access and promote their use and development on an equitable basis. It was adopted by the FAO Conference in November 1993. The International Code of Conduct for Plant Biotechnology as it Affects the Conservation and Utilization of Plant Genetic Resources will operate on two levels. First, it will promote the use of biotechnology for the conservation and sustainable use of plant genetic resources by maximizing biotechnology's positive effects and minimizing possible negative effects. Second, it will address biosafety and other environmental concerns, such as genetic erosion and agro-ecological disruption, presented by biotechnological products. Finally, agreements are being negotiated with various States and institutions, such as the International Agricultural Research Centres of the Consultative Group on International Agricultural Research, to place their *ex-situ* plant genetic resource base and active collections under FAO auspices to hold in trust for the benefit of the global community.

Technical components of the Global System include a World Information and Early Warning System, a network of *ex-situ* base collections under the auspices and/or jurisdiction of FAO and a network of *in-situ* conservation areas which is still under development.

An FAO Fund for Plant Genetic Resources was established in 1988, on an interim basis, pursuant to article 6 of the Undertaking. Donors—governments, NGOs and individuals—can contribute to the FAO Fund to support plant genetic resource conservation and use.

The International Fund for Plant Genetic Resources, envisaged in Resolution 3/91 of the Undertaking (Annex III, 1991), will finance plant genetic resource conservation and utilization programmes outlined by a Global Plan of Action on Plant Genetic Resources derived from information found in a proposed periodic report: the State of the World's Plant Genetic Resources. The International Fund will also create the means to implement the concept of Farmers' Rights. Farmers' Rights are:

rights arising from the past, present and future contributions of farmers in conserving, improving and making available plant genetic resources, particularly those in centres of origin/diversity. These rights are vested in the International Community, as trustee for present and future generations of farmers, for the purpose of ensuring full benefits to farmers, and supporting the continuation of their contributions, as well as the attainment of the overall purposes of the International Undertaking. (Annex II).

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Box 13. The FAO Global System for the Conservation and Utilization of Plant Genetic Resources

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The Farmers' Rights concept promotes a more equitable relationship between the donors and users of germplasm by providing the basis for farmers to share in the benefits derived from germplasm they have developed and conserved over generations. The Farmers' Rights concept has been difficult to implement primarily because the nature of financing the International Fund remains to be determined as well as how entitlements would be determined and benefits distributed. The Conference for the Adoption of the Agreed Text of the Convention on Biological Diversity adopted a provision in Resolution 3 of the Nairobi Final Act recognizing the need to resolve the outstanding issue of Farmers' Rights within the FAO Global System (see appendix).

In response to Resolution 3, the CPGR adopted in April 1993 Resolution CPGR 93/1 (Revision of the International Undertaking on Plant Genetic Resources). The resolution was adopted by the 27th FAO Conference in November 1993. It recommends convening intergovernmental negotiations to:

- harmonize the Undertaking with the Convention on Biological Diversity
- consider the issue of access on mutually agreed terms to plant genetic resources, including access to *ex-situ* collections of plant genetic resources not covered by the Convention
- realize Farmers' Rights.

The CPGR hopes to complete the Undertaking's revision in time for the Fourth International Technical Conference on Plant Genetic Resources, tentatively scheduled for 1996. The intergovernmental negotiations would occur in close cooperation with the Convention on Biological Diversity's Conference of the Parties. If the governments so decide, the revised Undertaking could be converted into a legally binding instrument which could, in turn, become a protocol to the Convention.

The first case reflects the principle that international agreements, as any legal rule, usually do not apply to past actions. Paragraph 3 incorporates this "non-retroactivity" principle. As a result, genetic resources acquired *before* the Convention enters into force are excluded from the ambit of articles 15, 16 and 19. *Ex-situ* genetic resource collections created prior to the Convention's entry into force belong to this category.

Contracting Parties from which genetic resources were obtained before the Convention's entry into force have no legal claim under the Convention to invoke the benefit-sharing provisions of articles 15, 16 and 19 for the past and future use of these genetic resources. Furthermore there is no obligation for Parties to facilitate access to these genetic resources pursuant to article 15(2) and Parties are not required to share the benefits derived from their use.

The fact that the Convention does not address access to pre-existing *ex-situ* genetic resource collections led the Conference for the Adoption of the Agreed Text of the Convention on Biological Diversity to adopt a provision in Resolution 3 of the Nairobi Final Act (see appendix) recognizing the need to seek appropriate solutions for plant genetic resources within the FAO Global System for the Conservation and Utilization of Plant Genetic Resources (see Box 13).

The second case refers to situations which may occur *after* the Convention has entered into force. A Contracting

Party which obtained genetic resources from another Contracting Party country of origin illegally without, for example, its prior informed consent (if consent is required (see article 15(5))), has no legal claim under the Convention to share in the benefits derived from those genetic resources if it, in turn, provides the genetic resources to a third Contracting Party. This is because the genetic resources were not acquired in accordance with the Convention.

Paragraph 3 raises two additional issues which should not be overlooked. First, except for the first 30 States which have ratified, accepted, approved or acceded to it, the Convention enters into force for each Party on a different date (see article 36 (Entry Into Force)). This may make it difficult for Party providers and users (whether other States or private users) to track the applicability of the Convention's provisions, particularly for articles 15, 16 and 19.

Second, notwithstanding its entry into force, the Convention does not define—in terms of time or legal meaning—when a genetic resource has been "provided" by a country of origin or when it is deemed "acquired" by a user. The closest the Convention gets to resolving these issues is in article 2, where "country providing genetic resources" is defined as "the country supplying genetic resources from *in-situ* sources ... or taken from *ex-situ* sources". Each Party may need to clarify this ambiguity in national legislation. For example, national legislation could determine the point in time when a

genetic resource has been provided, differentiating between users that will leave the country with the genetic

resource and users that remain in the country with the genetic resource.

4. Access, where granted, shall be on mutually agreed terms and subject to the provisions of this Article.

Paragraph four conditions access to genetic resources on attaining mutually agreed terms. Inherent in the phrase "mutually agreed terms" is the expectation of a negotiation between the Contracting Party granting access to genetic resources and another entity—an individual, a company, an institution, a community or a State—desiring access to and use of the genetic resources. A successful negotiation could result in the creation of an access agreement.

Access agreements are likely to become the primary means for Parties not only to authorize access to genetic resources, but also to agree on a return of benefits from subsequent use. Indeed, it may prove difficult to negotiate benefit-sharing independent of or after negotiating an access agreement.

As a provider of genetic resources, a Contracting Party may want to consider establishing a national focal point to coordinate and implement access agreements with other States and private entities. There are three primary advantages to creating a focal point. First, it could inform potential users of a Party's genetic resource access rules and regulations. Second, access determinations can be streamlined to avoid delays. Third, arbitrary decision making is more likely to be avoided. A focal point, then, could be one practical measure a Party might take to ensure that access to genetic resources is facilitated and is not restricted (see article 15(2)).

The focal point could be a governmental agency, a government or university related research institution. It could also be a private contractor or an independent private, non-profit organization, either of which could act as an intermediary on behalf of the government. The mechanism for determining the focal point's scope of responsibilities depends on what form it takes. If a governmental organization, its scope of responsibilities could be determined by national

legislation and implemented through administrative regulations or policy guidelines. A private contractor or non-profit organization's scope of responsibilities could be determined by contract.

The focal point might be given the authority to negotiate, on behalf of the Contracting Party, the terms of access, including the return of benefits. It could also track genetic resource use, collect and disburse potential user fees, royalties, other financial returns or other compensation and seek enforcement of access agreements. The focal point could also carry out or coordinate the collection and characterization of genetic resources to better identify their potential use or value and identify potential users (see the discussion of article 7(a) and (d)).

Like the other paragraphs of article 15, ownership of genetic resources is not addressed by paragraph 4. A State has sovereign rights over the genetic resources within its jurisdiction. Consequently, governments have the authority to determine access to genetic resources, whether they are owned by the State or by another (see article 15(1)).

By enacting national legislation, the government will determine the conditions of access for a potential user (see the discussion of article 15(5)). But the legislation will have to distinguish between genetic resources for which the State is the owner, and those that are owned by others. While there are probably many possible scenarios, in instances where the State is not the owner of genetic resources, access legislation should clearly indicate that a potential user needs to negotiate an access agreement with the owner, and whether it is subject to governmental review, or whether a tripartite-like agreement must be negotiated with the State and the other owner.

5. Access to genetic resources shall be subject to prior informed consent of the Contracting Party providing such resources, unless otherwise determined by that Party.

Paragraph five makes access conditional on the prior informed consent (PIC) of the Contracting Party providing genetic resources. Prior informed consent is a concept which has only been used in one other convention: the Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel, 1989). In contrast to the Basel Convention which requires informed consent with a view to protecting importing States from environmental damage, this paragraph requires informed

consent prior to access and subsequent export of genetic resources from a Contracting Party.

Prior informed consent in this case may be described as:

- (1) consent of the Contracting Party which is the genetic resource provider (an affirmative act),
- (2) based on information provided by the potential genetic resource user,

(3) prior to consent for access being granted.

In terms of sequence, then, mutual agreement with a user would precede consent, and could be accomplished within the PIC procedure created by the provider.

The PIC requirement gives a Contracting Party the authority to require a potential genetic resource user—whether another Party or, for example, a collector or a company in the private sector—not only to gain its authorization before accessing genetic resources within its jurisdiction, but also to require the potential user to outline the implications of access by, among other things, specifying how and by whom the genetic resources will be subsequently used. This information, or lack of information, may be important for the provider to decide whether, and on which terms, to grant access.

The phrase "unless otherwise determined by that Party" indicates that prior informed consent is the norm, unless a Contracting Party providing genetic resources decides otherwise. There is, however, an important practical ramification: the providing Party should take steps to establish the necessary procedure in its legal system (Hendrickx, *et al*, 1993). If a Party fails to do so, its ability to effectively control a potential user's access and ensure benefit sharing may be lost.

The phrase also implies that a Party is free to decide in what instances PIC will apply. For example, the PIC requirement may apply to all genetic resources within the provider's jurisdiction or only to particular categories of genetic resources (see the discussion of article 15(4)).

In order to give full effect to the prior informed consent requirement, sole action by the providing State will probably not be sufficient. National legislation in both Contracting Parties providing genetic resources and Contracting Parties using genetic resources is likely to be necessary. In fact, as any Party can be both a provider and user of genetic resources, the national legislation enacted to give effect to this paragraph should best address both situations, and apply to nationals and non-nationals alike.

National legislation of a Party as provider might specify minimum or general terms or conditions of access, while leaving flexibility to negotiate more specific terms, like benefits sharing, on a case by case basis. By including the minimum requirements for access in national legislation, the provider will create a uniform basis from which negotiations can proceed, minimize delays and limit arbitrary decision making.

This legislation could establish:

- the scope of application, in particular, which *in-situ* or *ex-situ* genetic resources are covered, whether public or private and which users, for example, commercial or non-commercial, are subject to PIC.
- the information required for an access determination, including any environmental assessment data and, to

the extent practicable, the future use of the genetic resources.

- whether an access fee and collecting or other licenses are required.
- general restrictions including restrictions on future use, such as limits on collecting, restrictions on third party use and transfer and specifications for environmentally sound uses, which could be later particularized to a specific transaction.
- whether the user has to make periodic reports concerning the subsequent use of the genetic resources, the form of the report and to whom it is to be sent.
- the government's policy on research collaboration, including intellectual property rights, and the sharing of benefits derived from the genetic resources, including rules regarding the allocation of benefits received by the State, pursuant to an access agreement, to public and private entities within the State.
- export restrictions, including requiring a report or list of what was collected and where, penalties for export without prior informed consent or policies for future access in such cases.
- biosafety restrictions to ensure the safe exchange of genetic resources.
- an appeals process for instances when access is denied.

The legislation could also establish a focal point to coordinate and implement access agreements (see the discussion of article 15(4)).

Genetic resources access legislation should keep in mind that legislation should strive for simplicity of process to minimize cumbersome rules and delays. Not only is this implicit in article 15(2) (facilitate access to genetic resources), but it may make good business sense as well, since the supply of genetic resources is elastic.

National legislation of a Party as a genetic resource user might require an importer to demonstrate that the importation and subsequent use of genetic resources is pursuant to the prior informed consent of the Contracting Party providing the resources, and respects the system of ownership in that Party. *Import controls*, for example import permits, could coincide with existing customs and biosafety controls (such as phytosanitary or quarantine regulations).

The scope of subsequent use is potentially very broad and could, therefore, include possession, cultivation, utilization and further transfer of the genetic resources. Controls on subsequent use could be expressed through legislatively-based processes to grant intellectual property protection or product approval and licensing. Legislation could also require users to make periodic reports of subsequent use of the genetic resources to the Party providing them.

Finally, the effectiveness of the system would require the Party providers or their intermediaries to have access to the court system of the Party using genetic resources.

Penalties and remedies for importation and subsequent use without prior informed consent would also have to be provided.

6. Each Contracting Party shall endeavour to develop and carry out scientific research based on genetic resources provided by other Contracting Parties with the full participation of, and where possible in, such Contracting Parties.

This paragraph parallels article 18 (Scientific and Technical Cooperation). Its aim is to involve Parties providing genetic resources in the research undertaken by Contracting Party users. Unlike article 19(1) which creates a narrower obligation for participation in biotechnological research, this paragraph applies to *all* scientific research based on the genetic resources provided and undertaken by a Contracting Party.

Like article 19(1), the intent here is to build scientific research capacity of the Parties providing genetic resources. By helping the provider gain scientific knowledge and capacity, soft technology transfer is facilitated (see the discussion of articles 16 and 19). Joint research, whether within the Party provider or not, may also encourage research into applications most relevant to the provider. Research within a Party providing genetic resources increases the likelihood that more local researchers can participate and may even result in hard technology transfer to the provider. Ideally, the obligation will help all Contracting Parties exchanging genetic resources develop greater scientific research capacity to use those genetic resources.

Implementing the spirit of this paragraph means that Contracting Parties using genetic resources need to take

steps to ensure that governmental agencies involved in scientific research on genetic resources work towards developing joint research programmes with, and if possible in, those Parties providing genetic resources. A prerequisite would be an internal review of agencies involved in such research and administrative action to ascertain whether and how appropriate steps can be taken.

These measures could be combined with funding incentives and conditionalities that encourage both governmental agencies directly engaged in research—and governmental institutions which make grants of public money to private sector research organizations, universities and business and industry—to develop appropriate joint research projects that benefit users *and* the Party providing the genetic resources.

These types of measures could be indirectly induced by those Contracting Parties providing genetic resources. For instance, the research requirement could be incorporated in the terms of a genetic resource access agreement which should also clarify the intellectual property rights of the research partners.

7. Each Contracting Party shall take legislative, administrative or policy measures, as appropriate, and in accordance with Articles 16 and 19 and, where necessary, through the financial mechanism established by Articles 20 and 21 with the aim of sharing in a fair and equitable way the results of research and development and the benefits arising from the commercial and other utilization of genetic resources with the Contracting Party providing such resources. Such sharing shall be upon mutually agreed terms.

Paragraph 7 requires each Contracting Party—whether developed or developing—to take legislative, administrative or policy measures whose goal is the fair and equitable sharing of benefits with the Contracting Party providing genetic resources. The benefits to be shared are:

- research and development results; and
- the commercial or other benefits derived from utilizing the genetic resources provided.

Sharing is to be on mutually agreed terms.

The paragraph references articles 16 and 19 which expand the potential benefits to include:

- access to and transfer of technology using the genetic resources (article 16(3));

- participation in biotechnological research activities based on the genetic resources (article 19(1)); and
- priority access to the results and benefits arising from biotechnological use of the genetic resources (article 19(2)).

Most of the benefits which this paragraph contemplates sharing are within the private sector. The paragraph is mindful of this in that it requires the Contracting Party to take measures aiming at (rather than requiring) benefit-sharing, while submitting concrete benefit-sharing arrangements to mutual agreement. It is important to keep in mind that the agreement in question will, in the majority of instances, have to be reached between the Contracting Party providing access to the genetic resources on the one

hand, and a private entity, often a commercial enterprise, on the other.

The widely varying circumstances and situations surrounding genetic resource use makes it virtually impossible (and perhaps unwise), for each Contracting Party which could provide genetic resources to specify, *a priori*, what benefits should be shared and the modalities to be employed to facilitate sharing. Since the sharing of benefits is conditioned on achieving "mutually agreed terms", a negotiation in each individual case is implied; such negotiations might best take place along with, or as part of, an access agreement (article 15(4)). Negotiating the terms of benefit-sharing in each case would allow the parties to agree on what is fair and equitable in a particular situation.

Sharing of benefits, as indicated above, may mean a variety of things, ranging from monetary benefits, such as royalties, to access to technology developed with the genetic resources at stake. What will be desired by the Contracting Party providing access to the genetic resources, and acceptable to the party (governmental institution or private enterprise) seeking access, is bound to be different in each case.

What is negotiated will be influenced by the perceived value of the material provided. This is likely to vary according to (1) the nature of the genetic resources provided and (2) the types of subsequent use proposed. In this regard, the negotiating position of the Party providing genetic resources will be strengthened if the provider can independently determine how a potential user might use or value a particular genetic resource.

By developing its capacity to characterize the genetic resources within its jurisdiction, the provider will develop a better understanding of their potential uses and be better able to discuss possible returns (see the discussion of article 7(a) (identify the components of biological diversity), article 7(d) (organize data collected from the identification and monitoring of the components of biological diversity, article 12 (Research and Training) and article 17 (Exchange of Information)). In addition, the potential genetic resource user will need to provide available information on the future use of the genetic resources, in particular, whether commercial use is contemplated.

Unfortunately in practice, it will not be possible in many instances to attain any of this user-related information at the time of an access negotiation. For example, this will be the case when genetic resources have yet to be collected, an end-product has yet to be determined or a final user, and there could be many, is not yet evident.

Another complication arises in instances where genetic resources from multiple providers will be used to create a particular end-product. This will typically be the case in agricultural applications involving conventional plant breeding because quantifying a genetic resource's

percent contribution to a new plant variety will be impossible, in most instances. In contrast, the contribution of a genetic resource to be directly used in, for example, drug derivation or in a biopesticide, may be more quantifiable *a priori* because the end-product is potentially identifiable and could be broken down into its constituent components.

These difficulties should neither be underestimated, nor exaggerated. Even though it will not always be possible to concretely determine in advance how the genetic resources provided will be used or what commercial value they will have as part of a particular end-product, effective benefit-sharing can still be attained.

Technology transfer, in particular joint research and sharing of research results, can be sought without necessarily knowing how the genetic resources will be subsequently used. The Party could request to be acknowledged in subsequent publications involving the genetic material provided. Advance payment or per sample fees can still be established as well. Even where it is difficult to determine the sales of an end-product yet to be created, a minimum royalty as a percentage of, for example, net sales could be agreed upon ahead of time during the negotiation.

