UNEP

CBD

Convention on Biological Diversity

Distr.
GENERAL

UNEP/CBD/COP/9/INF/32
26 March 2008

ENGLISH ONLY

CONFERENCE OF THE PARTIES TO THE
CONVENTION ON BIOLOGICAL DIVERSITY
Ninth meeting
Bonn, 19-30 May 2008
Item 3.3 of the provisional agenda*

IN-DEPTH REVIEW OF INVASIVE ALIEN SPECIES – INFORMATION COMPILED BY THE EXECUTIVE SECRETARY

Note by the Executive Secretary

1. This document compiles information gathered by the Executive Secretary for the in-depth review of invasive alien species. Information received in submissions from Parties, other Governments and organizations and this document were the key sources of information for the official presession document on the in-depth review of ongoing work (UNEP/CBD/COP/9/11) as well as the relevant recommendation of SBSTTA-13 (UNEP/CBD/COP/9/3) on the outcomes of the consultation on the lack of international standards covering invasive alien species.

* UNEP/CBD/COP/9/1.

/…

TABLE OF CONTENTS

I. BACKGROUND, MANDATE AND SCOPE

1. 'Invasive alien species' is a cross-cutting issue under the Convention on Biological Diversity, and is subject to in-depth review at the ninth meeting of the Conference of the Parties in accordance with decision VIII/10 regarding the Operations of the Convention (paragraph 6 and annex II).

2. Guidance on the in-depth review was given by COP in decision VIII/27, paragraph 71, which "Requests the Executive Secretary, in preparation for the in-depth review of ongoing work on invasive alien species that will take place at the ninth meeting of the Conference of the Parties (as specified in decision VII/31 on the multi-year programme of work) to review implementation of all decisions related to invasive alien species on the basis of *inter alia* the third national report and the views and experiences submitted by Parties, other Governments and relevant international organizations not later than six months prior to the ninth meeting of the Conference of the Parties, and to report on that review to the Conference of the Parties at its ninth meeting."

3. Since invasive alien species is a cross-cutting issue under the CBD, it has been addressed to varying degrees under the thematic work programmes and other cross-cutting issues. Consequently, the decisions that need to be reviewed include not only those specific to invasive alien species, but also any decision addressing the issue.

4. In addition, guidance can also be taken from the Guidelines for the Review of the Programmes of Work of the Convention, contained in annex III of decision VIII/15. Although these guidelines are intended to guide reviews of the thematic work programmes, for which there are formal programmes of work, many elements are also relevant to cross-cutting issues. For example, the purpose of reviews is to determine progress made to advance the objectives of the Convention, and should include information from Parties on:

(a) Progress made on implementation of the programme of work

(b) Barriers to implementation of the programme of work

(c) Priorities for capacity-building to address the barriers

(d) The contribution the programme of work has provided to Parties in implementing the Convention; and

(e) The contribution of the programme of work in reducing the rate of biodiversity loss.

5. Regarding the process of reviewing implementation of a programme of work, the Guidelines note that a review can include *inter alia*:

(a) Consideration of whether, and to what degree, the implementation of activities has contributed to meeting the objectives of the Convention and provisional goals and targets of the framework for evaluating implementation of the three objectives of the Convention and progress towards the 2010 target;

(b) Identification of barriers to effective implementation of the Convention within the thematic area, and capacity building priorities to address the barriers;

(c) Consideration of whether, and to what degree, the Convention Secretariat and other partners have facilitated the mobilization of necessary financial resources. This would involve analysing the trends in funding for the issue, as well as actions taken by the financial mechanism and other multilateral and bilateral donors in response to the guidance of the Conference of the Parties regarding the programme of work;

(d) Assessment of the current and future effectiveness of the programme of work in the context of the Millennium Development Goals and the Johannesburg Plan of Implementation of the World Summit on Sustainable Development. The activities of the programme of work should be assessed against the status and trends in biodiversity, new scientific knowledge and other emerging issues, to

determine whether these remain adequate for reducing rates of biodiversity loss, promoting sustainable use, and contributing to the fair and equitable sharing of benefits arising out of the utilization of genetic resources.

6. Importantly, the Guidelines note that modification of existing programmes of work should only occur where a significant gap has been identified and filling this gap would provide valuable further guidance to Parties, other Governments and organizations supporting implementation of the Convention. For example, activities could be included where required to address needs, in light of: (i) status and trends in biodiversity, current and projected major threats to biodiversity and new scientific knowledge, obstacles to sustainable use and to the fair and equitable sharing of benefits arising out of the utilization of genetic resources, and the experience of the previous version of the programme of work; and (ii) results of a gap analysis taking into account all relevant activities including those being undertaken within the framework of other conventions, and by organizations and initiatives that contribute to the objectives of the programme of work (the gap analysis would also help to identify opportunities for collaboration, as well as areas where additional activities would add the most value).

7. Activities being undertaken by other conventions, organizations and initiatives should be acknowledged so that the work under the CBD fills gaps and provide added-value. Also, for any potential new activities, consideration should be given to the financial implications in light of their likely effectiveness and impacts, and the capacity of Parties and partners to implement them. Consideration should also be given to measures to provide practical support, including financial and technical support, for national and regional implementation.

II. SOURCES

8. All information gathered during the in-depth review of invasive alien species is available on or linked to the IAS portal at http://www.cbd.int/invasive.shtml.

A. Third National Reports

9. As requested in paragraph 71 of decision VIII/27, 3rd national reports were used as a key source of information for the in-depth review. A summary of information on IAS taken from the reports is contained in Annex B to this report.

B. Submissions from Parties, other Governments and Organizations

10. Parties, other Governments and organizations were invited by the COP to make submissions for the in-depth review in paragraph 71 of decision VIII/27. A reminder was sent by the Executive Secretary in November 2006 (Notification 2006-116). Submissions are compiled in a separate information document.

C. The Millennium Ecosystem Assessment

11. In decision VIII/9, paragraphs 12-13, the COP decided to consider the findings of the Millennium Ecosystem Assessment in the implementation and the future review of the programmes of work and cross-cutting issues under the Convention, and noted the urgent need to address the issues which the Assessment finds most significant at the global level in terms of their impacts on biodiversity and consequences for human well-being, such as: … (e) the introduction of invasive alien species.

12. A summary of the findings of the Millennium Ecosystem Assessment regarding IAS is contained in Annex B to this report.

D. Other sources

13. In addition to national reports, submissions, and the Millennium Ecosystem Assessment, the Guidelines for the Review of the Programmes of Work of the Convention, contained in annex III of decision VIII/15, provide some additional suggestions for other sources, including:

- Information from the 2010 monitoring exercise (global headline indicators)
- Information from other international and national scientific bodies such as science academies and science associations.
- Reports of, and information from, the Global Environment Facility and other multilateral and bilateral donor agencies on thematic areas and cross-cutting issues;
- Experiences shared through the clearing-house mechanism and other information-sharing mechanisms.

All of these source have been used to the extent possible.

III. IN-DEPTH REVIEW OF WORK ON INVASIVE ALIEN SPECIES

A. Consultations on international standards

14. In paragraph 14 of decision VIII/27, the COP requested the Executive Secretary "to consult with relevant international bodies and instruments, such as the International Plant Protection Convention, the World Organization for Animal Health (OIE), the Food and Agriculture Organization of the United Nations, and the World Trade Organization, taking into account the observations of the report of the Ad Hoc Technical Expert Group (UNEP/CBD/SBSTTA/11/INF/4), regarding whether and how to address the lack of international standards covering invasive alien species, in particular animals, that are not pests of plants under the International Plant Protection Convention, and to report on the results of these consultations for consideration by the Subsidiary Body on Scientific, Technical and Technological Advice and by the Conference of the Parties at its ninth meeting".

15. The secretariat began consultations initially in mid-2006. At the suggestion of the WTO secretariat and at the invitation of the Chair of the Committee on Sanitary and Phytosanitary Measures (SPS Committee), the secretariat consulted informally with SPS Committee members. Following that meeting, the secretariats of the CBD, OIE, IPPC and WTO continued to explore the issue in more detail by teleconference. One of the starting points was the observations of the AHTEG, in particular paragraphs 21-22 and 30-34 which including *inter alia* possible options for addressing the identified lack of international standards. However, during the consultations the ideas exchanged were not limited to the observations of the AHTEG.

16. The CBD secretariat has reported on the status of these consultations to SBSTTA-13, and any recommendations that may emerge from SBSTTA-13 will be forwarded directly to COP-9. For that reason, the consultations are not reported on further here.

B. National needs and priorities

17. In decision VI/23[1] paragraph 10 (a), the COP requests Parties to "Identify national needs and priorities". Only some Parties (15%) have identified their needs and priorities for the implementation of the Guiding Principles, while some Parties (34%) have not. Half of responding Parties reported that they are identifying their needs and priorities. The most common avenue of assessing needs and priorities was through development of national strategies or action plans. Needs and priorities identified include strengthening policies, institutions and capacities; disseminating information on risk, impacts and management of IAS; and implementing strategies for prevention and management of IAS.

18. It should be noted that in national reports, some Parties (27% - see Annex B) have identified some or all IAS of major concern, and have a tracking system in place to address IAS. A larger percentage of industrialized Parties have some or all major IAS identified with tracking systems in place than do developing countries and Parties with economies in transition. For example, Switzerland has

1/ One representative entered a formal objection during the process leading to the adoption of this decision and underlined that he did not believe that the Conference of the Parties could legitimately adopt a motion or a text with a formal objection in place. A few representatives expressed reservations regarding the procedure leading to the adoption of this decision (see UNEP/CBD/COP/6/20, paras 294-324).

established a black list to register those alien species that have caused damage and a watch list to record those alien species with the potential to cause damage or that have caused damage in neighbouring countries.

C. Implementation of the Guiding Principles

19. In decision VI/23 (para 5), the COP "urges Parties, other Governments and relevant organizations to promote and implement the Guiding Principles for the prevention, introduction and mitigation of impacts of alien species that threaten ecosystems, habitats or species". According to 3rd national reports (see Annex B), only a few Parties (12%) had mechanisms in place to coordinate national programmes for applying the Guiding Principles and many Parties (40%) had mechanisms under development. Almost half of responding Parties (49%) had not created such mechanisms. In comments provided by Parties, the most common mechanisms to coordinate national programmes were steering committees, national strategies and action plans and coordination between government departments and ministries. A few Parties also mentioned coordination at the border, quarantine measures and legislation, as mechanisms for national coordination of IAS issues.

20. The Guiding Principles address prevention and mitigation of impacts of IAS. In 3rd National Reports, Parties were asked whether measures have been undertaken to prevent the introduction of, control or eradicate, those alien species which threaten ecosystems, habitats or species. Most Parties (83%) have some preventive measures in place and only a few have established comprehensive measures. A larger percentage of industrialized Parties have comprehensive measures in place compared to other economic groups of countries. Approximately half of responding Parties mentioned legislation and policies that contain provisions and measures to prevent the introduction of, control or eradicate alien species. Approximately one quarter of responding Parties mentioned surveillance/monitoring programmes at the point of entry. Some Parties reported management techniques, quarantines and physical/chemical/phytosanitary measures. A few Parties mentioned EIA/risk assessment, outreach/education, collaboration, research, biocontrol and a national strategy/action plan as preventive measures. In decision V/8. (paragraph 6), the COP "urges Parties, other Governments and relevant bodies to give priority to the development and implementation of alien invasive species strategies and action plans". Out of 127 Parties who have submitted their 3rd National Report, 8 Parties report that they have a strategy for dealing with Invasive Alien Species. In addition, there are regional strategies for Europe, the Pacific Islands, and the Caribbean.

21. In decision VI/23 paragraph 10 (c), the COP requests Parties to "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". Based on analysis of 127 national reports, many Parties (41%) have some measures, policies and tools in place to promote activities to reduce the threats of IAS and only one Party has comprehensive measures and tools in place. Some Parties (37%) have not developed financial measures, policies and tools and some Parties (22%) have measures and policies under development. Many industrialized countries have some financial measures, policies and tools in place, however, many countries with economies in transition have yet to develop measures, policies or tools to address IAS. Many developing countries are developing measures and policies in this regard. Many Parties mentioned government institutions and departments as being responsible for funding IAS projects and creating laws to reduce their threats. For example, the European Union, through the Nature component of the LIFE programme, has funded over 100 projects on management of IAS (1992-2002).

22. In light of the Guiding Principles, a few Parties (6%) have already made adjustments and completed development of relevant policies, legislation and institutions, while almost half of Parties (41%) have not. Some Parties (29%) are reviewing their relevant policies, legislation and institutions. A few Parties (13%) have ongoing adjustment and development, and a few Parties (11%) have completed review with the adjustment proposed. About half of developing countries and countries with economies in transition have not reviewed, adjusted and/or developed policies, legislation and institutions, while most

industrialized countries have undertaken the review and adjustment. Of the countries that had completed adjustments and developments, few provided details on the extent of changes introduced to relevant legislation, policies and institutions, as a result of reviews undertaken. Development of national invasive species strategies was often cited as a means of integrating relevant policies, although many Parties reported that only reviews and analyses had been undertaken. Many countries listed new laws and policies that contain provisions and measures to address IAS.

23. Guiding Principles 1 and 3 address the precautionary approach and the ecosystem approach respectively. In decision V/8. paragraph 8, the COP "Urges Parties, other Governments and relevant bodies, such as the Global Invasive Species Programme, in their work on alien invasive species, to give priority attention to geographically and evolutionarily isolated ecosystems, and to use the ecosystem approach and precautionary and biogeographical approaches, as appropriate". Many Parties (59%) reported that they are using the ecosystem, precautionary and biogeographical approaches in their work on IAS. However, close to half (41%) responded that these approaches were not being used. Some Parties commented on some precautionary measures that may involve the ecosystem and biogeographical approach: legislation/policy, regulations on the import of aliens at points of entry, control programmes, phyto-sanitary and quarantine measures, and risk analysis. The Ecosystem Approach appears to be more commonly used than other approaches mentioned. The precautionary approach has been used by many countries with regard to implementation of quarantine and related procedures at points of entry. Few countries commented on the biogeographical approach.

D. Assessment and research

24. The COP has specifically urged Parties and organizations to promote and carry out research and assessment on several aspects of IAS (decision VI/23, paragraphs 15, 24). In addition, guiding principle 5 addresses research and monitoring of IAS.

25. In decision VII/13, paragraph 6, the COP "*Invites* relevant Parties to the Convention on Biological Diversity and other Governments, as well as national, regional and international organizations to: (b) Support national and regional decision-making and rapid response through the further development of risk analysis. Similarly, in decision VI/23, paragraph 12 (a), the COP encouraged Parties to "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". According to 3rd national reports (Annex B), only a few Parties (5%) have comprehensive activities underway while 28% are undertaking some activities in this regard. Some Parties (38%) have not developed capacity for risk assessment to address threats of IAS. Some Parties (29%) have not developed capacity for risk assessments but relevant programmes are under development. Many industrialized countries have undertaken various activities to develop capacity for risk assessments. Several Parties mentioned conducting risk assessments in accordance or collaboration with the International Plant Protection Convention (IPPC).

26. Based on information from 3rd national reports, only a few Parties (11%) have assessed risks to ecosystems, habitats and species for most alien species. Most Parties (71%) have assessed risks only for species of concern. All industrialized Parties, as well as some countries with economies in transition, have assessed risks posed by some or most IAS. About one third of Parties reported on research/risk assessments of IAS in aquatic ecosystems. Some Parties reported projects on agro-ecosystems and a few commented on projects in marine and coastal, forest and island ecosystems. Certain Parties mentioned research on certain invasive taxonomic groups – almost half of the Parties cited plants/trees; some Parties had done risk assessments for fish, terrestrial vertebrates, reptiles, amphibians, insects/invertebrates; and a few Parties mentioned microorganisms and marine/ aquatic zoobenthic organisms. Some African Parties indicated that they had conducted research and/or risk assessments on the water hyacinth (*Eichhornia crassipes)* which is considered the world's worst invasive aquatic weed, which occurs in more than 50 countries on five continents.

27. Information about several organizations, networks and initiatives involved in assessment and research can be found on the IAS portal.

E. Collaboration and cooperation

1. Collaboration among Governments

28. In decision VIII/27, paragraph 62, the COP urges Parties "to be proactive in preventing the introduction and spread of invasive alien species within their territories". In decision VII/13 paragraph 6, Parties are invited to "a) Improve the coordination of regional measures to address transboundary issues through the development and implementation of regional standards, regional support for risk analysis and regional cooperation mechanisms". In decision VI/23, paragraph 10, the COP urged Parties to "(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". Guiding Principle 9 encourages Parties to cooperate with other Governments in order to address invasive alien species.

29. According to 3rd national reports (see Annex B), 64 Parties reported regional and/or subregional cooperation to address IAS issues. 24 Parties had established mechanisms for bilateral cooperation; 31 Parties noted multilateral cooperation; and 28 Parties indicated that they were not involved in any mechanisms for international cooperation. Industrialized economies have the highest rate of participation in bilateral, regional/subregional and multilateral cooperation in this field. Over half of developing countries engage in regional/subregional cooperation to address IAS. The role of the Global Invasive Species Programme (GISP) in providing opportunities for countries to work together to address IAS, was also mentioned by a number of Parties.

30. In decision VIII/27, para 60, the COP "*Encourages* Parties, other Governments, and regional bodies to develop procedures and/or controls to ensure that cross-border impacts of potentially invasive alien species are considered as part of national and regional decision-making processes, taking into account already existing procedures and controls for invasive alien species that are pests of plants under the International Plant Protection Convention". Based on 127 3rd National Reports, Parties were asked whether they are collaborating with trading partners and neighbouring countries to address threats of invasive alien species to biodiversity in ecosystems that cross international boundaries. Some Parties (21%) have relevant programmes in place; however, some Parties (33%) were not collaborating with trading partners and neighbouring countries to address threats of IAS. Many Parties (46%) have relevant collaborative programmes under development. More industrialized Parties have developed programmes for collaboration with neighbouring countries and trading partners, compared to developing countries and Parties with economies in transition.

