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ALIEN SPECIES: GUIDING PRINCIPLES FOR THE PREVENTION, INTRODUCTION AND MITIGATION OF IMPACTS

Note by the Executive Secretary

EXECUTIVE SUMMARY

In its decision IV/1 C entitled "Alien species that threaten ecosystems, habitats or species", the Conference of the Parties requested the Subsidiary Body on Scientific, Technical and Technological Advice to develop guiding principles for the prevention, introduction and mitigation of impacts of alien species and to report on those principles and any related work programme to the Conference of the Parties at its fifth meeting. The Subsidiary Body, at its fourth meeting, adopted recommendation IV/4, in which it requested the Executive Secretary to develop, in cooperation with the Global Invasive Species Programme (GISP), principles for the prevention, introduction and mitigation of impacts of alien species, for consideration by the Subsidiary Body at its fifth meeting.

Accordingly, the Executive Secretary is presenting in annex I to the present note draft guiding principles for the prevention, introduction and mitigation of impacts of alien species, developed in cooperation with GISP. In order to see practical examples of the issues tackled by the draft principles in action, the preparation process also drew upon relevant information contained in case-studies received pursuant to paragraph 3 of recommendation IV/4, as well as on the national reports submitted under Article 26 of the Convention and other sources. In paragraph 2 of the same recommendation, the Subsidiary Body had requested the Executive Secretary to develop an outline for case-studies on alien species on the basis of proposals from two Parties, as set out in annexes I and II to recommendation IV/4. The outline developed by the Executive Secretary is contained in annex II to this document.

* UNEP/CBD/SBSTTA/5/1.

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SUGGESTED RECOMMENDATIONS

The Subsidiary Body on Scientific, Technical and Technological Advice may wish to recommend to the Conference of the Parties that it:

1. Adopt the draft guiding principles as contained in annex I to this note; and

2. Call upon Parties to apply the principles, in particular, in the context of activities aimed at the implementation of Article 8(h) of the Convention; and

3. Request the Executive Secretary, in close coordination with the Global Species Invasive Programme and relevant organizations, and ensuring consistency with the development of standard terminology on alien species (as referred in recommendation IV/4, paragraph 4(f) and (i), to further elaborate the guiding principles into a set of guidelines on the prevention, introduction and mitigation of the impacts of alien species, to be considered by the Subsidiary Body on Scientific, Technical and Technological Advice, in preparation for the sixth meeting of the Conference of the Parties. 1/

1/ In accordance with decision IV/16, alien species will be an item for in-depth consideration by the Conference of the Parties at its sixth meeting.

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I. BACKGROUND

1. Through its decision IV/1 C, entitled "Alien species that threaten ecosystems, habitats or species", the Conference of the Parties requested the Subsidiary Body on Scientific, Technical and Technological Advice to develop guiding principles for the prevention, introduction and mitigation of impacts of alien species and to report on those principles and any related work programme to the Conference of the Parties at its fifth meeting. The Conference of the Parties also requested the Subsidiary Body to identify the priority work pertinent to the issue of alien species in geographically and evolutionarily isolated ecosystems and to report thereon to the Conference of the Parties at its fifth meeting. The Subsidiary Body, at its fourth meeting, should also examine the Global Invasive Species Programme, with a view to considering concerted action and developing proposals for further action under the Convention on this issue.

2. Pursuant to that request, the Subsidiary Body, at its fourth meeting, held in Montreal in June 1999, adopted recommendation IV/4, in which it requested the Executive Secretary, inter alia, to develop, in cooperation with the Global Invasive Species Programme (GISP), principles for the prevention, introduction and mitigation of impacts of alien species, taking into account the proposed principles presented for debate at the fourth meeting of the Subsidiary Body (UNEP/CBD/SBSTTA/4/Inf.8) and the draft IUCN Guidelines for the Prevention of Biological Diversity Loss Due to Biological Invasions, for consideration by the Subsidiary Body at its fifth meeting.

3. Accordingly, the Executive Secretary is presenting in annex I of the present note draft guiding principles for the prevention, introduction and mitigation of impacts of alien species. These draft principles have been prepared, in cooperation with the Global Invasive Species Programme, on the basis of the above-mentioned proposed principles submitted for discussion at the fourth meeting of the Subsidiary Body and the draft IUCN Guidelines (using the latest, February 1999, version). In order to see practical examples of the issues tackled by the draft principles in action, the preparation process also drew upon relevant information contained in case-studies received pursuant to paragraphs 2 and 3 of recommendation IV/4, as well as on the national reports submitted under Article 26 of the Convention and other sources, as appropriate. This information is summarized in section II below.