The negotiation and resulting agreement could also provide for adjustments to accommodate future unforeseen end-products, applications or other contingencies resulting from long research and development lead time, or third party transfers.

In this regard, keeping informed of the fate of genetic resources provided is a legitimate concern for the Party providing access; thus, information on any subsequent use of the genetic resources, could be required. Also, when transfer of genetic resources from the original user to a third party is contemplated, the agreement could require the prior informed consent of the Party provider *before* the transfer can take place. This would allow the provider to negotiate mutually agreed terms with the third party.

At minimum, the parties to an access negotiation should ultimately strive for a clear definition of potential benefits, both short and long term (including intellectual property rights), a clear definition of how the benefits will be distributed and who owns the genetic resource samples collected. Negotiators should also keep in mind that good partners make good friends and that an access agreement reflects a two-way relationship of good will.

Finally it must be noted that paragraph 7 is also linked to the Convention's financial articles (see the discussion of articles 20 and 21). This linkage means that, where needed, the agreed full incremental cost of sharing research and development results and other benefits could be financed through the Convention's financial mechanism, if the Conference of the Parties decides that such activities are potentially eligible for funding (see article 20 (Financial Resources)).

Article 16. Access to and Transfer of Technology

Article 16 defines the basic obligations of each Contracting Party regarding technology transfer, the basis of transfer to developing countries and what measures are to be taken to institute the transfers contemplated. Together with article 19 and the financial articles (articles 20 and 21), article 16 is probably the most controversial article in the Convention on Biological Diversity. It reflects the years of north-south debate in other fora over the issue of technology transfer and, in some of the technology at stake, the related sub-issue of intellectual property rights.

It is a complex, ambiguous article whose imprecise text reflects the complexity of the political debate and subsequent compromise reached during the negotiations. Circular cross-referencing introduces decided ambiguity that opens the door to differing interpretations. As a result, the article will only truly take shape after the Parties collectively or individually put into practice their own interpretations over time. Therefore, the commentary which follows is necessarily general.

During the early stage of the negotiating process, a number of governments—primarily of developed countries—did not want the Convention to include any provisions on technology transfer, based on the parallel discussion of this and related issues in other fora. At the

same time, other governments—primarily of developing countries—considered technology transfer to be an essential Convention element, particularly as a counterpart to the provisions related to genetic resource access. The latter position prevailed, but the technology transfer issue remained extremely contentious throughout the negotiations as the scope and terms of the article were defined. Developed countries were particularly fearful of language which might be interpreted as requiring them in any way to force their private sectors to transfer technology (including biotechnology). Protecting intellectual property rights was a parallel concern not least because, being based on DNA, many biotechnologies protected by intellectual property rights are easy to reproduce without the permission of the intellectual property rights holder.

Article 16 must be read in conjunction with other articles in the Convention because internal barriers—such as a lack of scientific, institutional, and administrative capacity—could impede the introduction and use of new technology in some Parties. Therefore, article 16 must be viewed and implemented along with article 12 (Research and Training), article 17 (Exchange of Information), article 18 (Technical and Scientific Cooperation) and article 19 (Handling of Biotechnology and Distribution of Its Benefits).

- 1. Each Contracting Party, recognizing that technology includes biotechnology, and that both access to and transfer of technology among Contracting Parties are essential elements for the attainment of the objectives of this Convention, undertakes subject to the provisions of this Article to provide and/or facilitate access for and transfer to other Contracting Parties of technologies that are relevant to the conservation and sustainable use of biological diversity or make use of genetic resources and do not cause significant damage to the environment.**

Paragraph 1 sets the obligation for each Contracting Party to undertake "to provide and/or facilitate access for and transfer to other Contracting Parties" of:

- technologies relevant to the conservation of biological diversity;
- technologies relevant to the sustainable use of its components; or
- technologies that make use of genetic resources.

These technologies must not cause significant damage to the environment.

The wording of this obligation is significant in three respects. First, the scope of the obligation is confined to the three categories of technology enumerated. All three categories cover a vast range of soft and hard technologies, including high technologies such as modern biotechnology.

Two points must be remembered concerning relevant technology. First, traditional or indigenous technologies

may be equally as valuable as "modern" technologies in helping to fulfil the Convention's objectives.

These technologies—both hard and soft—should not be discounted merely because they are not "new", "modern" or "scientific". Second, many relevant and useful technologies already exist in the public domain (that is, free of intellectual property restrictions) and may not only be appropriate, but easy and cost effective to transfer to developing countries.

The second significant aspect of the obligation is the option given to provide or facilitate access to and transfer of technology. Parties are given a choice and "facilitate" denotes the minimum obligation each Contracting Party must fulfil to comply with the obligation.

The paragraph applies to *each* Contracting Party reflecting not only that technology transfer can occur between all Parties, but also that the minimum obligation to facilitate access to and transfer of technology is incumbent on *all* Parties, regardless of whether they are

suppliers or recipients of technologies. Since neither "provide" nor "facilitate" are defined in the Convention, Parties have a great deal of latitude to implement the obligation in the way most suitable to their particular situation. For example, a Party could *provide* relevant publicly owned or public domain technologies to other Parties directly.

There are many different ways to *facilitate* access to and transfer of technology. As a first step, a Party may want to review existing policies and practices to determine which are most effective, then determine and implement what additional measures are needed as appropriate. Measures to facilitate access could include:

- tax and other economic incentives (see article 11) in supplier Parties to encourage exports and in recipient Parties to encourage imports;
- reforming foreign investment rules;

- trade assistance;
- expanded intellectual property rights protection;
- collaborative research and development arrangements;
- establishing national and regional technology clearing house mechanisms;
- grants; or
- the purchase of intellectual property rights on behalf of another Party.

The third significant aspect of the obligation is that the technologies ultimately transferred between Contracting Parties must not cause significant damage to the environment. The requirement parallels the concept of "environmentally sound technologies" found in Chapter 34 of *Agenda 21* (Transfer of Environmentally Sound Technology, Cooperation and Capacity Building).

Box 14. What Is Technology Transfer?

According to the United Nations Conference on Trade and Development (UNCTAD), technology transfer is the "transfer of systematic knowledge for the manufacture of a product, for the application of a process or for the rendering of a service" (UNCTAD, 1990). Technology flows between a supplier and a recipient, whether within a country or between States. Within countries it occurs between, for example, the public and private sectors and within the private sector. Internationally, technology transfer is an everyday phenomenon of international trade. It occurs between the private sectors of different States, between their public sectors or a combination of both. Transfer is complete when a technology is successfully adapted and used by the particular public entity or portion of the private sector it has been transferred to.

Technology takes many different forms but falls into two general categories: soft technology and hard technology. Know-how, skills and techniques are generally known as soft technologies. This technology is "soft" because it is conveyed as information which does not necessarily take a tangible form. Examples are the ethno-botanical or ethno-pharmacological knowledge of a traditional healer, the conservation techniques of a local farming community, a training course in wildlife management techniques or a research collaboration which imparts new biotechnological techniques to researchers.

Hard technologies, on the other hand, are tangible goods. The most obvious examples are equipment or hardware such as a computer or a bioprocessing plant. Less obvious might be a seed from a particular plant variety developed by a farmer or a bacterium genetically engineered to produce a particular substance. Hard technologies can rarely be transferred successfully without some form of accompanying soft technology transfer. Therefore, hard and soft technology transfer are usually complementary processes.

High technology is advanced or leading edge hard or soft technology. Examples might be a genetically engineered plant, the details of a bioremediation or biogas process or the hardware and software needed for a biodiversity information management system.

Technology can be developed "formally" through the application of modern scientific and engineering methods. It can also be developed "informally". Examples of the latter might be the development of different crop landraces by farmers in a community over many generations; another example is a traditional healer's knowledge of a plant extract's medicinal properties and use.

In international environmental agreements, technology transfer may constitute an incentive for States to sign an agreement, or it may be a prerequisite for the agreement's implementation when some of the parties do not have the endogenous technological capability needed. The flow of technology transfer is typically viewed as being from the northern countries to the southern countries. However, technology transfer is not unidirectional. In fact, most technology transfer is north to north, but technology can and does flow from south to north, as well as south to south.

Two important issues this qualification raises are

- who decides whether a particular technology will cause significant damage to the environment, and
- how will the technology be assessed?

Clearly, a Party providing technology has a particular responsibility in this regard.

A recipient Party has an equal responsibility to determine whether a technology will cause significant damage to its environment. The ability to assess a particular technology, however, will depend on a recipient Party's:

- access to relevant information about the technology and the situation within which it will be used (see article 17 (Exchange of Information) and article 19(4) (provide available information about the use and safety regulations regarding living modified organisms));
- technical and administrative capacity to gather and review relevant information (see article 12 (Research and Training) and article 18 (Technical and Scientific Cooperation)); and
- national legislation regulating technology imports.

2. Access to and transfer of technology referred to in paragraph 1 above to developing countries shall be provided and/or facilitated under fair and most favourable terms, including on concessional and preferential terms where mutually agreed, and, where necessary, in accordance with the financial mechanism established by Articles 20 and 21. In the case of technology subject to patents and other intellectual property rights, such access and transfer shall be provided on terms which recognize and are consistent with the adequate and effective protection of intellectual property rights. The application of this paragraph shall be consistent with paragraphs 3, 4 and 5 below.

Paragraph 2 addresses technology transfer to developing countries. Its first part creates the general obligation and outlines the general terms of transfer, including linkages with the Convention's financial mechanism. The second part deals with the transfer of technology which is subject to intellectual property rights. The third part links the paragraph with the three paragraphs that follow in the article.

Access and transfer are to be achieved under fair and most favourable terms. Fair and most favourable terms include concessional and preferential terms, if mutually agreed. The Convention does not define the scope of these terms. However, the same or similar provisions can be found in the UN Framework Convention on Climate Change (New York, 1992), the Protocol on Substances that Deplete the Ozone Layer (Montreal, 1987) and similar language is used in *Agenda 21*. These terms would benefit from a consistent interpretation "across the board".

Access to and transfer of technology is linked to the Convention's financial provisions. The link is important for two reasons. First, it clearly means that the funds available

Another issue which must be addressed is whether the assessment should be formulated on a case by case or category basis. For quickly evolving areas, such as biotechnology, assessment criteria must be developed with the understanding that, as the state of knowledge increases, what may be considered to cause significant damage to the environment today may become controllable or manageable in the future. Furthermore, assessment criteria should be periodically reassessed for their appropriateness.

Many recipient Parties may be faced with limited technical and administrative capacity to gather and review relevant information on technology. In some circumstances, therefore, it may be helpful for a Party to draw on the private sector for support and advice. By establishing a technology transfer advisory group, individuals, such as scientists, the business community and NGOs may be able to work with governmental agencies and provide impartial advice on the application and potential environmental impacts of proposed technologies which could be transferred. In instances where it is difficult to ascertain the environmental impact of proposed technologies, a precautionary approach should be applied (see preambular paragraph 9).

through the Convention's financial mechanism could be used for purposes of technology transfer. Second, it implies that these funds could provide a means to overcome the legal and economic difficulties associated with the transfer of technologies which need to be purchased, including proprietary technology (that is, technology covered by intellectual property rights). For example, they could make it possible for a developing country to acquire proprietary technology in instances where its own financial resources would not otherwise allow. They could also help achieve the favourable terms of transfer required by covering the cost between a technology's market value and a more favourable price.

The second part of the paragraph specifically deals with the transfer of technology to developing countries which is subject to intellectual property rights (see Box 15). Transfer is to be provided on terms which recognize and are consistent with the "adequate and effective" protection of intellectual property rights over transferred technology.

The phrase "adequate and effective protection" has been inserted into the Convention to establish a link with the recently completed Agreement on Trade-related Aspects

of Intellectual Property Rights (TRIPs) negotiated in the Uruguay Round of the General Agreement on Tariffs and Trade (GATT). However, the terms "adequate and effective" have neither been formally defined in the Convention, nor in the TRIPs agreement (see Box 16).

The last part of this paragraph mandates its application to be consistent with the three subsequent paragraphs

(3, 4 and 5). Paragraph 3 addresses the transfer of technologies which make use of genetic resources to the Contracting Parties having provided genetic resources.

Paragraph 4 applies to private sector technology transfer. Paragraph 5 is a statement of cooperation on intellectual property rights.

Box 15. Intellectual Property Rights Particularly Relevant to Article 16

Intellectual property rights (IPRs) are private legal rights which apply to the intangible human contribution that goes into producing a particular technology. Legislation and case-law create the legal right and define its scope. In its most basic form, an intellectual property right allows its holder to control others' commercial use of the intellectual information embodied in the technology during the life of the IPR. In effect, the holder has a legal monopoly over the commercial exploitation of the intellectual property for a specified period of time and, therefore, the technology which embodies it. As a result, potential users must seek the holder's permission before commercially using the intellectual property. Permission is typically granted, and technology transfer effected, pursuant to a licensing agreement.

There are many forms of intellectual property rights which are relevant to the Convention. Copyrights, for example, are extended to scientific publications, computer software and databases. This box focuses on three which are particularly relevant to technology transfer pursuant to the Convention: patents, trade secrets and plant breeders' rights. The scope of the holder's right varies with each.

Patents

Patents can be granted for any process, machine or composition of nature which is novel, useful and embodies an inventive or non-obvious step. An inventor is given a private monopoly of fixed duration to restrict others from making, using or selling the invention. In exchange for the patent, the patent's subject matter must be published.

The international treatment of patents has been through the Paris Convention for the Protection of Industrial Property which is administered by the World Intellectual Property Organization (WIPO). The Paris Convention does not create an internationally enforceable patent right. Rather, patent protection remains a phenomenon of national legislation and case law. Therefore, the extent of patent protection varies by State. For example, as matters of public policy many States do not allow living organisms to be patented. The United States first confirmed the extension of utility patent protection to living organisms in 1980. In so doing, it initiated a debate in other OECD countries as to whether they should offer similar protection. In addition to the moral questions which extend to the patenting of life-forms is the issue of restricted access to modified genetic material which has been patented.

The term, scope and enforcement of international patent protection was discussed in the negotiations which led to an Agreement on Trade-related Aspects of Intellectual Property Rights (TRIPs) as part of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) (see Box 16). The TRIPs agreement stipulates that the term of patent protection in GATT member States shall be no less than twenty years from the filing date of the patent application (article 33). In a separate part which applies to all forms of intellectual property covered by the agreement, general enforcement obligations (article 41), civil and administrative procedures and remedies (articles 42-49), provisional measures (article 50), special requirements related to border measures (articles 51-60) and criminal procedures (article 61) are also specified.

Patents are also being discussed in the on-going patent harmonization negotiations for a Patent Law Treaty under the auspices of WIPO.

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Box 15. Intellectual Property Rights Particularly Relevant to Article 16

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Trade Secrets

Trade secrets are used to protect subject matter which is either unpatentable because it does not fit the criteria for a patent or because the holder does not want to publicly publish the subject matter for fear that a commercial competitor will use the information to the holder's disadvantage. Once information is publicly disclosed, the holder can no longer claim the information secret and the ability to control others' use could be lost. For example, the ability to subsequently apply for and be granted a patent may be affected by the public disclosure of the information.

Trade secrets can be applied to a wide range of information. For example, scientific information or a traditional healer's knowledge could be protected. Biological materials subject to material transfer agreements can also be protected through trade secret law. In general, trade secret protection is only against acquisition, disclosure or use of information or materials in a manner contrary to honest commercial practices. Unlike a patent, trade secret protection does not prevent others from developing and using the same information by other independent means, for example by reverse engineering. Their existence and enforcement vary from State to State. In some States, the unauthorized disclosure and subsequent use of trade secrets is linked to unfair competition laws.

Trade secret protection as a means against unfair competition is recognized at the international level in article 1 *Obis* of the Paris Convention. The TRIPs Agreement (article 39) requires member States to protect trade secrets (known in the agreement as "undisclosed information") as well.

Plant Breeders' Rights

Plant breeders' rights (PBRs) are recognized internationally through the 1961 International Convention for the Protection of New Varieties of Plants as amended in 1978 (UPOV). Member States are expected to grant and protect breeders' rights at the national level for plant varieties which are new, distinct, uniform and stable (article 6(1)). In contrast to the 1978 text, the amendments adopted in 1991, but which have yet to enter into force, expand the scope of the breeder's right in two instances.

In the first instance, the original minimum scope of the PBR gave the breeder the right to exclude others from *commercially* marketing or selling the protected variety's propagating material (seed, for example) (article 5(1)). This had the effect of implicitly creating a "farmer's privilege". The privilege allowed a farmer who buys the protected variety's seed to save the seeds from the resulting crop for subsequent use the following year without paying additional royalties to the plant breeder. The 1991 text extends the PBR to *all* production—commercial or otherwise—theoretically eliminating the farmers' privilege (article 14(1)). The 1991 text, however, allows UPOV members in their national legislation to limit the scope of the PBR and, therefore, recognize a farmer's privilege after all (article 15(2)).

In the second instance, the 1991 text, as does the 1978 text, recognizes a breeder's or research exception (article 15(1)(iii)). Within the research exception, the protected variety can be used by other breeders as the basis for creating new, protectable varieties without prior authorization. Therefore, unlike patenting genetic material, the PBR does not limit others' access to the plant variety's genetic material to create new plant varieties. Consequently, the UPOV Convention helps ensure unrestricted access to modified genetic material.

The scope of the research exception, however, has been limited in the 1991 text by the introduction of a new concept: essential derivation. Under the 1991 text, the exploitation of new varieties developed from a protected variety is subject to the original breeder's right when the new variety is very closely related to the protected variety and, therefore, contains virtually all of the protected variety's genes (article 14(5)).

The concept of essentially derived varieties was created to close a loophole in the breeders' right which is likely to widen with the use of genetic engineering in plant breeding, and to improve the breeders' position in relation to the owner of a patent on a product or process for transformation of plants. It was felt improper that the breeder of a variety, on the one hand, should be deprived of fair remuneration for his efforts by another person who would add but one useful characteristic to the variety and exploit the resulting new variety, while the patent owner has, on the other hand, a right to exclude the breeder (or any other person) from using the patented product or process. The new concept will enable the breeder to exclude the patent owner (or any other person) from exploiting the transformed variety, if it falls within the narrow limits of essential derivation. Authorization to use or exploit will be given through licenses, with payment of a royalty being a likely term of the license.

Box 16. GATT and Trade-related Aspects of Intellectual Property Rights

At first glance intellectual property rights hardly seem related to international trade. But the economies of many countries are dependent on trade in technology, which in many cases is protected by intellectual property rights. Intellectual property protection standards vary from State to State and may create non-tariff barriers to the technology trade.

In the 1970's Tokyo Round of the General Agreement on Tariffs and Trade (GATT), attention had been focused on creating a code to address trade in counterfeit goods. No agreement was reached. In 1986, some industrialized countries lobbied to place the issue of intellectual property protection, as it relates to trade, on the agenda of the GATT Uruguay Round.