2. Regional activities, agreements and networks

31. Many regional agreements exist related to IAS. They vary widely in scope and content but most are treaties or conventions on conservation of natural resources and wildlife that contain IAS provisions protecting wildlife from IAS (see IAS Portal for a list of some regional agreements at http://www.cbd.int/invasive/done.shtml). These regional agreements cover Africa, Antarctic, Southeast Asia, Latin/Central America, Europe and the South Pacific. Regional Conventions related to protection of aquatic and marine ecosystems are reviewed in the thematic sections below.

32. Parties within the European Union have been particularly active at regional level in addressing IAS. Decision VI/23, paragraph 21, welcomed "the initiative of the Council of Europe in the framework of the Bern Convention to help the implementation of Article 8(h), including the development of a European Strategy on Invasive Alien Species". In 2003 the Bern Convention and the Council of Europe produced the "European strategy on invasive alien species"

(http://www.nobanis.org/files/eu_strategy_inva.pdf), which promotes coordinated efforts to minimize the negative impacts of IAS on Europe's biodiversity, economy and human health[2].

33. Some examples of cooperative projects and activities related to IAS in Europe and other regions include the following –see the IAS portal for other relevant examples:

- **The LIFE Program-EU Project (**http://ec.europa.eu/environment/life/life/nature.htm). In 1992, the European Union Governments adopted legislation designed to protect the most highly threatened habitats and species across Europe (Scalera and Zaghi 2004). A network was formed of specially protected areas for conservation called the Natura 2000 series (http://www.natura.org/) that includes all EU member states and the EU Commission. IAS has been addressed within these areas of special conservation and pilot actions have been undertaken to eradicate and control IAS. Out of a total of 715 LIFE Nature projects conducted between 1992 and 2002, 102 include measures dealing with IAS (about 14 % of the total). The total budget spent for implementing these projects amounts to over 27 million Euros.

- **EPIDEMIE Project – EU project (**http://science.ceh.ac.uk/epidemie/). Using a multidisciplinary approach involving ecologists, statisticians, modellers, and economists, EPIDEMIE addresses the issue of ecosystem vulnerability due to exotic plant invasions. EPIDEMIE aims to provide insight into plant invasions, strategies and approaches to management of vulnerable ecosystems and new perspectives in local and regional policy.

- **European and Mediterranean Plant Protection Organization's (EPPO) regional approach to invasive alien species** (https://www.ippc.int/cds_static/en/invasive_species_ippc_en_26901_all_2.html). The EPPO is the regional plant protection organization for Europe and the Mediterranean region and has 46 member countries and is recognized under the framework of the IPPC. Due to the numerous internal borders in the European and Mediterranean region, phytosanitary efforts should be supported by their neighbours. EPPO have developed over 400 regional standards for phytosanitary measures and works with its members and authorities responsible for all regulatory aspects of plant protection and plant quarantine. In 2002, the EPPO Council decided that IAS that affect plants are quarantine pests under the IPPC. An Ad hoc Panel on IAS has been recently established, concentrating on invasive plants. The panel has created a list of hundreds of plants reported to be invasive in EPPO countries, and selected from that list about 40 species to be studied in greater detail.

- **North American Plant Protection Organization (**http://www.nappo.org/menu_e.shtml). NAPPO was created in 1976 and is a Regional Plant Protection Organization of the International Plant Protection Convention. NAPPO harmonizes the work on IAS between Canada, the United States and Mexico in order to protect plant resources from the entrance, establishment and spread of regulated plant pests, while facilitating trade.

34. In decision VI/23, paragraph 11, the COP urged "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". Numerous networks exist and are useful for information and expertise sharing and access. Some networks are specific to IAS while other existing networks have made IAS one area of focus. Many of these cooperative networks allow data sharing and dissemination between countries and regions and/or across data portals. Below are summaries of a selection of regional networks.

- **FAO's** Forestory websites - With regard to forestry, a global review of the impacts on forest and forestry by alien invasive species was undertaken by FAO in 2005, and a wide range of information made available online (http://www.fao.org/forestry/site/aliens/). Parties may be

2/ Genovesi, P. and Shine, C. (2003). European Strategy on Invasive Alien Species. Convention on the Conservation of European Wildlife and Natural Habitats, Standing Committee 23rd meeting, Strasbourg.

particularly interested in accessing a database on invasive tree species; www.fao.org/forestry/site/24107/en that summarizes information from forest tree species that have been reported to be invasive outside their native habitat. Databases on insects and diseases that are harmful to forests as well as forest pest profiles are also available on FAO's forest health website www.fao.org/forestry/site/pests/en

- **Forest Invasive Species Network for Africa – FISNA (h**ttp://www.fao.org/forestry/site/26951/en/). The Forest Invasive Species Network for Africa (FISNA) was created in December 2004 by the Forest Research Institute of Malawi (FRIM) and FAO. Seven African countries (Ghana, Kenya, Malawi, South Africa, United Republic of Tanzania, Uganda, Zambia) were represented in FISNA. The objective of FISNA is to coordinate the collation and dissemination of information relating to forest invasive species in sub-Saharan Africa for sustainable forest management and conservation of biodiversity. All countries in sub-Saharan Africa are eligible to participate in the network.

- **Asia-Pacific Forest Invasive Species Network (APFISN) (**http://envfor.nic.in/divisions/fret/apfisn.htm). The Asia Pacific Forestry Commission (APFC) is part of the FAO and its objective is to facilitate discussions at the regional level for government policy-makers, NGOs, local organizations and the private sector. The focus of APFISN is on forestry issues, including global policies, raising awareness and shaping of international policy discussions.

- **BioNET's regional networks.** BioNET has established a series of subregional technical cooperation networks known as LOOPs (Locally Owned and Operated Partnerships) to help developing country governments build capacity and share resources for taxonomy, which may include work on invasive species. LOOPs are permanent, self-sufficient, government-owned and formed by intergovernmental agreement to address national and regional taxonomic priorities identified by their member countries. Established LOOPs exist in several subregions.

- **Inter-American Biodiversity Information Network (**http://i3n.iabin.net/). In decision VI/23, paragraph 22, the COP "welcomes the "I3N" (Inter-American Biodiversity Information Network (IABIN) Invasives Information Network) initiative on invasive alien species, and calls on the Global Environment Facility, Parties, Governments and relevant organizations to support and participate in these initiatives". The IABIN Invasives Information Network (I3N) integrates information from countries of the Western Hemisphere to facilitate IAS detection and management, and cooperation on IAS information collection, sharing, management, and distribution. I3N provides capacity building, electronic tools, increased access to information and support for database development. The IABIN Invasives Information Network (I3N) is coordinated by the National Biological Information Infrastructure (NBII) of the United States Geological Survey (USGS) and funded by the U.S. State Department.

- **North European and Baltic Network on Invasive Alien Species** (NOBANIS – http://www.nobanis.org/About.asp). NOBANIS has established a portal with access to information and a network of databases on invasive and potentially invasive alien species of the region (includes Denmark, Estonia, Finland, Faroe Islands, Germany, Greenland, Iceland, Latvia, Lithuania, Norway, Poland, Sweden and the European part of Russia). NOBANIS's network enables cooperation between authorities for IAS and provides administrative tools to implement the precautionary approach. Regional cooperation established by NOBANIS helps countries in eradication, control and mitigation of ecological effects of invasive alien species.

3. Mainstreaming and collaboration within national Governments

35. In decision VI/23, paragraph 10, the COP urged Parties and other Governments to "(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". Similar encouragement was made in decision VII/13 (paragraphs 4 (d), 5e and 6) and in decision VIII/27 (paragraphs 8 and 27).

36. Based on analysis of 127 submissions of 3rd national reports (Annex B), some Parties (29%) stated that mechanisms were in place for cooperation between sectors. Over half of responding Parties (53%) reported no sectoral cooperation, but potential mechanisms were under consideration; and some Parties (17%) have no cooperation between sectors. Cooperation mechanisms are established mostly in the form of coordinating groups and committees, and through development of national strategies and action plans. For example, in Cameroon, committees were created in 2005 to link committees established in various sectors such as the Phytosanitary Committee, the Committee of Biological Diversity, Committee on Environment; Committee on Biosecurity etc**.** In Canada, the National Invasive Species Strategy is enhancing cooperation between sectors to improve prevention, early detection, rapid response and management of IAS. China has set up a cross-sectoral coordinating group on prevention and control of IAS. The European Community has developed several related plans that provide a framework for enhanced cooperation between sectors. In the Philippines, a National Committee on Biosafety has developed a set of guidelines that provide a framework for enhancing sectoral cooperation to improve prevention, eradication and control of IAS. In Samoa, a national IAS Steering Committee has been established representing over 30 agencies involved in preventing and reducing impacts of IAS.

4. International bodies, instruments, and organizations

37. There are dozens of international bodies, legal instruments, guidelines and/or codes of conduct that deal with some facet of IAS prevention or management. Many of these are listed on the IAS web portal.

38. Many international bodies, instruments and organizations have been invited by the COP to address IAS or to take IAS into account in their work. The COP has made general references to many bodies and organizations including but not limited to 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 the Convention on the Conservation of Migratory Species of Wild Animals, the Convention on Wetlands (Ramsar, Iran, 1971), the Convention on the Conservation of European Wildlife and Natural Habitats, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, the World Heritage Convention, and the Man and the Biosphere Programme of the United Nations Educational, Scientific and Cultural Organization, the Global Invasive Species Programme, and its participating organizations[3]. In addition more specific invitations have been made to certain organizations to address particular issues, and many of these are discussed under relevant sections of this document that address particular pathways or ecosystem types.

39. Some of the key activities of selected international bodies, instruments and organizations include the following:

40. **The Global Invasive Species Programme** (GISP – http://www.gisp.org/). The Global Invasive Species Programme (GISP) was established in 1997 to address global invasive alien species threats and to provide support to the implementation of Article 8(h) of the CBD. The COP has addressed GISP in numerous decisions and assigned the GISP a leadership role in coordinating global efforts to facilitate implementation of Article 8(h) (e.g., see decision V/8, paragraph 14).

41. GISP is run by a consortium of the Scientific Committee on Problems of the Environment (SCOPE), CAB International (CABI), the South African National Biodiversity Institute (SANBI) and the World Conservation Union (IUCN). GISP is also partners with the United Nations Environment Programme (UNEP) and is a component of DIVERSITAS. The GISP Secretariat was established in 2003

3/ Examples include decision VII/13, paragraph 11; decision VI/23, paragraphs 8, 14, 16; decision V/8, paragraph 11.

to organize the implementation of the Global Strategy on Invasive Alien Species. The primary objective of GISP is to assist with the prevention, control and management of invasive species on a global level. GISP aims to provide scientific data for decision-making on invasive species; develop capacities for early warning and rapid assessment and response systems; enhance management capacity and control methods for invasives; reduce economic impacts of invasives; develop improved risk assessment methods; and reinforce international agreements. GISP also works to develop public education about IAS and examine legal and institutional frameworks for controlling invasives and design new tools for assessing the impact of invasives.

42. Some of the main activities of GISP have been to:

- Facilitate information-sharing related to IAS (GISP was designated as an international thematic focal point under the Clearing-House Mechanism)
- Develop initiatives to address IAS priorities identified by COP (mandate for this comes from decision VII/13 paragraph 11).
- Lead development of a joint programme of work related to IAS among key bodies including the CBD, the Convention on Wetlands, the International Maritime Organization, and the International Plant Protection Convention (in response to decision VI/23, paragraph 26(e)). This included co-organizing (with the CBD secretariat) two workshops in 2005, one on marine and coastal IAS (held in June 2005) and the other on terrestrial and freshwater IAS (held in November 2005).
- Develop concept papers on important IAS issues
- Complete an assessment of the socio-economic and biological impacts of invasive alien species on inland water- and island ecosystems

43. **CAB International –** CABI, together with GISP, produced a toolkit[4] of best prevention and management practices to address IAS, as guidance for biodiversity conservation and managers. The toolkit provides examples of best practices and insights into how to tackle IAS issues and is global in scope with a small island focus. Information is presented on building strategy and policy, methods for prevention of invasive species, risk-analysis process, methods for early detection of new invasive species and a review of management approaches. The toolkit was adapted to form a website, which can be updated with new information as it becomes available (http://www.cabi-bioscience.ch/wwwgisp/gtcsum.htm). CABI is currently developing an Invasive Species Compendium, in collaboration with partners, that aims to draw together scientific information and databases on IAS for researchers, students and practitioners.

44. **IUCN – The World Conservation Union** (www.iucn.org). IUCN, through its Invasive Species Specialist Group (ISSG), has been particularly active in addressing IAS. The ISSG is an international group of 146 scientific and policy experts on invasive species from 41 countries, which provides advice on threats, control or eradication to IUCN members, conservationists, and policy-makers. ISSG's focus is on reducing biodiversity loss, with particular attention to IAS that threaten islands. The ISSG has developed the Global Invasive Species Database and is active in the Global Invasive Species Information Network (GISIN). IUCN has produced Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species (IUCN 2000). The IUCN Guidelines are a voluntary instrument addressing the gaps in IAS regulation. These Guidelines address all wildlife threatened by IAS, whether animal plant, terrestrial or marine and are designed to help implement article 8h of the CBD, and raise awareness and understanding of impacts of IAS to reduce the negative effects of alien invasive species.

45. **The Nature Conservancy (**http://www.nature.org/initiatives/invasivespecies/). The Global Invasive Species Initiative, a network that is part of the Nature Conservancy (TNC), is working with its

4/ T Wittenberg, R., Cock, M.J.W. (eds.) 2001. Invasive Alien Species: A Toolkit of Best Prevention and Management Practices, http://www.gisp.org/publications/toolkit/Toolkiteng.pdf

partners to prevent and control species invasions with 50 US states and over 30 countries. TNC provides scientific information for Governments and policymakers to make informed decisions about combating IAS, in addition to building awareness and providing funds. The TNC also works with the private sector to prevent invasions from pathways such as ballast water, shipping containers, packaging and trade in exotic pets and plants.

46. The Nature Conservancy and Instituto Hórus collaborated to produce Brazil's first nationwide survey and assessment of IAS, and documented over 200 invasive plant and animal species. This survey led to the first national symposium on IAS in 2005, which produced a government-created technical advisory group. TNC also sponsored a similar assessment in the Caribbean, and are currently working with partner Governments and agencies to create a coordinated plan for preventing and controlling invasive species across the region.

47. CITES **(Convention on International Trade in Endangered Species).** In decision VII/13, paragraph 4, the COP recognized "the need to strengthen further institutional coordination among international organizations and *requests* the Executive Secretary to: (c) Further collaborate with relevant conventions including the Convention on International Trade in Endangered Species (CITES)." At the 16th and 22nd meetings of the Plants and Animals Committees respectively in July 2006, both committees agreed that it would be useful if the CBD secretariat could keep the Plants and Animals Committees informed about relevant issues concerning IAS (reference document PC16/AC22 Sum.1 Rev.1). At the earlier meetings (15th and 21st respectively), the committees had considered some of the links between CITES and CBD on the issue of IAS, but the 16th and 22nd meetings, in reviewing the issues further, decided that work on these issues would not be pursued.

48. **World Trade Organization (WTO).** The WTO and its relevant bodies have been invited by the COP to consider IAS issues (decision VII/13 paragraph 5 (a)). The COP has also requested the Executive Secretary to collaborate with the WTO secretariat with regard to capacity-building and awareness raising about IAS (paragraph 5 (b) of the same decision), and has requested the Executive Secretary to seek observer status in the SPS Committee (paragraph 5(c)) – the application for observer status in the SPS Committee (and other committees) is still pending, although the Executive Secretary does have observer status in the Committee on Trade and Environment in Regular Session (CTE-R). The World Trade Organization (WTO), together with the IPPC, OIE, and FAO are involved in the consultations on standards covered in section 3.1 of this document.

49. Joint **Liaison Group of the Convention on Biological Diversity**. Decision VII/13 (a) calls for fuller consideration of issues relating to invasive alien species in other international forums, including through the joint liaison group (JLG) of the CBD, the United Nations Framework Convention on Climate Change and the United Nations Convention to Combat Desertification, and the Collaborative Partnership on Forests.

50. The JLG was formed in 2001 to link the three Rio Conventions (CBD, UNFCCC, UNCCD) as an informal forum to exchange information and exploring opportunities for synergies and coordination. To date there has been little work by the Joint Liaison Group done on IAS.

51. **International Plant Protection Convention (IPPC)**. The IPPC has been extremely active in addressing invasive alien species, since there is considerable overlap in scope between the IPPC and the CBD. The IPPC definition of a plant pest includes any organism that directly or indirectly affects plants. Several IPPC standards address IAS. In addition, decisions of the Commission on Phytosanitary Measures have addressed IAS, most notably the decision of ISPM-7.

52. In decision VII/13. 4. the COP "*recognizes* the need to strengthen further institutional coordination among international organizations and *requests* the Executive Secretary to: (e) develop a joint work plan with the secretariat of the International Plant Protection Convention". A joint work plan has been developed and has been updated periodically following meetings between the two secretariats. This joint work plan contains the following elements:

- Mechanisms of collaboration
- Implementation of decisions of the Commission on Phytosanitary Measures (CPM, formerly the ICPM)
- Development of standards under IPPC
- Implementation of COP and COP/MOP decisions
- Development of guidance/standards under the CBD and Biosafety Protocol
- Terminology
- Capacity-building and technical assistance
- Websites and information-sharing

53. The CBD secretariat has participated in several IPPC meetings including expert groups to draft standards under the IPPC. Similarly, the IPPC has been represented at numerous CBD meetings, including the AHTEG on gaps and inconsistencies in the international regulatory framework on IAS. The IPPC also led a workshop "Invasive species and the International Plant Protection Convention: An expert consultation on phytosanitary services and environmental protection agencies". This workshop aimed to facilitate the exchange of ideas between experts, environmentalists and regulators and for them to learn how the IPPC can help prevent the spread of IAS.