4. The draft principles have been classified into four categories: a general category, which constitutes an introductory chapeau to more specific principles; and three categories reflecting the above-mentioned aspects of the alien species issue previously identified by the Conference of the Parties in its decision IV/1 C, namely prevention, introduction and mitigation of impacts.

5. It must be reiterated that the terminology surrounding the issue of impact arising from alien species is interpreted differently by different Parties and other Governments, and that additional terminology problems arise in the translation. The Subsidiary Body, at its fourth meeting, recommended that the Conference of Parties invite the Global Invasive Species Programme, the Food and Agricultural Organization of the United Nations, the International Maritime Organization, the World Health Organization and other relevant organizations to assist the Parties to the Convention in developing a standardized terminology on alien species and to inform the Subsidiary Body

on Scientific Technical and Technological Advice at its sixth meeting on progress made (recommendation IV/4, paragraphs 4 (f) and (i)). In the interim, for the purpose of this paper, terminology used in annex I is taken from the various case-studies, national reports, and other sources, without attempting to standardize. For the purpose of preparing the draft principles in annex I, working definitions are used.

II. PRACTICAL EXAMPLES OF THE ISSUES TACKLED BY THE DRAFT PRINCIPLES IN ACTION EMERGING FROM CASE-STUDIES, NATIONAL REPORTS AND OTHER SOURCES

6. Of the 110 national reports that are accessible through the clearing-house mechanism's national reports page on the Secretariat's website, 52 refer to measures, legislative, regulatory or policy measures, to address the issue of alien species. In many but not in the majority of cases, prevention is considered to be the best measure. Control measures are also in place, and several countries allowing release of any alien species to their territories (and sometimes even reintroduction of species) for different purposes do so only after permits have been issued. In some cases, legislation on biological diversity does not yet address alien species and therefore a specific legislative framework is missing.

7. Virtually all countries referring to invasions by alien species in case-studies and national reports recognize these invasions as one of the major factors limiting biological diversity today, and several refer specifically to the importance to prevent invasions to and between regions within the country. Most countries have taken legislative and policy measures to this effect, and in some cases, in the context of those measures, the issue of alien species is dealt with in relation with that of genetically modified organisms. Germany, for example, stresses that risk-assessment procedures and, more generally, legal regulations concerning alien organisms may be considered in comparison to genetically modified organisms.

8. National measures include extensive legislation, as well as numerous research and management programmes. Legislative measures can be as specific (sectoral) as to include fishery, nature conservation and game laws. The impact of sectoral activity is well illustrated by a case reported by Brazil, where highway construction, and the consequent expansion of agriculture and cattle-ranching, is considered as a highly significant impact on the forests and their biological diversity, which is frequently accompanied by the invasion by non-indigenous species.

9. Import risk analyses are conducted by several countries, including in accordance with standards developed under various international agreements. Australia's risk analyses are based on the International Plant Protection Convention and the World Organization for Animal Health. The European Community has adopted protective measures on alien species, including through import controls envisaged in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

10. Regulations often include animal and plant quarantines and measures to strictly enforce associated importing laws. They also encompass internal regulations for agencies involved in importing alien species for developing e.g. agricultural breeds. Countries are reviewing and sometimes strengthening their quarantine laws.

11. Most countries are Parties to the International Plant Protection Convention, 2/ which has "the purpose of securing common and effective action to prevent the spread and introduction of pests of plants and plant products, and to promote appropriate measures for their control." Each of these countries have national plant protection organizations established according to the Convention with authority in relation to quarantine control, risk analysis and other measures required to prevent the establishment and spread of all invasive alien species that, directly, or indirectly, are pests of plants. Under the Convention, Parties agree to cooperate on information exchange and on the development of International Standards for Phytosanitary Measures, which include agreements on definitions (terminology), and ways of working (procedures). These standards are recognized in the World Trade Organization's Agreement on the application of sanitary and phytosanitary measures.