Many developed and developing countries held different views on this. Developed countries have argued that worldwide disparities in intellectual property protection create barriers to trade by among other things allowing, for example, patented technology to be copied at a fraction of the cost required to originally research and develop it. Their emphasis on patents is particularly strong. They argue that the Paris Convention for the Protection of Industrial Property: (1) does not provide enforceable, minimum patent rights pursuant to internationally agreed rules, but only guarantees a right to national treatment; (2) requires no specific subject matter protection; and (3) allows too freely compulsory licensing which, in certain specified instances, allows a patent to be used without the permission of the owner.

Most developing countries are members of the Paris Convention. Still, some have argued that intellectual property rights impede technology transfer and, consequently, impede development. They have argued that the level of patent protection should be tailored to a country's economic and technological development and should, therefore, be determined nationally.

After much debate—and many objections by developing countries who considered WIPO was the more appropriate forum—the Trade-related Aspects of Intellectual Property Rights (TRIPs) were placed on the Uruguay Round agenda. According to the preamble of the TRIPs Agreement finalized in late 1993 and signed in early 1994, the agreement was inspired by the need for new rules and disciplines in a number of areas relevant to intellectual property including *adequate* standards concerning the availability, scope and use of intellectual property rights, as well as *effective* means to enforce them.

For both moral and socio-economic reasons, one of the more controversial topics within the TRIPs negotiations was extending patent protection to living organisms. Under the final TRIPs Agreement, Members have the option to offer patent protection to all eligible inventions using genetic resources. Mandatory protection will have to be extended to eligible inventions of micro-organisms. Plant variety protection will have to be provided *either* by patent, some other effective *sui generis* (specially designed) system, such as plant breeders' rights (see Box 15) or a combination of both. Members have the option to exclude from patenting plants, animals and essentially biological processes for their production.

- 3. Each Contracting Party shall take legislative, administrative or policy measures, as appropriate, with the aim that Contracting Parties, in particular those that are developing countries, which provide genetic resources are provided access to and transfer of technology which makes use of those resources, on mutually agreed terms, including technology protected by patents and other intellectual property rights, where necessary, through the provisions of Articles 20 and 21 and in accordance with international law and consistent with paragraphs 4 and 5 below.**

Paragraph 3 addresses the special case of technology which makes use of genetic resources. A careful reading of this paragraph emphasizes its complexity. Three points are especially noteworthy.

First, the obligation created does not require each Contracting Party to actually transfer technologies

making use of genetic resources to the Contracting Party providing genetic resources. Rather, the obligation is for each Contracting Party—whether a developed or developing country—to take the appropriate steps whose aim would be to provide access to and transfer of technology making use of genetic resources to those Contracting Parties providing genetic resources.

The distinction is subtle but important. The obligation each Contracting Party undertakes is not the outright transfer of technology making use of genetic resources. Rather, it is to create a framework permitting technology transfer to take place—in this case the transfer of technology making use of genetic resources to the Contracting Parties providing the genetic resources used.

Second, the paragraph recognizes that each Contracting Party is a potential provider and user of genetic resources. As a provider of genetic resources, every Contracting Party is, at least in theory, potentially entitled to receive technology making use of genetic resources. However, the paragraph stresses the particular obligation towards developing country Parties which provide genetic resources.

As a user of genetic resources, each Contracting Party is obliged to create the framework previously described. The measures chosen to fulfil the obligation are left to the discretion of the Party, but the goal is actual technology transfer to the provider of genetic resources. As an example, a Party could take steps to require its governmental agencies to transfer technology, or extend the obligation to anyone using public funds to develop a particular technology. A Party could also purchase technology developed by the private sector and directly furnish it to the Party which provided the genetic resources it is based upon. Incentives could also be given to encourage the private sector to transfer the technology directly.

4. Each Contracting Party shall take legislative, administrative or policy measures, as appropriate, with the aim that the private sector facilitates access to, joint development and transfer of technology referred to in paragraph 1 above for the benefit of both governmental institutions and the private sector of developing countries and in this regard shall abide by the obligations included in paragraphs 1, 2 and 3 above.

Paragraph 4 requires each Contracting Party to take measures to encourage their private sector to facilitate access, transfer and joint development of technology to both the governmental and private sectors of developing countries. The technology referred to in paragraph 1 is: (1) technology relevant to the conservation of biological diversity; (2) technology relevant to the sustainable use of the components of biological diversity; and (3) technology which makes use of genetic resources.

The vast amount of technology at stake is owned by the private sector of developed countries. These countries were naturally extremely unreceptive to developing countries' call for a mechanism which would in any way make demands on the private sector to transfer technology to potential competitors. Indeed, such a proposal was perceived as contrary to the very basis of free market economies.

Third and finally, it is reiterated that, where needed, the Convention's financial mechanism can be used to facilitate actual technology transfer between Contracting Parties.

The framework is qualified in four important ways which draw on this and other articles. First, article 15(3) states that genetic resources "provided by a Contracting Party" are only those from countries of origin or by Parties that have acquired them in accordance with the Convention. The consequences of this limitation are explained in the commentary for article 15(3).

Another qualification is to reach mutually agreed terms. The context in which "mutually agreed terms" is used in other Convention articles, for example article 15(4), implies a negotiation between a user and a provider of genetic resources. In the context it is used in *this* paragraph, it seems that the measures required must provide the basis through which mutually agreed terms can be achieved. Therefore, as a user of genetic resources, a Party might require its agencies to seek mutually agreed terms as part of a genetic resources access agreement. Similarly, public funding used to develop technology could be conditioned in the same way.

The third qualification states that access and transfer must be consistent with international law. This would include international law applicable to intellectual property rights.

Finally, the application of paragraph three must be consistent with paragraphs 4 and 5.

The compromise reached focuses on facilitating access, joint development and transfer of private technology to governmental institutions and the private sectors of developing countries which provide genetic resources. This implies encouraging (rather than forcing) the private sector to jointly develop and transfer technology to developing countries. Furthermore, since each Party is to take measures, both genetic resource users and providers are called to take such action. One first and simple way to facilitate access would be for Contracting Parties to make arrangements for improving information exchange on what technologies are needed by which Parties (see article 17 (Exchange of Information)). Incentives could also facilitate access (see the discussion of article 11).

Paragraph four refers to paragraphs 1 to 3 of this article. The reference implies that the obligations under these paragraphs prevail over this paragraph.

- 5. The Contracting Parties, recognizing that patents and other intellectual property rights may have an influence on the implementation of this Convention, shall cooperate in this regard subject to national legislation and international law in order to ensure that such rights are supportive of and do not run counter to its objectives.**

The fifth paragraph has three basic themes. The first is the Contracting Parties' collective recognition that intellectual property rights may have an influence, whether positive or negative, on attaining the goals of the Convention. Even though the text has been drafted in a preambular style and is a statement of fact, it is not conclusory. By using the word "may", the Parties have not concluded that intellectual property rights have a

positive or negative impact on technology transfer. The implication is that there will be a further dialogue. The second theme obliges the Contracting Parties to cooperate to ensure that intellectual property rights do not interfere with the Convention's objectives. The third theme relates back to the second, namely cooperation, but greatly restricts it by subjecting it not only to existing international law, but national legislation as well.

Box 17. The Debate over Patents and Technology Transfer

Historically, developing countries have argued that strong patent protection impedes technology transfer particularly because protected technology is more expensive and its use is subject to a variety of restrictions. This in turn effects their economic development. In contrast, industrialized countries believe strong intellectual property rights protection is needed to encourage technology transfer to developing countries and to create an incentive for local innovation.

The debate has continued for almost three decades, starting as early as 1964, when the United Nations first started formally considering the issue. The early consideration by the UN led to the General Assembly's adoption of the Declaration on the Establishment of the New International Economic Order in December 1974. A Program of Action on the Establishment of a New International Economic Order was also adopted at the same time. The central theme was reforming the international regime governing technology transfer. The international intellectual property rights regime, embodied in the Paris Convention for the Protection of Industrial Property, would be reformed. Furthermore, a code of conduct for technology transfer would be developed under the auspices of the United Nations Conference on Trade and Development. Work began on the code of conduct in 1977, but it has yet to be completed.

The debate is slowly ebbing with time as many developing countries, especially in Latin America and East Asia, have been strengthening patent protection and protection for other forms of intellectual property. Some of this change derives in part from increased pressure placed on developing countries by industrialized countries. The general trend to more market-based economies and the general goal to provide more attractive conditions for foreign investment and technology transfer are also influencing this. Finally, the increased capacity of many developing countries to produce valuable new technologies for the international market has also played a role in this change.

Article 17. Exchange of Information

Global problems require common action by States. Central to common action is the need for States to inform each other about their own domestic environmental situation and the measures they have taken to solve the environmental problems they face. With appropriate review, modification and application, the experiences of individual States in a particular situation can be invaluable to finding solutions to similar problems in other countries. However, knowledge and experience about environmental problems and their solutions are unequally and poorly distributed around the globe. In particular, there is an information gap between developed and developing countries which must be bridged. A provision on information exchange, therefore, has become a standard addition to international environmental and conservation agreements.

The conservation of biological diversity and sustainable use of its components are global issues that require Parties to cooperate with each other in a variety of ways to facilitate national action. One aspect of cooperation is the exchange of information between Contracting Parties.

Article 17 is a general provision which stands on its own or can be considered in conjunction with other Convention provisions, in particular, article 7 (Identification and Monitoring), article 12 (Research and Training) and article 16 (Access to and Transfer of Technology). Paragraph 1 creates an obligation to facilitate the exchange of information relevant to the conservation and sustainable use of biological diversity. Paragraph 2 contains a non-exclusive list which specifies what types of information could be exchanged.

- 1. The Contracting Parties shall facilitate the exchange of information, from all publicly available sources, relevant to the conservation and sustainable use of biological diversity, taking into account the special needs of developing countries.**

Paragraph 1 requires Contracting Parties to facilitate information exchange. Implied in the word "facilitate" is the expectation that Parties are to remove obstacles which may restrict the exchange of information.

The information exchange to be facilitated is qualified in two ways. First, the information must be "relevant to the conservation and sustainable use of biological diversity". Second, article 17 applies only to information from publicly available sources. This excludes all confidential information held by a Contracting Party's public or private sectors, such as trade secrets (see Box 15).

This paragraph requires the "special needs" of developing countries to be considered. This requirement highlights developing countries' particular needs for obtaining information to help them achieve the Convention's goals. The words "special needs" may even be understood as requiring preferential treatment for developing countries.

Information exchange can be facilitated through a variety of means ranging from newsletters, publication of research results, conferences and scientific exchanges to on-line electronic data communications. National, regional and global information clearing-houses—mechanisms set-up to match sources of information with potential users—can also be established or maintained. National clearing-house mechanisms could be set-up as biodiversity information and monitoring centres (see the discussion of article 7(d)) and article 18(3).

Another aspect of facilitating information exchange is ensuring that available information is presented in a format suitable for easy use. Information exchange could also be facilitated by developing a Party's capacity to collect, supply and ultimately use information on the conservation of biological diversity and the sustainable use of its components. This in turn implies training staff and providing equipment.

- 2. Such exchange of information shall include exchange of results of technical, scientific and socio-economic research, as well as information on training and surveying programmes, specialized knowledge, indigenous and traditional knowledge as such and in combination with the technologies referred to in Article 16, paragraph 1. It shall also, where feasible, include repatriation of information.**

Paragraph 2 lists what the exchange of information shall include. It reemphasizes that information relevant to the conservation of biological diversity and the sustainable use of its components is very broad and can take many forms. In particular, the paragraph recognizes the need

to exchange information in conjunction with technology transferred pursuant to article 16(1). This naturally includes operational information, but might also include information to assess the appropriateness or environmental impact of the technology.

The information to be exchanged is not limited to that from developed countries. All countries have potentially useful information relevant to the conservation and sustainable use of biological resources. Therefore, all Contracting Parties are expected to exchange such information with other Parties.

Paragraph 2 also provides that exchange of information shall include "repatriation of information", where feasible. Much original and unique information about species and ecosystems in developing countries is held by

museums and other research institutions in developed countries, yet this information is often very difficult to access by the country where those specimens were collected. Paragraph 2 encourages the holders of such information, largely in the developed countries, to take measures to ensure that the information held is shared with the countries where it originated. "Sharing" is usually referred to as "returned" or "repatriated". This is all the more urgent because budgets for the great reference collections in the developed countries are shrinking even as needs increase.

Article 18. Technical and Scientific Cooperation

- 1. The Contracting Parties shall promote international technical and scientific cooperation in the field of conservation and sustainable use of biological diversity, where necessary, through the appropriate international and national institutions.**

Article 18 obliges Contracting Parties to promote international technical and scientific cooperation. Technical and scientific cooperation is expected to take place in all areas of biological diversity conservation and

the sustainable use of its components. Where necessary, the cooperation can be channelled through both international and national institutions.

- 2. Each Contracting Party shall promote technical and scientific cooperation with other Contracting Parties, in particular developing countries, in implementing this Convention, *inter alia*, through the development and implementation of national policies. In promoting such cooperation, special attention should be given to the development and strengthening of national capabilities, by means of human resources development and institution building.**

Paragraph 2 creates an obligation which emphasizes each Contracting Party's individual obligation to promote technical and scientific cooperation with other Contracting Parties while implementing the Convention. Cooperation is to be through national policy development and implementation.

Developing and strengthening a Party's national capabilities, in many instances, may require tapping into the

technical and scientific expertise found in other States—both developed and developing countries. National capabilities in the areas of human resource development and institution building are to be given special attention.

While each Contracting Party is to promote cooperation with others, cooperation is particularly needed between developing countries and other countries. Developing countries are, therefore, emphasized in the paragraph.

- 3. The Conference of the Parties, at its first meeting, shall determine how to establish a clearing-house mechanism to promote and facilitate technical and scientific cooperation.**

Paragraph 3 suggests that a clearing-house mechanism could help promote and facilitate technical and scientific cooperation between Contracting Parties. Such an institution could, for example, "match" researchers with common research interests in different Parties or match a Party with

a particular problem, need or requirement with another Party who can assist. The Conference of the Parties is specifically entrusted with determining how to establish such a clearing-house at its first meeting.

- 4. The Contracting Parties shall, in accordance with national legislation and policies, encourage and develop methods of cooperation for the development and use of technologies, including indigenous and traditional technologies, in pursuance of the objectives of this Convention. For this purpose, the Contracting Parties shall also promote cooperation in the training of personnel and exchange of experts.**

The special case of technology cooperation is addressed in paragraph 4. Technology cooperation is the larger process within which access to and transfer of technology occurs (see the discussion of article 16). According to Chapter 34.4 of Agenda 21, technology cooperation requires repeated "joint efforts" between the suppliers and users of technology to ensure that technology transfer is successful. Essentially, then,

technology cooperation is the creation of technology partnerships between Parties as well as their private sectors.

Paragraph 4 requires technology cooperation to be encouraged and developed through national legislation and governmental policies in order to develop and use technologies that will help attain the objectives of the Convention

(see the discussion of article 1). Technology cooperation applies to all technologies including those that are indigenous and traditional. As in paragraph 2, capacity building is emphasized.

This obligation complements more general obligations found in article 8(j) (promote the wider application of

the knowledge, innovations and practices of indigenous and local communities), article 12 (Research and Training), article 16 (Access to and Transfer of Technology), article 17 (Exchange of Information), and article 19 (Handling of Biotechnology and Distribution of Its Benefits).

5. The Contracting Parties shall, subject to mutual agreement, promote the establishment of joint research programmes and joint ventures for the development of technologies relevant to the objectives of this Convention.

Paragraph 5 builds on paragraph 4 to promote a specific aspect of technology cooperation: joint research programmes and joint technology development ventures between Contracting Parties. Joint research and development of technology allows the strengths of the participants to be combined and promotes capacity building to strengthen individual weaknesses. Drawing on article 16(1), these technologies include technologies to conserve biological diversity, to use the components of

biological diversity sustainably, or those making use of genetic resources. This paragraph's obligation parallels more specific obligations in article 12(c) (promote and cooperate in the use of scientific advances in biological diversity research), article 15(6) (develop and carry out scientific research with the full participation of the Party providing genetic resources) and article 19(1) (joint participation in biotechnological research with the Parties providing genetic resources).

Article 19. Handling of Biotechnology and Distribution of Its Benefits

Article 19 was one of the most difficult articles to negotiate. Like other articles, its full meaning will only develop through the individual practice of Contracting Parties, as well as from common action taken by the Conference of the Parties. It addresses three aspects of biotechnology relevant to the conservation of biological diversity and the sustainable use of its components. Paragraph 1 concerns a Contracting Party's participation in biotechnological research activities using the genetic resources it has provided. Paragraph 2 addresses a

Contracting Party's access to the results and benefits from biotechnology making use of the genetic resources it has provided. Paragraphs 3 and 4 respectively oblige the Contracting Parties to (1) consider the need for a protocol dealing with issues related to the safe transfer, handling and use of living modified organisms, and (2) establish the basis for the bilateral provision of regulatory and impact information related to living modified organisms provided to a Contracting Party.

- 1. Each Contracting Party shall take legislative, administrative or policy measures, as appropriate, to provide for the effective participation in biotechnological research activities by those Contracting Parties, especially developing countries, which provide the genetic resources for such research, and where feasible in such Contracting Parties.**

Paragraph 1 parallels similar requirements in other articles. These are article 15(6) (scientific research on genetic resources provided by Contracting Party with full participation of, and where possible in, the Contracting Party providing genetic resources), article 16(3) (access to and transfer of technologies making use of genetic resources provided by a Contracting Party) and article 18(2) (cooperation to build national scientific and technical capabilities).

The intent of paragraph 1 is to build, through participation, the biotechnological research capacity of any Contracting Party which provides genetic resources, especially if it is a developing country. Research participation represents soft technology transfer.

The obligation created in this paragraph, while limited to biotechnological research, is stronger and more focused than in article 15(6) where Parties must simply "endeavour to develop and carry out scientific research based on genetic resources". Here, Contracting Parties are required to create a legislative, administrative or policy framework through which "effective participation" can occur. The word "effective" stresses the necessity of achieving substantive participation, such as joint or cooperative efforts, where researchers jointly set goals and attain results that are mutually beneficial to all participants.

Like article 15(6), this paragraph recognizes that biotechnological research *in* the Party provider is to be pursued where it is feasible. It could help a Party build greater endogenous technical and technological capacity than if its researchers merely participated in joint research in another Party. It could, for example, involve a larger number of local researchers and may result in the transfer of hard technologies to facilitate the research. Furthermore, when the research is completed not only have personnel been technically trained, but hard technology could remain in the laboratory for use on future genetic resource related research. Ultimately, this may enable the Party to better use its genetic resources to solve local problems and could help it to independently

develop products for local, regional and global markets.