54. **Office International des Epizooties (OIE**). The OIE is an international intergovernmental organization that sets standards to prevent animal diseases in trade of animals and animal products, but not on animals that are themselves pests. The OIE sets codes for standards on import risk analysis and import/export procedures and minimum health precautions for trading partners to avoid the spread of animal diseases. In decision VII/13, para 4, the COP "*recognizes* the need to strengthen further institutional coordination among international organizations and *requests* the Executive Secretary to (f) Establish closer linkages with the Office international des epizooties".

55. A joint meeting of the secretariats was held in 2004 in order to identify issues of common interest, including IAS. More recently, the OIE has been directly involved in the consultations on international standards for IAS as discussed in section 3.1 above.

5. Terminology

56. A key aspect of collaboration among international bodies including the CBD secretariat has been promotion of clarification and common understanding of terminology[5]. Terminology related to IAS has been compiled by the Executive Secretary on the IAS portal, and also by CAB International. The IPPC has a glossary working group that also works towards clarification of terminology.

F. Information-sharing, communication, and awareness-raising

57. The COP has put considerable emphasis on information-sharing, communication, and awareness-raising regarding IAS. There have been a number of general invitations to Parties and organizations[6] to carry out relevant activities and to engage stakeholders and indigenous and local communities, including through Guiding Principle 8 on exchange of information. There have been numerous requests to the Executive Secretary[7] to facilitate information-sharing, communication and awareness-raising. One result has been the development of the IAS portal on the CBD website.

5/ Decision VIII/27, paragraphs 67-70 deal with terminology related to IAS.

6/ Decision VIII/27, paragraphs 3, 4, 6, 11, 12, 13, 16, 17, 61; decision VII/13, paragraph 6c; decision VI/23, paragraphs 10e, 10f, 19, 25, 27, guiding principle 8 in the annex; decision V/8, paragraphs 3, 9, 12.

7/ Decision VIII/27, paragraphs 11, 69; decision VII/13, paragraph 12; decision VI/23, paragraphs 13, 25, 26, 28, 32; decision V/8, paragraphs 4, 14

58. The IAS portal contains links to glossaries, publications, databases, case studies and experiences with IAS, guidance documents and tools. It also contains links to organizations, government websites and initiatives that aim to share information and raise awareness regarding IAS. All of the specific information that was found during the in-depth review is available in or linked to the IAS portal, and is not repeated here. However, it is worth highlighting the important role of a few organizations with respect to information-sharing:

- GISP – the GISP website is an important source of information and links regarding IAS. The GISP was designated as a thematic focal point for IAS under the clearing-house mechanism.
- The Global Invasive Species Database (GISD - http://www.issg.org/database/welcome/) is managed by the Invasive Species Specialist Group (ISSG) of the Species Survival Commission of the IUCN-World Conservation Union and led by the Global Invasive Species Programme (GISP). This is a key database of information regarding IAS.
- The Global Invasive Species Information Network (GISIN - http://www.gisinetwork.org/index.html) is an internet platform for sharing invasive species information internationally and collaborates with Government, non-government, nonprofit, educational, and other organizations**.** GISIN is currently developing a pilot system to search across various invasive species information systems already existing on the Internet. GISIN is also working increase capacity, internationally, and to standardize invasive species information on the web. A list of more than 240 accessible databases and GISIN publications are available on their website (http://www.gisinetwork.org/pubs.html).

G. Addressing particular pathways

59. The COP has addressed particular pathways for IAS in several decisions. However, the main source of COP guidance for pathways comes from decision VIII/27, which was based on the recommendations of the Ad Hoc Technical Expert Group (AHTEG) that met in New Zealand from 16 to 20 May 2005. The AHTEG addressed gaps and inconsistencies in the international regulatory framework in relation to IAS. The full report of the meeting is available on the CBD website as document UNEP/CBD/SBSTTA/11/INF/4.

60. The IAS portal includes pathway-specific key tools and guidance related to invasive alien species (http://www.cbd.int/invasive/tools.shtml). Links are available to documents and information under the following pathways: Biological Control, Civil Air Transport, Marine and aquatic pathways, Military, International aid and development and Scientific research.

1. Conveyances

61. In decision VIII/27, paragraph 16, the COP invited "Parties and other Governments to share, through the clearing-house mechanism and other means, national experiences in dealing with invasive alien species, in particular animals and their parasites, introduced or spread through various conveyances (e.g., vessels, floating timber, equipment and machinery, household goods, packaging and containers, waste materials, air transport vessels, tourist vessels, etc.), including any risk assessments or risk management measures that have been carried out for particular species or pathways. In addition, the COP encouraged relevant regional bodies and institutions to develop regional guidance for particular conveyances as pathways for introduction and spread of invasive alien species" (paragraph 18) and invited "relevant bodies and institutions, such as the Global Invasive Species Programme, the Working Group on Ballast and Other Shipping Vectors of the International Council for the Exploration of the Sea, and the Working Group on Non-Indigenous Species of the North Pacific Marine Science Organization, to further study conveyance pathways for introduction and spread of invasive alien species, and to conduct risk assessments for potential future introductions (paragraph 19).

62. 'Conveyances' as a pathway is a broad catch-all category that includes vectors of transport for which specific pathways have been identified (e.g., aircraft). Many of these vectors have been addressed by governments and organizations, as discussed in subsequent sections.

2. Aquaculture/mariculture

63. The COP addressed aquaculture / mariculture as a pathway for IAS in decision VIII/27 (paragraphs 20 to 24). Aquaculture and mariculture are rapidly growing industries providing pathways for unintentional introductions of alien species including escaped fish, their parasites and diseases. Intentional introduction for aquaculture, including the ornamental aquarium trade, is the leading pathway of entry for invasive species in inland water ecosystems are caused by invasive alien species. Aquaculture has been cited as the main reason for introducing fin-fish into inland water systems with 40% of the documented introductions. One-third of the established aquaculture fin-fish species were reported to have adverse ecological impacts (Bartley and Casal 1999). The top five species established for aquaculture are: common carp (*Cyprinus carpio)*, Mozambique tilapia (*Oreochromis mossambicus)*, rainbow trout (*Oncorhynchus mykiss)*, largemouth bass (*Micropterus salmoides)* and brown trout (*Salmo trutta)* (source: UNEP/CBD/SBSTTA/10/INF/4).

64. There are no specific binding international requirements that address the use of alien species in aquaculture and there are no requirements for assessments of risks prior to the release of alien aquatic organisms in transboundary water systems. OIE codes address disease risks but not the invasiveness of introduced stock. However there are two voluntary codes and one technical guideline, which are described on the CBD IAS portal (https://www.cbd.int/invasive/done.shtml) that establish principles and best practice guidance: FAO Code of Conduct for Responsible Fisheries (1995), International Council for the Exploration of the Sea: Code of Practice on the Introduction and Transfers of Marine Organisms (2004) and the FAO Technical Guidelines for Responsible Fisheries: Precautionary Approach to Capture Fisheries and Species Introductions (1995).

65. Binding obligations can be found under two United Nations agreements, the United Nations Convention on the Law of the Sea, where Parties are requested to take measures "to prevent, reduce and control pollution of the marine environment resulting from … the intentional or accidental introduction of species alien or new, to a particular part of the marine environment, which may cause significant and harmful changes thereto" (Article 196); and 1997 United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses (not yet entered into force), where States are required to take measures to "prevent the introduction of species, alien or new, into an international watercourse which may have effects detrimental to the ecosystem of the watercourse resulting in significant harm to other watercourse States" (Article 22). In decision VIII/27, paragraph 22, the COP *"Urges* Parties and other Governments to ratify and implement the 1997 United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses;". In decision VIII/27, paragraph 21, the COP *"Urges* Parties and other Governments to implement the Code of Practice on the Introduction and Transfers of Marine Organisms of the International Council for the Exploration of the Sea, the Code of Conduct on Responsible Fisheries of the Food and Agriculture Organization of the United Nations, and Article 196 of the United Nations Convention on the Law of the Sea;".

66. At regional level, the Convention Concerning Fishing in the Waters of the Danube **(**http://eelink.net/~asilwildlife/danubefish.html) specifies that the intentional introduction and breeding of new species of fish, animals and aquatic plants in the waters of the Danube can only be carried out with the consent of the Commission (Annex Part V, article 10).

67. The Global Aquaculture Alliance (http://www.gaalliance.org/) is an international, nonprofit trade association that aims to promote progress in environmentally and socially responsible aquaculture and promotes best management practices for sustainable aquaculture through the Responsible Aquaculture Program (RAP), conferences and other activities. GAA is a voluntary program that is primarily educational in nature. The RAP began as the "Guiding Principles for Responsible Aquaculture" that promote a cooperative approach to establishing aquaculture and encourages environmental, economic,

and social sustainability. The Guiding Principles were then expanded with the "Codes of Practice for Responsible Shrimp Farming". GAA then established the Best Aquaculture Practices standards for responsible shrimp farming addressing social and environmental issues and food safety but there are no specific guidelines for alien species. GAA has aligned with Aquaculture Certification Council (ACC), Inc. to offer more formal recognition of sustainable practices. ACC is a nongovernmental organization that certifies social, environmental and food safety standards at aquaculture facilities internationally and applies the Global Aquaculture Alliance Best Aquaculture Practices standards in a certification for shrimp production facilities.

68. In decision VIII/27 paragraph 3, the COP invited Parties "to develop and implement national and regional programmes of work, such as those under the Asia-Pacific Economic Cooperation, for the sustainable management of aquaculture as well as for the control of aquatic invasive species." Fisheries under the Asia-Pacific Economic Cooperation (APEC) account for over 75% of the world's capture fisheries and over 90% of the world aquaculture production. The APEC region consumes 70% of global fish products. The Fisheries Working Group (FWG) was created in 1991 and represents 21 economies in the Pacific. Although there is no specific work on alien species, the objectives of the FWG are to promote "the conservation and sustainable use of fisheries resources; sustainable development of aquaculture and habitat preservation; development of solutions to common resource management problems; the enhancement of food safety and quality of fish and fisheries products; sector-specific work relating to trade and investment liberalization and facilitation. FWG activities over the past few years were initially guided by the 2002 Seoul Oceans Declaration (Seoul, Korea 22-26 April, 2002) where APEC countries resolve to "Facilitate, through exchange of information, effective regional implementation of global fisheries instruments in achieving responsible fisheries and sustainable aquaculture;"

3. Ballast water

69. The transfer of harmful organisms and pathogens in ships' ballast water is projected to increase three-fold due to increased trade in the next century, with developing countries and small island states being most at risk.

70. The main international instrument for ballast water is the International Convention for the Control and Management of Ship's Ballast water and Sediments which provides guidance and strategies to prevent, minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens through ships' ballast water and sediments. The Convention was adopted by an IMO Diplomatic Conference in 2004 and builds on the complementary roles of coastal, port and flag States as well as the shipping industry in protecting marine environment. The Convention will enter into force 12 months after 30 States representing 35% of the world's merchant shipping tonnage have ratified it. As of December 2007, 11 States representing 3.46% of the world's merchant shipping tonnage have ratified the Convention (www.imo.org) and several other States are in the process of ratification.

71. The International Convention on Ballast Water Management supersedes the IMO Voluntary Guidelines for the Control and Management of Ships' Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens (IMO Assembly Resolution A.868 (20)), which assist Governments and authorities, ship operators and owners, port authorities, and other relevant parties, to reduce the risk of harmful organisms and pathogens from ballast water and sediments while protecting ships' safety.

72. In decision VII/13 paragraph 3, the COP "*Notes* the adoption of the International Convention for the Control and Management of Ships' Ballast Water and Sediments under the International Maritime Organization, and recommends that Parties to the Convention on Biological Diversity and other Governments consider ratifying this Convention". In decision VIII/27 paragraph 25, the COP "*Urges* Parties and other Governments to ratify and implement the International Convention on the Control and Management of Ships' Ballast Water and Sediments as soon as possible". Decision VII/13, paragraph 3 and VII/5, annex element 5, objective 5.2 also address the ratification and implementation of this convention.

73. In decision VIII/27 paragraph 26, the COP "*Urges* Parties and other Governments to address, in their national legislation, the issue of domestic translocation of ballast water, by vessels requiring equivalent compliance with but not covered by the International Convention on the Control and Management of Ships' Ballast Water and Sediments, as stipulated in the guideline for equivalent compliance for small craft which is under consideration by the Marine Environmental Protection Committee of the International Maritime Organization.". The Guidelines for Ballast Water Management Equivalent Compliance (G3) was adopted by MEPC in July 2005.

74. The GEF/UNDP/IMO Global Ballast Water Management Programme (GloBallast - http://globallast.imo.org/) being executed by IMO is helping to address this issue in developing countries, The pilot phase of this programme focussed on (2000-2004) promotion of communication and awareness raising activities; capacity-building; training and technical assistance; risk assessments and port baseline surveys; and co-operative regional arrangements between neighbouring countries in six developing regions. A scaling-up of this pilot phase is currently being undertaken through the second phase of this programme titled **GloBallast Partnerships** (2008-2012). **GloBallast Partnerships** will assist particularly vulnerable countries to enact legal, policy and institutional reforms to meet the objectives of the International Convention for the Control and Management of Ships' Ballast Water and Sediments and will focus on the implementation of the BWM Convention. The Project will assist 14 developing sub-regions and will include 13 Lead Partnering Countries and over 40 Partnering Countries from 5 high priority sub-regions, namely Wider Caribbean, Mediterranean, Red Sea and Gulf of Aden, the Pacific coast of South America, and the West Coast of Africa.

75. GloBallast Partnerships has also developed a number of tools to address the issue of ballast water management, the main one being the "Introductory Training package on Ballast Water Management" which was developed in partnership with the UN-Train Sea Cost Programme. This 9-module comprehensive training package is currently used by a number of regional and national level training activities around the world. The other tools GloBallast Partnerships developed include the "GloBallast Risk Assessment Package" including a large set of databases, GIS tools and statistical analysis tools. In addition, GloBallast and BBC joined hands together to develop a highly acclaimed TV-documentary on Ballast Water/Invasive Species issues, titled "Invaders from the Sea".

76. At regional level, the Great Lakes-St Lawrence Seaway System in Canada/United States has some of the most stringent standards in the world for management of ballast water (www.greatlakes-seaway.com/en/navigation/ballast_water.html). In the past, IAS have significantly changed this ecosystem, having broad economic and social effects. Coordinated efforts are under way by U.S. and Canadian governments, eight state governments, two provincial governments, and regional and local programs. U.S. Coast Guard regulations and Transport Canada's "Ballast Water Control and Management Regulations" with "Canadian Guidelines for Ballast Water Management" require all ships from beyond the exclusive economic zone (EEZ) to exchange their ballast at sea or else pump the ballast water ashore to be treated in an environmentally sound manner or return to sea to conduct a ballast water exchange. Residual ballast water is also subject to strict regulations. Additionally, foreign vessels are subject to inspection as part of the Enhanced Seaway Inspection (ESI) program, which measures salinity of the ballast water to ensure, the environment is harsh enough for remaining organisms. In addition the "Voluntary Management Practices to Reduce the Transfer of Aquatic Nuisance Species within the Great Lakes by U.S. and Canadian Domestic Shipping" (2001) require that ships not operating beyond the EZZ to comply to regular inspections and removal of sediment.

77. In Australia, the CSIRO Centre for Research on Introduced Marine Species (CRIMP) has developed a ballast water risk assessment framework on behalf of the Australian Quarantine and Inspection Service (AQIS)[8].

8/ Hayes, K.R. and Hewitt, C.L. (2000). Centre for Research on Introduced Marine Species. Technical Report no. 21. Risk Assessment framework for ballast water, Vol. II. CSIRO Marine Research. Hobart 198 pp.

78. Under the GEF-UNDP-IMO GloBallast Partnership Programme, a number of regions have developed and adopted Regional Strategic Action Plans and formalized Regional Task Forces to implement the Regional Action Plans (http://globallast.imo.org).

4. Hull-fouling

79. Hull fouling is an important pathway for the transfer of alien species, and has been addressed by the COP in decision VIII/27 (paragraphs 29-33) and in decision VI/23 (paragraph 7). No specific instruments exist concerning IAS transferred by hull fouling and few countries have national controls. The COP, in paragraph 32 of decision VIII/27, reiterated its call "to the International Maritime Organization regarding the need to address the issue of hull-fouling". The Marine Environmental Protection Committee of IMO, has initiated the deliberations on this issue and in 2007 approved the inclusion of a new high priority item in its BLG Sub-Committee's work programme, and instructed the Sub-Committee to commission the development of international measures for minimizing the translocation of invasive aquatic species through bio-fouling of ships.

80. In decision VIII/27, paragraph 31, the COP encouraged Parties "to ratify and implement the 2001 Convention on the Control of Harmful Anti-fouling Systems on Ships". However, there is concern about an increase in introductions related to hull-fouling as few alternative exist to the tributyltin (TBT) – based anti-fouling paints.

5. Air transport

81. Air transport is an important pathway for invasive alien species. Species may be moved inside the cabin in passengers clothing or luggage, stowaways in cargo, in packing materials, wheel wells and other aircraft parts. Many contracting Parties require that passengers and cargo carried by air be subject to quarantine measures and controls at borders. These controls vary depending on the country and their particular vulnerabilities. Many contracting Parties also require disinsection and disinfection of the aircraft to prevent introduction of insects and microorganisms. However, little guidance exists at the international level to assist Governments in developing national policies and there are no binding agreements addressing civil air transport.

