

International instruments

Mechanisms of the Convention on Biological Diversity for the control and responsible use of alien species in fisheries

Devin M. Bartley
and Isabel J. Fleischer

“Each Contracting Party shall, as far as possible and as appropriate: ... Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species”

Introduction

The Convention on Biological Diversity (CBD) arose from the UNCED process (the Earth Summit) in 1992 and came into force on 29 December of 1993 (CBD, 1994). It has the most signatories of any piece of international legislation and its articles are legally binding. The goals of the CBD are the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from such use. These processes are to be facilitated by appropriate access to genetic resources and transfer of relevant technologies, taking into account all rights over those resources and technologies. Further, the international community recognized that developing countries will require assistance in implementing the articles of the CBD, and therefore a funding mechanism, the Global Environment Facility (GEF) was established. The primary governing body of the CBD is the Conference of the Parties (COP). In recognizing the need for scientific and technical advice in order to implement the CBD, the Convention established a Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA). This body is the forum for a variety of scientific and technical assessments and discussions, including those pertaining to alien species. It operates under the authority of, and reports regularly to the COP.

The CBD is often perceived as a “conservation” convention, and indeed this is a vital part of its mandate. However, it was the inclusion of the “sustainable use” of biological diversity that has also been responsible for the numbers of countries joining this process. Alien species and alien genotypes (Table 1) are a component of biodiversity and have provided the world with agriculture benefits for millennia. Following domestication, usually but not always, in centers of origin, alien species and domesticated crops and animals have been moved around the world and now form the basis of a multi-billion dollar agriculture industry. The CBD recognized the contribution that agricultural biodiversity can make to improving the human condition, and noted the unique characteristics of this component of biological diversity.



Table 1. Definitions

Alien species (also known as introduced, non-indigenous or exotic species)	A species, subspecies or lower taxon, introduced outside its natural past or present distribution; includes any part, gametes, seeds, eggs, or propagules of such species that might survive and subsequently reproduce (CBD)
Alien genotype	The CBD definition refers to products of selective breeding, and living modified organisms resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of marine and coastal biodiversity. However, hybridization and chromosome set manipulation may also produce genotypes not found in nature; we prefer a more general definition to signify any genotype produced through the intervention of humans that is not found in nature, whether or not the alien genotype adversely impacts the environment
Domestication	A species in which the evolutionary process has been influenced by humans to meet their needs (CBD)
Genetically modified organism (GMO)	Organisms (and micro-organisms) in which the genetic material (DNA) has been altered in a way that does not occur naturally by mating or natural recombination. The technology is often called "modern biotechnology" or "gene technology", sometimes also "recombinant DNA technology" or "genetic engineering". It allows selected individual genes to be transferred from one organism into another, also between non-related species (European Union)
Introduced species	Any species intentionally or accidentally transported and released by humans into an environment outside its present range (ICES 1995)
Invasive alien species	An alien species whose introduction and/or spread threaten biological diversity
Living modified organisms (LMO)	Defined in the Cartagena Protocol on Biosafety as any living organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology. The Protocol also defines the terms 'living organism' and 'modern biotechnology' (see Article 3). In everyday usage LMOs are usually considered to be the same as GMOs (Genetically Modified Organisms), but definitions and interpretations of the term GMO vary widely (See for example ICES vs. EU definitions)
Living organism	Any biological entity capable of transferring or replicating genetic material, including sterile organisms, viruses and viroids
Modern biotechnology	The application of: a. In vitro nucleic acid techniques, including recombinant deoxyribonucleic acid (DNA) and direct injection of nucleic acid into cells or organelles, or b. Fusion of cells beyond the taxonomic family, that overcome natural physiological reproductive or recombination barriers and that are not techniques used in traditional breeding and selection
Transferred species	Any species intentionally or accidentally transported and released by humans into an environment within its present range (ICES 1995)

The CBD further recognized the dangers of the global movement of species and genetically altered species. The CBD especially noted the opportunities and problems associated with modern biotechnology. Thus, a specific protocol on biosafety was created in 2000 to protect biological diversity from the potential risks posed by living modified organisms (LMOs) resulting from modern biotechnology; this is known as the Cartagena Protocol on Biosafety to the Convention on Biological Diversity.