The Convention does not explicitly state that the framework created must be extended to the private sector, and it is left to the discretion of each Party to determine what is appropriate to ensure the objectives of the paragraph are fulfilled. National measures taken to facilitate private sector involvement, though, are fully in keeping with the spirit of the Convention and should be promoted. This could be accomplished by providing the private sector with incentives (see article 11). In addition, if public money is being used to fund biotechnological research on genetic resources, conditionalities on research grants are perhaps the most appropriate way to encourage the private sector—research institutions, universities and companies—to provide effective participation in research, whether within or outside the Party provider.

Finally, the Contracting Parties who provide access to genetic resources can take this aspect into consideration in the negotiation of genetic resource access agreements (see the discussion of article 15(7)) and so foster effective participation in research.

Two significant qualifications are the obligation's applicability only to genetic resources (1) provided by a country of origin or acquired in accordance with the Convention and (2) used in biotechnological research.

The first qualification is imposed by article 15(3). Its most significant ramification is the inapplicability of paragraph 1 to genetic resources acquired prior to the Convention's entry into force (see the discussion of article 15(3)).

There are two points to be made about the second qualification concerning biotechnological research. First, only those genetic resources which will be actually used in biotechnological research are covered. The paragraph, therefore, strictly correlates the particular genetic resource provided to particular research conducted on it.

Second, genetic resources provided will not necessarily be immediately used in biotechnological research. Therefore, lines of communication are needed to alert the providing Party when resources will be used to ensure participation takes place. A genetic resources

access agreement, therefore, might include terms that require notification *before* research begins. The Conference of the Parties may need to address these points in order to generate concerted, rather than individual, interpretations.

- 2. Each Contracting Party shall take all practicable measures to promote and advance priority access on a fair and equitable basis by Contracting Parties, especially developing countries, to the results and benefits arising from biotechnologies based upon genetic resources provided by those Contracting Parties. Such access shall be on mutually agreed terms.**

This paragraph implicitly acknowledges that genetic resources have a value which entitles the Party providing them to returns which must be:

- provided on a preferential basis;
- fair and equitable; and
- mutually agreed.

The entitlement to benefits is founded on principles of equity. The acknowledgment of value, the entitlement to benefits and the requirement of mutually agreed terms parallel articles 15(7) and 16(3).

The phrase "results and benefits" is not defined in the Convention. Its meaning, however, can be inferred from common usage. "Results" are the end product of biotechnological research with genetic resources. This could include any scientific or technological data or any product or process produced for any purpose, whether for profit or not for profit. "Benefits" are the advantages that flow from using the results of biotechnological work such as technical or technological information, commercial profits, royalties or also, perhaps, more intangible advantages.

The words "promote and advance" are also not defined in the Convention. They are the result of long negotiation and were carefully chosen to avoid implying any commitment to be imposed on the private sector—an obliga-

tion unacceptable to most developed countries— although the majority of biotechnological research and development undoubtedly occurs in the private sector. Thus, each Contracting Party is required to do everything within its practical capabilities to achieve sharing. Some measure of discretion applies to what is practicable, but is limited by what is reasonably accomplishable. Therefore, the measures contemplated are not only to apply to governmental agencies who use genetic resources, but to the private sector as well, at least through incentive measures created by both Parties using and providing genetic resources.

The scope of "priority access on a fair and equitable basis" is left to be mutually agreed. "Priority access" is not defined in the Convention and is used only once. The phrase suggests preferential treatment. "Fair and equitable basis" is also not defined by the Convention. However, negotiating and ultimately reaching mutually agreed terms will permit shared and individual interests to be taken into consideration.

Seeking mutual agreement is likely to become part of the negotiations for a genetic resources access agreement. However, as discussed for article 15(7), in many cases, it may not be easy for Parties to determine what is fair and equitable at the time an access agreement is negotiated.

- 3. The Parties shall consider the need for and modalities of a protocol setting out appropriate procedures, including, in particular, advance informed agreement, in the field of the safe transfer, handling and use of any living modified organism resulting from biotechnology that may have adverse effect on the conservation and sustainable use of biological diversity.**
- 4. Each Contracting Party shall, directly or by requiring any natural or legal person under its jurisdiction providing the organisms referred to in paragraph 3 above, provide any available information about the use and safety regulations required by that Contracting Party in handling such organisms, as well as any available information on the potential adverse impact of the specific organisms concerned to the Contracting Party into which those organisms are to be introduced.**

Article 8(g) of the Convention requires each Party to domestically regulate the risks associated with the use and release of living modified organisms (LMOs) resulting

from biotechnology. Domestic measures may, however, benefit from the establishment of international standards. Paragraphs 3 and 4 do not directly address the domestic

regulation of LMOs, but do provide a basis for future international action on two aspects of the biosafety issue.

Paragraph 3

Paragraph 3 obliges the Contracting Parties as a group (in the Conference of the Parties) to consider the need for a "biosafety" protocol and the different safety assurance systems a protocol might recommend or mandate. This is the only reference to a specific protocol in the Convention. However, it must be understood that paragraph 3 does not actually call for a protocol. Rather, the Parties are only obliged to *consider the need* for one. If adopted, the biosafety protocol would only apply to those Parties which ratify it since a protocol is a separate legal instrument from the Convention it supplements (see the discussion of article 32).

The Conference of the Parties has the ultimate authority to determine the scope of a protocol. However, paragraph 3 does guide the Parties' consideration. The scope contemplated is limited to living modified organisms resulting from biotechnology which may have impacts on the conservation and sustainable use of biological diversity.

The term "genetically modified organisms" (GMOs) was used in earlier drafts of this paragraph, but was later replaced by "living modified organisms". LMOs are not defined, but include any organism resulting from biotechnology which is alive (see the discussion of article 8(g)).

The scope is further limited to those LMOs—imported or domestically created—whose handling and use *may* have an adverse effect on the conservation and sustainable use of biological diversity. An LMO's adverse effects could be direct or indirect (see the discussion of article 8(g)). Unlike article 8(g), however, this paragraph does not mention the risks to human health.

The paragraph directs the Parties to consider whether the protocol should include a procedure for advanced informed agreement (AIA) for the *transfer* of LMOs between Contracting Parties. The text does not describe what advanced informed agreement is. However, the probable intent of the negotiators was to create a procedure which, though similar to the prior informed consent

Paragraph 4

Paragraph 4 creates a bilateral obligation to provide information on an LMO prior to providing it to another Contracting Party. The obligation applies even if the Conference of the Parties decides not to negotiate a biosafety protocol or if a subsequently negotiated protocol is adopted without an AIA requirement.

A Contracting Party or its nationals, either of which could be providing the LMO, must supply the information. Two categories of information are to be provided.

(PIC) procedure of the Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel, 1989), the UNEP London Guidelines for the Exchange of Information on Chemicals in International Trade (1989) or the FAO Code of Conduct on the Distribution and Use of Pesticides (1989), takes into consideration that the presumption of hazard which these other procedures address will not necessarily pertain to LMOs. These other instruments incorporate the principle that a State has the sovereign right to refuse the importation of certain potentially hazardous materials.

Establishing an advanced informed agreement procedure would prevent living modified organisms from being transferred from one Contracting Party to another without the latter's prior agreement. The importing Contracting Party would be supplied by the exporting Contracting Party or, perhaps its nationals, with all relevant information on the known ramifications of the LMO's transfer and, as the case may be, handling and use.

The majority of participants in a UNEP Expert Panel on this subject have concluded that an advanced informed agreement procedure might require:

- information relating to the organism;
- information on prior related releases of the organism;
- regulations concerning the organism's safe handling and use in the exporting country;
- information relating to the planned conditions of the release;
- a preliminary risk assessment;
- a risk management procedure;
- information and assessment of the socio-economic implications; and
- practical information concerning transfer (UNEP, 1993d).

The first category is very general. It includes any available information on the regulatory measures taken by the exporting Contracting Party itself concerning the use and safety of LMOs in general. The information supplied might also pertain to the informational requirements its own relevant authorities require to ascertain safety. Any available policy or guidance generated to implement the regulations could be supplied. Also included could be information on any specific decisions taken with regard to LMOs by the Party's relevant authorities. Such actions

might include any legislative or administrative bans implemented on the domestic use or export of LMOs.

The second category of information to be supplied is more specific. It applies to any available information on the "potential adverse impact" of a particular LMO. The scope of the information appears to be quite broad and could be interpreted to extend beyond impacts on biological diversity to include, for example, economic or human health and safety data. The obligation does not, however, require the exporting Party or its nationals to actually ascertain or generate information concerning the potential adverse effects of the LMO in the importing Party.

Five aspects of the obligation created by paragraph four should be noted. First, no obligation is created if information is not available. Second, to encourage information sharing, the importing Party should ensure the confidentiality of all information not already in the public domain. Third, the importing State must have the administrative and technical capacity to process the information provided and draw conclusions. This requires technically trained staff (see article 12 (Research and Training)). Fourth, the information provided must be in a clear and useful format for use in the particular

social, economic, technical and legal context of the importing country. To do otherwise will impede, and perhaps make impossible, the ability to accomplish fully informed assessments.

Finally, what information will actually be exchanged will depend very much on how the phrase "potential adverse impact" is interpreted by the Parties involved. If it is interpreted to mean "adverse effects which may occur" or "possible adverse effects", then the amount of information exchanged will probably be considerable. If, on the other hand, the phrase is interpreted to mean "probable or likely adverse impacts", then the scope of the response will be considerably diminished. The Conference of the Parties may need to consider this issue in order to rationalize information requirements.

Providing information before an LMO is "introduced" also implies that the importing Party may determine whether or not to allow importation. However, since paragraph 4 does not specify the applicability of an advanced informed consent principle or create an advanced informed consent procedure for biosafety, short of a protocol such as the one contemplated in paragraph 3, each Contracting Party has to decide for itself whether to create such a procedure for LMO imports.

Article 20. Financial Resources

Agenda 21 (Chapter 15.8 (Conservation of Biological Diversity)) estimates that between 1993 and the year 2000 approximately US\$3.5 billion will be needed annually to fund the activities it outlines for biological diversity conservation. The *Global Biodiversity Strategy* estimates the worldwide costs for conserving biodiversity as approximately US\$17 billion per year.

Admittedly, both of these figures embody large sums of money, but they need to be put into proper perspective. They are many orders of magnitude smaller than the money spent worldwide on activities which use biological resources and which have depleted biodiversity (McNeely, 1988), or the estimated US\$1 trillion annual world military expenditure (WRI, IUCN & UNEP, 1992).

Instead of being unrecoverable expenditures, financial resources spent on biodiversity conservation and the sustainable use of its components are really investments in the future ecological, economic and social security of each Party. The gross cost estimates described earlier fail to take into consideration the extremely valuable

benefits genes, species and ecosystems provide individuals, business or industry and society—both nationally and globally. They also fail to consider the large sums governments could save by removing "perverse" incentives which encourage the loss of biological diversity (see the discussion of article 11).

Article 20 primarily considers national and international responsibilities for financing action mandated by the Convention. Paragraph 1 contains a commitment for all Contracting Parties to provide financial resources at the national level. Paragraphs 2-4 refer to the obligation of developed countries to provide new and additional financial resources to developing countries. Finally, paragraphs 5-7 call for the consideration of the interests of particular groups of developing countries.

As noted in the *Guide's* introduction, the provisions of article 20, as well as those of article 21 (Financial Mechanism), were negotiated in some considerable heat, and contain language that was deliberately left to the Conference of the Parties to clarify.

- 1. Each Contracting Party undertakes to provide, in accordance with its capabilities, financial support and incentives in respect of those national activities which are intended to achieve the objectives of this Convention, in accordance with its national plans, priorities and programmes.**

Paragraph 1 commits each Contracting Party to provide financial support and incentives for the national measures needed to implement the Convention. Each Party undertakes to provide financial resources and incentives to the extent it is capable. Qualifying the obligation in terms of national capabilities implicitly means that each Party must make its best efforts to meet the goal which is set.

How to pay for biodiversity's conservation and the sustainable use of its components is a fundamental issue facing each Party, especially in times when national budgets are extremely tight. The solutions found will vary with each Party. Undoubtedly, however, new funds in addition to current budgetary allocations will have to be found.

New funding, however, should not be viewed as a major constraint to implementing the Convention (McNeely, 1988). Indeed, a primary goal should be to examine how existing conservation funds are being spent and whether they can be spent more wisely, whether more cost-effectively or on higher priority problem areas. The examination, which could be undertaken as part of completing a national biodiversity strategy (see Box 8), should also identify and take into consideration other government expenditures which directly or indirectly impact biodiversity. How these expenditures could better promote,

rather than inhibit, biodiversity conservation should be identified. Innovative funding mechanisms should also be identified.

The examination should coincide with the development of incentive measures called for in this paragraph and in article 11. The commentary for article 11 notes that incentives should be combined with disincentives, and that "perverse" incentives should be eliminated to encourage biodiversity conservation and sustainable use.

Ideally, a larger portion of the financing for biodiversity conservation should come from those who benefit from biological resources such as non-subsistence consumers, business and industry. Governmental policies should seek to recognize the many values of biological resources in national income accounts and the pricing of biological resources, as well as the true costs of conservation. Some measures which could be implemented might include:

- collecting conservation taxes on timber extraction, commercial fishing or the trade in wildlife and wildlife products.
- charging for ecosystem services provided by protected areas or other areas such as forests or wetlands.

- charging national park entry fees to help defray the costs of managing parks.
- returning a fair portion of the profits from biological resource exploitation—whether from tourism or extraction—back to local communities.
- linking conservation funding with development projects (see the discussion of article 8(m)).
- seeking support from the private sector in the form of voluntary financing or negotiating strong concessionary agreements which maximize the rental value of the components of biological diversity.

Box 18. The Funding Debate and the Compromise Reflected in Articles 20, 21 and 39

Early in the process to develop a biological diversity convention, it became clear that a permanent funding mechanism to help finance activities to implement the Convention in developing countries would be required for the Convention to be effective. This would distinguish it from most other biodiversity related treaties. As the negotiations for the Convention on Biological Diversity proceeded, debate on the financial provisions became increasingly divided along North-South lines. It focused on:

- whether and how to establish an independent biodiversity fund;
- what costs would be covered; and
- who would administer the financial resources—the Conference of the Parties, an existing institutional structure or a new one.

Developing countries envisioned an independent fund administered under the authority of the Conference of the Parties and funded by developed countries. The goal of the developing countries was to give control over the Convention's financial resources to the Conference of the Parties, a body in which they would likely have a majority.

Developed countries never denied the need to make funds available to developing countries to implement the Convention. However, they wanted the Global Environment Facility (GEF), a new financial initiative established in 1990, and jointly operated by the World Bank, the United Nations Development Programme and the United Nations Environment Programme, to become the financial mechanism under the Convention (see Box 20).

The text of articles 20 (Financial Resources), 21 (Financial Mechanism) and 39 (Financial Interim Arrangements) represents a compromise negotiated in the final negotiating session's final hours. Article 20 and 21 both contain language that was deliberately left vague for the Conference of the Parties to later clarify. But, overall, the Conference of the Parties was given control over the financial mechanism established and the designation of the institutional structure which will operate the mechanism.

Resolution 1 of the Nairobi Final Act (see appendix) invited the GEF to operate, on an interim basis, the financial mechanism during the period between the Convention's opening for signature and its entry into force. Article 39 designates the GEF as the interim institutional structure entrusted to operate the financial mechanism, between the Convention's entry into force and the first meeting of the Conference of the Parties, or until the Conference of the Parties decides otherwise, provided it is fully restructured to fulfil the requirement found in article 21 that the financial mechanism operate in a democratic and transparent manner.

- 2. The developed country Parties shall provide new and additional financial resources to enable developing country Parties to meet the agreed full incremental costs to them of implementing measures which fulfil the obligations of this Convention and to benefit from its provisions and which costs are agreed between a developing country Party and the institutional structure referred to in Article 21, in accordance with policy, strategy, programme priorities and eligibility criteria and an indicative list of incremental costs established by the Conference of the Parties. Other Parties, including countries undergoing the process of transition to a market economy, may voluntarily assume the**

obligations of the developed country Parties. For the purpose of this Article, the Conference of the Parties, shall at its first meeting establish a list of developed country Parties and other Parties which voluntarily assume the obligations of the developed country Parties. The Conference of the Parties shall periodically review and if necessary amend the list. Contributions from other countries and sources on a voluntary basis would also be encouraged. The implementation of these commitments shall take into account the need for adequacy, predictability and timely flow of funds and the importance of burden-sharing among the contributing Parties included in the list.

In addition to their obligations under paragraph 1, developed countries are required to provide "new and additional financial resources" to allow developing countries to meet the "agreed full incremental costs" of implementing and benefiting from the Convention. "New and additional" means funds additional to existing bilateral and multilateral funds. The term "developing country" is not defined, but appears to exclude countries undergoing the transition process to market economies (UNEP, 1993c).

Other Parties, such as those with economies in transition, may voluntarily assume the financial obligations of the developed countries. Non-parties and other sources can also contribute on a voluntary basis. All countries are encouraged to make voluntary contributions.

Whatever the source, the funds will be made available through the financial mechanism established under article 21. The developed country Parties, as well as those Parties who will voluntarily assume the financial obligations, will be enumerated in a list to be established by the Conference of the Parties. The list will be reviewed periodically and updated by the Conference of the Parties.

The full incremental costs (see Box 19) to be covered in each case must be agreed between the developing country concerned and the institutional structure designated by the Conference of the Parties to operate the mechanism. This implies case by case review will be conducted for measures proposed for funding. Any agreement will be concluded based on:

- policy, strategy and programme priorities, as well as
- eligibility criteria and

- an indicative list of incremental costs

to be established by the Conference of the Parties.

This paragraph clearly establishes that the control of the overall operation and focus of the Convention's financial programme rests with the Conference of the Parties. The tasks required of the Conference of the Parties are, however, challenging: given the range of issues dealt with by the Convention, an indicative list of incremental costs will not be easy to establish, and its consideration by the Conference of the Parties deserves early and careful preparation.

The last sentence of paragraph 2 indicates the financial obligation's implementation must consider the need for "adequacy, predictability and timely flow of funds". These terms are by no means self explanatory, although "adequacy" implies the funds provided are to be sufficient; "predictability" and "timely" imply regular replenishment to enable Parties to receive funds when they are needed. In light of a common declaration released by 19 countries during the adoption of the Convention's text, how these requirements will be applied in practice for each donor country may have to be agreed upon and worked out over time through the Conference of the Parties, as ultimately funding the Convention is a national decision.

Another requirement whose meaning will have to be clarified over time by the Conference of the Parties is the need to take into consideration "burden-sharing" among the contributing Parties. The phrase implies dividing the financial commitment according to the individual financial capabilities of the contributing Parties.

Box 19. Incremental Costs

General Overview

Recent global environmental legal instruments such as the Montreal Protocol on Substances that Deplete the Ozone Layer (article 10), the Climate Change Convention (article 11) and the Convention on Biological Diversity (article 20) incorporate financial provisions which make funds available to Parties with particular financial needs. The primary goal is to assist them in meeting their obligations under the agreement.