82. The International Civil Aviation Organization (ICAO) and contracting states have recognized the threat posed by the introduction, by civil aviation, of IAS of flora and fauna. In 2004, ICAO adopted the Assembly Resolution A35-19 committing member states to reducing threats of potential IAS and for ICAO to produce guidance material and standards and recommended practices (SARPs) to reduce risks. In decision VIII/27, paragraph 34, the COP *"Welcomes* resolution A35-19 of the Assembly of the International Civil Aviation Organization (ICAO) on invasive alien species, and *invites* the International Civil Aviation Organization to address invasive alien species as a matter of urgency". In paragraph 35, the COP requested the Executive Secretary "to collaborate with the secretariat of the International Civil Aviation Organization, as appropriate, to support any efforts to develop guidance or standards according to resolution A35-19". In paragraph 36, the COP encouraged "the secretariats of the International Civil Aviation Organization and Asia-Pacific Economic Cooperation, in addressing the issue of invasive alien species, to coordinate with other relevant bodies, including the secretariats of the Convention on Biological Diversity and the International Plant Protection Convention".

83. ICAO conducted a worldwide survey on the IAS problem *vis-à-vis* international air transportation to find out if member States were aware of intentional and unintentional introductions of IAS through air transportation; if they had entered into any agreements with Governments or international organizations (other than ICAO) that directly address the prevention/management of the unintentional introduction and spread of IAS via international civil aviation; and if they had in place outbound border control and management programmes to prevent the unintentional export of species that were invasive elsewhere.

84. The ICAO has also requested member States and their national organizations for air transport to provide "best practices" in combating the spread of IAS via civil aviation, which supports decision VIII/27, paragraph 37, where the COP "*Encourages* Parties and other Governments to promote

collaboration at the national level among relevant agencies responsible for matters of invasive alien species and/or civil air transport (e.g., civil aviation, transport, customs, trade, plant protection, environment) so that all relevant issues are raised through national participation in the International Civil Aviation Organization". To date, ICAO has not had adequate resources to analyze the results or carry the issue forward. GISP is attempting to raise funds for the analysis of these results to develop guidelines for invasive species prevention in air transport.

6. Military activities

85. In decision VIII/27, paragraph 38, the COP encouraged "relevant United Nations bodies, in collaboration with the Convention on Biological Diversity and relevant organizations, to develop and promulgate guidance or codes of practice to address the issue of introduction and spread of invasive alien species associated with military operations or aid including peace-keeping operations". The COP also encouraged "relevant United Nations bodies, in collaboration with the Convention on Biological Diversity and relevant organizations, to develop and promulgate guidance or codes of practice to address the issue of introduction and spread of invasive alien species associated with military operations or aid including peace-keeping operations" (paragraph 38), and encouraged "Parties and other Governments to ensure that they promote good practice in relation to invasive alien species in any military-aid or joint exercises, and to develop procedures and build capacity among their military forces to avoid the introduction of potentially invasive species into new areas, taking into account relevant international guidance, and to detect and rectify any problems of invasive alien species created during military operations". There is little information available regarding IAS and military operations, with the exception of one publication by the National Wildlife Federation (see link in IAS portal).

7. Emergency aid, relief and response

86. Humanitarian or other emergency relief or aid efforts may cause introductions or spread of IAS, in particularly due to the short-time period for urgent preparation of humanitarian responses, which makes incorporating invasive alien species considerations difficult. Very little information is available on this topic, suggesting perhaps that IAS threats are not often considered in emergency aid, relief and response efforts. The COP addressed the issue of IAS transport associated with emergency aid, relief and response (decision VIII/27, paragraphs 40-42), and encouraged relevant bodies and organizations to develop codes of practice. Little guidance exists in this regard, with the exception of the IUCN Best Practice Guidelines for Restoration of Tsunami-Affected Areas. GISP has a link to one relevant case study on its website addressing the Introduction of Parthenium Weed into Ethiopia (http://www.cabi-bioscience.ch/wwwgisp/gtc3cs10.htm), where famine relief was implicated in the introduction of this exotic species as contaminants of food grain.

8. International development assistance

87. The COP encouraged "United Nations bodies and other organizations involved in international development assistance, in cooperation with the Convention on Biological Diversity and other relevant bodies or agreements, to develop or adopt existing procedures or codes of practice to minimize the risks associated with the use, dispersal or establishment of invasive alien species, taking into account relevant national codes of practice or other guidance" (decision VIII/27, paragraph 43), and also urged "Parties and other Governments to consider, through collaboration with biosecurity, biodiversity and aid organizations, national controls or codes of practice to address invasive alien species in development assistance efforts" (paragraph 44). The World Bank has prepared a preliminary report on this issue in 2006, while the FAO has developed specific procedures for food-aid shipments (see guidance section of the IAS portal). In addition, the US Agency for International Development has produced a report linking development assistance and IAS in freshwater systems in southeast Asia (also available through the IAS portal).

9. Scientific research

88. Scientific research has been identified as a significant pathway causing spread of pests and diseases on contaminated equipment, movement of research organisms and biological specimens and the reintroduction of species as part of biodiversity management programmes. Researchers may also carry equipment, pests or organisms to sites of high conservation value that may be closed to the public. The COP addressed this issue in decision VIII/27, paragraphs 45 and 46, by urging "Parties, other Governments and relevant organizations to raise awareness among scientific research organizations of existing measures to control the spread of invasive alien species, and to put in place measures to prevent or minimize the risks of introduction and spread of invasive alien species associated with scientific research activities", and by encouraging "relevant international and regional organizations, including the Future Harvest (CGIAR) centres, Botanic Gardens Conservation International and the International Union of Forestry Research Organizations, as well as professional societies, to develop codes of practice for preventing and minimizing the risk of introduction and spread of invasive alien species associated with scientific-research activities, and to carry out risk assessments as appropriate on proposed species introductions associated with such scientific-research activities, recognizing the need to avoid duplication of efforts, and *encourages* the Global Invasive Species Programme to review and make available existing information in this regard.

89. In decision VIII/27, paragraph 47, the COP *"Requests* the Executive Secretary, in consultation with relevant bodies and organizations, to identify existing guidelines on scientific research that address invasive alien species, and to disseminate them through the clearing-house mechanism;". Research guidelines have been updated on the IAS portal (http://www.cbd.int/invasive/tools.shtml). The most comprehensive guidance is a code of conduct for field work developed by the Scientific Committee on Antarctic Research, which aims to minimise introductions of alien species to Antarctic and subantarctic environments and to reduce the risk of accidental transfer of alien species between major ice-free localities. The issue has also been acknowledged in guidance developed by:

- the US Aquatic Nuisance Species Task Force
- the American Society of Ichthyologists and Herpetologists, American Fisheries Society, and the American Institute of Fisheries Research Biologists.
- The Australian Department of the Environment and Heritage – Australian Antarctic Division

10. Pets, aquarium species, live bait, live food and plant seeds

90. Exotic aquarium fish and plants, as well as pets, can become invasive alien species if they are intentionally or accidentally released and become established. For example, feral domestic cats (*Felis catus)* have caused local and regional declines and extinctions due to their predatory impact on native prey, especially on islands. Another example the tropical seaweed *Caulerpa taxifolia* , which is speculated to be a hardier clone developed for aquarium purposes. It is adapted to colder waters and has spread throughout the northern Mediterranean, and other areas including Australia, threatening native marine flora and fauna - it is listed as one of IUCN's 100 of the world's worst invasive species. Other species initially imported as aquarium fish, such as tilapia, carp, guppies, barbs and swordtails have also been recorded in various locations outside their native range. Another striking example is the Burmese Python (*Python molurus bivittatus*), native to India and China, which is established in Florida and preys upon mammals, birds, reptiles, amphibians, and fish. Common in the pet trade, it has successfully been reproducing in Everglades National Park since at least the 1980s.

91. The COP has urged Parties and Governments to "take measures, as appropriate and consistent with their national and international obligations, to control import or export of pets, aquarium species, live bait, live food or plant seeds, that pose risks as invasive alien species" and to "take action, as appropriate and consistent with their national and international obligations, to prevent and minimize introductions of known invasive species into the wild, including through measures addressing disposal and discard of such species" (decision VIII/27, paragraphs 53 and 54).

92. There are no specific international standards concerning risks of invasions involving trade of pets and aquarium species that are not pests of plants under IPPC, such as fish, reptiles, or insects. There are also no international standards for risks of invasions related to live bait and live food. In addition, there has been an increase in such trade due to internet-based pet and bait sales. Exotic plants and animals are often traded illegally over the internet and an alarming rate, without normal controls and regulation (source: UNEP/CBD/SBSTTA/11/INF/4).

93. In paragraph 52 of decision VIII/27, the COP *"Encourages* relevant Government departments, consumer protection groups, industry, trade and shipment organizations, and other relevant organizations such as the Universal Postal Union and the Global Express Association, to raise awareness with consumers, including through Internet sites that facilitate transactions or may otherwise be visited by consumers, and to further study, as appropriate, current safe disposal measures for imported alien species, with a view to considering development of guidance or codes of practice regarding trade in pets, aquarium species and plant seeds, in particular disposal and discard of such species". In this regard, the Pet Industry Joint Advisory Council (PIJAC - http://www.pijac.org/i4a/pages/index.cfm?pageid=154), the world's largest pet trade association, aims to help sustain the global pet industry and focuses on education, information, governmental and regulatory issues. It is centred on US issues but also deals with international affairs. PIJAC recognizes that importation, captive breeding, acquisition, sale and/or possession of non-native species poses a threat to the environment. They have analyzed regulations which range from "(1) prohibit all species until the industry can prove on a species-by-species basis that the species can not pose a threat to man, agriculture or the environment under any conditions, (2) prohibit new introductions (species not previously in trade) until species is subjected to a screening/risk assessment process. For species in trade, new monitoring systems (under development) would require that a limited number of species perceived to pose a "serious threat" be evaluated for possible prohibition or regulations (i.e. permits, containment rules)".

94. The internet has accelerated the rate of trade. The United States Department of Agriculture (USDA) has an Internet Surveillance Project, which includes an Agricultural Internet Monitoring System (AIMS), however this is only effective for US sites. GISP has invited contracting Parties to the CBD and others to present their views on how to address this issue (http://www.gisp.org/publications/brochures/index.asp).

11. Biocontrol agents

95. Exotic species are often used to control pest species, which can become invasive pest species themselves. The main instrument regulating the trade and use of biocontrol agents is the Code of Conduct for the Import and Release of Exotic Biological Control Agents (FAO 1995 - http://www.fao.org/docrep/x5585E/x5585e0i.htm). The Code of Conduct is destined to facilitate safe import, export and release of biological control agents and introduce internationally acceptable procedures, especially where national legislation is inadequate or non-existent. In addition, the IPPC has developed a standard (revised International Standard for Phytosanitary Measures #3) on Guidelines for the Export, Shipment, Import and Release of Biological Control Agents and Other Beneficial Organisms (e.g., pollinators) (www.acfs.go.th/sps/downloads/76047_ISPM_3_E.pdf -). However, animals used in biological control of animals are not specifically addressed. Marine organisms used in biocontrol are included in the ICES Code of Practice on the Introductions and Transfers of Marine Organisms, which is voluntary.

96. The COP has encouraged Governments and organizations to take measures to address this issue, taking into account the work of IPPC and others (decision VIII/27, paragraph 55), and also encouraged "the animal breeding industry, as well as regional and international organizations such as IUCN and the World Association of Zoos and Aquariums, to promote sharing of best practices regarding the movement of alien animal species for *ex situ* breeding" (paragraph 56).

12. Ex-situ animal breeding programmes

97. *Ex-situ* conservation or "off-site conservation" is the process of protecting a threatened/endangered species of plant or animal by relocating part of a population to an area where it may be protected and breed, to often be relocated back to its original habitat. Zoos and botanical gardens are the most common methods of ex-situ conservation. The COP, in decision VIII/27, paragraph 57, urged "Parties and other Governments to take measures as appropriate and consistent with their national and international obligations, based for example on risk assessment, to control movements of animals used for *ex situ* breeding, including controlling the movements of fish between water bodies and drainage basins as well as containing the movements of animals within safari parks and zoos".

98. The Convention on International Trade in Endangered Species (CITES) controls movements of certain categories of endangered species, some being potentially invasive. IUCN has issued Technical Guidelines on the Management of *Ex Situ* Populations for Conservation (2002) (www.eaza.net/download/doc_EEP_IUCNGuidelines.pdf), which refer to invasive species (Plant and animal).

99. Botanic gardens are major source of alien species introductions . At its second congress in 2004, Botanic Gardens Conservation International stated that the issue of invasive alien species is important. The Centre for Plant Conservation has issued Voluntary Codes of Conduct for Botanic Gardens and Arboreta. These are professional codes of conduct designed to control the use and distribution of invasive plant species. These codes are being considered by the major professional societies and organizations for endorsement (List of endorsements: http://www.centerforplantconservation.org/invasives/endorsementN.html).

13. Tourism

100. Tourism has been identified as a source of accidental and deliberate introductions of alien species. The COP has urged Governments and regional bodies to take measures to address the issue, and has encouraged action by organizations such as the World Tourism Organization and the International Air Transport Association[9]. The Guidelines on Biodiversity and Tourism Development annexed to decision VII/14 call for policies and good practices covering prevention of "the introduction of alien species as a result of the construction, landscaping and operating of tourism activities, including for example from shipping associated with tourism" (paragraph 49g). The Guidelines also mention the need for monitoring and surveillance to prevent the introduction of alien species as a result of tourism activities (paragraph 71). The IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species[10] include a guiding principle that encourages operators in eco-tourism businesses to raise awareness on the problems caused by alien invasive species and to work to develop industry guidelines

H. Addressing Particular Ecosystems

1. Islands

101. The COP has given particular emphasis to the issue of IAS associated with islands (e.g., decision V/8, paragraph 8). The programme of work on islands biodiversity, adopted in decision VIII/1, contains several elements addressing. For example, the programme of work calls on Parties to establish control systems at national island borders, to collaborate to identify and address pathways for movement of IAS, to develop and implement measures for early detection and rapid response, to develop and implement plans for prevention, eradication and management, and to enlist the support and cooperation of all sectors of society to address IAS (section E, paragraphs 10.1, 10.2, 10.3, 11.1, 11.2).

102. The programme of work on island biodiversity contains several supporting actions for the Executive Secretary, primarily aimed at assisting Parties, facilitating collaboration and facilitating information sharing (decision VIII/1, paragraphs 9, 24). In this regard, the Island Biodiversity Portal on

9/ Decision VIII/27, paragraphs 50-51
10/ http://www.iucn.org/themes/ssc/publications/policy/invasivesEng.htm

the CBD website includes IAS-related information (https://www.cbd.int/island/invasive.shtml), including a list of partner organizations that are working to control threats to island biodiversity from IAS CBD (http://www.cbd.int/island/partners.shtml).

103. A few examples of initiatives taken by certain organizations or bodies include the following (others are listed in the islands portal and/or IAS portal):

(a) **Global Island Partnership (GLISPA -** https://www.cbd.int/island/glispa.shtml). GLISPA was launched in March 2006 at COP 8 to build leadership and partnerships committed to actively supporting implementation of the island biodiversity programme of work and other related global policies. GLISPA brings together over 20 Parties to the Convention, as well as major non-governmental and multilateral organizations, to assist islands in addressing one of the world's greatest challenges: to protect and sustainably manage natural resources on islands around the world. Some work has been initiated by the Global Island Partnership on invasives.

(b) **South Pacific Regional Environment Programme (SPREP -** www.s**prep**.org). SPREP is an organization established by the Governments of the Pacific region "*to promote co-operation in the South Pacific region and to provide assistance in order to protect and improve its environment and to ensure sustainable development for present and future generations*". STREP has 26 members that include 22 Pacific island countries/territories and 4 developed countries (Australia, France, New Zealand and the United States of America) that have interests in the area. SPREP's Regional Invasive Species Programme (RISP) and Regional Bird Conservation Programme (RBCP) began work in 1998. SPREP's Regional Invasive Species Programme's objective is "Prevention, eradication or control of non-indigenous species which threaten ecosystems, habitats and species" and that of the Regional Bird Conservation Programme is: "to recover threatened bird species and to conserve all other indigenous bird species and their habitats." SPREP has also initiated the Pacific Invasives Learning Network, which helps local communities share ideas and skills, breaking the isolation of remote islands in the Pacific for effective IAS management (Micronesia, Polynesia, Melanesia and Hawai'I). This network provides links to technical expertise, increases information exchange, and accelerates action on the ground. PILN's projects involve, developing national invasive species strategies, public awareness programs, eradicating invasive weeds and animals and restoring islands. PILN's secretariat has been established at SPREP and works through partnerships with various Governments and international organizations. In 2007, Birdlife International signed a Memorandum of Understanding with SPREP, committing to work together for the next five years to prevent bird extinctions in the pacific region.

(c) **Cooperative Islands Initiative (CII -** http://www.issg.org/cii/). The CII is a global initiative which began in 2002 and coordinated by the Invasive Species Specialist Group (ISSG) of the Species Survival Commission of IUCN under the umbrella of the Global Invasive Species Programme (GISP). Pacific countries were requesting a more coordinated and cooperative approach to addressing invasive species threats. The Pacific Invasives Initiative (PII) was the first programme of the CII to be funded, provided by the New Zealand Agency for International Development (NZAID) and the Pacific Conservation & Development Trust in 2002/2003. The COP endorsed the CII in decision VI/23, paragraph 19.

(d) **Pacific Island Ecosystems at Risk** (PIER - http://www.hear.org/pier/). The PIER project compiles and disseminates listings and descriptions of plant species that threaten ecosystems of the Pacific islands. PIER focuses on exotic plants that threaten natural or semi-natural ecosystems but is also includes agricultural weeds or invaders of disturbed sites. PIER is funded by USDA Forest Service International Program funds and directed by the U.S. Forest Service's Institute of Pacific Islands Forestry and partners.

(e) **Hawaiian Ecosystems at Risk project (HEAR -** http://www.hear.org/). HEAR provides technology, methods, and information to facilitate communication for decision-makers, resource managers, and the general public to enable informed, science-based management of IAS in Hawaii and

the Pacific. HEAR offers exotic species information, distribution and information on the controllability of selected species by island.