The purpose of this document is to review and raise awareness of the main articles and mechanisms of the CBD that pertain to alien species, alien genotypes and living modified organisms.

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General articles

Article 1 of the CBD sets out the main objectives of the Convention, namely the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from such use. Although not specifically mentioned, achieving these objectives is essential for the responsible use and control of alien species in fisheries. Article 3 sets out, as the guiding principle of the Convention, the sovereign rights of States to exploit their own biological diversity pursuant to national environmental policies and objectives, but that States have the responsibility not to cause environmental damage to other States beyond the limits of national jurisdiction. Thus, States are free to use responsibly alien species in national development, but should ensure that this does not adversely impact others, for example through transboundary or international water bodies.

In order to organize the work of implementing the Convention, the COP created 5 thematic areas based on ecosystem characteristics: Marine and Coastal Ecosystems, Inland Water Ecosystems, Agro-ecosystems, forests and dry and Sub-humid Lands. The programme of work for Marine and Coastal Ecosystems has been named the “Jakarta Mandate”, to signify that it was adopted at the second meeting of the COP in Jakarta, Indonesia. Alien species were identified as significant cross-cutting issue that is addressed by numerous thematic areas.

The Convention acknowledges the importance of planning and Article 6 states that “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

(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.”

Thus, under the CBD countries are preparing National Biodiversity Strategies and Action Plans (NBSAP).

Article 7 on identification and monitoring states in sections (a) and (b) that signatories should identify components of biological diversity important for sustainable use and monitor their status. In section 7(d) states are called on to maintain and organize data derived from the above identification and monitoring. The CBD created a Clearing House Mechanism, coordinated by the Executive Secretary and overseen and guided by an Informal Advisory Committee (IAC) to promote awareness of the multiple needs and concerns facing various communities, countries and regions.

Article 14 on impact assessment and minimizing adverse impacts requires in section (a) the introduction of environmental impact assessment procedures where there is the likelihood of environmental damage from development. Article 14(c) promotes consultation and exchange of information regarding national activities that may have environmental consequences in neighbouring states through bilateral, regional or multi-lateral arrangements.

The emphasis of the CBD is on in situ conservation of biological diversity. Article 8(d) requires states to “Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings.”

The Preamble to the CBD and Principle 15 in the Rio Declaration both promote a precautionary approach to development¹:

“In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”

Specific reference to precaution and alien species is made in the Jakarta Mandate²:

“(…) because of the difficulties of complete containment, introduction of alien species, products of selective breeding, and living modified organisms resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of marine and coastal biodiversity should be responsibly conducted using the precautionary approach.”

Articles on alien species

Alien species are specially listed in Article 8(h): “Each Contracting Party shall, as far as possible and as appropriate: Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species”. The COP has also identified alien species as one of five programme elements in the work programme on marine and coastal biological diversity and on inland water biodiversity. The programme of work to implement the Jakarta Mandate identified three objectives relating to alien species:

- ▶ to achieve better understanding of the causes of the introduction of alien species and genotypes and the impact of such introductions on biological diversity;
- ▶ to identify gaps in existing or proposed legal instruments, guidelines and procedures to counteract the introduction of and the adverse effects exerted by alien species and genotypes which threaten ecosystems, habitats or species, paying particular attention to transboundary effects; and to collect information on national and international actions to address these problems, with a view to prepare for the development of a scientifically-based global strategy for dealing with the prevention, control and eradication of those alien species which threaten marine and coastal ecosystems, habitats and species;
- ▶ to establish an “incident list” on introductions of alien species and genotypes through the national reporting process or any other appropriate means.

¹ Report of the United Nations Conference on Environment and Development (Rio de Janeiro, 3-14 June 1992). United Nations General Assembly report A/CONF.151/26 (Vol. I). New York.

² The Jakarta Mandate on Marine and Coastal Biological Diversity is part of the Ministerial Statement on the implementation of the Convention on Biological Diversity, as adopted at the Second Ordinary Meeting of the Conference of Parties to the Convention on Biological Diversity, 6–17 November 1995, Jakarta, Indonesia.