12. More specific examples are provided in paragraphs 13-23 below, grouped according to the draft principles in annex I below to which they are potentially relevant. This information was drawn from case-studies received from: Argentina, Bulgaria, China, Ecuador, Galapagos, Germany, Israel, New Zealand, the Philippines, Thailand; and national reports of: Australia, Austria, Bahamas, Belarus, Botswana, Brazil, Bulgaria, Egypt, Estonia, Gambia, Germany, Kenya, Hungary, Ireland, Israel, Lesotho, Malawi, Mozambique, New Zealand, Norway, Oman, Poland, Portugal, the Russian Federation, Saint Lucia, Seychelles, Slovenia, South Africa, Swaziland, Sweden, Thailand, Turkey, Uganda, the United Kingdom, and the European Community.

13. With regard to the precautionary approach (draft principle 1), South Africa reports that, despite many efforts made by the Government to control alien species that become invasive, measures have been unsuccessful. It advocates for proactive responses to be preferred to reactive ones, as in the latter case action is taken when invasive alien species have already caused problems. South Africa refers to reactive measures as not being cost-effective, and states that they have resulted in drastic impacts on biological diversity. A proactive, preventative and precautionary approach to control the introduction and spread of alien organisms appears therefore as the best approach to deal with these organisms.

14. With regard to effects on local species and ecosystems and the ecosystem approach (draft principle 3), several countries report on the effects of alien species on local species and communities, including the alteration of the structure and functioning of local ecosystems and their related services. Argentina cites Cyprinus carpio, several types of salmon species (Salmo trutta, Salmo salar sebago and others) and other species such as Sturnus vulgaris and Castor canadiensis as all interacting with local populations and therefore determining new ecosystem conditions, which need to be further investigated. In Belarus, an example of impacts exerted by competitive relations between introduced species, on the one hand, and rare or low-plasticity species, on the other hand are the competitive ousting of European mink (Mustela lutreola) by American mink (Mustela vison). Egypt reports the introduction of an exotic species of freshwater crab, originally introduced in aquaculture basins, but which later found its way into major water channels, thus becoming a serious pest to commercial fish and to

2/ 110 Countries are Parties to the Convention, and many others apply its norms by virtue of their membership of associated regional bodies.

biological diversity in general. Egypt also cites the example of the water fern Azolla filiculoides, which is utilized as a biological fertilizer in rice fields. The plant has unintentionally escaped into water courses, where it seems to compete and replace a number of other native hydrophytes. Botswana reports about degradation of habitats resulting from the encroachment by invasive species such as Acacia species on over-grazed rangelands. Bulgaria states in its national report that invasions (for example, of the Black Sea by a new species of ctenophore) have significantly affected the dynamics of major ecosystems, such as the invasion of Mnemiopsis leidyi, which has caused a sharp decline in the catch of the main commercial fish species - the anchovy. The water hyacinth Eichornia crassipes is known for having significant adverse effects on the entire community in the littoral zones of major freshwater bodies worldwide. Some other globally-spread species are known for leading to the disappearance of sometimes up to hundreds of endemic species (such as the Nile perch Lates nilotica, which has caused the disappearance of hundreds of haplochromine cichlids in Lake Victoria). Galapagos has adopted measures that span from research and monitoring, to raising tourists' awareness, legislation, control, and cooperation with other countries in and outside the region.

15. On research and monitoring (draft principle 5), some countries report about promoting research into methods and approaches that improve our ability to assess whether or not alien organisms will have an adverse impact on biodiversity. Methods and approaches include mechanisms such as screening standards and risk assessment procedures. Under national biodiversity strategies, several countries are conducting, or plan to conduct, research into the biology and ecology of alien species that threaten biological diversity. Monitoring programmes are also conducted to assess the extent and impacts of introduced alien organisms. Regardless of the resources available, research has been identified as a priority by both developed and developing countries, and is clearly spelled out for example in the strategies to deal with alien species of Australia and Mozambique.

16. With respect to education and public awareness (draft principle 6), several countries have adopted measures to involve local residents, based on the assumption that, because of their closeness to nature, local people are more likely to be aware of species and habitats and can recognize changes in efforts to harvest a product, changes in habitat boundaries, disappearance of formerly common plant or animal species, and arrival of alien invading species. Local communities can also contribute to the monitoring and control process. In South Africa, incentives are provided to landowners to eradicate or control alien organisms that threaten biological diversity, with a focus on vegetation of key catchment areas.

17. Countries use different means to disseminate the information in order to raise public awareness regarding the risks of introduction of alien species. Malawi has included the commencement of radio programmes in its measures to educate the public on the risks posed by alien species. Also, the stage at which public awareness is considered in the context of national programmes and activities on alien species varies, depending on the country. In Oman, the implementation of public awareness measures has been undertaken as part of the process leading to the drafting of new legislation to control the import of exotic plants.