2. Dry and sub-humid lands

104. The COP has called for increased information exchange and establishing guidelines and mechanisms for best management of IAS in dry and sub-humid lands (decision VII/2, annex 7 c). Subsequently, in decision VIII/2, targets were established for identifying and controlling major potential IAS in dry and sub-humid lands (target 6.1) and for putting in place and implementing management plans for major alien species that threaten dry and sub-humid lands ecosystems, habitats or species (target 6.2). There are some existing initiatives that contribute to implementation of these decisions. Examples include:

(a) **Environment Canada's Native Prairie Conservation Program (**http://www.mb.ec.gc.ca/nature/whp/nwa/lml/df09s12.en.html). As of 2006, the Native Prairie Conservation Program covers federally protected areas throughout the Prairie Provinces. The Native Prairie Conservation Program aims to restore prairie ecosystems on formerly cultivated land and in areas invaded by non-native plant species and develops a vegetation management strategy to eradicate invasive non-native plant species and restore natural habitat biodiversity.

(b) African **National Biodiversity Institute (SANBI –** www.**sanbi**.org/gcrg/**invasive**s.htm and www.**sanbi**.org/gcrg/**invasive**shelp.htm). SANBI has extensive activities on prevention, control or eradication of listed invasive species; IAS in their strategic plan for 2005-2009, including leadership with the NEPAD invasive species programme (www.sanbi.org/csp&bp/SANBI%20CSP%202005-2009%20Feb%202005.pdf) and collaboration with GISP. Also in their plans are employment creation, poverty eradication and enhanced social cohesion through IAS removal and habitat restoaration. SANBI's Global Change Research Group examines the impacts of invasive alien grasses on ecosystem diversity and its relationship with climate change. SANBI focuses its research on mediterranean-climate ecosystems, such as the fynbos and succulent karoo biomes of southern Africa, global biodiversity hotspots that are very sensitive to changes in biodiversity due to their high species richness and endemism. These ecosystems are highly threatened by the rapid spread of urbanization, agriculture and alien species. The South African National Biodiversity Institute (SANBI) has been commissioned by the IUCN funded Southern African Development Community Biodiversity Support Program (SABSP) to compile a list of experts involved in research on alien invasive organisms in South Africa, and to compile a bibliography of scientific and popular literature on alien invasive organisms in South Africa. The objective is to establish improved information sharing and collaboration among invasive alien species experts and to identify research and management gaps. The info will be published and made available electronically via a link on the SANBI website.

(c) **New Partnership for African Development (NEPAD -** www.dwaf.gov.za/wfw/Docs/Books/NEPADAug04.pdf and http://nepad.org/2005/files/reports/action_plan/action_plan_english2.pdf). NEPAD's work involves work on some arid areas but their programme is broad and also address ballast water and aquatic invasive species. The NEPAD programme on lnvasive Alien Species (Programme area 3) is helping African nations to prevent, manage and combat invasions. South Africa is the focal point for NEPAD's programme on IAS, and is leading a multi- country task team working in conjunction with the UNEP. A NEPAD thematic workshop on prevention, control and management of IAS was held in Pretoria in January 2003. Fourteen project proposals were identified for the implementation of the IAS. The sub-programme areas include: prevention of IAS; awareness-raising; information sharing; training; capacity-building.

(d) **CBD - UNCCD Joint Programme.** At one time, the CBD's joint work programme with the United Nations Convention to Combat Desertification (UNCCD) included management of invasive alien species as a priority action. However, the Conference of Parties to the UNCCD has not yet adopted

IAS-related decisions or guidance to prevent the introduction of IAS when selecting species and varieties in programmes addressing land degradation, erosion control and deforestation.

3. Marine and coastal

105. The programme of work on marine and coastal biodiversity addresses IAS by suggesting information exchange, technical cooperation, capacity-building, international collaboration, and collaboration between national agencies (decision VII/5, annex, element 5). The Executive Secretary was requested to take a leading role in information dissemination (e.g., through the clearing-house mechanism), collaboration and exchange of experiences and expertise.

106. The COP has also invited the International Maritime Organization, the GISP, FAO, and the Convention on Wetlands to develop an international cooperative initiative to address impediments to the management of marine IAS (decision VI/23, paragraph 20). In this regard, the Workshop on the Joint Programme of Work on Marine and Coastal Invasive Species was organized and hosted by the SCBD, GISP and the UNEP Regional Seas Programme, with financial support from GISP and the Regional Seas Programme (UNEP/CBD/SBSTTA/11/INF/10). A draft work plan for the management of marine invasive species was developed based on contributions made by various organizations before, during and after the Workshop.

107. At international level, the Convention on the Protection of the Marine Environment of the Baltic (HELCOM), the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) and the United Nations Convention on the Law of the Sea (UNCLOS) are the three major binding agreements that have provisions related to the protection of the marine environment from IAS. In addition the International Convention for the Control and Management of Ship's Ballast water and Sediments also aim to address the marine and coastal invasions by mandating the ballast water management requirements. HELCOM and OSPAR aim to protect the marine environment from "pollution", using a broad definition which includes IAS. UNCLOS addresses IAS directly in its Convention text (Article 196). In addition the Code of Practice on the Introduction and Transfers of Marine Organisms (International Council for the Exploration of the Sea 2004) aims to reduce the risks and negative effects from the introduction and transfer of marine (including brackish water) organisms.

108. Several national and international organizations are working on marine IAS issues. Examples include:

(a) **IUCN** – IUCN's Invasive Species Specialist Group has established a working group for marine and brackish IAS with over 20 members. IUCN's Commission on Environment Law and the Environmental Law Programme are supporting the development of legal and institutional frameworks for addressing IAS. The Environmental Law Programme published *A Guide to Designing Legal and Institutional*

(b) *Frameworks on Alien Invasive Species* to provide policy makers with information and guidance for strengthening legal and institutional frameworks on IAS. In addition, IUCN is involved with, *inter alia*, the International Maritime Organization, the Barcelona Convention for the Protection of the Mediterranean Sea, various components of the Antarctic Treaty System, the World Trade Organization and the CBD. IUCN's Global Marine Programme (GMP) has been developing activities and projects internationally and has a cooperative relationship with the GloBallast programme. IUCN would like to develop a global joint work programme on marine invasive species[11].

(c) **CSIRO (Australia - http://www.marine.csiro.au/crimp//)**. The Australian Commonwealth Government established the Centre for Research on Introduced Marine Pests (CRIMP) in 1994 to form a more multi-disciplinary approach to IAS management. The centre works in collaboration with industry and scientific partners to facilitate cooperative research throughout Australia and the

11/ Meliane, I. Hewitt, C. 2005 Gaps and Priorities in addressing Marine Invasive Species. IUCN information document. 9 p.

international community. In 2003, a risk management approach was adopted by the Australian Quarantine and Inspection Service (AQIS) to reduce the risk of further introductions through ship's ballast water. The objectives of CRIMP include developing and promoting techniques for earlier detection, prediction of impacts and assessment of risks and costs for marine pest species in Australia; and developing new methods or improving existing measures to control the introduction and spread, and minimizing the impacts of introduced marine pest species. Recent activities include assessment of protozoan and metazoan parasites for the biological control of marine pest species; assessment of transgenic approaches for marine pest management and risk management; assessment of the effectiveness of physical removal and the use of algaecides for controlling invasive algae; and assessment of strategies for eradication or control of pest species. Other research areas include developing better ballast water and hull fouling management protocols and assessing treatment methods such as assessment of the effectiveness of heat treating ballast water; development of ballast water sampling protocols; and development of a methodology and model framework for vessel port to port risk assessments.

(d) UNEP's Regional Seas Programme (RSP - http://www.unep.org/regionalseas/News/Regional_Seas_and_Invasive_Species/default.asp). UNEP RSP has carried out several activities related to IAS. For example, UNEP RSP has held a pilot training course in Tanzania on the Management of Marine and Coastal Invasive Species that was attended by scientists, managers and representatives from ports authorities. The objective was to draft the Training Toolkit on the Management of Marine and Coastal Invasive Species developed by GISP and RSP. UNEP RSP was also a key supporter of the Workshop on the Joint Programme of Work on Marine and Coastal Invasive Species mentioned above.

4. Inland waters

109. The COP has addressed IAS in the programme of work on inland waters by specifying activities to (1) promote and implement relevant guidelines and expert guidance, (2) to share information about impacts of IAS and programmes to control their introduction and mitigate negative consequences, (3) provide appropriate mechanisms to prevent the spread of IAS in transboundary catchments and watersheds, (4) raise awareness regarding possible problems and costs associated with the deliberate release of alien species, including exotic stocks and alien genotypes and genetically modified organisms, and (5) prevent the introduction of IAS and restore, where appropriate, indigenous wild-capture fisheries stocks in preference to other aquaculture developments (decision VII/4, annex, activities 1.4.1 to 1.4.5; also decision VIII/27, paragraph 59). The COP has also encouraged "relevant regional and international organizations and bodies to require impact assessments to ensure consideration of invasive alien species issues within water transfer schemes and navigation canal projects, and to develop technical advice on methods to prevent or minimize the introduction or spread of invasive alien species through canals and pipes" (decision VIII/27, paragraph 58).

110. The Executive Secretary was requested by COP to play a role in facilitating collaboration with other bodies as well as compiling and making available information (decision VII/4, annex, activities 1.4.6 to 1.4.9, 3.3.5). The IAS portal contains links to documents (e.g., UNEP/CBD/SBSTTA/10/INF/4), organizations and initiatives related to IAS in inland water.

111. At international level, there are few binding international agreements dealing with IAS in inland waters. Parties to the Convention on the Law of Non-navigational Uses of International Watercourses are required to take measures to prevent the introduction of species, alien or new, into an international watercourse, which may harm the environment (Article 22). In addition, the Convention on Wetlands (Ramsar Convention) addresses IAS in their COP-7 Resolution VII/14 as they are considered a threat to wetlands.

112. There are numerous national, regional and international initiatives to address IAS in inland waters. For example, the A**quatic Invasive Species Task Force (http://www.cglg.org/projects/ais/index.asp)** aims to prevent further introduction and spread of aquatic IAS into the Great Lakes. The Task Force combats IAS through advocacy, coordination, the identification

of best practices and regional support for a consistent strategy for IAS. The Task Force endeavours to identify options for how decision makers can best prevent the introduction and spread of IAS within the region and have researched various treatment technologies and management techniques. A second example is **Fishbase (http://www.fishbase.org/), a database d**eveloped by the FAO and the WorldFish Center in collaboration with other organizations, which includes thousands of records related to reported inland water fish introductions. Additional examples can be found on the IAS portal and also in document UNEP/CBD/SBSTTA/10/INF/4).

5. Mountains

113. The COP has addressed IAS in mountain ecosystems in several elements of the programme of work annexed to decision VII/27. Actions call for development of strategies specific to IAS in mountain ecosystems; compilation and dissemination of information including case studies and lessons learned; and strengthening of collaboration and synergies between the work programmes of various bodies and initiatives (actions 1.1.4, 1.1.9, 2.3.4).

6. Forests

114. The programme of work on forest biodiversity calls for strategies at regional and national level to address IAS, and also calls for improvement of knowledge regarding impacts of IAS on forest ecosystems and adjacent ecosystems (decision VI/23, annex, goal 2, objective 1). There are some initiatives related to IAS in forests, including the following:

(a) The **Forest Invasive Species Network for Africa (FISNA -** http://www.fao.org/forestry/site/26951/en/). FISNA was created in 2004 in collaboration with FAO in order to deal with current forest health issues and increasing problems with invasive species. FISNA involves seven African countries (Ghana, Kenya, Malawi, South Africa, United Republic of Tanzania, Uganda, Zambia). The network's objective is to coordinate the collation and dissemination of forest IAS information in sub-Saharan Africa for sustainable forest management and conservation of biodiversity.

(b) **The Asia-Pacific Forestry Species Network (APFISN)** , **Commissions,Near East Network for Forest Health and Invasive Species (NENPHIS) and Forest Invasive Species Network for the South Cone Countries of South America** (in formulation stage). These are technically supported by FAO and endorsed by the Regional Foresty Commissions

(c) **North American Forest Commission Exotic Forest Pest Information System (NAFC-ExFor -** http://www.spfnic.fs.fed.us/exfor/index.cfm). ExFor is a joint project of member organizations of the Insect and Disease Study Group of the North American Forest Commission, which include the Canadian Forest Service, the Canadian Food Inspection Agency, SEMARNAT (Sanidad Forestal, Mexico), the United States Department of Agriculture (USDA) Forest Service, and the USDA Animal and Plant Health Inspection Service. ExFor is used to access forest pest records and species/subspecies information. This information system concerns only pests of trees that threaten the forest resources or the timber industry (not pests that attack shrubs or other woodland plants) including those that attack seeds, cones, live and dead trees. ExFor includes insects, mites, nematodes, fungi and fungus-like organisms, bacteria, parasitic plants, and disease-causing organisms. ExFor excludes invasive plants, mammals, birds and abiotic causes of disease in trees.

7. Agriculture – Pollinators Initiative

115. The plan of action for the international initiative for the conservation and sustainable use of pollinators (decision VI/5, annex II) addresses IAS by calling for case studies to identify … threats to pollinator diversity including the introduction of exotic pollinators (see activity 2.1a). Some case studies have been developed and are accessible at http://www.cbd.int/programmes/areas/agro/cs.aspx. The North American Pollinator Protection Campaign has also produced a fact sheet about IAS and pollinators (www.coevolution.org/force-download.php?file=uploads/NAPPC%20Invasive%20Species%20Fact%20Sheet.pdf). The NAPPC is seriously addressing the issue of invasive species through its task forces and committees and also works

with the International Pollinator Initiative. NAPPC has been heavily involved with the recently-funded National Academy of Sciences proposal to assess the status of pollinators in North America. The European Pollinator Initiative (EPI - http://europeanpollinatorinitiative.org/) also addresses competition with non-native pollinators and effects of invasive plants in their work to conserve Europe's pollinators.

I. Addressing invasives through other cross-cutting issues

1. Impact assessment

116. In the voluntary guidelines on biodiversity-inclusive environmental impact assessment (decision VIII/28, annex, paragraphs 19 and 31), the COP noted that impact assessments should consider introduction of invasive alien species as a direct driver of change.

117. Natureserve has developed an Invasive Species Assessment Protocol (http://www.natureserve.org/getData/plantData.jsp) which ranks hundreds of alien plant species by impact or "I-ranks" (high, medium, low, or insignificant) and provides reports for each individual species (see also http://www.natureserve.org/library/invasiveSpeciesAssessmentProtocol.pdf).

2. Global Taxonomy Initiative

118. Prevention and mitigation of the impacts of invasive alien species often relies on timely access to taxonomic expertise, and to taxonomic resources such as identification tools, information on species names, and biological reference collections. The COP has adopted an activity on IAS as part of the programme of work on the Global Taxonomy Initiative (decision VIII/23, paragraph 8 and annex II). This activity calls for development and/or expansion of IAS databases, development of working identification keys, and development of lists of organisms which are susceptible to key invasion pathways. The clearing-house mechanism is identified as one important information portal.

119. The importance of taxonomy in addressing IAS issue is well-known. BioNET International has developed a series of case studies on "taxonomy targeting invasives", which can be accessed through the IAS portal. In their taxonomic needs assessments, it is expected that some governments will identify IAS as an issue for which taxonomic capacity and resources are needed (taxonomic needs assessments are available through the GTI portal at https://www.cbd.int/gti/needs.shtml). BioNET-INTERNATIONAL (BioNET) and the UK Natural History Museum (NHM) are producing an assessment of global and regional taxonomic needs in relation to invasive alien species (IAS).

120. Further information about links between the GTI and IAS can be found in the GTI Guide at http://www.cbd.int/doc/programmes/cro-cut/gti/gti-guide-en.pdf.

3. Global Strategy for Plant Conservation

121. Target 10 of the Global Strategy for Plant Conservation (GSPC) is "Management plans in place for at least 100 major alien species that threaten plants, plant communities and associated habitats and ecosystems" (decision VI/9, annex). In decision VII/10, paragraph 8, the COP decided to integrate this target into the work on invasive alien species. Efforts to date to track progress in the implementation of target 10 of the GSPC have been limited in their effectiveness. Most recently, the GISP, through its partner CABI, has submitted a proposal for funding through the UK Darwin Initiative which aims to consult with a wide range of stakeholders. The proposal was submitted in January 2007.

122. Many Parties to the International Plant Protection Convention report on their management actions to address plant pests, through pest reports and other means (see www.ippc.int). Plant pest reports and alerts are also posted by regional plant protection organizations (e.g., www.nappo.org).

123. It is important to note that the 2010 targets for IAS are closely related to target 10 of the GSPC: "Pathways for major potential invasive species controlled" (target 6.1), and "Management plans in place for major alien species that threaten ecosystems, habitats or species (target 6.2).

4. Protected areas

124. The COP has suggested that Parties take measures to control risks associated with IAS in protected areas (decision VII/28, annex, activity 1.5.4), and has encouraged Parties to take into account IAS with respect to World Heritage sites or other such sites (decision VIII/27, paragraph 63). The COP has also encouraged Parties, Governments and relevant bodies to ensure that relevant laws and provisions do not inadvertently constrain the use of appropriate measures to address IAS (paragraph 64). Finally, the COP also took decisions to encourage consideration of IAS at the Antarctic Treaty Consultative Meeting to address threats of IAS in the Antarctic Treaty area (paragraphs 65 and 66).