The CBD specifically addressed alien species in the work programme on inland water biological diversity (decision IV/4, annex I, paragraph 8 [c] [vi]), and invited states in paragraph 9 (e) (iv) to “Undertake assessments in such inland water ecosystems which may be regarded as important. Furthermore, states should undertake assessments of threatened species and conduct inventories and impact assessments of alien species within their inland water ecosystems.”

Significant decisions have been taken by the COP in regards to implanting Article 8(h) and other articles of the CBD. The most recent decisions (COP VI) call for national strategies and action plans, and international action, collaboration, and funding. Relevant organizations and initiatives, as well as specific suggestions for national governments are listed in Annex 1. At its sixth meeting (COP VI), the Conference of the Parties also adopted 15 guiding principles for the prevention, introduction and mitigation of impacts of invasive alien species for the full and effective implementation of **Article 8(h)** of the CBD (Annex 2). These, “Guiding Principles For The Prevention, Introduction And Mitigation Of Impacts Of Alien Species That Threaten Ecosystems, Habitats Or Species”, *inter alia*:

- ▶ urge states, other governments and relevant bodies to give priority to the development and implementation of alien invasive species strategies and action plans;
- ▶ encourage parties to develop mechanisms for transboundary cooperation and regional and multilateral cooperation in order to deal with the issue, including the exchange of best practices;
- ▶ encourage parties to develop effective education, training and public-awareness measures, as well as to inform the public about the different aspects of the issue, including the risks posed by alien invasive species.

Decision IV/4 which was again noted in COP IV, called on international groups to assist in: (a) developing standardized terminology on alien species; (b) developing criteria for assessing risks from introduction of alien species; (c) developing processes for assessing the socio-economic implications of alien invasive species, particularly the implications for indigenous and local communities; (d) furthering research on the impact of alien invasive species on biological diversity; (e) developing means to enhance the capacity of ecosystems to resist or recover from alien species invasions; (f) developing a system for reporting new invasions of alien species and the spread of alien species into new areas; (g) assessing priorities for taxonomic work.

In addition to the NBSAP called for in Article 6 (above), the CBD has also requested countries to prepare thematic reports on alien species. These reports identify responsible individuals within a country. These reports have been completed by only a few countries in the Mekong/Lancang Region and those that have been completed have not focused on aquatic alien species.

At its Fifth meeting the COP, in decision V/8, requested the Executive Secretary of the CBD in collaboration with other international agencies, including FAO, to consider, *inter alia*, further development of the guiding principles and developing an international instrument to deal with alien species. The matter of an international instrument is still pending.

Cartagena Protocol on Biosafety to the Convention on Biological Diversity

The Cartagena Protocol of the Convention on Biological Diversity, adopted on 29 January 2000 in Montreal, Canada, “seeks to protect biological diversity from the potential risks posed by LMOs resulting from modern biotechnology”.³ Thus, the scope of the Protocol is limited and does not include wild alien species, or those species genetically altered by selective breeding, hybridization, chromosome set manipulation, or sex reversal. For practical purposes at present the Protocol refers to transgenic organisms. Currently, there are no transgenic aquatic species available to the fisheries and aquaculture industry or to the consumer; genetically modified soy has been used in fish feed.

The Protocol establishes an *advance informed agreement* (AIA) procedure for ensuring that countries are provided with the information necessary to make informed decisions before agreeing to the import of LMOs into their territory. The Protocol advocates a *precautionary approach* and reaffirms the precaution language in Principle 15 of the Rio Declaration on Environment and Development. The Protocol also establishes a *Biosafety Clearing-House* to facilitate the exchange of information on LMOs and to assist countries in the implementation of the Protocol. The Protocol includes a “savings clause” that states that nothing in the agreement shall alter the rights and obligations of parties under existing international law (e.g. WTO rules).

KEY ELEMENTS OF THE PROTOCOL

The Advance Informed Agreement Procedure

The Protocol creates an AIA procedure that requires exporters to seek consent from importers before the first shipment of LMOs meant to be introduced into the environment (such as seeds for planting, fish for release, and for bioremediation). However, it only applies to a small percentage of traded LMOs as it excludes LMO commodities that are intended for food, feed, or processing (LMO-FFPs), LMOs in transit and LMOs destined for contained use (e.g. vials for scientific research).