18. Several countries call upon national environmental authorities, sectoral agencies, sectors and organizations to inform and educate the public on the effects related to the introduction of alien species. The task of

informing the public is thus shared among those agencies and stakeholders but is in any event seen as a common responsibility.

19. On exchange of information (draft principle 8), many countries report figures of alien species that are, in both relative and absolute terms, significant. Thailand states that approximately 80 per cent of 1,000 plant species, including fruits, flowering plants and vegetables, have been introduced from other countries, whereas the remaining 20 per cent are believed to be indigenous or at least native. In China, alien species have been introduced intentionally or unintentionally, and according to incomplete statistics there are about 1,000 plant species and 126 animal species that have been introduced, of which currently 60 species are considered to be harmful. In Israel, out of 120 adventive wild plant species, about 30 have become widespread and have penetrated into natural ecosystems. Of these species 20 are known to be invasive species from other countries. Australia reports that 15 per cent of the Australian flora is imported from other countries and that in Tasmania the proportion is as high as 31 per cent. Belarus reports that, only in the last decade, more than 120 species of new alien, predominantly invasive (adventitious) plants have been found. Poland reports that 23 out of 116 fish species found in the country are alien and that, regionally, at least 50 species have been introduced to the Baltic in the last 100 years, mainly through ballast water.

20. This information needs to be organized in the form of check-lists. In Ireland, 300 out of the approximately 800 taxa of alien vascular plant species are considered to be established and are included in the census catalogue of the flora of Ireland. An annotated check-list of these species is currently in preparation. Lesotho reports on the lack of information and little documentation available on the effects of alien species invasion into economically important ecosystems. As information on alien species concerns in principle all countries, and as serious information gap would handicap efforts to deal with the introduced species, it is important that the information be made available through appropriate mechanisms and be shared.

21. On cooperation and capacity-building (draft principle 9), some countries report the need to identify and eliminate common sources of introductions and to develop national and international measures that support the identification and anticipation of the introduction of potentially harmful organisms in order to develop control measures. This is relevant to the issue of cooperation, as reflected in the related principle.

22. New Zealand reports that the major limitations in implementation of programmes relevant to biological diversity include lack of cost-effective techniques, particularly in relation to alien species, ecosystem recovery and species recovery. These limitations could be overcome through appropriate capacity-building measures. Thailand and Malawi report on the organization of training seminars for officers on how to deal with alien species, including import, export, or transfer of species outside the country, which use guidebooks on alien species, with pictures. Thailand also has seminars for the general public, which focus on impacts.

23. Some countries also deal with the issue of rehabilitation when addressing alien species. According to the draft IUCN Guidelines, eradications and some control programmes can significantly improve the likely success of reintroductions of native species and therefore provide opportunities to reverse earlier losses of native biological diversity. Australia carries out programmes coupling the promotion of the use of local

indigenous species in rehabilitation with discouraging the use of non-local native species in revegetation schemes.

III. CONCLUSIONS

24. In its analysis of the information contained in the case-studies submitted to the Secretariat, as well as in its searching of illustrative examples in national reports and other sources, the Secretariat noted a high degree of consistency between the proposed principles contained in document UNEP/CBD/SBSTTA/4/Inf.8, the draft IUCN Guidelines for the Prevention of Biological Diversity Loss Due to Biological Invasions, and the information contained in the case-studies, national reports and those other sources.

25. Bearing in mind that, at its fourth meeting, the Subsidiary Body on Scientific, Technical and Technological Advice recognized the two above-mentioned documents as a valid basis for the elaboration of a set of principles specifically for the Convention, and since the contents of those documents match the information reported by the Parties in terms of actions, needs and resources related to alien species, the draft guiding principles proposed by the Executive Secretary, in cooperation with the Global Species Invasive Programme, which reflect the above-mentioned information, can be considered as a suitable set of principles for adoption by the Conference of the Parties.

26. The analysis of the information contained in the case-studies, national reports and other sources recognize that the terminology surrounding the issue of impact arising from alien species is interpreted differently by different Parties, consistently with the recommendation by the Subsidiary Body that the Conference of Parties invite the Global Invasive Species Programme and others to assist the Parties to the Convention in developing a standardized terminology on alien species.