In addition to criteria decided upon by their respective Conferences, each agreement limits to "incremental costs" those costs which can be funded for particular actions taken. For the Montreal Protocol, costs are limited to "all agreed incremental costs" (article 10(1)). In the case of the Climate Change and Biological Diversity Conventions, costs are limited to the "agreed full incremental costs" (see articles 4(3) and 20(2), respectively).

Incremental cost is a theoretical concept comprising one aspect of cost/benefit analysis. Cost/benefit analysis is an attempt to quantify and compare the costs and benefits of particular actions. The process of determining costs and benefits can, in theory, help decision-makers make more objective funding determinations by allowing the costs and benefits of different options to be compared. In addition to incremental cost, other aspects of cost/benefit analysis include calculating an action's total cost, incremental benefits and total benefits. Costs are measured in monetary terms. Benefits can be measured monetarily as well. In addition, benefits can also be measured in terms of "effectiveness", for example, the amount of biological diversity conserved.

Two of the interpretations of incremental cost are gross incremental cost and net incremental cost. Gross incremental cost is the most basic interpretation of incremental cost. It represents the entire extra cost incurred by a Party to implement a particular action (for example, a policy, programme or project) in order to fulfil a treaty obligation, compared to the cost of another action (a baseline action) the Party would have undertaken had it not been a treaty Party. An arithmetic expression of gross incremental cost would be:

$$I_c = A_c - B_c \text{ where}$$

I_c = the incremental cost of the proposed action

A_c = the cost of the proposed action taken pursuant to the treaty

B_c = the cost of the baseline action

Net incremental cost is a more restrictive interpretation of the concept. Here, the calculation is almost the same as before, but also subtracted are the domestic benefits which accrue to the Party undertaking the proposed action. An arithmetic expression of net incremental cost would be:

$$I_c = A_c - B_c - D_b \text{ where}$$

I_c = the incremental cost of the proposed action

A_c = the cost of the proposed action taken pursuant to the treaty

B_c = the cost of the baseline action

D_b = the benefits which accrue to the Party taking the proposed action

The simplicity of the preceding examples masks the complexity of the incremental cost concept in real world applications. This is particularly the case for biodiversity applications. To begin with, the Convention on Biological Diversity uses the term "full" in the phrase "agreed full incremental costs". The term has not been defined in the Convention and it will have to be defined by the Conference of the Parties as it could represent many different types of cost including opportunity costs, direct and indirect costs or capital versus operating costs. Different time periods for funding may also have to be considered in its definition.

Other complicating factors include establishing a discount rate for biodiversity loss, valuing the benefits of biodiversity conservation and sustainable use, as well as coping with the uncertainties inherent in our lack of knowledge and understanding of ecosystem structure and function and the place of species within that. In addition to these, another primary problem is determining a representative baseline.

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Box 19. Incremental Costs

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The simple equations described earlier show that the incremental cost (and, as it turns out, incremental benefit) is highly determinant on establishing an appropriate baseline. A baseline action's cost is used as a reference point against which the cost of a proposed action can be subtracted to determine an incremental cost. A baseline cost could represent present day conditions for a particular situation. Baseline costs for actions involving mutually exclusive options (such as whether to build a dam or transfer a particular hard technology) are relatively explicit and straight forward to determine. The most simple baseline is no action, keeping in mind that inaction's costs could be quite great.

Determining an appropriate baseline is more complex when there are multiple options for action, such as is the case for biodiversity conservation. For example, if "perverse" economic incentives (see the discussion of article 11) exist which encourage the loss of biological diversity, is the baseline for a particular option based on keeping the perversities in place or removing them? In the biodiversity area, a national biodiversity strategy could provide a baseline by outlining particular policies and goals for a country to implement or attain.

The nature of measures needed to ensure the conservation of biological diversity and the sustainable use of its components are also not, in all cases, amenable to establishing baselines. Many measures will not be discreet one time actions, such as transferring a particular piece of technology. Rather, many actions will be undertaken "in the field" over a certain period of time. Another complicating factor is that different countries will have different baselines, because some have undertaken more conservation measures than others. Therefore, in theory, those countries which have either been unable to finance conservation measures or which have chosen not to finance them could be more eligible for funding than those that have already taken action. One conclusion which could be drawn from this is that without uniform baselines, the incremental cost concept could encourage inaction on the part of eligible Parties.

The Global Environment Facility and Incremental Cost

The GEF (see Box 20) is another international mechanism which relies on the incremental cost concept. In its decision making process, the GEF compares domestic benefits, domestic costs and global environmental benefits of proposed actions (UNEP, 1993f). It determines and funds the incremental cost of achieving the global environmental benefits of proposed actions.

In theory, the GEF only funds the net incremental cost of achieving a global environmental benefit. That is, the gross incremental cost of achieving the global environmental benefit minus the domestic benefit the action produces for the country (UNEP, UNDP & World Bank, 1993). However, the simplicity of the concept is deceptive, especially for biological diversity related projects, for many of the same reasons described earlier.

In the biodiversity area the incremental cost concept has been found to be too complex for the GEF to apply in practice (UNEP, UNDP & World Bank, 1993). It has been difficult to establish baselines and virtually impossible to directly value the global benefit of avoiding biological diversity depletion. Furthermore, there are no proxies for which to measure progress. As a result the GEF has not been able to operationalize the incremental cost concept and the incremental cost of a proposed biodiversity project has simply been determined to be the total cost of the project (UNEP, UNDP & World Bank, 1993).

To work through some of the problems incremental cost presents to all four of its focus areas, the GEF created the Program for Measuring Incremental Costs for the Environment (PRINCE). In November 1993, a PRINCE financed reconnaissance mission selected four sites in Mexico to begin a study of the application of incremental cost to the conservation of biological diversity (GEF, 1994).

In summary, incremental cost is a highly theoretical concept. The modalities for its application within the Convention on Biological Diversity will need to be carefully considered by the Conference of the Parties for it to be applied effectively to real world situations. While the technical problems are worked out, funding decisions may need to rely simply on which costs are "agreed" between a developing country and the institutional structure set-up to administer the financial mechanism provided for in article 21 of the Convention.

- 3. The developed country Parties may also provide, and developing country Parties avail themselves of, financial resources related to the implementation of this Convention through bilateral, regional and other multilateral channels.**

According to paragraph 3, the developed countries may also provide financial resources through bilateral, regional and other multilateral channels, over and above those which they are obligated to provide under

paragraph 2. How the supply of these other financial resources will affect the determination of burden-sharing in paragraph 2 will also have to be considered.

- 4. The extent to which developing country Parties will effectively implement their commitments under this Convention will depend on the effective implementation by developed country Parties of their commitments under this Convention related to financial resources and transfer of technology and will take fully into account the fact that economic and social development and eradication of poverty are the first and overriding priorities of the developing country Parties.**

Paragraph 4 underscores the critical link between the developed countries' financial and technology transfer commitments and the developing countries' ability to effectively implement the Convention. At the same time it reiterates, from preambular paragraph 9, that the developing countries' first priority is economic and social development, as well as the eradication of poverty. The same provision is found in article 4(7) of the UN Framework Convention on Climate Change (New York, 1992).

The legal significance of this declaratory statement is not easy to assess. It may appear to merely recognize that the

effectiveness of measures taken by developing country Parties to conserve biodiversity and sustainably use its components depends on financial resources and technology transfer from developed countries.

It may also be interpreted by developing countries as a precondition to implementing the Convention. This interpretation may not be entirely realistic, however, because language creating such a condition was proposed and rejected during the Convention's negotiations (Chandler, 1993).

- 5. The Parties shall take full account of the specific needs and special situation of least developed countries in their actions with regard to funding and transfer of technology.**
- 6. The Contracting Parties shall also take into consideration the special conditions resulting from the dependence on, distribution and location of, biological diversity within developing country Parties, in particular small island States.**
- 7. Consideration shall also be given to the special situation of developing countries, including those that are most environmentally vulnerable, such as those with arid and semi-arid zones, coastal and mountainous areas.**

Paragraphs 5-7 address the interests of particular groups of developing countries:

- the least developed countries (paragraph 5);
- countries particularly dependent on the distribution and location of biological diversity, such as small island states (paragraph 6); and
- countries which are environmentally vulnerable.

Special mention in the text implies that these States will be granted some preferential treatment in the allocation of funds and, if least developed, technology transfer as well. However, the Convention contains no criteria or definition to determine whether a state falls into one of these categories, in particular, whether it is "most environmentally vulnerable".

Article 21. Financial Mechanism

- 1. There shall be a mechanism for the provision of financial resources to developing country Parties for purposes of this Convention on a grant or concessional basis the essential elements of which are described in this Article. The mechanism shall function under the authority and guidance of, and be accountable to, the Conference of the Parties for purposes of this Convention. The operations of the mechanism shall be carried out by such institutional structure as may be decided upon by the Conference of the Parties at its first meeting. For purposes of this Convention, the Conference of the Parties shall determine the policy, strategy, programme priorities and eligibility criteria relating to the access to and utilization of such resources. The contributions shall be such as to take into account the need for predictability, adequacy and timely flow of funds referred to in Article 20 in accordance with the amount of resources needed to be decided periodically by the Conference of the Parties and the importance of burden-sharing among the contributing Parties included in the list referred to in Article 20, paragraph 2. Voluntary contributions may also be made by the developed country Parties and by other countries and sources. The mechanism shall operate within a democratic and transparent system of governance.**

- 2. Pursuant to the objectives of this Convention, the Conference of the Parties shall at its first meeting determine the policy, strategy and programme priorities, as well as detailed criteria and guidelines for eligibility for access to and utilization of the financial resources including monitoring and evaluation on a regular basis of such utilization. The Conference of the Parties shall decide on the arrangements to give effect to paragraph 1 above after consultation with the institutional structure entrusted with the operation of the financial mechanism.**

Paragraph 1 establishes a financial mechanism to make funds available to developing country Parties to enable them to implement the Convention. The funds will be made available on a grant or concessional basis. This means money could be given outright or loaned at less than market interest rates.

The mechanism is established under the authority and guidance of the Conference of the Parties and is accountable to it. Its operations are to be carried out by an institutional structure determined by the Conference of the Parties.

Article 39 designates the GEF (see Box 20) as the interim institutional structure for the period between the Convention's entry into force and the first meeting of the Conference of the Parties or until the Conference decides otherwise. This is, however, conditioned on its full restructuring to enable the mechanism to operate democratically and transparently.

Paragraph 2 requires the Conference of the Parties, at its first meeting, to determine the mechanism's:

- policy, strategy and programme priorities; and
- eligibility criteria and guidelines related to access and utilization of financial resources, including regular monitoring and evaluation of their use.

These will reflect the overriding requirement of ensuring the mechanism is operated within a democratic and transparent system of governance. A subordinate position for the financial mechanism is emphasized in paragraph 2: after consultation with the institutional structure responsible for it, the Conference of the Parties ultimately decides on the arrangements to implement paragraph 1.

The Conference of the Parties will also periodically determine the amount of resources needed. Contributions will reflect the need, mentioned in article 20, for adequate, predictable and timely flows of funds, as well as the importance of burden sharing among the Parties, also mentioned in article 20.

The determination by the Conference of the Parties of the amount of resources needed was particularly controversial. Developed countries feared that the formula chosen might be interpreted as requiring compulsory contributions from them or the GEF. Therefore, 19 countries released a common declaration when the agreed text of the Convention was adopted in Nairobi. This recorded their understanding that the decision the Conference of the Parties would take only applies to the "amount of resources needed" (as written in the Convention) not "the extent or nature and form of the contributions of the Contracting Parties."

Box 20. What is the Global Environment Facility?

The Global Environment Facility was formally created in 1991 to assist countries with a per capita income of less than US\$4000 address four main global environmental problems: global warming, pollution of international waters, loss of biological diversity and the depletion of the stratospheric ozone layer. It provides additional grant and concessional funding to meet the agreed incremental costs for investment projects, technical assistance and research to achieve agreed global environmental benefits.

Twenty-eight countries, of which 12 were developing countries, have pledged US\$800 million to a core fund called the Global Environment Trust Fund (GET). Some of these same countries and others, have committed US\$300 million to additional co-financing arrangements. Finally, US\$200 million has been committed under the Montreal Protocol to help developing countries phase-out ozone-depleting substances.

The GEF is operated jointly by the World Bank, the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP). The World Bank administers the GEF and is the repository for the GET. It also is responsible for the GEF financed investment projects. The UNDP provides technical assistance, identifies projects and runs a Small Grants Programme for NGOs. UNEP provides the secretariat for the Scientific and Technical Advisory Panel (STAP) and contributes environmental expertise to the GEF process.

The creation of GEF initiated a three year Pilot Phase which ends in June 1994. Projects have a US\$10 million limit if they stand alone; US\$30 million if incorporated as part of a World Bank project. The Small Grants Programme is currently funded at US\$10 million to make individual loans up to US\$50,000 (US\$250,000 if regionally oriented) to support community based projects related to the GEF's focus areas. Grants are allocated by national committees composed of NGO representatives.

The independent Scientific and Technical Advisory Panel is composed of 15-20 experts from industrialized and developing countries and assists in the development of criteria for project selection. It also reviews and comments on project proposals.

There have been two primary criteria for grants under the Pilot Phase. First, a project had to benefit the *global* environment (see Box 19). Second, a project had to be innovative.

A project could not be financed if it was economically viable on the basis of local costs and benefits, regardless of global environmental benefits. GEF could fund projects not ordinarily viable without concessional funding, but offering global benefits. Similarly, GEF could provide supplementary funding to enable a viable project to generate global environmental benefits.

Since its inception, the GEF has been greatly criticized for its internal structure, the implementing agencies chosen and the design of the projects it funds. Action is being taken to address these issues. By conditioning the GEF's participation as the institutional structure for their respective financial mechanisms, the UN Framework Convention on Climate Change and the Convention on Biological Diversity have helped to instigate this change. An independent evaluation of the GEF released its report at the end of 1993 (UNEP, UNDP & World Bank, 1993).

Intergovernmental negotiations on restructuring the GEF were held throughout 1993 and into 1994. The negotiations led to the GEF's restructuring. A new phase has been initiated (GEF II) beginning in 1994 and extending to 1996. The donor countries have committed themselves to replenishing the GEF with US\$2.02 billion dollars.

- 3. The Conference of the Parties shall review the effectiveness of the mechanism established under this Article, including the criteria and guidelines referred to in paragraph 2 above, not less than two years after the entry into force of this Convention and thereafter on a regular basis. Based on such review, it shall take appropriate action to improve the effectiveness of the mechanism if necessary.**

The Conference of the Parties will review the mechanism's effectiveness, as well as eligibility criteria and guidelines, every two years after the Convention's entry

into force. The Conference has the authority to take whatever appropriate action is necessary to improve the mechanism's effectiveness.

4. The Contracting Parties shall consider strengthening existing financial institutions to provide financial resources for the conservation and sustainable use of biological diversity.

Paragraph 4 requires Contracting Parties to consider strengthening existing financial institutions which provide funds for the conservation and sustainable use of biological diversity. The financial mechanism is not to replace existing financial institutions which already

finance biological diversity conservation. It is a way to allow more flexibility in providing funding to developing countries, as well as increase such funding in the field of biological diversity.

Article 22. Relationship With Other International Conventions

Although this convention is the first to deal with biological diversity comprehensively, there are a number of existing international conservation conventions which address particular aspects of conservation and other subjects relevant to the Convention on Biological Diversity. Therefore, the relationship between the Convention and existing international conventions has to be specified. This is the purpose of article 22.

This kind of article is a typical feature of international conventions. It specifies whether and to what extent a

new convention affects the obligations deriving from older conventions and helps avoid *post facto* discussions on the intention of the Parties. Without such a paragraph, the newer obligations might easily be interpreted as prevailing on the assumption that, by adopting new rules on a particular subject, it was the intention of the negotiators to change existing rules.

- 1. The provisions of this Convention shall not affect the rights and obligations of any Contracting Party deriving from any existing international agreement, except where the exercise of those rights and obligations would cause a serious damage or threat to biological diversity.**

Paragraph 1 creates a rule whereby the rights and obligations under existing international conventions will not be affected by the Convention. The provision refers to "any existing international agreement" which means that both conservation agreements, such as CITES or Ramsar, and seemingly non-related agreements on other subjects, such as GATT, are included.

The rule, however, is limited by an "exception clause" at the end of the paragraph. It provides that where the Convention and another agreement conflict, the Convention trumps the other agreement if exercising the other's provisions would seriously damage or threaten biological

diversity. The reference to the "exercise" of rights and obligations implies that in cases of conflict, the specific conflicting provision of the other international convention cannot be applied in the particular instance.

The paragraph may in practice, however, be difficult to implement because implementation depends on the circumstances of a particular case and how "serious damage or threat" is interpreted. The notion of serious damage or threat implies that a certain threshold must be achieved before the Convention prevails. The terms will certainly require further interpretation or guiding criteria.

- 2. Contracting Parties shall implement this Convention with respect to the marine environment consistently with the rights and obligations of States under the law of the sea.**

There was general consensus during the negotiations that the Convention should apply to the marine environment. But its applicability to the marine environment brought it into potential conflict with the existing law of the sea, both customary and that deriving from the United Nations conventions on the law of the sea. For example, just one of many issues is the relationship of marine protected areas to be established under article 8(a) and navigational rights.

In contrast to paragraph 1, under paragraph 2, the existing conventional and customary law of the sea is privileged. Paragraph 2 affirms that Parties must implement the Convention on Biological Diversity consistently with States' rights and obligations derived from the law of the sea. Thus, the law of the sea prevails in instances

where the Convention's implementation conflicts with it.

This solution was considered necessary because a number of elements of the law of sea, in particular, the UN Convention on the Law of the Sea (UNCLOS), are directly relevant to the conservation of biological diversity, or the sustainable use of biological resources. In addition to being a major sectoral international instrument which will enter into force in 1994, UNCLOS contains numerous articles directly or indirectly related to subjects dealt with by the Convention on Biological Diversity. In view of this paragraph, as well as articles 4 and 5 (Jurisdictional Scope and Cooperation), an in depth review of the relationship of the Convention on Biological Diversity with the UNCLOS should be considered.

Box 21. Global Treaties Related to the Conservation of Biological Diversity

A number of conventions now in force address various aspects of biological diversity conservation. Together with the Convention on Biological Diversity, they will form the regime applicable to biological diversity. Among them are four major global instruments:

The Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar, 1971)

The Ramsar Convention requires each party to promote the conservation of internationally important wetlands and the wise use of all wetlands within its territory. Conservation measures are to be established in wetland areas to promote wetland and waterfowl conservation. Each party designates at least one wetland area of international significance to be included on the world list maintained under the Convention.

The Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972)

The World Heritage Convention requires parties to take steps to identify, protect, conserve, present and transmit to future generations the cultural and natural heritage within their territories. Cultural and natural areas of outstanding universal value are eligible for listing on the World Heritage List and the Convention establishes the World Heritage Fund which can be used by the World Heritage Committee to assist countries with establishing and conserving World Heritage Sites.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington, 1973)

CITES regulates international trade of all species listed in its Appendices (I, II and III). Appendix I lists species threatened with extinction which are or may be affected by trade. Trade in these species is banned except in exceptional circumstances, in accordance with the provisions of the Convention. Appendix II lists species not yet threatened with extinction, but which may become so unless their trade is subject to strict international controls. Appendix III lists species which any party identifies as subject to regulation within its jurisdiction to prevent or restrict exploitation, and which require the cooperation of the other CITES parties in the control of international trade.

The Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 1979)

The parties to the Migratory Species Convention are to act within the Convention's framework to conserve migratory species and their habitat. Parties can undertake to (1) adopt strict measures protecting migratory species categorized in Appendix I as endangered and (2) adopt agreements to conserve and manage migratory species whose conservation status is unfavourable or which would significantly benefit from international cooperation. Agreements have been concluded on common seals of the Wadden Sea, European bats and small cetaceans. Another agreement is presently being drafted for palearctic waterfowl.

Article 23. Conference of the Parties

1. **A Conference of the Parties is hereby established. The first meeting of the Conference of the Parties shall be convened by the Executive Director of the United Nations Environment Programme not later than one year after the entry into force of this Convention. Thereafter, ordinary meetings of the Conference of the Parties shall be held at regular intervals to be determined by the Conference at its first meeting.**
2. **Extraordinary meetings of the Conference of the Parties shall be held at such other times as may be deemed necessary by the Conference, or at the written request of any Party, provided that, within six months of the request being communicated to them by the Secretariat, it is supported by at least one third of the Parties.**

Article 23 is basically self-explanatory. It establishes the Convention's highest organ: the Conference of the Parties. The Conference assembles representatives of all Parties to the Convention and observers, including non-governmental organizations (NGOs) (see the discussion of paragraph 5 and Box 23). Its basic function is to steer and supervise the entire process of implementing and

further developing the Convention. The Conference needs to meet regularly. This Convention, unlike many others, leaves it to the Conference itself to decide at which intervals it should meet. The conferences to other conventions meet at intervals usually varying from two to three years.

Box 22. Selected References to Specific Actions to be Taken by the Conference of the Parties

Article 23 designates the Conference of the Parties. It outlines the Conference's broad responsibilities and requires it to take other specific actions such as adopt rules of procedure for itself and subsidiary bodies. In addition, a number of articles in the Convention also direct the Conference of the Parties to take specific actions. The most important of these are listed here, and those to be carried out at the first meeting of the Parties are highlighted:

Article 14(2)

Examine the issue of liability and redress for damage to biological diversity.

Article 18(3)

At its first meeting, determine how to establish a clearing-house mechanism to promote and facilitate technical and scientific cooperation.

Article 19(3)

Consider the need for and the modalities of a protocol for appropriate procedures for the safe transfer, handling and use of any living modified organism resulting from biotechnology.

Article 20(2)

At its first meeting, establish a list of developed country Parties and other Parties which voluntarily assume the financial obligations of the developed country Parties.

Establish an indicative list of incremental costs.

Article 21(1)

Decide an institutional structure to carry out the operations of the financial mechanism (Note: article 21(1) indicates the Conference may decide this at its first meeting).

Periodically decide the amount of resources needed for the financial mechanism.

- 3. The Conference of the Parties shall by consensus agree upon and adopt rules of procedure for itself and for any subsidiary body it may establish, as well as financial rules governing the funding of the Secretariat. At each ordinary meeting, it shall adopt a budget for the financial period until the next ordinary meeting.**

The Convention does not provide the Conference's procedural rules or those of the Conference's subsidiary bodies. Rather, the Conference is given the responsibility to create those rules itself. Rules are to be adopted by consensus and not by voting. The rules for the Secretariat's funding are adopted by the Conference of the Parties in the same way.

One of the main functions of the Conference of the

Parties is to adopt a budget for the next financial period, until its next ordinary meeting. The budget referred to in this paragraph is the one needed to permit the functioning of the Convention as an institution and cover costs for:

- meetings of the Conference of Parties.
- any subsidiary bodies of the Conference.
- the Secretariat.

- 4. The Conference of the Parties shall keep under review the implementation of this Convention, and, for this purpose, shall:**

- (a) **Establish the form and the intervals for transmitting the information to be submitted in accordance with Article 26 and consider such information as well as reports submitted by any subsidiary body;**
- (b) **Review scientific, technical and technological advice on biological diversity provided in accordance with Article 25;**
- (c) **Consider and adopt, as required, protocols in accordance with Article 28;**
- (d) **Consider and adopt, as required, in accordance with Articles 29 and 30, amendments to this Convention and its annexes;**
- (e) **Consider amendments to any protocol, as well as to any annexes thereto, and, if so decided, recommend their adoption to the parties to the protocol concerned;**
- (f) **Consider and adopt, as required, in accordance with Article 30, additional annexes to this Convention;**
- (g) **Establish such subsidiary bodies, particularly to provide scientific and technical advice, as are deemed necessary for the implementation of this Convention;**
- (h) **Contact, through the Secretariat, the executive bodies of conventions dealing with matters covered by this Convention with a view to establishing appropriate forms of cooperation with them; and**
- (i) **Consider and undertake any additional action that may be required for the achievement of the purposes of this Convention in the light of experience gained in its operation.**

The Conference of the Parties' primary responsibility is to review and steer the Convention's implementation. Paragraph 4(a)-(i) lists the areas in which the Conference will operate to fulfil this responsibility. Paragraph 4(i) indicates this list is not all inclusive; in addition, other more specific areas of competence are included in other articles in the Convention (see Box 22).

Among the nine functions which are listed in this paragraph, four are directly related to the Convention's

further development. This indicates the weight given by the Convention's negotiators to the future consideration and negotiation of instruments to complement and expand the agreed original framework. The Conference of the Parties is empowered to adopt and amend protocols to the Convention, as well as adopt and amend annexes to the Convention or its protocols.

- 5. The United Nations, its specialised agencies and the International Atomic Energy Agency, as well as any State not Party to this Convention, may be represented as observers at meetings of the Conference of the Parties. Any other body or agency, whether governmental or non-governmental, qualified in fields relating to conservation and sustainable use of biological diversity, which has informed the Secretariat of its wish to be represented as an observer at a meeting of the Conference of the Parties, may be admitted unless at least one third of the Parties present object. The admission and participation of observers shall be subject to the rules of procedure adopted by the Conference of the Parties.**

This paragraph is similar to those of many recent conventions. It deals with two distinct matters: the admission of observers and, once admitted, their right to participate in the meetings of the Conference of the Parties. It empowers the Conference to regulate both the admission and participation of observers through the rules of procedure adopted under paragraph 3 of this article.

Certain basic rules regarding *admission* are, however, already specified in this paragraph. There are two distinct cases. The first case includes institutions which, by their very nature, have a right to participate and, therefore, are *ipso facto* admitted. These include the UN, its specialized agencies and any State not a Party to the Convention. The second case includes all other institutions—governmental or NGOs. These must submit to an admission procedure which requires:

- qualification in the field dealt with by the Convention.
- notification of the Secretariat that observer status is sought.

- lack of objection on the part of at least 1/3 of the Parties present at the particular meeting in question.

The last requirement indicates that the procedure does not grant blanket admission to all future meetings. Instead, the second category of institutions must reapply for observer status for all subsequent meetings.

As mentioned above, the Conference of the Parties will also have to determine an observer's right to *participate* in the meeting. These usually include the right to distribute documents and to speak, according to certain rules specified in the rules of procedure. A number of precedents for such rules exist as in the case of CITES (trade in endangered species), as well as the Ramsar (wetlands), Berne (European wildlife) and Bonn (migratory species) Conventions.

With the observer's right to participate come certain obligations. Perhaps the most important is the obligation to adhere to and follow the Conference's rules of procedure.

Box 23. The Role NGOs Can Play in Implementing the Convention on Biological Diversity

The UNCED process has underscored the important role non-governmental organizations (NGOs) play in achieving environment and sustainable development goals. This is emphasized in Chapter 27 of *Agenda 21* (Strengthening the Role of Non-governmental Organizations: Partners for Sustainable Development).

The sheer magnitude and cross-sectoral nature of the loss of biological diversity will strain the ability and resources of each Party to successfully implement the Convention. The very nature of biodiversity loss demands finding most solutions at the national and local levels. At these levels, the diverse expertise of NGOs is particularly well suited to help Parties address the complex issues involved in conserving biological diversity and sustainably using its components. Therefore, Parties should increasingly draw on the expertise of NGOs specializing in these fields.

NGOs can help bridge the gap between science, policy-making and the citizenry, and thereby enhance the decision-making process. They can also help build public awareness of the importance of biological diversity and the forces driving its loss and, through this, help create a political climate in which difficult decisions can be made and action taken. Finally, NGOs can act as watchdogs, monitoring the actions taken to implement the Convention at the local, national and international levels.

Article 24. Secretariat

1. **A secretariat is hereby established. Its functions shall be:**
 - (a) **To arrange for and service meetings of the Conference of the Parties provided for in Article 23;**
 - (b) **To perform the functions assigned to it by any protocol;**
 - (c) **To prepare reports on the execution of its functions under this Convention and present them to the Conference of the Parties;**
 - (d) **To coordinate with other relevant international bodies and, in particular to enter into such administrative and contractual arrangements as may be required for the effective discharge of its functions; and**
 - (e) **To perform such other functions as may be determined by the Conference of the Parties.**

Experience has demonstrated that an international treaty can only function satisfactorily if it is serviced by a secretariat carrying out a number of functions between the meetings of the Conference of the Parties. Article 24 establishes the Convention Secretariat and lists its functions in a non-limitative manner: paragraph 1(e) clearly indicates that the Secretariat may be entrusted with additional functions by decision of the Conference of the Parties. Among the functions mentioned in this paragraph, a particularly important one, considering the Convention's nature, is coordination with "other relevant international bodies". The secretariats of *other* conventions belong to this category.

It was repeatedly emphasized during the negotiations that the Convention's implementation must take into

account activities undertaken pursuant to other conventions and that effective coordination must take place. This goal may appear simple to achieve, but there are practical and institutional difficulties. For example, each convention has its own institutions, its own parties and these parties control all actions taken pursuant to it. Coordination, therefore, will require the political will and the affirmative decision of the other fora. Coordination may also be complicated by the fact that each convention has different parties which may or may not be Parties to the Convention on Biological Diversity. Similar difficulties may arise regarding coordination with international organizations.

2. **At its first ordinary meeting, the Conference of the Parties shall designate the secretariat from amongst those existing competent international organizations which have signified their willingness to carry out the secretariat functions under this Convention.**

According to paragraph 2, the Convention Secretariat will not be newly created. Instead, the Conference will entrust the secretariat functions to an existing international organization. To be considered, the existing organization must be "competent" and must have declared its desire to carry out the Convention Secretariat's functions.

In the interim period between the Convention's entry into force and the first meeting of the Conference of the

Parties, the United Nations Environment Programme will provide the secretariat ad interim, pursuant to article 40. Resolution 2 of the Nairobi Final Act (see appendix) also requested the UNEP Executive Director to provide the secretariat on an interim basis before the Convention's entry into force (see the discussion of article 40).

Article 25. Subsidiary Body on Scientific, Technical and Technological Advice

- 1. A subsidiary body for the provision of scientific, technical and technological advice is hereby established to provide the Conference of the Parties and, as appropriate, its other subsidiary bodies with timely advice relating to the implementation of this Convention. This body shall be open to participation by all Parties and shall be multidisciplinary. It shall comprise government representatives competent in the relevant field of expertise. It shall report regularly to the Conference of the Parties on all aspects of its work.**

Article 25 specifically establishes a separate multidisciplinary Subsidiary Body to provide the Conference of the Parties, and its other subsidiary bodies, with scientific, technical and technological advice. All Parties to the Convention may participate in the Subsidiary Body.

The Subsidiary Body will be composed of competent government representatives. Without further elaboration by the Conference of the Parties under paragraph 3, it appears that the admission of observers (from either

governmental institutions or NGOs) to meetings of this body is not contemplated, although the Subsidiary Body's rules of procedure could clarify this. Parties, however, are free to determine the modalities of their representation on this, as on any, subsidiary body to the Conference of the Parties (and, indeed, to the Conference itself). In other situations, this has led to substantial inputs on the part of NGOs, either through their participation in governmental delegations or through prior consultations.

- 2. Under the authority of and in accordance with guidelines laid down by the Conference of the Parties, and upon its request, this body shall:**
 - (a) Provide scientific and technical assessments of the status of biological diversity;**
 - (b) Prepare scientific and technical assessments of the effects of types of measures taken in accordance with the provisions of this Convention;**
 - (c) Identify innovative, efficient and state-of-the-art technologies and know-how relating to the conservation and sustainable use of biological diversity and advise on the ways and means of promoting development and/or transferring such technologies;**
 - (d) Provide advice on scientific programmes and international cooperation in research and development related to conservation and sustainable use of biological diversity; and**
 - (e) Respond to scientific, technical, technological and methodological questions that the Conference of the Parties and its subsidiary bodies may put to the body.**

The Subsidiary Body acts under the authority of the Conference of the Parties and, therefore, must comply with the guidelines adopted by the Conference. It can only provide advice to the Conference itself and only upon its request. This implies that only the Conference of the Parties has access to the Subsidiary Body, individual Parties do not.

Paragraph 2(a)-(e) lists the broad range of subject matter the Conference may request advice on. Paragraph 2(b) is particularly broad. It refers to scientific and technical

assessment of the effects of "types of measures taken in accordance with the provisions of this Convention". Therefore, the Subsidiary Body may be requested to assess an area covered by the Convention in which measures have been taken, whether at the international or national level. The only limitation is the reference to "types of measures." It means that the Subsidiary Body will not consider particular individual actions taken by particular Parties, only *categories* of measures taken. Whether this distinction is workable remains to be seen.

3. The functions, terms of reference, organization and operation of this body may be further elaborated by the Conference of the Parties.

It is important for the Conference of the Parties to resolve the practical questions involved in operating the Subsidiary Body as soon as possible. The need for more detailed rules is recognized in this paragraph and the Conference

of the Parties is given the authority to further elaborate the Subsidiary Body's functions, terms of reference, organization and operation.

Article 26. Reports

Each Contracting Party shall, at intervals to be determined by the Conference of the Parties, present to the Conference of the Parties, reports on measures which it has taken for the implementation of the provisions of this Convention and their effectiveness in meeting the objectives of this Convention.

Article 26 provides a mechanism to monitor the implementation of the Convention. Each Contracting Party is obliged to report regularly on the measures taken to implement the Convention. The report must also consider the measures' effectiveness which means a Party may have to draw on information derived from Article 7 (Identification and Monitoring) to fulfil its reporting obligations.

The reports would normally be presented through the Secretariat to the Conference of the Parties for its consideration. An obligation to report at regular intervals such as this implies the report will be discussed by the

Conference.

The Convention does not specify the intervals at which the reports have to be delivered. This decision will be made by the Conference of the Parties; many other conventions require such a report to be provided at each ordinary meeting of the Conference of the Parties.

Also important for the Conference of the Parties to decide will be the format in which to present the reports: in order to be useful, the reports have to be comparable, and thus agreement has to be reached on the format and the coverage of the report.

Article 27. Settlement of Disputes

Article 27 provides for the means of conflict resolution. Any conflict arising under the Convention has to be settled according to its provisions. The means provided are the "classical" ones: they include binding and

non-binding procedures, with a clear priority given to non-binding procedures (negotiations, good offices, mediation or conciliation).

- 1. In the event of a dispute between Contracting Parties concerning the interpretation or application of this Convention, the parties concerned shall seek solution by negotiation.**

- 2. If the parties concerned cannot reach agreement by negotiation, they may jointly seek the good offices of, or request mediation by, a third party.**

In each dispute, Parties are bound to first seek a solution by negotiation. This is a fundamental and traditional rule of conflict resolution.

good offices of, or the mediation by, a third party. The Parties involved in the dispute must jointly decide to use the services of a third party.

If a negotiated resolution of the conflict cannot be reached, the disputing Parties have the option to seek the

- 3. When ratifying, accepting, approving or acceding to this Convention, or at any time thereafter, a State or regional economic integration organization may declare in writing to the Depositary that for a dispute not resolved in accordance with paragraph 1 or paragraph 2 above, it accepts one or both of the following means of dispute settlement as compulsory:**
 - (a) Arbitration in accordance with the procedure laid down in Part 1 of Annex II;**
 - (b) Submission of the dispute to the International Court of Justice.**

At any time, a State can make a written declaration to the Convention's Depositary accepting a compulsory dispute resolution by arbitration, by the International Court of Justice (ICJ) or both when negotiation or mediation have failed. Either procedure chosen leads to a binding decision. Both procedures are applicable only if a State has expressly declared that it accepts these procedures as compulsory. Even if Parties have accepted arbitration and/ or submission of the dispute to the ICJ as compulsory, they have to try to resolve their disputes first by negotiation. This is to ensure that Parties attempt to resolve their disputes first by non-judicial (non-binding) procedures.

The procedures for arbitration are laid down in Part 1 of Annex II of the Convention. The rules provided there are standard rules contained in many other international instruments. In a conflict between two Parties, the arbitration court will be the classical three member panel. If more Parties are involved in the dispute, Parties "in the same interest" are bound to nominate one "common" arbitrator (see article 2(2) of Annex II, Part 1).

The procedures to be applied in cases before the ICJ are laid down in the Statute of the International Court of Justice.

- 4. If the parties to the dispute have not, in accordance with paragraph 3 above, accepted the same or any procedure, the dispute shall be submitted to conciliation in accordance with Part 2 of Annex II unless the parties otherwise agree.**

In those cases in which Parties have not accepted any of the judicial procedures (arbitration and/or ICJ) and negotiation or good offices or mediation have failed,

the dispute must be submitted to conciliation. Submitting the dispute to conciliation is an obligation, unless the Parties agree otherwise.

The conciliation procedure does not lead to a binding decision. The conciliation commission will make proposals for resolution of the dispute which the Parties concerned must consider in good faith.

The procedure for a five member conciliation commission is laid down in Part 2 of Annex II of the Convention. The disputing Parties can otherwise agree on a different number of commission members.

5. The provisions of this Article shall apply with respect to any protocol except as otherwise provided in the protocol concerned.

The dispute settlement rules apply, in general, to both the Convention and any protocols to be concluded under the Convention. However, since the protocols will be international agreements in their own right, subject to the

general provision of article 32 (Relationship Between This Convention and Its Protocols), they may provide their own rules for dispute settlement.