The party of export is obliged to notify (or ensure notification) in writing to the party of import, before the first intentional import of any given type of LMO. The party of import then has 90 days to acknowledge receipt of the notification, and advise that it intends to proceed with the Protocol’s decision procedure, or according to its domestic regulatory framework. Importers are to make decisions on the import of LMOs intended for introduction into the environment based on a scientific risk assessment and within 270 days of notification of an intent to export.

Biosafety Clearing-House

The Protocol establishes an internet-based Biosafety Clearing-House to help countries exchange scientific, technical, environmental and legal information about living modified organisms. The agreement requires governments to provide the Biosafety Clearing-House with

³ Cartagena is the name of the city in Colombia where the Biosafety Protocol was originally scheduled to be concluded and adopted in February 1999. However, due to a number of outstanding issues, the Protocol was finalized and adopted a year later on 29 January 2000 in Montreal, Canada.

information concerning any final decisions on the domestic use of an LMO commodity within 15 days of making a decision. A pilot phase of the Clearing-House has been developed⁴.

LMO– FFPs

LMO– FFPs are not subject to the AIA procedure that covers other LMOs, but are covered by a separate, less restrictive, procedure outlined in Article 11. Parties making a final decision about the domestic use of an LMO must notify the other Parties of the decision through the Biosafety Clearing-House. Thus, while the AIA procedure lays first responsibility on the *party of export* to notify its intent to export, the procedure for LMO– FFPs lays first responsibility on potential importers to develop and announce regulations proactively. The result is less onerous for the exporters, who will not have to wait for the parties of import to respond to their notifications. As well, exporters of LMO– FFPs do not face the burden of proof established for exporters of other LMOs, who may have to conduct and finance **risk assessments** in support of their notifications.

Shipments of commodities that contain, or may contain, LMO– FFPs must be identified as such in their accompanying documentation. The details of this procedure still remain to be worked out, and are supposed to be settled within two years after the Protocol enters into force. Such shipments must also be accompanied by a list of other information, including the identity and relevant traits and characteristics of the LMOs, any requirements for safe handling, storage, transport and use, and information about the importers and exporters. These requirements are helpful to countries that are enacting domestic labelling schemes for LMOs and products thereof. But they are unwelcome for exporters, who will be forced either to segregate LMO and non-LMO commodities, or to label all exports “may contain LMO– FFPs” and likely pay the penalty in lower prices.

Science and Precaution

The Protocol contains a strong version of the precautionary principle. Whether the precautionary principle can be used in deciding to prohibit or restrict import of LMOs is not clear as it is limited by the structures of the WTO Sanitary and Phytosanitary Measures (SPS) Agreement⁵. But it is indicative that the burden of risk-proof is put on the party of export and notifier, who can be required to conduct and/or finance a risk assessment.

Liability

Article 27 commits the first meeting of the parties to put in place a process to elaborate rules and procedures on liability. It sets a period of four years for completion of this task.

Trade with non-parties

The Protocol states that the “transboundary movement of LMOs between parties and non-parties shall be consistent with the objective of this Protocol.”

Currently there are no LMOs available for the fisheries and aquaculture industry. However, trans-genic salmon are awaiting approval by regulatory agencies in the USA and trans-genic tilapia in Cuba are undergoing evaluation for commercial use. Thus, it will be opportune for the industry and governments to be aware of such protocols in the event LMOs become available.

⁴ Pilot phase of the CBD Clearing-House. September 2003. CBD. Available at <http://bch.biodiv.org/Pilot/Home.aspx>

⁵ Agreement on the Application of Sanitary and Phytosanitary Measures, Uruguay Round Agreement (Article 1 — 11). WTO. Available at www.wto.org

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Annex 1

Excerpts from Decision VI/23⁶

ALIEN SPECIES THAT THREATEN ECOSYSTEMS, HABITATS OR SPECIES

The following are selected sections from COP Decision VI/23 that calls for national action (for complete text of the Decision see footnote 6).

II. Guiding principles for the implementation of article 8(h)

Recognizing that invasive alien species represent one of the primary threats to biodiversity, especially in geographically and evolutionary isolated ecosystems, such as small island developing States, and that risks may be increasing due to increased global trade, transport, tourism and climate change, ...