J. Financial measures and incentives

125. In decision VI/23, paragraph 12, the COP encouraged "Parties and other Governments, in undertaking this work and, in particular, when developing priority actions, to consider the need to: (b) develop financial measures, and other policies and tools, to promote activities to reduce the threat of invasive alien species." In decision VI/23, paragraph 17, the COP invited international organizations "to develop financial and other measures for the promotion of activities aiming to reduce the harmful effects of invasive alien species". In decision VII/13, paragraph 6, the COP invited "relevant Parties to the Convention on Biological Diversity and other Governments, as well as national, regional and international organizations to: (f) Consider the introduction of positive incentive measures for the prevention, mitigation, eradication or control of invasive alien species and the use of native species taking into consideration effectiveness in control and impact on the other native species in land and water management and other programmes;"

126. Examples of financial incentive measures to help prevent, control and manage IAS include:

(a) **U.S. Wildlife Habitat Incentives Program (**www.nrcs.usda.gov/programs/whip/). The Wildlife Habitat Incentives Program (WHIP), of the USDA's Natural Resources Conservation Service, is a voluntary program for the conservation of wildlife habitat on private land in the United States. WHIP provides technical assistance and up to 75 percent cost-share assistance to improve fish and wildlife habitat and generally last from 5 to 10 years. Through this program, there have been successful efforts to control IAS. For example, the zebra mussel was eradicated from an infested quarry in Northern Virginia, located near two facilities that supply water to over a million people.

(b) **Invasive Alien Species Partnership Program (IASPP -** http://www.cbin.ec.gc.ca/issues/ias_iaspp.cfm). The Canadian government initiative IASPP provides funding to provinces, municipalities, non-government organizations and groups who are doing work that supports the national IAS strategy by reducing the introduction and spread of IAS; addressing their pathways of invasion through prevention, detection, and management activities; and improving understanding and awareness of IAS. IASPP can provide up to $50,000 per year to individual projects and multi-year projects.

(c) Information about economic incentives for controlling trade-related invasions in the Great Lakes is available in the following journal article: Horan, R.D. and F. Lupi. 2005. Economic incentives for controlling trade-related biological invasions in the Great Lakes. *Ecological Economics* 52(3): 289-304.

K. Financial support

127. The COP has provided guidance to the Global Environment Facility (GEF) regarding IAS[12]. Most of this guidance has been aimed at the provision of support to developing countries to build capacity and take measures to address IAS. The GEF reported to COP-8 that there are 51 GEF-funded projects dealing with IAS (document UNEP/CBD/COP/8/10).

12/ Decision VIII/18, paragraph 27; decision VIII/27, paragraph 6; decision VII/20, paragraph 9; decision VI/17, paragraph 10.

128. Some examples of GEF-supported projects addressing IAS include (see GEF website for further information):

- "Removing Barriers to Invasive Plant Management in Africa". The project's objective is to protect ecosystems, species and genetic diversity from terrestrial and aquatic IAS, for global, national and community benefit by removing barriers to effective prevention and management of invasive, alien species in four pilot countries; Ethiopia, Ghana, Uganda and Zambia.
- "Conservation and Restoration of the Globally Significant Biodiversity of the Tisza River Floodplain through Integrated Floodplain Management".
- "Development of Best Practices and Dissemination of Lessons Learned for Dealing with the Global Problem of Alien Species that Threaten Biological Diversity".
- "Mauritius Biodiversity Restoration and Restoration of Highly Degraded and Threatened Native Forests". This project targeted forest ecosystems that have been affected by IAS.
- "Control of Invasive Species in the Galapagos Archipelago" project.
- "Building Capacity and Raising Awareness in Invasive Alien Species Prevention and Management"
- "Pacific Invasive Species Management project". This project aims to establish an effective biosecurity system in the Pacific (prevention of IAS, restoration, management).
- "Invasive Alien Species Program for the Polynesia-Micronesia Hotspot" (www.cepf.net).
- "Building Partnerships to Assist Developing Countries to Reduce the Transfer of Harmful Aquatic Organisms in Ships' Ballast Water (GloBallast Partnerships)".

129. In addition to providing guidance to the GEF, the COP has also appealed to Governments, other donors, funding agencies and development agencies to support developing countries in building capacity and implementing measures to address IAS issues (decision VIII/27, paragraphs 4, 5, 42; decision VII/13, paragraphs 6, 13, 22, 34), and to support the Global Invasive Species Program (decision V/8, paragraph 17). There are numerous donors supporting projects related to IAS, including the World Bank and other bodies, non-government organizations and bilateral donors. Some are mentioned throughout this document. The GISP website and the IAS portal provide links to organizations and initiatives that have implemented or are implementing IAS-related projects.

130. The Integrated Technical Cooperation Programme (http://www.imo.org) of IMO is funding and coordinating a number of activities aiming at assisting in the ratification and implementation of the Ballast Water Management Convention, based on specific requests from Governments.

1. Financial mechanisms for incursion response

131. The COP has also requested "the Executive Secretary, in collaboration with the Global Invasive Species Programme, the Global Environment Facility, the Food and Agriculture Organization of the United Nations and the Organisation for Economic Co-operation and Development, to identify a mechanism(s) for providing Parties with access to financial support for rapidly responding to new incursions by alien species, and report to the Conference of the Parties at its seventh meeting on progress to establish that mechanism(s)" (decision VI/23, paragraph 33). The Secretariat contacted the organizations listed in paragraph 33, as well as a few other organizations and experts. In addition, an email was sent to the Aliens-L ListServe, a network of over 700 experts. Several responses were received, and are summarized here.

132. First, it should be noted that many developed countries have mechanisms for incursion response at federal or state level. This is the case in many US states and Canadian provinces, whereby controlling new outbreaks of potentially harmful species is part the mandate of relevant agencies, although those mandates may be limited to subsets of IAS such as agricultural weeds or pests. In Australia, incursions of

animal and plant diseases can be dealt with through a cost-sharing agreement between the Commonwealth and the States/Territories (see http://www.outbreak.gov.au). Also in Australia, in some cases there is nationally coordinated response to plant incursions, including cost-sharing (see http://www.weeds.org.au/awcnews.htm)

133. Governments have also developed relevant mechanisms through regional cooperation. For example, the European Union has a financial tool named LIFE+ which is used to protect a number of species and habitats listed in some EU directives. It is not dedicated for addressing IAS but has been occasionally used to manage IAS. Further information is available at http://ec.europa.eu/environment/life/infoproducts/alienspecies_en.pdf. In addition, there are some regional response mechanisms for addressing particular IAS. For example, the Secretariat of the Pacific Community has an emergency response plan for particular IAS such as fruit flies (see http://www.pacifly.org/). This plan is supported in part by external donors.

134. At international level, the FAO has at least two relevant mechanisms. The first is FAO's Technical Cooperation Programme (http://www.fao.org/tc/tcp/index_en.asp), which funds project to address specific problems in the agriculture, fisheries and forestry sectors. Pest and disease prevention and management is one of the areas covered by TCP projects. TCP assistance is intended to deal with urgent and unforeseen issues. A second mechanism within FAO is the Emergency Prevention System (EMPRES) for Transboundary Animal and Plant Pests and Diseases, which deals with global/regional issues such as avian influenza. Rapid reaction and containment of outbreaks is a key element of EMPRES.

135. If the concept of a financial mechanism for incursion response is taken forward, some considerations that have been suggested include:

- Adopting the "polluter pays" principle, which has been used to raise funds for oil spill prevention and clean-up in the U.S., for example. There would be many options, such as the use of insurance, or the possibility of directly charging fees to importers of live animals and plants, or to air cargo and shipping companies that carry them (i.e., those that benefit from the import of potential IAS). Further information is available in the Global Strategy on Invasive Alien Species (McNeely et al. 2001, published by GISP – see Strategy Element 4), and in the IUCN document A Guide to Designing Legal and Institutional Frameworks on Alien Invasive Species[13] which includes examples of where fees have been used at national levels.
- In the case of natural disasters, including an IAS financial mechanism as part of disaster relief funds, to deal with incursions that may result directly from a disaster (e.g., species swept out of enclosures) or indirectly afterwards (brought in with relief supplies and vehicles).

L. Targets and Indicators for the 2010 Framework

136. Goal 6 in the 2010 framework is to "control threats from invasive alien species", and there are two targets associated with this goal (decision VIII/15):

- Target 6.1: Pathways for major potential alien invasive species controlled
- Target 6. 2: Management plans in place for major alien species that threaten ecosystems, habitats or species

137. The Executive Secretary was requested to prepare proposals for the integration of these goals and targets into programmes of work (decision VII/30, paragraph 3 (a)), which was implemented for some

13/ Shine, C., Williams, N. and Gündling, L. (2000). A Guide to Designing Legal and Institutional Frameworks on Alien Invasive Species. Environmental Policy and Law Paper No. 40, IUCN - Environmental Law Centre. A Contribution to the Global Invasive Species Programme IUCN - The World Conservation Union. Gland, Switzerland Cambridge and Bonn. xvi+138 pp.

programmes in decision VIII/15, paragraph 9 and annex IV. Parties were urged to develop national and/or regional goals and targets and related national indicators (decision VIII/15, paragraphs 10-11).

138. The indicator specified for targets 6.1 and 6.2 is "trends in invasive alien species" (decision VIII/15, annex II and annex V). In 2006, the CBD Secretariat commissioned the Species Survival Commission of IUCN-World Conservation Union, through the Indicators and Assessment Unit, Institute of Zoology, Zoological Society of London to carry out a study on Options for a global indicator on "Trends in Invasive Alien Species". This study was conducted to assess the availability of data, assessment processes and feasibility of these data and processes to develop a global indicator of trends for 2010 and a long-term scaleable indicator. A survey of online databases and other sources of information were undertaken and other IAS data surveys and proposed indicators were evaluated. The main findings on IAS data were: patchy and uneven quantity and quality of data across countries and regions; taxonomic and geographic biases; no central data access; inaccessible data; terminology and conceptual issues not standardized; and inconsistent methodology, scale and reporting frequency. Given these limitations, the following indicators were suggested: number of alien species per country, number of IAS per country, spread of worst IAS across nations, regions; abundance of selected IAS populations, control of major introduction pathways, management plans in place to control IAS; trends in populations of species threatened by IAS; changes in the threat status of species threatened by IAS; trends in the number of species threatened by IAS.

139. It was suggested that an *ad hoc* expert meeting of IAS data holders and users be organized to review this study and discuss the next steps. The Ad hoc meeting of IAS data providers and user groups to develop the 2010 indicator took place 22-23rd January 2007. The IAS data providers, data users and indicators experts evaluated availability of data, feasibility of indicators for measuring trends in IAS by 2010, at national, regional and global levels. A framework was also developed on how to transform these recommendations into practical indicators. The complete list of IAS indicators under consideration are in a table from the report on this meeting, which is attached in Annex C. Meeting participants considered and reviewed each indicator in working groups. They also assessed whether the indicator could be delivered by 2010, and which could be delivered over a longer term. Each potential indicator was scored high (H) medium (M) or low (L), for 1) Relevance (to policy and understanding of threat to biodiversity from IAS; 2) Rigour (i.e. scientific validity; and, 3) Representativeness (geographic) (i.e how well the measure could be developed to reflect a broad range of nations and regions).

140. The process above resulted in the following 9 measures being short-listed as promising. Most will not be possible before 2010.

1. No of invasive alien species
2. Population trends / abundance
3. No. of countries that are party to relevant international agreements
4. No. of countries with operational management of introduction pathways
5. No. of IAS management plans in place
6. Economic impacts
7. Change in threat status of species driven by invasives
8. Population trends of species threatened by IAS
9. Emerging disease outbreaks
10. Number or % areas important for biodiversity threatened by invasives

141. GISP will be working on refining the list of indicators above and liaising with data providers for the additional work to be undertaken to deliver some of these indicators. GISP will be setting up a working group and gathering country opinions of IAS indicators.

M. Implications of the Millenium Ecosystem Assessment

142. The Millenium Ecosystem Assessment (MA) confirmed the role of IAS as a major driver of biodiversity loss, particularly in inland water and island ecosystems as well as biodiversity hotspots. Economic costs were also estimated to be significant. Although the four MA scenarios differ, the overall conclusions of the MA are that the impacts of IAS will continue to increase, and that addressing IAS will require:

- a focus on prevention measures
- a combination of global cooperation and local management
- measures to address trade as an important vector of introduction
- overcoming insufficient commitment, financial and human resources to implement existing policy and regulation.

Annex I

ANALYSIS OF THIRD NATIONAL REPORTS

I. QUESTIONS ON ALIEN SPECIES (Article 8h)

Based on 127 National Reports received before April 2007

A. *Introduction*

1. The Conference of the Parties acknowledged the urgent need to address the threat of invasive alien species (IAS) at its fourth meeting (decision IV/1) in 1998. Invasive alien species occur in and affect all major taxonomic groups and ecosystems and is considered a cross-cutting issue applicable to all the work programmes of the Convention. The Conference of the Parties has addressed IAS, most notably in decisions V/8, VI/23, VII/13 and VIII/27.

2. The third national report contains 12 questions on Article 8 (h), primarily covering development and implementation of national invasive species strategies and action plans and the IAS Guiding Principles. The following analysis synthesizes responses to these questions.

B. *Identification of alien species introduced into its territory and establishment of a system for tracking the introduction of alien species*

3. Many Parties (63%) have identified some species but have not established a tracking system. Some Parties (27%) have identified some or all IAS of major concern, with a tracking system in place. A few Parties have neither identified IAS nor established a tracking system. A larger percentage of industrialized Parties have some or all major IAS identified with tracking systems in place than do developing countries and Parties with economies in transition. For example, Switzerland has established a black list to register those alien species that have caused damage and a watch list to record those alien species with the potential to cause damage or that have caused damage in neighboring countries.

C. Assessment of the risks posed to ecosystems, habitats or species by the introduction of these alien species

4. Only a few Parties (11%) have assessed risks to ecosystems, habitats and species for most alien species. Most Parties (71%) have assessed risks, but only for species of concern. All industrialized Parties, including some countries with economies in transition, have assessed risks posed by some or most IAS.

5. Many comments provided by Parties did not directly deal with risk assessment but described projects and research on species that have invaded local ecosystems. About one third of Parties reported on research/risk assessments of IAS in aquatic ecosystems. Some Parties reported projects on agro-ecosystems and a few commented on projects in marine and coastal, forest and island ecosystems. Certain Parties mentioned research on certain invasive taxonomic groups: almost half of the Parties cited plants/trees; some Parties had done risk assessments for fish, terrestrial vertebrates/reptiles/amphibians, insects/invertebrates; and a few Parties mentioned microorganisms and marine/ aquatic zoobenthic organisms.

6. Some African countries, indicated that they had conducted research and/or risk assessments on the water hyacinth (*Eichhornia crassipes)* which is considered the world's worst invasive aquatic weed, and is indigenous to the Amazon Basin of South America. It occurs in more than 50 countries on five continents. Finland and a few CEE countries mentioned American mink (*Mustela vision*) and the raccoon dog (*Nyctereutes procionoides*) causing damage to local fauna. Lithuania reports that the European mink (*Mustela europea*) has been completely replaced by the American mink and is now considered extinct.

D. *Measures undertaken to prevent the introduction of, control or eradicate, those alien species which threaten ecosystems, habitats or species*

7. Most Parties (83%) have some preventive measures in place and only a few have established comprehensive measures. A larger percentage of industrialized Parties have comprehensive measures in place compared to other economic groups of countries.

8. Approximately half of responding Parties mentioned legislation and policies that contain provisions and measures to prevent the introduction of, control or eradicate alien species. Approximately one quarter of responding Parties mentioned surveillance/monitoring programmes at the point of entry. Some Parties reported management techniques, quarantine and physical/chemical/phytosanitary measures. A few Parties mentioned EIA/risk assessment, outreach/education, collaboration, research, biocontrol and a national strategy/action plan as preventive measures. Eight Parties report that they have a strategy for dealing with invasive alien species. In addition, there are regional strategies for Europe, the Pacific Islands, and the Caribbean.

9. An important example of preventive measures cited by many countries is the Global Ballast Water Management Program (GLOBALLAST), funded by UNEP/GEF, which is an initiative of the International Maritime Organization, member states and shipping industry. GLOBALLAST supports developing countries with reducing the transfer of marine IAS through ballast water. Many countries have also developed their own national plan for dealing with ballast water.

E. Development of or involvement in mechanisms for international cooperation to deal with invasive species

10. 64 Parties reported regional and/or subregional cooperation to address IAS issues. 24 Parties had established mechanisms for bilateral cooperation; 31 Parties noted multilateral cooperation; and 28 Parties indicated that they were not involved in any mechanisms for international cooperation. In terms of percentage, industrialized economies have the highest rate of participation in bilateral, regional/subregional and multilateral cooperation in this field. Over half of developing countries engage regional/subregional cooperation to deal with IAS.

F. Use of the Ecosystem Approach, precautionary approach, and bio-geographical approaches

11. Many Parties (59%) reported that they are using the ecosystem, precautionary and biogeographical approaches in their work on IAS. However, many Parties (41%) responded that these approaches were not being used.

12. Comments provided by Parties were on a wide range of topics and various activities/projects/research were described in different ecosystems: forests, aquatic/inland waters, protected areas, arid/semi-arid lands, agro-ecosystems, mountains and marine and coastal ecosystems. Some Parties commented on some precautionary measures that may involve the ecosystem and biogeographical approach: legislation/policy, regulations on the import of aliens at points of entry, control programmes, phyto-sanitary and quarantine measures, and risk analysis. The taxonomic group most often cited as involving the use of the three approaches was plants.

13. In Nepal, the Ecosystem Approach has been introduced for the conservation of protected areas. In Poland, the Ecosystem Approach is applied by the phytosanitary, veterinary, and forest services. Singapore uses the Ecosystem Approach in the Plant Conservation Strategy, in identifying Important Plant Areas (IPAs) and assessing sites for conservation activities. In Armenia, recent research on plant IAS is based on the Ecosystem Approach, which includes geo-botanical descriptions of the plant community. European Commission-funded projects from the Nature component of the LIFE programme are based on the Ecosystem Approach. These projects are coordinated to apply a common conservation strategy over indigenous species' natural range.