Article 28. Adoption of Protocols

- 1. The Contracting Parties shall cooperate in the formulation and adoption of protocols to this Convention.**
- 2. Protocols shall be adopted at a meeting of the Conference of the Parties.**
- 3. The text of any proposed protocol shall be communicated to the Contracting Parties by the Secretariat at least six months before such a meeting.**

The Convention provides a legal framework for a number of goals related to biological diversity. It is designed as an instrument to be further developed by additional legal instruments called "protocols".

Article 28 concerns the adoption of protocols. It obliges the Contracting Parties to cooperate in the formulation and adoption of protocols. It also gives basic rules as to their adoption (paragraph 2) and consideration (paragraph 3).

The article does not specify subject matter for protocols. This implies that any matter covered by the Convention

may generate a protocol, if the Parties consider this desirable. One such area has been singled out by article 19(3), which requires the Parties to consider the need for and modalities of a protocol on the safe transfer, handling and use of living modified organisms resulting from biotechnology which could have an adverse impact on the conservation of biological diversity and the sustainable use of its components.

The legal relationship between a protocol and the Convention is considered in article 32.

Article 29. Amendment of the Convention or Protocols

1. **Amendments to this Convention may be proposed by any Contracting Party. Amendments to any protocol may be proposed by any Party to that protocol.**
2. **Amendments to this Convention shall be adopted at a meeting of the Conference of the Parties. Amendments to any protocol shall be adopted at a meeting of the Parties to the Protocol in question. The text of any proposed amendment to this Convention or to any protocol, except as may otherwise be provided in such protocol, shall be communicated to the Parties to the instrument in question by the secretariat at least six months before the meeting at which it is proposed for adoption. The secretariat shall also communicate proposed amendments to the signatories to this Convention for information.**
3. **The Parties shall make every effort to reach agreement on any proposed amendment to this Convention or to any protocol by consensus. If all efforts at consensus have been exhausted, and no agreement reached, the amendment shall as a last resort be adopted by a two-third majority vote of the Parties to the instrument in question present and voting at the meeting, and shall be submitted by the Depositary to all Parties for ratification, acceptance or approval.**
4. **Ratification, acceptance or approval of amendments shall be notified to the Depositary in writing. Amendments adopted in accordance with paragraph 3 above shall enter into force among Parties having accepted them on the ninetieth day after the deposit of instruments of ratification, acceptance or approval by at least two thirds of the Contracting Parties to this Convention or of the Parties to the protocol concerned, except as may otherwise be provided in such protocol. Thereafter the amendments shall enter into force for any other Party on the ninetieth day after that Party deposits its instrument of ratification, acceptance or approval of the amendments.**
5. **For the purposes of this Article, "Parties present and voting" means Parties present and casting an affirmative or negative vote.**

Article 29 concerns amendments to the Convention or its protocols: who can propose them (paragraph 1), how they are to be adopted (paragraphs 2 and 3) and how they enter into force (paragraph 4). Amendments to the Convention are adopted by the Conference of the Parties. Amendments to a protocol are adopted by the Parties to the protocol. The Secretariat must communicate in advance to the Parties of the relevant instrument all proposed amendments within the time periods provided. Proposed amendments to protocols must also be communicated to the Parties to the Convention (see article 23(4)(e)). This point is also implied—though not very clearly—in the last sentence of paragraph 2. Amendments to both the Convention and to its protocols are to be

adopted by consensus and this article requires the Parties to develop every effort towards this aim. Should these efforts not be successful, adoption by a two-third majority vote is provided for, but only as a last resort.

Amendments to both the Convention and its protocols enter into force for Parties having accepted them 90 days after 2/3s of the Parties concerned have indicated their acceptance of the amendment to the Depositary of the Convention (or protocol). For the remaining 1/3, the amendment will enter into force 90 days after each individual acceptance and for that particular Party only. Paragraph 5 means that abstention will not be taken into consideration in the determining a majority.

Article 30. Adoption and Amendment of Annexes

Like many international conservation or environment agreements, the Convention contains annexes. It is anticipated that additional annexes may be adopted at a later stage, and that protocols under the Convention will

contain annexes as well. The purpose of this article is to clarify the relationships between the Convention and its annexes or protocols and their respective annexes, as well as the procedures to adopt and modify those annexes.

- 1. The annexes to this Convention or to any protocol shall form an integral part of the Convention or of such protocol, as the case may be, and, unless expressly provided otherwise, a reference to this Convention or its protocols constitutes at the same time a reference to any annexes thereto. Such annexes shall be restricted to procedural, scientific, technical and administrative matters.**

- 2. Except as may be otherwise provided in any protocol with respect to its annexes, the following procedure shall apply to the proposal, adoption and entry into force of additional annexes to this Convention or of annexes to any protocol:**
 - (a) Annexes to this Convention or to any protocol shall be proposed and adopted according to the procedure laid down in Article 29;**
 - (b) Any Party that is unable to approve an additional annex to this Convention or an annex to any protocol to which it is Party shall so notify the Depositary, in writing, within one year from the date of the communication of the adoption by the Depositary. The Depositary shall without delay notify all Parties of any such notification received. A Party may at any time withdraw a previous declaration of objection and the annexes shall thereupon enter into force for that Party subject to subparagraph (c) below;**
 - (c) On the expiry of one year from the date of the communication of the adoption by the Depositary, the annex shall enter into force for all Parties to this Convention or to any protocol concerned which have not submitted a notification in accordance with the provisions of subparagraph (b) above.**

- 3. The proposal, adoption and entry into force of amendments to annexes to this Convention or to any protocol shall be subject to the same procedure as for the proposal, adoption and entry into force of annexes to the Convention or annexes to any protocol.**

- 4. If an additional annex or an amendment to an annex is related to an amendment to this Convention or to any protocol, the additional annex or amendment shall not enter into force until such time as the amendment to the Convention or to the protocol concerned enters into force.**

Annexes to the Convention or a protocol form an integral part of the respective instrument. Paragraph 1, therefore, confirms a traditional rule in treaty-making. While the subject matter which may be dealt with by protocols is only limited by relevance to the subjects dealt with by the Convention, annexes are limited to procedural, scientific, technical and administrative matters.

Proposal and adoption of annexes follows the general rule

described in article 29 for amendments to the Convention and its protocols. However, for an annex's entry into force, the Convention—like many other international instruments—provides a simplified procedure. According to paragraph 2(c), an annex enters into force for all Parties one year after its adoption has been communicated by the Depositary, except for those Parties which have notified the Depositary of their inability to approve the annex. The purpose of such a simplified procedure is to speed up entry into force.

Article 31. Right to Vote

1. **Except as provided for in paragraph 2 below, each Contracting Party to this Convention or to any protocol shall have one vote.**

Paragraph 1 confirms the rule of one-state-one-vote. It is a traditional rule of international law derived from the

principle of sovereign equality. Votes are not weighed and each Party has the same right to participate.

2. **Regional economic integration organizations, in matters within their competence, shall exercise their right to vote with a number of votes equal to the number of their member States which are Contracting Parties to the Convention or the relevant protocol. Such organizations shall not exercise their right to vote if their member States exercise theirs, and vice versa.**

Both individual States and regional economic integration organizations (REIOs) (see the definition in article 2) can become Parties to the Convention. As a result, voting rights need to be clarified. A member State of such an organization, also Party to the Convention, may not exercise its right to vote twice—as a Contracting Party and again through the organization in question. This is why paragraph 2 stipulates that a REIO shall not exercise its right to vote if its member States exercise their right to vote and vice versa. Whether it is the REIO or the

member States which exercise the right to vote depends on the respective competencies of the concerned REIO and its member States, and may vary according to the subject being voted on. In cases where it is the REIO which has the competence to exercise the right to vote, it does so with the number of votes equivalent to the number of its member States who are Parties to the Convention (and are present at the meeting where the vote is taking place).

Article 32. Relationship Between This Convention and Its Protocols

- 1. A State or a regional economic integration organization may not become a Party to a protocol unless it is, or becomes at the same time, a Contracting Party to this Convention.**

The Convention, and any protocols subsequently concluded, are separate instruments from a legal point of view. Therefore, Parties to the Convention are not obliged to become parties to any protocol adopted later on.

By contrast, the principles and rules determined by the Convention must be accepted by all. Therefore, a prerequisite to become a party to any protocol is to be

a Party to the Convention. Thus, no State or regional economic integration organization may only become a party to a protocol. This rule is necessary as the Convention provides the common basis on which future protocols are built.

- 2. Decisions under any protocol shall be taken only by the Parties to the protocol concerned. Any Contracting Party that has not ratified, accepted or approved a protocol may participate as an observer in any meeting of the parties to that protocol.**

Paragraph 2 emphasizes that protocols are separate legal instruments, by stating that decisions made pursuant to any protocol are to be made by its Parties. This means that Parties to the Convention, or to other protocols, who are not Parties to the protocol under consideration have

no right to participate in this protocol's decision-making process. However, these Parties *do* have the right to participate as observers in the meetings of Parties to that protocol.

Articles 33 - 42. Final Provisions

Articles 33-38 and 40-42 address the mechanisms needed to give effect to the Convention. The first steps are the signing of the Convention and its ratification by the signatories or a State's accession to it. However, a convention is binding only if it has entered into force. The Convention on Biological Diversity entered into force on 29 December 1993, ninety days after 30 documents of ratification, or equivalent instruments

(of acceptance, approval or acceptance) were deposited with the Depositary (see Article 36).

At that time, the Convention entered into force for those thirty States, which then became "Parties" to the Convention. After that date, the Convention enters into force in each additional State ninety days after the deposit by that State of a pertinent instrument with the Depositary.

Article 33. Signature

This Convention shall be open for signature at Rio de Janeiro by all States and any regional economic integration organization from 5 June 1992 until 14 June 1992, and at the United Nations Headquarters in New York from 15 June 1992 to 4 June 1993.

One hundred and fifty-six governments and the European Economic Community signed the Convention in Rio de Janeiro during the UN Conference on Environment and Development. Signing a convention does not normally have a binding effect on the State concerned if the Convention requires ratification. However, after a government signs a convention, the State is obliged to refrain from acts which could defeat the object and purpose of the convention (see, for example, article 18

of the Vienna Convention on the Law of Treaties). In the case of the Convention on Biological Diversity the objectives are set out in article 1.

After the end of the time period in which the text is open for signature, the States wishing to participate in the Convention have to follow the procedure of accession provided in article 35 (Accession).

Article 34. Ratification, Acceptance or Approval

- 1. This Convention and any protocol shall be subject to ratification, acceptance or approval by States and by regional economic integration organizations. Instruments of ratification, acceptance or approval shall be deposited with the Depositary.**
- 2. Any organization referred to in paragraph 1 above which becomes a Contracting Party to this Convention or any protocol without any of its member States being a Contracting Party shall be bound by all the obligations under the Convention or the protocol, as the case may be. In the case of such organizations, one or more of whose member States is a Contracting Party to this Convention or relevant protocol, the organization and its member States shall decide on their respective responsibilities for the performance of their obligations under the Convention or protocol, as the case may be. In such cases, the organization and the member States shall not be entitled to exercise rights under the Convention or relevant protocol concurrently.**
- 3. In their instruments of ratification, acceptance or approval, the organizations referred to in paragraph 1 above shall declare the extent of their competence with respect to the**

matters governed by the Convention or the relevant protocol. These organizations shall also inform the Depositary of any relevant modification in the extent of their competence.

Ratification, acceptance and approval are different types of declaration expressing a State's formal willingness (or that of a regional economic integration organization) to be bound by a convention after signing it within the signature period (see article 33).

In cases where regional economic integration organizations are to become a Party to the Convention on Biological Diversity, the specific rules of paragraphs 2 and 3 apply.

Most importantly, the organization and its member States must decide on their respective responsibilities regarding the obligations under the Convention. In addition, the respective and relevant competencies of the organization and its member states must be declared in the instruments of ratification, acceptance or approval made to the Convention's Depositary by the organization.

Article 35. Accession

- 1. This Convention and any protocol shall be open for accession by States and by regional economic integration organizations from the date on which the Convention or the protocol concerned is closed for signature. The instruments of accession shall be deposited with the Depositary.**
- 2. In their instruments of accession, the organizations referred to in paragraph 1 above shall declare the extent of their competence with respect to the matters governed by the Convention or the relevant protocol. These organizations shall also inform the Depositary of any relevant modification in the extent of their competence.**
- 3. The provisions of Article 34, paragraph 2, shall apply to regional economic integration organizations which accede to this Convention or any protocol.**

The Convention on Biological Diversity was closed for signature on 4 June 1993 (see article 34). Paragraph (1) of article 35 indicates that the Convention is open for accession by States and regional economic integration organizations (REIO).

In such instances, a State or REIO agrees to be bound by the Convention, the only difference being that signature leads to ratification (or its equivalent), whereas once a convention is closed for signature a State can only join it by acceding to it.

The effect of accession is the same as ratification. In both

Article 36. Entry Into Force

- 1. This Convention shall enter into force on the ninetieth day after the date of deposit of the thirtieth instrument of ratification, acceptance, approval or accession.**
- 2. Any protocol shall enter into force on the ninetieth day after the date of deposit of the number of instruments of ratification, acceptance, approval or accession, specified in that protocol, has been deposited.**

3. **For each Contracting Party which ratifies, accepts or approves this Convention or accedes thereto after the deposit of the thirtieth instrument of ratification, acceptance, approval or accession, it shall enter into force on the ninetieth day after the date of deposit by such Contracting Party of its instrument of ratification, acceptance, approval or accession.**
4. **Any protocol, except as otherwise provided in such protocol, shall enter into force for a Contracting Party that ratifies, accepts or approves that protocol or accedes thereto after its entry into force pursuant to paragraph 2 above, on the ninetieth day after the date on which that Contracting Party deposits its instrument of ratification, acceptance, approval or accession, or on the date on which this Convention enters into force for that Contracting Party, whichever shall be the later.**
5. **For the purposes of paragraphs 1 and 2 above, any instrument deposited by a regional economic integration organization shall not be counted as additional to those deposited by member States of such organization.**

The Convention on Biological Diversity entered into force on 29 December 1993, ninety days after the deposit of the thirtieth instrument of ratification, acceptance, approval or accession. Mongolia became the thirtieth State, after it deposited its instrument of ratification with the Convention's Depositary. For the first 30 States which made the required deposits, the Convention entered into force with respect to them on 29 December 1993.

According to paragraph 2 of this article, for each subsequent Contracting Party which ratifies, accepts or approves

the convention or accedes to it, the Convention shall enter into force with respect to that Party, 90 days after its instrument of ratification, acceptance, approval or accession is placed with the Depositary.

This means that the Convention's obligations take effect for different Parties at different times. This has most obvious relevance to article 15(3) where "genetic resources being provided by a Contracting Party, as referred to in (Article 15) and Articles 16 and 19", is implicitly qualified in terms of the Convention's entry into force.

Article 37. Reservations

No reservations may be made to this Convention.

A reservation is a formal declaration by a State, at the time it takes the action needed to become a party to a convention, whereby it announces that it does not consider itself bound by some of the convention's provisions. The reservations must be clearly enunciated and can no longer be made at a later stage.

The text of any convention may restrict the Parties' right to make reservations and the Convention on Biological

Diversity has done this by excluding *all* reservations. The exclusion is absolute. The reason behind this strict rule is probably the desire to preserve the balance between the various obligations created by the Convention which would otherwise be threatened if Parties had the right to make reservations

Article 38. Withdrawals

- 1. At any time after two years from the date on which this Convention has entered into force for a Contracting Party, that Contracting Party may withdraw from the Convention by giving written notification to the Depository.**
- 2. Any such withdrawal shall take place upon expiry of one year after the date of its receipt by the Depository, or on such later date as may be specified in the notification of the withdrawal.**
- 3. Any Contracting Party which withdraws from this Convention shall be considered as also having withdrawn from any protocol to which it is party.**

Article 39. Financial Interim Arrangements

Provided that it has been fully restructured in accordance with the requirements of Article 21, the Global Environment Facility of the United Nations Development Programme, the United Nations Environment Programme and the International Bank for Reconstruction and Development shall be the institutional structure referred to in Article 21 on an interim basis, for the period between the entry into force of this Convention and the first meeting of the Conference of the Parties or until the Conference of the Parties decides which institutional structure will be designated in accordance with Article 21.

The Conference of the Parties, according to article 21, has to designate an institutional structure to operate the financial mechanism. This article designates the Global Environment Facility (GEF) (see Box 20) as the interim institutional structure of the financial mechanism, for the period from the Convention's entry into force until a permanent institutional structure is designated by the Conference of the Parties. The earliest this could be is at the first meeting of the Conference.

Article 39 subjects interim designation to a condition: the GEF has to be "fully restructured in accordance with the requirements of Article 21". The restructuring of the GEF has to take into account the criteria mentioned in article 21, particularly the requirement that the

mechanism shall operate within a democratic and transparent system of governance.

Resolution 1 of the Nairobi Final Act (see appendix) also invites the GEF to operate the financial mechanism during the period between the Convention's opening for signature and its entry into force, although no mention is made of restructuring.

Resolution 1 also calls upon the UNDP, the World Bank, the regional development banks, UNEP and other UN bodies and agencies, such as FAO and UNESCO, to provide financial and other resources for the Convention's provisional implementation between its opening for signature and entry into force and until the first meeting of the Conference of the Parties.

Article 40. Secretariat Interim Arrangements

The secretariat to be provided by the Executive Director of the United Nations Environment Programme shall be the secretariat referred to in Article 24, paragraph 2, on an interim basis for the period between the entry into force of this Convention and the first meeting of the Conference of the Parties.

Much work needs to be accomplished during the interim period between a convention's entry into force and the first meeting of its conference of parties. This article states that the Executive Director of the United Nations Environment Programme will provide an interim secretariat for the Convention on Biological Diversity during this period. In September of 1993, UNEP created an interim secretariat.

At its first ordinary meeting, the Conference of the Parties will designate a permanent secretariat chosen from existing competent international organizations which have expressed their willingness to carry out the secretariat functions (see article 24(2)).

Article 41. Depositary

The Secretary-General of the United Nations shall assume the functions of Depositary of this Convention and any protocols.

The depositary of a convention has important formal functions. In particular it serves as the repository and source of information on the Convention and its status

(signatures, deposit of relevant instruments, entry into force, etc.).

Article 42. Authentic Texts

The original of this Convention, of which the Arabic, Chinese, English, French, Russian and Spanish texts are equally authentic, shall be deposited with the Secretary-General of the United Nations.

All authentic texts of a convention are equally authoritative, and the terms of the treaty are presumed to have the same meaning in each authentic text. Cases of discrepancies between authentic language versions, however, may happen. They can only be resolved by

negotiation, and amendment of one or more versions. The addition of an authentic version necessitates the amendment of the relevant article (here article 42) of the convention in question.

IN WITNESS WHEREOF the undersigned, being duly authorized to that effect, have signed this Convention.

Done at Rio de Janeiro on this fifth day of June, one thousand nine hundred and ninety-two.