Recognizing the value of international instruments under section III, the Decision recommended, *inter alia*,

“Invites the International Plant Protection Convention, the Office International des Epizooties, the Food and Agriculture Organization of the United Nations, the International Maritime Organization, the World Health Organization and other relevant international instruments and organizations, as they elaborate further standards and agreements, or revise existing standards and agreements, including for risk assessment/analysis, to consider incorporating criteria related to the threats to biological diversity posed by invasive alien species; and invites further such instruments and organizations to report on any such ongoing, planned, or potential initiatives”. Furthermore, under section IV OTHER OPTIONS the decision noted:

“Reaffirming the importance of national and regional invasive alien species strategies and action plans, and of international collaboration to address the threats to biodiversity of invasive alien species and the need for funding as a priority to implement existing strategies,

Noting the range of measures and the need to strengthen national capacities and international collaboration.

(A) NATIONAL INVASIVE ALIEN SPECIES STRATEGIES AND ACTION PLANS

Urges Parties and other Governments, in implementing the Guiding Principles, and when developing, revising and implementing national biodiversity strategies and action plans to address the threats posed by invasive alien species, to:

- a. Identify national needs and priorities;
- b. Create mechanisms to coordinate national programmes;

⁶ COP 6 - Sixth Ordinary Meeting of the Conference of the Parties to the Convention on Biological Diversity, The Hague. The Netherlands (7-19 April 2002). Decision VI/23.
<http://www.biodiv.org/decisions/default.asp?lg=0&dec=VI/23>

- c. Review, in the light of the Guiding Principles, relevant policies, legislation and institutions to identify gaps, inconsistencies and conflicts, and, as appropriate, adjust or develop policies, legislation and institutions;
- d. Enhance cooperation between the various sectors, including the private sector that might provide pathways or vectors for the unintended transfer of invasive alien species, in order to improve prevention, early detection, eradication and/or control of invasive alien species, and in particular, ensure communication between focal points of respective relevant international instruments;
- e. Promote awareness of the threats to biological diversity and related ecosystem goods and services posed by invasive alien species and of the means to address such threats, among policy makers at all levels of government, and in the private sector; quarantine, customs and other border officials; and the general public;
- f. Facilitate the involvement of all stakeholder groups, including in particular indigenous and local communities, and the private sector, as well as all levels of government, in national invasive alien species strategies and action plans, and in decisions related to the use of alien species that may be invasive;
- g. Collaborate with trading partners and neighbouring countries, regionally, and with other countries, as appropriate, in order to address threats of invasive alien species to biological diversity in ecosystems that cross international boundaries, to migratory species, and to address matters of common interest;

Urges existing regional organizations and networks to work cooperatively to actively support the development and implementation of invasive alien species strategies and action plans, and to develop regional strategies where appropriate.

Encourages Parties and other Governments, in undertaking this work and, in particular, when developing priority actions, to consider the need to:

- a. Develop capacity to use risk assessment/analysis to address threats of invasive alien species to biological diversity, and incorporate such methodologies in environmental impact assessments, and strategic environmental assessments, as appropriate and relevant;
- b. Develop financial measures, and other policies and tools, to promote activities to reduce the threat of invasive alien species;
- c. When necessary, develop recommendations and strategies to take account of effects of alien species on populations and naturally occurring genetic diversity;
- d. Incorporate invasive alien species considerations into national biodiversity strategies and action plans and into sectoral and cross-sectoral policies, strategies and plans, taking into account the ecosystem approach, and in order to ensure full implementation of the national invasive alien species strategies and action plans as called for in paragraph 6 of decision V/8 of the Conference of the Parties.

Notes the technical information developed by the Executive Secretary, the Subsidiary Body on Scientific, Technical and Technological Advice and the Global Invasive Species Programme and commends this information to Parties for use in national implementation of Article 8(h) and requests the Executive Secretary to ensure that the technical information developed

within the Convention on Biological Diversity is readily available to Parties in an appropriate form, including through technical publications and the clearing-house mechanism;

Urges the Global Invasive Species Programme and other relevant organizations to evaluate known and potential pathways for the introduction of invasive alien species and identify opportunities to minimize incursions and manage risks, and:

- a. Provide advice to Governments and organizations on actions to be taken at national and regional levels; and
- b. Provide recommendations to the Conference of the Parties at its seventh meeting on actions to be taken at the international level; “ ...