Annex I

DRAFT GUIDING PRINCIPLES FOR THE PREVENTION, INTRODUCTION AND MITIGATION OF IMPACTS OF ALIEN SPECIES

It should be noted that in the draft guiding principles below, terms are used for which a definition has not yet been developed, pending a decision by the Conference of Parties on the development of a standardized terminology on alien species, as mentioned in paragraph 5 above. In the interim and for the purpose of these draft principles, to avoid confusion the following definitions are used: (i) "alien" or "alien species" refers to a species occurring outside its normal distribution; (ii) "alien invasive species" refers to those alien species which threaten ecosystems, habitats or species.

A. General

Guiding principle 1: Precautionary approach

Given the unpredictability of the impacts on biological diversity of alien species, efforts to identify and prevent unintentional introductions as well as decisions concerning intentional introductions should be based on the precautionary approach. Lack of scientific certainty about the environmental, social and economic risk posed by a potentially invasive alien species or by a potential pathway should not be used as a reason for not taking preventative action against the introduction of potentially invasive alien species. Likewise, lack of certainty about the long-term implication of an invasion should not be used as a reason for postponing eradication, containment or control measures.

Guiding principle 2: Three-stage hierarchical approach

Prevention is generally far more cost effective and environmentally desirable than measures taken following introduction of an alien invasive species. Priority should be given to prevention of entry of alien invasive species (both between and within States). If entry has already taken place, actions should be undertaken to prevent the establishment and spread of alien species. The preferred response would be eradication at the earliest possible stage (Principle 13). In the event that eradication is not feasible or is not cost-effective, containment (Principle 14) and long-term control measures should be considered (Principle 15). Any examination of benefits and costs (both environmental and economical) should be done on a long-term basis.

Guiding principle 3: Ecosystem approach

All measures to deal with alien invasive species should be based on the ecosystem approach, 3/ in line with the relevant provisions of the Convention and the decisions of the Conference of the Parties.

3/ See the note by the Executive Secretary on the further conceptual elaboration of the ecosystem approach (UNEP/CBD/SBSTTA/5/11).

Guiding principle 4: State responsibility

States should recognize the risk that they may pose to other States as a potential source of alien invasive species, and should take appropriate actions to minimize that risk. In accordance with Article 3 of the Convention on Biological Diversity, and principle 2 of the 1992 Rio Declaration on Environment and Development, States have 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. In the context of alien invasive species, activities that could be a risk for another State include:

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

(b) The intentional or unintentional 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.

Guiding principle 5: Research and monitoring

In order to develop an adequate knowledge base to address the problem, States should undertake appropriate research on and monitoring of alien invasive species. This should document the history of invasions (origin, pathways and time-period), characteristics of the alien invasive species, ecology of the invasion, and the associated ecological and economic impacts and how they change over time. Monitoring is the key to early detection of new alien species. It requires targeted and general surveys which can benefit from the involvement of local communities.

Guiding principle 6: Education and public awareness

States should facilitate education and public awareness of 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 inform local communities and appropriate sector groups on how to support such measures.

B. Prevention

Guiding principle 7: Border control and quarantine measures

1. States should implement border control and quarantine measures to ensure that:

(a) Intentional introductions are subject to appropriate authorization (Principle 10);

(b) Unintentional or unauthorized introductions of alien species are minimized.

2. These measures should be based on an assessment of the risks 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 coordination may be useful.

Guiding principle 8: Exchange of information

States should support the development of database(s), such as that currently under development by the Global Invasive Species Programme, for compilation and dissemination of information on alien species that threaten ecosystems, habitats or species, to be used in the context of any prevention, introduction and mitigation activities. This information should include incident lists, information on taxonomy and ecology of invasive 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.

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 as:

(a) Where a State of origin is aware that a species being exported has the potential to be invasive in the receiving State, the exporting State should provide information, as available, on the potential invasiveness of the species to the importing State. Particular attention should be paid where exporting Parties have similar environments;

(b) 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;

(c) States should support capacity-building programmes for States that lack the expertise and resources, including financial, to assess the risks of introducing alien species. Such capacity-building may involve technology transfer and the development of training programmes.