Annex I. Identification and Monitoring

- 1. Ecosystems and habitats: containing high diversity, large numbers of endemic or threatened species, or wilderness; required by migratory species; of social, economic, cultural or scientific importance; or, which are representative, unique or associated with key evolutionary or other biological processes;**

- 2. Species and communities which are: threatened; wild relatives of domesticated or cultivated species; of medicinal, agricultural or other economic value; or social, scientific or cultural importance; or importance for research into the conservation and sustainable use of biological diversity, such as indicator species; and**

- 3. Described genomes and genes of social, scientific or economic importance.**

Annex II. Part 1. Arbitration

Article 1

The claimant party shall notify the secretariat that the parties are referring a dispute to arbitration pursuant to Article 27. The notification shall state the subject-matter of arbitration and include, in particular, the articles of the Convention or the protocol, the interpretation or application of which are at issue. If the parties do not agree on the subject matter of the dispute before the President of the tribunal is designated, the arbitral tribunal shall determine the subject matter. The secretariat shall forward the information thus received to all Contracting Parties to this Convention or to the protocol concerned.

Article 2

- 1. In disputes between two parties, the arbitral tribunal shall consist of three members. Each of the parties to the dispute shall appoint an arbitrator and the two arbitrators so appointed shall designate by common agreement the third arbitrator who shall be the President of the tribunal. The latter shall not be a national of one of the parties to the dispute, nor have his or her usual place of residence in the territory of one of these parties, nor be employed by any of them, nor have dealt with the case in any other capacity.**
- 2. In disputes between more than two parties, parties in the same interest shall appoint one arbitrator jointly by agreement.**
- 3. Any vacancy shall be filled in the manner prescribed for the initial appointment.**

Article 3

- 1. If the President of the arbitral tribunal has not been designated within two months of the appointment of the second arbitrator, the Secretary-General of the United Nations shall, at the request of a party, designate the President within a further two-month period.**
- 2. If one of the parties to the dispute does not appoint an arbitrator within two months of receipt of the request, the other party may inform the Secretary-General who shall make the designation within a further two-month period.**

Article 4

The arbitral tribunal shall render its decisions in accordance with the provisions of this Convention, any protocols concerned, and international law.

Article 5

Unless the parties to the dispute otherwise agree, the arbitral tribunal shall determine its own rules of procedure.

Article 6

The arbitral tribunal may, at the request of one of the parties, recommend essential interim measures of protection.

Article 7

The parties to the dispute shall facilitate the work of the arbitral tribunal and, in particular, using all means at their disposal, shall:

- (a) Provide it with all relevant documents, information and facilities; and
- (b) Enable it, when necessary, to call witnesses or experts and receive their evidence.

Article 8

The parties and the arbitrators are under an obligation to protect the confidentiality of any information they receive in confidence during the proceedings of the arbitral tribunal.

Article 9

Unless the arbitral tribunal determines otherwise because of the particular circumstances of the case, the costs of the tribunal shall be borne by the parties to the dispute in equal shares. The tribunal shall keep a record of all its costs, and shall furnish a final statement thereof to the parties.

Article 10

Any Contracting Party that has an interest of a legal nature in the subject-matter of the dispute which may be affected by the decision in the case, may intervene in the proceedings with the consent of the tribunal.

Article 11

The tribunal may hear and determine counterclaims arising directly out of the subject-matter of the dispute.

Article 12

Decisions both on procedure and substance of the arbitral tribunal shall be taken by a majority vote of its members.

Article 13

If one of the parties to the dispute does not appear before the arbitral tribunal or fails to defend its case, the other party may request the tribunal to continue the proceedings and to make its award. Absence of a party or a failure of a party to defend its case shall not constitute a bar to the proceedings. Before rendering its final decision, the arbitral tribunal must satisfy itself that the claim is well founded in fact and law.

Article 14

The tribunal shall render its final decision within five months of the date on which it is fully constituted unless it finds it necessary to extend the time-limit for a period which should not exceed five more months.

Article 15

The final decision of the arbitral tribunal shall be confined to the subject-matter of the dispute and shall state the reasons on which it is based. It shall contain the names of the members who have participated and the date of the final decision. Any member of the tribunal may attach a separate or dissenting opinion to the final decision.

Article 16

The award shall be binding on the parties to the dispute. It shall be without appeal unless the parties to the dispute have agreed in advance to an appellate procedure.

Article 17

Any controversy which may arise between the parties to the dispute as regards the interpretation or manner of implementation of the final decision may be submitted by either party for decision to the arbitral tribunal which rendered it.

Annex II. Part 2. Conciliation

Article 1

A conciliation commission shall be created upon the request of one of the parties to the dispute. The commission shall, unless the parties otherwise agree, be composed of five members, two appointed by each Party concerned and a President chosen jointly by those members.

Article 2

In disputes between more than two parties, parties in the same interest shall appoint their members of the commission jointly by agreement. Where two or more parties have separate interests or there is a disagreement as to whether they are of the same interest, they shall appoint their members separately.

Article 3

If any appointments by the parties are not made within two months of the date of the request to create a conciliation commission, the Secretary-General of the United Nations shall, if asked to do so by the party that made the request, make those appointments within a further two-month period.

Article 4

If a President of the conciliation commission has not been chosen within two months of the last of the members of the commission being appointed, the Secretary-General of the United Nations shall, if asked to do so by a party, designate a President within a further two-month period.

Article 5

The conciliation commission shall take its decisions by majority vote of its members. It shall, unless the parties to the dispute otherwise agree, determine its own procedure. It shall render a proposal for resolution of the dispute, which the parties shall consider in good faith.

Article 6

A disagreement as to whether the conciliation commission has competence shall be decided by the commission.

Appendix

RESOLUTIONS ADOPTED BY THE CONFERENCE FOR THE ADOPTION OF THE AGREED TEXT OF THE CONVENTION ON BIOLOGICAL DIVERSITY

Resolution 1

INTERIM FINANCIAL ARRANGEMENTS

The Conference,

Having agreed upon and adopted the text of the Convention on Biological Diversity at Nairobi on 22 May 1992,

Considering that preparations should be made during the period between the opening of the Convention for signature and its entry into force for early and effective implementation of the relevant provisions of the Convention once it has entered into force,

Noting that financial support and a financial mechanism during the period between opening of the Convention for signature and its entry into force are necessary for the early and effective operation of the Convention,

1. *Invites* the Global Environment Facility of the United Nations Development Programme, the United Nations Environment Programme and the International Bank for Reconstruction and Development to undertake the operation of the financial mechanism in accordance with Article 21 on an interim basis for the period between the opening of the Convention for signature and its entry into force and, for the purposes of Article 39, until the first meeting of the Conference of the Parties to the Convention;
2. *Calls upon* the United Nations Development Programme, the International Bank for Reconstruction and Development, the regional development banks, the United Nations Environment Programme and other United Nations bodies and agencies such as the Food and Agriculture Organization of the United Nations and the United Nations Educational, Scientific and Cultural Organization to provide financial and other resources for the provisional implementation of the Convention on Biological Diversity on an interim basis for the period between the opening of the Convention for signature and its entry into force and for the purposes of Article 39, until the first meeting of the Conference of the Parties.

Adopted on 22 May 1992

Resolution 2**INTERNATIONAL COOPERATION FOR THE CONSERVATION OF
BIOLOGICAL DIVERSITY AND THE SUSTAINABLE USE OF
ITS COMPONENTS PENDING THE ENTRY INTO FORCE OF
THE CONVENTION ON BIOLOGICAL DIVERSITY**

The Conference,

Having agreed upon and adopted the text of the Convention on Biological Diversity at Nairobi on 22 May 1992,

Noting that preparations are required for an early and effective operation of the Convention once it has entered into force,

Noting further that, in the interim arrangements, involvement in the negotiations of all Governments, particularly those that participated in the Conference for the Adoption of the Agreed Text of the Convention on Biological Diversity, is desirable,

Noting with appreciation the work so far undertaken under the auspices of the United Nations Environment Programme in the first set of country studies conducted with national, bilateral and multilateral support,

Recognizing the ongoing joint programmes of the United Nations Environment Programme and other organizations that have mobilized the involvement, in each region, of all sectors to explore options for the conservation of biological diversity and the sustainable use of its components,

Further recognizing that the preparation of biological diversity country studies is the first systematic attempt to assist countries in establishing baseline information on their biological diversity and is the basis for national action programmes on conservation of biological diversity and the sustainable use of its components,

1. *Calls upon* all States and regional economic integration organizations entitled to consider signing the Convention during the United Nations Conference on Environment and Development in Rio de Janeiro or at the earliest subsequent opportunity and thereafter to consider the ratification, acceptance, approval of or accession to the Convention;
2. *Invites* the Governing Council of the United Nations Environment Programme to consider requesting the Executive Director of the Programme to convene meetings of an Intergovernmental Committee on the Convention on Biological Diversity starting in 1993, to consider the following issues:
 - (a) Assistance to Governments, upon request, in further work in the preparation of country studies in recognition of their importance in the development of their national biological diversity strategy and action plans, *inter alia*:
 - (i) To identify components of biological diversity of importance for its conservation and the sustainable use of its components including the collection and evaluation of data needed for effective monitoring of those components;
 - (ii) To identify processes and activities which have or are likely to have an adverse impact on biological diversity;

- (iii) To evaluate the potential economic implications of the conservation of biological diversity and the sustainable use of biological and genetic resources and to ascribe values to biological and genetic resources;
 - (iv) To suggest priority action for the conservation of biological diversity and the sustainable use of its components;
 - (v) To review and, where appropriate, suggest revision of the draft guidelines for country studies on biological diversity;
 - (vi) To identify modalities for providing support to countries, in particular developing countries, undertaking studies;
- (b) Organization of the preparation of an agenda for scientific and technological research on 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 before it has entered into force;
 - (c) Consideration of the need for and modalities of a protocol setting out appropriate procedures including, in particular, advance informed agreement, in the field of the safe transfer, handling and use of any living modified organism resulting from biotechnology that may have adverse effect on the conservation and sustainable use of biological diversity;
 - (d) Modalities for the transfer of technologies, in particular to developing countries, relevant to the conservation of biological diversity and the sustainable use of its components, as well as technical cooperation in support of national capacity-building in those areas;
 - (e) Provision of policy guidance to the institutional structure invited to undertake the operation of the financial mechanism in accordance with Article 21 of the Convention on an interim basis for the period between the opening of the Convention for signature and its entry into force;
 - (f) Modalities for bringing into early effect the provisions of Article 21;
 - (g) Development of the policy, strategy and programme priorities, as well as detailed criteria and guidelines for eligibility for access to and utilization of the financial resources, including monitoring and evaluation on a regular basis of such utilization;
 - (h) Financial implications of and relevant arrangements in support of international cooperative action before the entry into force of the Convention, including voluntary contributions in cash and kind required for the operation of an interim secretariat and the meetings of the Intergovernmental Committee on the Convention on Biological Diversity;
 - (i) Other preparations for the first meeting of the Conference of the Parties to the Convention;
3. *Further requests* the Executive Director of the United Nations Environment Programme to provide the secretariat on an interim basis until the Convention has entered into force and also requests the Executive Director to seek the full and active involvement of the Food and Agriculture Organization of the United Nations and the United Nations Educational, Scientific and Cultural Organization in the establishment and operations of the Interim Secretariat, as well as full cooperation with the secretariats of relevant conventions and agreements and the Consultative Group on International Agricultural Research, the World Conservation Union and other relevant international organizations, taking into account relevant decisions of the United Nations Conference on Environment and Development.

4. *Invites* the Food and Agriculture Organization of the United Nations and the United Nations Educational, Scientific and Cultural Organization to provide full support to the establishment and operations of the interim secretariat;
5. *Also requests* the Executive Director of the United Nations Environment Programme to contribute to the financing of the costs of the preparations for and the holding of the meetings, subject to the availability of resources in the Environment Fund;
6. *Invites* Governments to contribute generously to the functioning of the interim secretariat and the successful conduct of the meetings of the Intergovernmental Committee on the Convention on Biological Diversity and to assist financially with a view to ensuring full and effective participation of developing countries;
7. *Further invites* Governments to inform the meetings of national action taken for the conservation of biological diversity and the sustainable use of its components consistent with the provisions of the Convention and pending its entry into force;
8. *Also invites* the secretariats of major international and regional environmental conventions, agreements and organizations to provide information to the Intergovernmental Committee on their activities, and the Secretary-General of the United Nations to provide the relevant sections of Agenda 21 that will be adopted at the United Nations Conference on Environment and Development in Rio de Janeiro.

Adopted on 22 May 1992

Resolution 3

THE INTERRELATIONSHIP BETWEEN THE CONVENTION ON BIOLOGICAL DIVERSITY AND THE PROMOTION OF SUSTAINABLE AGRICULTURE

The Conference,

Having agreed upon and adopted the text of the Convention on Biological Diversity at Nairobi on 22 May 1992,

Recognizing the basic and continuing needs for sufficient food, shelter, clothing, fuel, ornamental plants and medicinal products for peoples of the world,

Emphasizing that the Convention on Biological Diversity stresses the conservation and sustainable use of biological resources,

Recognizing the benefits from the care and improvement by the peoples of the world of animal, plant and microbial genetic resources to supply those basic needs and from the institutional research on and development of those genetic resources,

Recalling that broadly-based consultations in international organizations and forums have studied, debated and achieved consensus on urgent action for the security and sustainable use of plant genetic resources for food and agriculture,

Noting that the Preparatory Committee of the United Nations Conference on Environment and Development has recommended that policies and programmes of priority for *in-situ*, on-farm and *ex-situ* conservation and sustainable use of plant genetic resources for food and sustainable agriculture, integrated into strategies and programmes for sustainable agriculture, should be adopted not later than the year 2000 and that such national action should include *inter alia*:

- (a) Preparation of plans or programmes of priority action on conservation and sustainable use of plant genetic resources for food and sustainable agriculture based, as appropriate, on country studies on plant genetic resources for food and sustainable agriculture;
- (b) Promotion of crop diversification in agricultural systems where appropriate, including new plants with potential value as food crops;
- (c) Promotion of utilization of, as well as research on, poorly known but potentially useful plants and crops, where appropriate;
- (d) Strengthening of national capabilities for utilization of plant genetic resources for food and sustainable agriculture, plant breeding and seed production capabilities, both by specialized institutions and farmers' communities;
- (e) The completion of the first regeneration and safe duplication of existing *ex-situ* collections on a world-wide basis as soon as possible; and
- (f) The establishment of *ex-situ* base collection networks,

Noting further that the Preparatory Committee for the United Nations Conference on Environment and Development has recommended:

- (a) The strengthening of the Global System for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Sustainable Agriculture operated by the Food and Agriculture Organization of the United Nations in close cooperation with the International Board for Plant Genetic Resources, the Consultative Group on International Agricultural Research and other relevant organizations;

(b) The promotion of the Fourth International Technical Conference on the Conservation and Sustainable use of Plant Genetic Resources for Food and Sustainable Agriculture in 1994 to adopt the first State-of-the-World Report and the first Global Plan of Action on the Conservation and Sustainable Use of Plant Genetic Resources for Food and Sustainable Agriculture; and

(c) The adjustment of the Global System for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Sustainable Agriculture in line with the outcome of the negotiations on a Convention on Biological Diversity,

Recalling the agreement in the Preparatory Committee for the United Nations Conference on Environment and Development on provisions regarding conservation and utilization of animal genetic resources for sustainable agriculture,

1. *Confirms* the great importance of the provisions of the Convention on Biological Diversity for the conservation and utilization of genetic resources for food and agriculture;

2. *Urges* that ways and means should be explored to develop complementarity and cooperation between the Convention on Biological Diversity and the Global System for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Sustainable Agriculture;

3. *Recognizes* the need for the provision of support to the implementation of all activities agreed upon in the programme area on conservation and sustainable utilization of plant genetic resources for food and sustainable agriculture and in the programme area on conservation and utilization of animal genetic resources for sustainable agriculture in the Agenda 21 proposed to be adopted at the United Nations Conference on Environment and Development in Rio de Janeiro;

4. *Further recognizes* the need to seek solutions to outstanding matters concerning plant genetic resources within the Global System for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Sustainable Agriculture, in particular:

- (a) Access to *ex-situ* collections not acquired in accordance with this Convention; and
- (b) The question of farmers' rights.

Adopted on 22 May 1992

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List of Acronyms

AIA	Advance Informed Agreement
BGCI	Botanic Gardens Conservation International
CEL	Commission on Environmental Law of IUCN
CGIAR	Consultative Group on International Agricultural Research
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
CNPPA	Commission on National Parks and Protected Areas of IUCN
CPGR	Commission on Plant Genetic Resources of FAO
EIA	Environmental Impact Assessment
ELC	Environmental Law Centre of IUCN
FAO	Food and Agriculture Organization of the United Nations
GATT	General Agreement on Tariffs and Trade
GEF	Global Environment Facility
GEF/STAP	Global Environment Facility/Science and Technology Advisory Panel
GET	Global Environment Trust Fund
GMO	Genetically Modified Organism
IARC	International Agricultural Research Center
ICCBD	Inter-governmental Committee for the Convention on Biological Diversity
ICJ	International Court of Justice
IEEP	International Environmental Education Programme
ICSU	International Council of Scientific Unions
INBIO	Instituto Nacional de Biodiversidad
INC	Inter-governmental Negotiating Committee for a Convention on Biological Diversity
IPGRI	International Plant Genetic Resources Institute
IPR	Intellectual Property Right
ISIS	International Species Information System
IUBS	International Union of Biological Sciences
IUCN	The World Conservation Union
IZY	International Zoo Yearbook
LMO	Living Modified Organism
MVP	Minimum Viable Populations
MIRCEN	Microbiological Resources Centre
NGO	Non-governmental Organization

NBS	National Biodiversity Strategy
OECD	Organization for Economic Cooperation and Development
PRINCE	Program for Measuring Incremental Costs for the Environment
PBR	Plant Breeders' Right
PHVA	Population and Habitat Viability Analysis
PIC	Prior Informed Consent
REIO	Regional Economic Integration Organization
RFLP	Restriction Fragment Length Polymorphism
SCOPE	Scientific Committee on Problems of the Environment
SEA	Strategic Environmental Assessment
SSC	Species Survival Commission of IUCN
TDWG	International Working Group on Taxonomic Databases for Plant Sciences
TRIPS	Trade-Related Aspects of Intellectual Property Rights negotiating group of GATT
UN	United Nations
UNCED	United Nations Conference on Environment and Development, also known as the "Earth Summit"
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNGA	United Nations General Assembly
UNIDO	United Nations Industrial Organization
UPOV	International Union for the Protection of New Varieties of Plants
WCED	World Commission on Environment and Development
WCMC	World Conservation Monitoring Centre
WIPO	World Intellectual Property Organization
WHO	World Health Organization
WRI	World Resources Institute
WWF	World Wide Fund for Nature (previously World Wildlife Fund and still World Wildlife Fund in the USA)

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