Under section III (c) on assessment, information and tools the Decision, *inter alia*:

Urges Parties, Governments and relevant organizations, at the appropriate level, with the support of relevant international organizations to promote and carry out, as appropriate, research and assessments on:

The characteristics of invasive species and the vulnerability of ecosystems and habitats to invasion by alien species, and the impact of climate change on these parameters.

The impact of alien species on biological diversity;

Analysis of the importance of various pathways for the introduction of invasive alien species;

The socio-economic implications of invasive alien species particularly the implications for indigenous and local communities;

The development of environmentally benign methods to control and eradicate invasive alien species, including measures for use in quarantine and to control fouling of ship hulls;

The costs and benefits of the use of biocontrol agents to control and eradicate invasive alien species;

Means to enhance the capacity of ecosystems to resist or recover from alien species invasions;

Priorities for taxonomic work through, *inter alia*, the Global Taxonomy Initiatives.

Criteria for assessing risks from introduction of alien species to biological diversity at the genetic, species and ecosystem levels;

The use of the traditional knowledge of indigenous and local communities in the development and implementation of measures to address invasive alien species, in accordance with Article 8(j) of the Convention;

Decides that the clearing-house mechanism will be used to facilitate scientific and technical cooperation on the topics listed under paragraph 24 above, in order to enhance the ability of the clearing-house mechanism to promote and facilitate scientific and technical cooperation, and welcomes the Global Invasive Species Programme as an international thematic focal point for alien species under the clearing-house mechanism, and calls on Parties, countries

and relevant organizations to contribute to the creation and maintenance of the global information network, in particular to:

Ensure effective international cooperation and expertise sharing;

Provide information to assist countries to perform effective risk analysis;

Provide information on potential pathway of alien invasive species; and

Provide support for management and control efforts, particularly for locating technical support for rapid response activities;

“Other sections of the Decision make suggestions to international organizations and the Secretariat of the CBD, and relate to capacity building and funding.

Annex 2

Guiding principles for the prevention, introduction and mitigation of impacts of alien species that threaten ecosystems, habitats or species

INTRODUCTION

This document provides all Governments and organizations with guidance for developing effective strategies to minimize the spread and impact of invasive alien species. While each country faces unique challenges and will need to develop context-specific solutions, the Guiding Principles give governments clear direction and a set of goals to aim toward. The extent to which these Guiding Principles can be implemented ultimately depends on available resources. Their purpose is to assist governments to combat invasive alien species as an integral component of conservation and economic development. Because these 15 principles are non-binding, they can be more readily amended and expanded through the Convention on Biological Diversity's processes as we learn more about this problem and its effective solutions.

According to Article 3 of the Convention on Biological Diversity, 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.

It should be noted that in the Guiding Principles below, the terms listed in footnote are used.

Also, while applying these Guiding Principles, due consideration must be given to the fact that ecosystems are dynamic over time and so the natural distribution of species might vary without involvement of a human agent.

A. GENERAL

Guiding principle 1: Precautionary approach

Given the unpredictability of the pathways and impacts on biological diversity of invasive alien species, efforts to identify and prevent unintentional introductions as well as decisions concerning intentional introductions should be based on the precautionary approach, in particular with reference to risk analysis, in accordance with the guiding principles below. The precautionary approach is that set forth in principle 15 of the 1992 Rio Declaration on Environment and Development and in the preamble of the Convention on Biological Diversity.

The precautionary approach should also be applied when considering eradication, containment and control measures in relation to alien species that have become established. Lack of scientific certainty about the various implications of an invasion should not be used as a reason for postponing or failing to take appropriate eradication, containment and control measures.

Guiding principle 2: Three-stage hierarchical approach

Prevention is generally far more cost-effective and environmentally desirable than measures taken following introduction and establishment of an invasive alien species.

Priority should be given to preventing the introduction of invasive alien species, between and within States. If an invasive alien species has been introduced, early detection and rapid action are crucial to prevent its establishment. The preferred response is often to eradicate the organisms as soon as possible (principle 13). In the event that eradication is not feasible or resources are not available for its eradication, containment (principle 14) and long-term control measures (principle 15) should be implemented. Any examination of benefits and costs (environmental, economic and social) should be done on a long-term basis.