14. The precautionary approach has been used by many countries with regard to legislation, quarantine and procedures at points of entry. For example, the precautionary approach has been applied in

the Czech Republic in phytosanitary and veterinary legislation. The precautionary approach has been applied in Indonesia by implementing quarantine procedures at the points of entry and of exit.

15. Few countries commented on the biogeographical approach. In India, the biogeographical approach has promoted the sharing of information among neighbouring states. In Canada, elements of the Ecosystem Approach, precautionary and bio-geographical approaches are used in the plant protection program and to address the threat of aquatic IAS. In Poland, the bio-geographical approach has been applied in the context of plant IAS in Specially Protected Areas. In China, georgraphic information is used to perform adaptability analysis for potential IAS.

G. Identification of national needs and priorities for the implementation of the Guiding Principles

16. Few Parties (15%) have identified their needs and priorities for the implementation of the Guiding Principles, half of responding Parties reported that they are identifying their needs and priorities, while 34% are not. Comments from responding Parties were very scattered on this subject. The most common avenue of assessing needs and priorities was through development of national strategies or action plans. China is currently drafting "National Planning on Prevention and Control of Invasive Alien Species" and the priorities are to improve relevant legislation, management of IAS, public awareness and risk assessment, and to develop technologies for early warning, monitoring and eradication. In Ethiopia, Uganda and Zambia, major regional needs and priorities were identified through a GEF-funded project "Removing Barriers to Invasive Plant Management in Africa". Needs and priorities identified include strengthening policies, institutions and capacities; disseminating information on risk, impacts and management of IAS; and implementing strategies for prevention and management of IAS. Lebanon has developed an action plan to address major priorities which include the establishment of a monitoring strategy, the development of legislation for marine and coastal habitats, and monitoring of marine biodiversity using bio-indicators. Poland, through its action plan, is prioritising recording and monitoring of IAS, exploring invasion sources and pathways, impacts on native species and ecosystems, and economic effects of invasions.

H. Mechanisms to coordinate national programmes for applying the Guiding Principles

17. Only a few Parties (12%) had mechanisms in place to coordinate national programmes for applying the Guiding Principles and many Parties (40%) had mechanisms under development. Almost half of responding Parties (49%) had not created such mechanisms. In comments provided by Parties, the most common mechanisms to coordinate national programmes were steering committees, national strategies and action plans and coordination between government departments and ministries. In Canada, mechanisms for coordination were created within the national strategy for IAS. A virtual secretariat was established to coordinate policy, manage a communication programme and coordinate rapid response. In Chile, a national operative committee for inter-institutional coordination for the control of invading species was established in 2005. This committee works within the framework of the Plan of Action of the National Biodiversity Strategy. One of the long-term objectives of this committee is to implement the Integrated National Program for the Control of Invading Species by 2015. In France, the National Council for the Protection of Nature coordinates and integrates IAS issues into conservation policy. In the Netherlands, the Ministry of Agriculture, Nature and Food Quality is considering establishing a coordinating commission for IAS. In Malawi, an expert working group on IAS has been established to identify training needs, develop educational materials and mainstream IAS issues into relevant national programmes. A few Parties also mentioned coordination at the border, quarantine measures and legislation, as mechanisms for national coordination of IAS issues.

I. Review of relevant policies, legislation and institutions in the light of the Guiding Principles, and adjusted or developed policies, legislation and institutions

18. Few Parties (6%) have made adjustments and completed development of relevant policies, legislation and institutions and many Parties (41%) have not. Some Parties (29%) are reviewing their relevant policies, legislation and institutions. A few Parties (13%) have ongoing adjustment and

development, and few Parties (11%) have completed review with the adjustment proposed. About half of developing countries and countries with economies in transition have not reviewed, adjusted and/or developed policies, legislation and institutions, while most industrialized countries have undertaken the review and adjustment.

19. Of the countries that had completed adjustments and developments, few provided details on the extent of changes introduced to relevant legislation, policies and institutions, as a result of reviews undertaken. Development of national invasive species strategies was often cited as a means of integrating relevant policies, although many Parties reported that only reviews and analyses had been undertaken. Many countries listed new laws and policies that contain provisions and measures to address IAS.

J. Enhancing cooperation between various sectors in order to improve prevention, early detection, eradication and/or control of invasive alien species

20. Some Parties (29%) stated that mechanisms were in place for cooperation between sectors. Over half of responding Parties (53%) reported no sectoral cooperation, but potential mechanisms were under consideration; and some Parties (17%) have no cooperation between sectors. Cooperation mechanisms are established mostly in the form of coordinating groups and committees, and through development of national strategies and action plans. For example, in Cameroon, committees were created in 2005 to link committees established in various sectors such as the Phytosanitary Committee, the Committee of Biological Diversity, Committee on Environment; Committee on Biosecurity etc**.** In Canada, the National Invasive Species Strategy is enhancing cooperation between sectors to improve prevention, early detection, rapid response and management of IAS. China has set up a cross-sectoral coordinating group on prevention and control of IAS. The European Community has developed several related plans that provide a framework for enhanced cooperation between sectors. In the Philippines, a National Committee on Biosafety has developed a set of guidelines that provide a framework for enhancing sectoral cooperation to improve prevention, eradication and control of IAS. In Samoa, a national IAS Steering Committee has been established representing over 30 agencies involved in preventing and reducing impacts of IAS.

K. Collaborating with trading partners and neighbouring countries to address threats of invasive alien species to biodiversity in ecosystems that cross international boundaries

21. Some Parties (21%) have relevant programmes in place, however, some Parties (33%) were not collaborating with trading partners and neighbouring countries to address threats of IAS. Many Parties (46%) have relevant collaborative programmes under development. More industrialized Parties have developed programmes for collaboration with neighbouring countries and trading partners, compared to developing countries and Parties with economies in transition.

22. Almost half of responding Parties cited collaboration with neighbouring countries and some Parties (17%) mentioned collaboration with trading partners. In this regard, the Global Invasive Species Programme (GISP), that provides opportunities for countries to work together to address IAS, was also mentioned by a number of countries. The Southern African Biodiversity Support Programme is funded by GISP and has formulated regional guidelines and established a best practices database on IAS management.

23. Collaboration also exists for phytosanitary measures. The European Community participates in the development of legal measures for ballast water management and international phytosanitary standards. Regional cooperation is offered through the Pan-European Biological and Landscape Diversity Strategy (PEBLDS) and engagement in invasive species work is carried out by the Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention).

24. Australia has been undertaking extensive collaboration with its neighbouring countries to address IAS, in particular in strengthening their capacities to prevent the introduction of IAS. Australia and New Zealand are part of the Asia Pacific Invasive Species Network. Australia's Cooperative Research Centre (CRC) for Weed Management has linkages in the Asia-Pacific region, southern Africa, the USA and

Europe. The CRC for the Biological Control of Pest Animals Control cooperates with France, New Zealand, the USA and the UK.

L. Developing capacity to use risk assessment to address threats of invasive alien species to biodiversity and incorporate such methodologies in environmental impact assessment (EIA) and strategic environmental assessment (SEA)

25. Only a few Parties (5%) have comprehensive activities underway while some countries (28%) are undertaking some activities in this regard. Some Parties (38%) have not developed capacity for risk assessment to address threats of IAS. Some Parties (29%) have not developed capacity for risk assessments but relevant programmes are under development. Many industrialized countries have undertaken various activities to develop capacity for risk assessments, however countries with economies in transition have not undertaken such activities. According to comments provided, it appears that risk assessments are more commonly conducted on plants than on other taxonomic groups. An example of risk assessment undertaken for plants is a national risk assessment of weeds on Australia's productivity and environment. Several Parties mentioned the International Plant Protection Convention (IPPC): China has been conducting risk assessments for IAS in accordance with principles of IPPC. Thailand conducts risk assessment in collaboration with the IPPC Secretariat. The Bahamas is using models developed out of the Western Australian Weed Risk Assessment, which is widely used in the South Pacific. A few Parties mentioned phytosanitary measures for risk assessment: Germany has established a phytosanitary risk analysis system that is independent of environmental impact assessment and SEA.

M. Development of financial measures and other policies and tools to promote activities to reduce the threats of invasive species

26. Many Parties (41%) have some measures, policies and tools in place to promote activities to reduce the threats of IAS, although only one Party has comprehensive measures and tools in place. Some Parties (37%) have not developed financial measures, policies and tools and some Parties (22%) have measures and policies under development. Many industrialized countries have some financial measures, policies and tools in place, however, many countries with economies in transition are yet to develop measures, policies or tools to address IAS. Many developing countries are developing measures and policies in this regard.

27. Many Parties mentioned government institutions and departments as being responsible for funding IAS projects and creating laws to reduce their threats. The Australian Natural Heritage Trust develops and implements actions to reduce the impact of feral animals on the environment and also funds the "Defeating the Weed Menace Programme". In Belgium, government subsidies are given to land owners and local authorities for the use of endemic shrubs and trees and removal of exotic species. The European Community, through the Nature component of the LIFE programme, has funded over 100 projects on management of IAS (1992-2002). However, these projects are mostly local and small-scale. Chile is the only country that indicated it has put comprehensive measures and policies in place. Chile states that the National Policy for Invading Exotic Species is being created and that collaboration exists with international programmes such as Globallast and GISP. Public funds have been made available for a pilot project to control beaver and mink, agricultural and forest invasions, as well as animal diseases.

N. Overall assessment of progress and challenges

28. Areas where 50% of Parties or more report progress being made include: regional and/or subregional cooperation; and the use of the ecosystem, precautionary and biogeographical approaches.

29. Areas where less than 50% of Parties report some progress is being made include: creating mechanisms for international cooperation and multilateral cooperation; identifying IAS species with a tracking system in place; identifying needs and priorities for the implementation of the Guiding Principles; creating mechanisms for cooperation between sectors; collaborating with trading partners and neighboring countries to address threats of IAS; and developing financial measures, policies and tools to promote activities to reduce the threats of IAS.

30. Areas where only a few Parties indicated some developments are ongoing include: assessing risks posed to ecosystems, habitats or species by most IAS (most Parties have for some IAS); undertaking comprehensive measures to prevent the introduction of, control or eradicate IAS (most Parties have some measures); establishing mechanisms to coordinate national programmes for applying the Guiding Principles; reviewing, adjusting and developing policies, legislation and institutions in the light of the Guiding Principles; and developing capacity to use risk assessment to address threats of IAS and incorporating methods into EIA and SEA.

31. The main obstacles to prevention, management, control and eradication of IAS include lack of a comprehensive IAS strategy; lack of relevant information and knowledge; lack of intersectoral coordination and lack of financial, human and technical resources and capacities.

II. ADDITIONAL SECTIONS IN THIRD NATIONAL REPORT DEALING WITH IAS

32. *IAS level of priority* – In this question in the third National Reports, countries assign the level of priority to the implementation of various articles, provisions and relevant programmes of the work of the Convention. Forty percent of Parties consider IAS a high priority, 35% consider IAS a medium priority and 24% consider this issue of low priority.

33. *IAS incorporated into provisional framework towards achieving the 2010 target in national reports* – In decision VII/30, annex II, the Conference of the Parties established a provisional framework consisting of goals and targets to assess progress towards the 2010 global target (decision VI/26) and to promote harmonization among the Convention's programmes of work. Goal 6 requests Parties to control the threats from IAS. In their responses to the third National Reports, some Parties (25%) have established a national target corresponding to the global target (6.1) of having pathways for major potential IAS controlled; many Parties (42%) have one or more specific national targets established; and some (33%) have not established this target. National targets for the control of pathways for major potential IAS under specific programmes of work have been addressed more commonly for agricultural and forest biodiversity and less commonly for the mountain biodiversity programme. Most Parties have national biodiversity strategy and action plans or sectoral strategies, plans and programmes and only some (26%) do not.

34. Parties are requested to have management plans in place for major alien species that threaten ecosystems, habitats or species (Target 6.2). Over half of Parties report no national strategies established corresponding to this target and few (15%) have management plans in line with this target; however some (33%) have national targets established. Management plans for IAS under specific programmes of work been more commonly addressed for the agricultural and forest biodiversity programmes of work, while mountain and dry and sub-humid lands biodiversity are less frequently dealt with. Most parties (72%) have incorporated this target into relevant plans, programmes and strategies or national biodiversity strategies and action plans and some (36%) have not.

35. *IAS management under the Global Strategy for Plant Conservation (GSPC)* – In the annex to decision VI/9, the Conference of the Parties adopted the GSPC, and in decision VII/10, integrated outcome-oriented targets into the Third National Reports. Target 10 addresses whether Parties have management plans in place for at least 100 major alien species that threaten plants, plant communities and associated habitats and ecosystems.

36. Most Parties (81%) reported that they did not have national targets for the management of at least 100 major alien species. About two-thirds of responding Parties have not incorporated this global or national target into relevant plans, programmes and strategies while approximately 1/3 have done so.

37. *Taxonomic support for the implementation of cross-cutting issues* – Operational objective 5 of the Global Taxonomy Initiative work programme (decision VI/8) promotes taxonomic work within cross-cutting issues of the Convention (see list below). Based on answers from the third national report, the cross-cutting issue with the most taxonomic support from Parties is IAS (29%). The Western Europe and

Others Group (WEOG) (69%) and industrialized Parties (65%) have very high taxonomic support for invasive alien species issues.

Annex II

SUMMARY OF THE MILLENNIUM ECOSYSTEM ASSESSMENT FINDINGS ON INVASIVE ALIEN SPECIES

A. The Millennium Ecosystem Assessment

1. The Millennium Ecosystem Assessment (MA) was carried out between 2001 and 2005 to assess the consequences of ecosystem change for human well-being and to analyze options available to enhance the conservation and sustainable use of ecosystems and their contributions to human well-being. The MA responded to requests for information received through the Convention on Biological Diversity and other international conventions. It was carried out by approximately 1,360 experts from 95 countries through four Working Groups and encompassed both a global assessment and 22 sub-global assessments. An independent Review Board has overseen an extensive review by Governments and experts[14]. The findings are contained in fifteen reports. The following were reviewed in regards to their contents on invasive alien species: Current State and Trends (Volume 1), Scenarios (Volume 2), Policy Responses (Volume 3), Multiscale Assessments (Volume 4), and the Biodiversity Synthesis.

2. The MA draws attention to invasive alien species as one of the most important drivers of change in ecosystems as well as one of the most significant issues at the global level in terms of their impacts on biodiversity and consequences for human well-being[15]. Although movement of species outside their natural habitat is natural, the rate of invasions of alien species has increased dramatically over the past century, concurrent with the increase in global trade. The MA findings concerning invasive alien species are summarized below under the following headings: (i) impacts of invasive alien species, (ii) factors affecting invasion resistance, (iii) policy responses and, (iv) invasive alien species across the MA scenarios.

B. Impacts of invasive alien species

3. The MA defines an invasive alien species as an alien species whose establishment and spread modifies ecosystems, habitats or species. The MA describes three broad negative impacts of invasive alien species on ecosystems and human well-being: loss of biodiversity, change in ecosystem functioning and economic costs. Despite the negative impacts of invasive alien species depicted below, the MA emphasizes that not all alien species have adverse impacts. Introductions of alien species can also be beneficial. In fact, most food is produced from introduced plants and animals.

C. Loss of biodiversity

4. Invasive alien species are a major cause of local or global extinction. Invasive alien species also contribute to homogenization of species in specific ecosystems. The MA illustrated these phenomena in its assessments of inland waters, island and polar ecosystems.

5. *Inland waters ecosystems* — The spread of exotic species in inland waters is increasing, due to the expansion of aquaculture, shipping, and global commerce. In 77% of 31 surveyed cases across several continents, native fish populations were reduced or eliminated following the introduction of a non-native fish (with salmonids responsible for the decline of native species in half of these). The MA further predicts that the importance of invasive alien species in inland waters is likely to increase along with increased global change[16].

6. *Island systems* — Invasive alien species are the most important driver of declines of wild populations and species extinction on islands. Invasive plant and animal species often out-compete native insular species for common resources or prey on native species. The introduction of the brown tree-snake on the island of Guam has led to the extinction of 10-13 native forest birds and several lizard species.

14/ Ecosystems and Well-Being: Biodiversity Synthesis, p.1
15/ Paragraph 13 of Decision VIII/9
16/ Volume 1, p. 570

7. *Polar systems* — The sub-Antarctic islands, part of the polar ecosystem, are also affected by introduced exotic species. Populations of cats, sheep, rabbits, reindeer and cattle introduced to some sub-Antarctic islands have reduced, and in some cases driven to extinction, populations of marine birds, waterfowl, and other ground-nesting birds, through habitat alteration or direct predation.

D. Change in ecosystem functioning

8. Invasive species may alter ecosystems in directions that are more favourable to them and less so to native species. They may alter geomorphic processes (soil erosion rates, for instance, or sediment accretion), biogeochemical cycling, hydrological cycles, or fire or light regimes (e.g. invasive grasses increase fire frequency and intensity).

9. Estuarine systems are singled out as the most invaded ecosystems in the world, with exotic introduced species being brought in by ballast water of large ships and other mechanisms. Such introductions result in habitat loss and alteration, hybridization with native species, highly destructive predation, and spread of pathogens and disease[17].

E. Economic costs

10. Invasive alien species are estimated to cost $137 billion to the US economy due to crop losses and the application of herbicides and pesticides to reduce exotic weeds and pests[18]. Much more is spent on control and prevention measures. The cost of invasive plants control in South Africa is estimated to be as much as $100 million yearly[19].

11. The MA notes that no economic incentive structure exists for limiting species invasions because the unintended costs of harmful invasions are usually borne by all citizens while the benefits of importation of species are concentrated in commercial interests[20].

F. Invasion resistance

12. The MA's survey of trends in species introductions and modeling predictions strongly suggest that biological invasions will continue to increase in number and impact. In addition, increasing abiotic stress (via eutrophication, pollution, nonsustainable harvesting, etc) suggests that resistance to invasions may decrease and that the number of communities dominated by invasive species will increase[21].