C. Introduction of species

Guiding principle 10: Intentional introduction

No intentional introduction should take place without proper authorization from the relevant national authority or agency. A risk assessment, including 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. States should authorize the introduction of only those alien species that, based on this prior assessment, are unlikely to cause unacceptable harm to ecosystems, habitats or species, both within that State and in neighbouring States. The burden of proof that a proposed introduction is unlikely to cause such harm should be with the proposer of the introduction. Further, the anticipated benefits of such an introduction should strongly outweigh any actual and potential adverse effects and related costs. Authorization of an introduction may, where appropriate, be accompanied by conditions (e.g., preparation of a mitigation plan, monitoring procedures, or containment requirements). The precautionary approach should be applied throughout all the above-mentioned measures.

Guiding principle 11: Unintentional introductions

1. All States should have in place provisions to address unintentional introductions, (or intentional introductions that have established and become invasive). These include statutory and regulatory measures, institutions and agencies with appropriate responsibilities and with the operational resources required for rapid and effective action.

2. 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, ornamental aquaculture, tourism and game-farming, are often pathways for unintentional introductions. Legislation requiring environmental impact assessment of such activities should also require an assessment of the risks associated with unintentional introductions of alien invasive species.

D. Mitigation of impacts

Guiding principle 12: Mitigation of impacts

Once the establishment of an alien invasive species has been detected, States should take steps such as eradication, containment and control, to mitigate the adverse effects. Techniques used for eradication, containment or control should be cost-effective, safe to the environment, humans and agriculture, as well as socially, culturally and ethically acceptable. Mitigation measures should take place in the earliest possible stage of invasion, on the basis of the precautionary approach. Hence, early detection of new introductions of potentially invasive or invasive 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 and cost-effective, eradication should be given priority over other measures to deal with established alien invasive species. The best opportunity for eradicating alien invasive 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. Community support, built through comprehensive consultation, should be an integral part of eradication projects

Guiding principle 14: Containment

When eradication is not appropriate, limitation of spread (containment) is an appropriate strategy only where the range of the invasive species is limited and containment within defined boundaries is possible. Regular monitoring outside the control boundaries is essential, with quick action to eradicate any new outbreaks.

Guiding principle 15: Control

Control measures should focus on reducing the damage caused rather than on merely reducing the numbers of the alien invasive species. Effective control will often rely on a range of integrated techniques. Most control measures will need to be regularly applied, resulting in a recurrent

operating budget and the need for a long-term commitment to achieve and maintain results. In some instances biological control may give long-term suppression of an alien invasive species without recurrent costs, but should always be implemented in line with existing national regulations, international codes and Principle 10 above.

Annex II

OUTLINE FOR CASE-STUDIES ON ALIEN SPECIES

To the extent possible, case-studies should be short and succinct summaries of experience on alien species at the country and regional levels. A case-study should focus on the prevention of introduction, control, and eradication of alien species that threaten ecosystems, habitats or species.

Case-studies should include the following sections (a summary of the information may be provided under each heading, and a more detailed paper may be attached; if the information were not available, this should be indicated in the appropriate section):

1. Description of the problem

- Location of the case-study
- History (origin, pathway and dates, including time period between initial entry/first detection of alien species and development of impacts) of introduction(s)
- Description of the alien species concerned:
  Biology of the alien species (the scientific name of species should be indicated if possible) and ecology of the invasion(s) (type of and potential or actual impacts on biological diversity and ecosystem(s) invaded or threatened, and stakeholders involved)
- Vector(s) of invasion(s) (e.g. of deliberate importation, contamination of imported goods, ballast water, hull-fouling and spread from adjacent area. It should be specified, if known, whether entry was deliberate and legal, deliberate and illegal, accidental, or natural)
- Assessment and monitoring activities conducted and methods applied, including difficulties encountered (e.g. uncertainties due to missing taxonomic knowledge)

2. Options considered to address the problem

- Description of the decision-making process (stakeholders involved, consultation processes used, etc.)
- Type of measures (research and monitoring; training of specialists; prevention, early detection, eradication, control/containment measures, habitat and/or natural community restoration; legal provisions; public education and awareness)
- Options selected, time-frame and reasons for selecting the options
- Institutions responsible for decisions and actions

3. Implementation of measures, including assessment of effectiveness

- Ways and means set in place for implementation
- Achievements (specify whether the action was fully successful, partially successful, or unsuccessful), including any adverse effects of the actions taken on the conservation and sustainable use of biodiversity
- Costs of action

4. Lessons learned from the operation and other conclusions

- Further measures needed, including transboundary, regional and multilateral cooperation
- Replicability for other regions, ecosystems or groups of organisms

- Information compilation and dissemination needed.