Guiding principle 3: Ecosystem approach

Measures to deal with invasive alien species should, as appropriate, be based on the ecosystem approach, as described in decision V/6 of the Conference of the Parties.

Guiding principle 4: The role of States

In the context of invasive alien species, States should recognize the risk that activities within their jurisdiction or control may pose to other States as a potential source of invasive alien species, and should take appropriate individual and cooperative actions to minimize that risk, including the provision of any available information on invasive behaviour or invasive potential of a species.

Examples of such activities include:

The intentional transfer of an invasive alien species to another State (even if it is harmless in the State of origin); and

The intentional introduction of an alien species into their own State if there is a risk of that species subsequently spreading (with or without a human vector) into another State and becoming invasive;

Activities that may lead to unintentional introductions, even where the introduced species is harmless in the state of origin.

To help States minimize the spread and impact of invasive alien species, States should identify, as far as possible, species that could become invasive and make such information available to other States.

Guiding principle 5: Research and monitoring

In order to develop an adequate knowledge base to address the problem, it is important that States undertake research on and monitoring of invasive alien species, as appropriate. These efforts should attempt to include a baseline taxonomic study of biodiversity. In addition to these data, monitoring is the key to early detection of new invasive alien species. Monitoring should include both targeted and general surveys, and benefit from the involvement of other sectors, including local communities. Research on an invasive alien species should include a thorough identification of the invasive species and should document: (a) the history and ecology of invasion (origin, pathways and time-period); (b) the biological characteristics of the invasive alien species; and (c) the associated impacts at the ecosystem, species and genetic level and also social and economic impacts, and how they change over time.

Guiding principle 6: Education and public awareness

Raising the public's awareness of the invasive alien species is crucial to the successful management of invasive alien species. Therefore, it is important that States should promote education and public awareness of the causes of invasion and the risks associated with the introduction of alien species. When mitigation measures are required, education and public-awareness-oriented programmes should be set in motion so as to engage local communities and appropriate sector groups in support of such measures.

B. PREVENTION

Guiding principle 7: Border control and quarantine measures

States should implement border controls and quarantine measures for alien species that are or could become invasive to ensure that:

Intentional introductions of alien species are subject to appropriate authorization (principle 10);

Unintentional or unauthorized introductions of alien species are minimized.

States should consider putting in place appropriate measures to control introductions of invasive alien species within the State according to national legislation and policies where they exist.

These measures should be based on a risk analysis of the threats posed by alien species and their potential pathways of entry. Existing appropriate governmental agencies or authorities should be strengthened and broadened as necessary, and staff should be properly trained to implement these measures. Early detection systems and regional and international coordination are essential to prevention.

Guiding principle 8: Exchange of information

States should assist in the development of an inventory and synthesis of relevant databases, including taxonomic and specimen databases, and the development of information systems and an interoperable distributed network of databases for compilation and dissemination of information on alien species for use in the context of any prevention, introduction, monitoring and mitigation activities. This information should include incident lists, potential threats to neighbouring countries, information on taxonomy, ecology and genetics of invasive alien species and on control methods, whenever available. The wide dissemination of this information, as well as national, regional and international guidelines, procedures and recommendations such as those being compiled by the Global Invasive Species Programme should also be facilitated through, *inter alia*, the clearing-house mechanism of the Convention on Biological Diversity.

The States should provide all relevant information on their specific import requirements for alien species, in particular those that have already been identified as invasive, and make this information available to other States.

Guiding principle 9: Cooperation, including capacity-building

Depending on the situation, a State's response might be purely internal (within the country), or may require a cooperative effort between two or more countries. Such efforts may include:

Programmes developed to share information on invasive alien species, their potential uneasiness and invasion pathways, with a particular emphasis on cooperation among neighbouring countries, between trading partners, and among countries with similar ecosystems and histories of invasion. Particular attention should be paid where trading partners have similar environments;

Agreements between countries, on a bilateral or multilateral basis, should be developed and used to regulate trade in certain alien species, with a focus on particularly damaging invasive species;

Support for capacity-building programmes for States that lack the expertise and resources, including financial, to assess and reduce the risks and to mitigate the effects when introduction and establishment of alien species has taken place. Such capacity-building may involve technology transfer and the development of training programmes;

Cooperative research efforts and funding efforts toward the identification, prevention, early detection, monitoring and control of invasive alien species.