13. The available evidence and theoretical predictions suggest that higher species richness can increase the resistance of a community against invasion by exotic species. It is therefore most likely that biodiversity loss from a particular habitat will decrease the invasion resistance. However, it should be noted that it is not only species richness that increases a habitat's resistance to invasions but also the traits of resident species[22].

14. Numerous studies have demonstrated that the factors that favour native species richness, also favour exotic species richness (i.e. benign climates, intermediate levels of disturbance, and habitat heterogeneity). This suggests that biodiversity hot spots are particularly at risk of invasion by introduced species.

15. Resistance to invasions may also be decreased as a result of mutualistic interactions between new invaders and established invaders or through modification of ecosystem properties (e.g., alien honeybees provide reliable pollination services to invading plants).

16. Lastly, the MA states that invasive alien species will interact strongly with other drivers of biodiversity loss such as climate change. Increased levels of CO2 may in some cases benefit some

---

17/ Volume 1, p. 520
18/ Volume 1, p. 307
19/ Volume 4, p. 182
20/ Volume 1, p. 520
21/ Volume 1, p. 307
22/ Volume 1, p. 307

species over others, providing them with a comparative advantage. For example, elevated CO2 levels increased the success of a particular grass species in the Mojave Desert, potentially reducing biodiversity and altering ecosystem function.

G. Policy Responses

17. The MA identifies trade as the main current cause of introductions and concludes that it is likely to continue to overwhelm efforts to prevent invasions in the future. It warns that if steps are not taken to reduce the unintended transport of species - particularly through trade - the numbers of non-native species established in most countries are expected to continue to increase along with increasing trade.

18. The MA maintains that preventing species invasion is the safest and most cost-effective approach to the problem of invasive species. Cost-benefit analyses conclude that costs of eradication are usually higher than costs of prevention[23].

19. In addition, the MA notes that eradication and control measures have had mixed results. Chemical and mechanical control measures of invasive plant species are costly, have not been as effective as desired, and have sometimes suffered from low public acceptance. Biological control can have unforeseen side effects including alteration of ecosystem functions and extinction of native species.

20. Three key factors to successful eradication are identified in the MA: particular biological features of the target species (i.e. poor dispersal ability), sufficient economic resources devoted for a long time, and widespread support from the relevant agencies and the public[24].

21. The MA acknowledges GISP responses and the CBD Guiding Principles on Invasive Alien Species as policy tools to address the global problem of invasives. In addition, the MA notes that response measures needed to prevent and minimize the impacts of invasive alien species are generally known, though many nations and territories lack the material or human resources to prevent the introduction of or to control or eradicate alien species that threaten ecosystems, habitats, or other species.

H. Invasive species across the MA scenarios[25]

21. The MA presented four scenarios exploring plausible future changes in drivers, ecosystems, ecosystem services, and human well-being.

22. The *Global Orchestration* scenario explores the possibilities of a world in which global economic and social policies are the primary approach to sustainability. Global trade increases the most in this scenario. Environmental problems are dealt with in an ad-hoc reactive manner, as it is assumed that improved economic well-being will eventually create demand for and the means to achieve environmental protection.

23. In this scenario, growing trade opens the door to an increase of intended and unintended introductions of species. Confidence in technology discourages research aiming to anticipate invasions or the scaling back of economically valuable species unless they become serious threats to economic growth in other sectors. Global cooperation facilitates response to invasions, but it comes usually too late and is thus likely not cost-effective. Responses use a combination of processes, but not in any organized or integrated way. Overall, frequent mistakes result in alien species spread and negative ecological consequences.

24. The *Order from Strength* scenario examines the outcomes of a world in which protection through boundaries becomes paramount. The policies enacted in this scenario lead to a world in which the rich

---

23/ Volume 3, p.138
24/ Volume 3, p. 139
24/ Volume 3, p. 139
25/ Text for this section was extracted from the Ecosystems and Human Well-Being: Biodiversity Synthesis p. 60-61, and Volume 2 "Scenarios", p. 277-279

protect their borders, attempting to confine poverty, conflict, environmental degradation, and deterioration of ecosystem services to areas outside the borders.

25. Global cooperation is poor in this scenario. Research into understanding, detecting, and controlling invasive species is likely to be low, consistent with the low priority given to proactive environmental management. Tight border controls are likely to be ineffective, as only a small number of individuals need to get through to start an invasion. Poorer countries tend to suffer more invasions and higher impacts, due to inadequate resource management and the high cost of control efforts. Meanwhile, rich countries do not give importance to ecological management. Therefore, future invasions will be likely to catch all countries off guard. Failures in monitoring, control, and management produce the largest invasion risks across the four scenarios.

26. The *Adapting Mosaic* scenario explores the benefits and risks of environmentally proactive local and regional management as the primary approach to sustainability. The local focus in this scenario will reduce long distance transport of materials which will reduce pressure on ecosystems, and should reduce the chances of species introductions. Close monitoring and learning by local managers should effectively deal with most invasions before they get established and reduce species damage.

27. On the other hand, the lack of coordinated response strategies would make broad-scale outbreaks difficult to control. The lack of national and global cooperation may also lead to frequent reinvasions at the local level. Yet, the overall risk from invasive species is likely to decline.

28. The *TechnoGarden* scenario explores the potential role of technology in providing or improving the provision of ecosystem services. Depending on whether detection and control technologies improve fast enough to counteract the increasing opportunities for species movement due to a substantial increase in global trade, this scenario could see an increase or decrease in species invasion.

29. Technologies (such as tracking technologies using biotechnology or nanotechnology) could help follow and control the spread of invasive species and could be used to keep the economically valuable ones contained. Investment in research for understanding, detecting, and controlling invasions - combined with international cooperation in amelioration - would give this scenario a distinct edge over the others. There is the danger that overconfidence and complacency could lead to surprises, however, and that technology could create new pests that are hard to control. Overall damage from invasive species is least severe in this scenario.

I. Conclusions

30. Overall, the MA findings with respect to IAS stress the need for: (i) prevention measures; (ii) a combination of global cooperation and local management; (iii) special attention to the vulnerability of inland water and island ecosystems as well as biodiversity hotspots; (iv) measures to address trade as an important vector of introduction; and (v) overcoming insufficient commitment, financial and human resources to implement existing policy and regulation.

31. The MA scenarios and sub-global assessments suggest that emphasis on prevention (via *inter alia* improved quarantine practices, investments in monitoring and research, collaboration and cooperation, and adequate legal frameworks) will be more effective at reducing invasions and the severity of their impacts than control and eradication measures.

32. Although national and global cooperation is stressed as being necessary to limit invasions and their spread, the Adapting Mosaic scenario also highlights the importance of local management of invasive alien species. Local regulation is more likely to prevent arrival of invasive species and local monitoring, management, and control are effective at reducing species damage.

33. The MA highlighted island and inland waters ecosystems as the ecosystems that are most adversely affected by invasive alien species. The MA also drew attention to the vulnerability of biodiversity hotspots to invasions of alien species. Thus, specific measures and policies tailored to these

ecosystems' needs, and to the specific pathways of invasion may be elaborated or added by the in-depth review of implementation.

34. An important variable in each of the MA scenarios is the volume of trade, and new links between trade partners. In addition, most sub-global assessments identify introduction of invasive alien species as a by-product of increased trade or the introduction of new technologies. As such, international, regional and national trade regulation should incorporate references to monitoring, prevention and control of invasive alien species. This also points to the need to involve the private sector. While some may gain economically from specific introductions, some economic sectors (e.g. agriculture) may suffer significant consequences from invasions of alien species. To that effect, the MA also noted that no incentive structures currently exist to reduce invasions of alien species. It is not only necessary to create positive incentives (as recommended per decisions VI/23 and VII/13), but it is also necessary to remove the numerous perverse incentives that promote the introductions of invasive alien species. In the context of the CBD, the issue of invasive alien species could be further addressed through the cross-cutting issue of incentive measures.

35. Lack of material and human resources was also noted by the MA as one of the main impediments to adequate responses to the spread of invasive alien species. It is worth noting that sufficient economic resources devoted for a long time as well as engagement from all stakeholders to address the problem were identified as two key factors in successful responses to invasions of alien species. In light of the above, increased support to capacity-building activities, including training and awareness-raising, may benefit the work on invasive alien species as a whole.

Annex III

RESULTS (TABLE 2) OF THE AD HOC MEETING OF IAS DATA PROVIDERS AND USER GROUPS TO DEVELOP THE 2010 INDICATOR, 22-23RD JANUARY 2007 – ASSESSMENT OF POSSIBLE INDICATORS

Each indicator is reviewed for 2010 and beyond. The scores are (H)igh, (M)edium and (L)ow for Relevance, Rigour and Representativeness. The selected indicators are asterisked (∗)

PROSPECTS FOR 2010	LONGER TERM PROSPECTS	SCORE		
I Measures of number				
I.i No. of alien and naturalised species. This is measured at the country scale, so alien indicates out of country. The measure would assess the effectiveness of management of invasions ans spread				
At country level - achievable only for a limited number of countries. 50 countries have lists of alien /invasive species. 10-15% of which have date of introduction for some species (approx. 5-20 countries overall could have a trend. No global measure, European bias). With some research into global distribution of aliens this baseline list could be improved (using date of introduction, not date species became invasive) to create trends but for a limited set of countries only. Could use past dates of introduction to back track to 1980 /1990 baseline. Outstanding issue of cryptogenic species?	Could be developed by encouraging countries to record aliens in surveys and expeditions more consistently, using data standards proposed by GISIN. In the future this measure may become more useful and fit well with other measures. Important to distinguish between 'alien' and 'naturalised' in this category.	M-M	L-M	L-H
* I.ii **No of invasive alien species** This is subset of the measure above and more relevant. Need an operational definition of invasive for this dataset and discussions with data owners (to define date of intro/ invasiveness). Many country lists use a variety of terms (e.g. exotic) and many include alien invasives disproportionately to aliens, but do not denote them as such.				
Feasible at country level for limited no. of countries. Many have date of introduction (but not the date the species became 'invasive'). Could, with effort produce trend for 2010 for limited set of countries – though likely to be biased to temperate and	Preferred measure for longer term development. Need to identify a subset of countries across regions and habitats with limited data to create improved lists of countries for more global dataset.	H - H	L-M	L-H

PROSPECTS FOR 2010	LONGER TERM PROSPECTS	SCORE		
European countries.				
I.iii No. of invasive species – in this case invasive species are counted regardless of whether they are alien or not. Especially important for large, heterogeneous countries where native species can become invasive.				
Not possible anywhere at present. Needs to be gathered at site / sub-country / country level.	Something that was considered useful. Needs to be defined much more clearly and have data collected. Site and sp level data sets could contribute new info.	-	-	-
II Measures of Spread				
II.i Spread of "worst" IAS. This is a subset of spread of IAS below				
Using ISSG list of the worst IAS it would be possible to obtain trends but would need date of introduction, which will be possible for many countries. Most useful at country level - global measure would be of limited use.		H - H	L-L	L-L
II.i Spread of IAS.				
Only country/ regional level state assessments exist. Trends for limited species in certain countries would be possible. Some detailed geographic baselines available (S Africa, NZ, Australia), DAISIE (Europe in 2008) (plants generally, some mammals). Outstanding issues = Time scale of change.	More regional specific trends may become available. May have some better mapping of habitats that are impacted by invasives (mangroves, etc) in the future but there will be a large resolution issue (Landsat, IKONOS). Good to combine with population / density / impact of invasives. Land surface area free from invasion as a potential measure.	.- H	.-M	.-M
III Measures of Abundance				
* III.i **Population trends / abundance** (of transformer species). This would be based on databases of population trends accumulated across species, poulations and sites, such as the Living Planet Index				
Could have a global trend for 2010, measured as rate of change of populations of alien species from 1970-2010 at	Would be good in the future if there are good population data for more taxa; could be adapted as a	M -	M-	M-H

PROSPECTS FOR 2010	LONGER TERM PROSPECTS	SCORE		
biogeographical scale globally. Problems are taxonomic bias to vertebrates, lack of data for certain countries and ecosystems (same as no. of alien species, above). Better measure could be number of invasive populations in state of rapid increase. Requires investment in data gathering and testing for best analysis.	measure of management effectiveness. Encourage national targeted data gathering to include IAS.	M	M	
IV Measures of Control				
* IV.i **No. of countries that are party to relevant international agreements**, i.e. where there are articles or obligations regarding IAS				
This is a country level measure but can aggregate to produce global scores. Trends for 2010 can be produced by checking listed conventions for each country. Has the country ratified conventions? Are there legal operations in place nationally?. Baseline possible, trend possible as can backtrack. Needs to be coordinated with CBD reporting. Illustrative conventions: 1. Convention on Biological Diversity 2. Cartagena Protocol on Biosafety 3. International Plant Protection Convention (IPPC) 4. Convention on Migratory Species (CMS / Bonn Convention) 5. Convention on International Trade in Endangered Species (CITES) 6. Ramsar Convention on Wetlands (Ramsar)7. Ballast Water Convention 8. Sanitary and Phytosanitary agreement 9. OIE (Organisation International d' Epizoologie) 10. Convention on International Civil Aviation (the Chicago	Measure management effectiveness in the future. Quality evaluation / validation is an issue.	H - H	H-H	H-H

PROSPECTS FOR 2010	LONGER TERM PROSPECTS	SCORE		
Convention) 11. International Postal Union 12. IAS identified as an issue in National Biodiversity strategies 13. IAS identified as an issue in National Biodiversity Action plans e.g. Number of countries scoring < 5				
***IV.ii No. of countries with operational management of introduction pathways**				
Needs to be established with minimum criteria, e.g existence of management regulation / plan, some evidence of implementation of above Relevant pathways to score: waterways: marine, waterways: freshwater, postal, air, within translocation, road /rail. Needs to be coordinated with CBD reporting. Could create baseline/ status for a good sample of countries. Baseline for 2010 (will profile the problem), no trend data.	Measure management effectiveness (effort) in the future. Adopted international system of standards relevant to IAS (under SPS agreement / ISO /IPPC). Precision may improve over time to be quality assessment rather than simple yes/no.	H - H	L-M	M-H
* **IV.iii No. of IAS management plans in place**. Can just be whether the country has a management plan for IAS, could have criteria, e.g. management plan should include components of management, eradication / control and prevention.				
Data to be gathered at country level, but could be accumulated for global measures. Good for profiling the problem (if know where the IAS are etc). Ecosystem / regional / site optional. No trend data but should be able to create a status for some countries. Limited data available for status assessment.	Expand to include more in depth definition of management plan (Has country adopted international system of standards relevant to IAS (under SPS agreement / ISO /IPPC)), effectiveness of plans (surveillance >> management against re-invasion). Requires lots of effort. Good measure in the long run. Co-relating level of management in place with level of threat?	H - H	L-M	L-M
V Measures of Cost				

PROSPECTS FOR 2010	LONGER TERM PROSPECTS	SCORE		
* **V.i Economic impacts** (cost and benefit) (economic cost of invasives, total – includes economic, livelihoods, biodiversity, control, etc).				
At present only case studies are available. We are still way off gathering biodiversity economic data usefully. Maybe possible to estimate single impact cost estimates for certain countries (including pests). Requires research into current projects underway (watersheds, climate change, country based etc). No information likely for 2010 beyond case studies.	Possibility of broadened approach based around case studies. Very effective measure if possible. Also possible to look at predictions of costs of IAS with climate change etc. Modellers and economists needed.	H - H	L-L	.-H
VI Measures of Impacts				
*** VI.i Change in threat status of species driven by invasives** This can be gathered from the IUCN Red List database, which records threats and status for threatened species. The Red List Index (RLI) records trends in threatened species, and this could be estimated only for those threatened by IAS.				
Global measure (for certain groups). Trends in threat status possible for birds, mammals, amphibians, cycads, conifers and sample of all vertebrates (sampled Red List Index) plus baseline data for other groups. By 2008 will be able to ID to invasive species. Can't disaggregate to scale of small countries, unless evaluate extinction risk at national scale. Only for globally assessed groups or sampled groups for RLI.	Global level for other groups in time, sampled RLI.	H - H	M-M	H-H
VI.ii Number of species threatened by IAS				
Baseline data only. Need to record reasons for change against changes.	Possible. Record impacts of IAS on ecosystems (or ecosystem function) in a more systematic way.	H - H	M-M	H-H

***VI.iii Population trends of species threatened by IAS**. As in III.i, this would be based around aggregated population trend data, such as used for the LPI. Could only be done for species whose main threat is IAS, and data gathering to record the type and impact of threat is needed				
With effort could be coarse status information, maybe trends, for 2010.	Could be further developed; complex methodological issues concerning species facing multiple threats whose relative impact is changing over time.	H - H	M-M	M-H
VI.iv Measure of ecosystem health				
No available data	Desirable but huge problems as difficult to aggregate & compare across ecosystems. Encourage ecosystem health community to consider IAS.	.- H	.-L	.-L
***VI.v Emerging disease outbreaks** (number of outbreaks over time). Explore case studies for 1 or 2 select ed diseases? E.g. whirling disease, chronic wasting disease, rinderpest, chytridomycosis, malaria (by invasive mosquitoes), Nile virus, exotic Newcastle disease). Issue of how to define an emerging disease, but potentially a good measure. Requires research into what currently available.				
Spread of disease outbreaks over countries possible. Probably no more than a limited case studies available for 2010.	Maybe	H - H	M-M	L-L
***VI.vi Number or % areas important for biodiversity (e.g. key biodiversity areas /IBAs, some Protected Areas, Ramsar Sites etc) threatened by invasives** (where invasives are one of the most important threats).				
Probably achievable, but not completely global. Status measure possible. Some data with trends for countries (or ecosystems / sites).	Global coverage desired. Needs some further development. IBA coverage soon complete, KBA some way off global coverage. Could look at Protected Areas also, but data patchy and possibly biased, plus PA may be set up for one purpose (e.g. not for biodiversity), with invasives impacting species within the PA	H - H	L-M	M-H