C. INTRODUCTION OF SPECIES

Guiding principle 10: Intentional introduction

No first-time intentional introduction or subsequent introductions of an alien species already invasive or potentially invasive within a country should take place without prior authorization from a competent authority of the recipient State(s). An appropriate risk analysis, which may include an environmental impact assessment, should be carried out as part of the evaluation process before coming to a decision on whether or not to authorize a proposed introduction to the country or to new ecological regions within a country. States should make all efforts to permit only those species that are unlikely to threaten biological diversity. The burden of proof that a proposed introduction is unlikely to threaten biological diversity should be with the proposer of the introduction or be assigned as appropriate by the recipient State. Authorization of an introduction may, where appropriate, be accompanied by conditions (e.g., preparation of a mitigation plan, monitoring procedures, payment for assessment and management, or containment requirements).

Decisions concerning intentional introductions should be based on the precautionary approach, including within a risk analysis framework, set forth in principle 15 of the 1992 Rio Declaration on Environment and Development, and the preamble of the Convention on Biological Diversity. Where there is a threat of reduction or loss of biological diversity, lack of sufficient scientific certainty and knowledge regarding an alien species should not prevent a competent authority from taking a decision with regard to the intentional introduction of such alien species to prevent the spread and adverse impact of invasive alien species.

Guiding principle 11: Unintentional introductions

All States should have in place provisions to address unintentional introductions (or intentional introductions that have become established and invasive). These could include statutory and regulatory measures and establishment or strengthening of institutions and agencies with appropriate responsibilities. Operational resources should be sufficient to allow for rapid and effective action.

Common pathways leading to unintentional introductions need to be identified and appropriate provisions to minimize such introductions should be in place. Sectoral activities, such as fisheries, agriculture, forestry, horticulture, shipping (including the discharge of ballast waters), ground and air transportation, construction projects, landscaping, aquaculture including ornamental aquaculture, tourism, the pet industry and game-farming, are often pathways for unintentional introductions. Environmental impact assessment of such activities should address the risk of unintentional introduction of invasive alien species. Wherever appropriate, a risk analysis of the unintentional introduction of invasive alien species should be conducted for these pathways.

D. MITIGATION OF IMPACTS

Guiding principle 12: Mitigation of impacts

Once the establishment of an invasive alien species has been detected, States, individually and cooperatively, should take appropriate steps such as eradication, containment and control, to mitigate adverse effects. Techniques used for eradication, containment or control should be safe to humans, the environment and agriculture as well as ethically acceptable to stakeholders in the areas affected by the invasive alien species. Mitigation measures should take place in the earliest possible stage of invasion, on the basis of the precautionary approach. Consistent with national policy or legislation, an individual or entity responsible for the introduction of invasive alien species should bear the costs of control measures and biological diversity restoration where it is established that they failed to comply with the national laws and

regulations. Hence, early detection of new introductions of potentially or known invasive alien species is important, and needs to be combined with the capacity to take rapid follow-up action.

Guiding principle 13: Eradication

Where it is feasible, eradication is often the best course of action to deal with the introduction and establishment of invasive alien species. The best opportunity for eradicating invasive alien species is in the early stages of invasion, when populations are small and localized; hence, early detection systems focused on high-risk entry points can be critically useful while post-eradication monitoring may be necessary. Community support is often essential to achieve success in eradication work, and is particularly effective when developed through consultation. Consideration should also be given to secondary effects on biological diversity.

Guiding principle 14: Containment

When eradication is not appropriate, limiting the spread (containment) of invasive alien species is often an appropriate strategy in cases where the range of the organisms or of a population is small enough to make such efforts feasible. Regular monitoring is essential and needs to be linked with quick action to eradicate any new outbreaks.

Guiding principle 15: Control

Control measures should focus on reducing the damage caused as well as reducing the number of the invasive alien species. Effective control will often rely on a range of integrated management techniques, including mechanical control, chemical control, biological control and habitat management, implemented according to existing national regulations and international codes.