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**INVASIVE ALIEN SPECIES**

*Prepared by the Government of Hungary  
in co-operation with the Government of the United Kingdom  
and the Bern Convention*

## **EXECUTIVE SUMMARY**

The invasion of mainly exotic plant and animal species has become increasingly important during the last decade and raised public attention. Damage to building property, damage to forestry, congestion to navigable waterways, allergenic effect and impacts of certain species tend to highlight problems of invasive alien species to the public. However, alien species invasion does not merely influence the society and economic sector but has major impacts on biological diversity and nature conservation.

Biological invasions operate now on global as well as regional and sub-regional scale and will undergo rapid increase in the near future due to interactions with other global changes such as increasing globalisation of markets, explosive rises in global trade, travel, tourism, and exchange of goods.

Invasive alien species are species introduced deliberately or unintentionally outside their natural habitats where they have the ability to establish themselves, invade, outcompete natives and take over the new environments. They are widespread in the world and are found in all categories of living organisms and all types of ecosystems. They are known to affect biological diversity whether within or outside protected areas and influence ecosystems, natural habitats and surrounding populations. Invasive alien species can cause significant irreversible environmental and socio-economic damages at the genetic, species and ecosystem levels.

In consequence, the planning of more effective strategies to deal with biological invasions is a conservation priority on global scale. For this purpose, new actions at national, trans-border, regional and international level are required, based on a proactive rather than reactive approach.

## **INTRODUCTION**

Different terms are used for alien species generally (non-indigenous, non-native, exotic, foreign, new) and for the subset that cause damage (pest, weed, harmful, injurious, invasive, environmentally dangerous). There are marked differences in use of terms in different sectors. Sanitary and phytosanitary instruments use “pest” and “weed” terminology, backed by clear definitions, and do not distinguish by source or origin: this means they also cover native pests. The International Plant Protection Convention (IPPC) uses the term ‘quarantine pest’ to distinguish by source and by level of damage. Multilateral environmental agreement (MEA) requirements usually refer to “alien” or “exotic” species (almost never defined) in combination with harm/invasiveness criteria to identify those species that should be subject to controls. This generally excludes native species that become invasive.

The IUCN Species Survival Commission (SSC) - ISSG (Invasive Species Specialist Group) published the „IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species”. It was approved by the 51<sup>st</sup> Meeting of the IUCN Council, Gland Switzerland, February 2000. We can find the followings in its „Definition of Terms”:

**"Alien invasive species"** (IAS) means an alien species, which becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity.

**"Alien species"** (non-native, non-indigenous, foreign, exotic) means a species, subspecies, or lower taxon occurring outside of its natural range (past or present) and dispersal potential (i.e. outside the range it occupies naturally or could not occupy without direct or indirect introduction or care by humans) and includes any part, gametes or propagule of such species that might survive and subsequently reproduce.

**Working definitions used by the Global Invasive Species Programme (GISP) (UNEP/CBD/SBSTTA/6/INF/5 Annex II.)**

**„Invasive alien species”**: an alien species whose establishment and spread threaten ecosystems, habitats or species with economic or environmental harm. These are addressed under Article 8(h) of the Convention on Biological Diversity (CBD).

**„Alien species”** (synonyms: non-native, non-indigenous, foreign, exotic): a species, subspecies, or lower taxon introduced outside its normal past or present distribution; includes any part, gametes, seeds, eggs, or propagules of such species that might survive and subsequently reproduce.

There are several other definitions produced by other organisations, but we think these are the most acceptable and overall ones this time.

Invasive alien species are now acknowledged as one of the major threats to biodiversity, together with habitat loss and fragmentation. Furthermore, it is predicted that biological invasions will become the major engines of ecological disintegration in the future; this is because of the increased spread of alien species, due to the greater mobility of human population, rapidly growing transport technology, expanding tourism and travel activities, and world-wide free trade (Cox 1999, Ruesink et al. 1995).

In addition to the threats to biodiversity, the direct costs of IAS are immense. It is difficult to estimate precisely the economic losses caused by biological invasions. They include the impact of weeds on crop production, the increased costs of control, the decreased water supply, the management costs of reducing the alterations of protected areas, the impact of introduced pathogens affecting wildlife and public health, and the impact of marine organisms transported by ships (mainly ballast water and hull-fouling).

The need to prevent unwanted introductions of alien species and to mitigate the impacts of biological invasions have been repeatedly addressed at international and regional levels. However, widespread concern about the threats posed by biological invasions, and general recognition of the urgent need to define and implement actions to reduce these threats, are faced with several obstacles.

The complex scientific, technical and political aspects are posed main difficulties. These include the very diverse sources of invasions, pathways and modes of entry, the economic importance of many intentional introductions, the human dimension of alien species introductions, the inadequate methods to detect and control new invasions, and their public acceptability.

In order to deal with biological invasions, it is fundamental to address very different aspects, including international trade regulations, control during transport, border controls and

quarantine, detection of new propagules and public perception of control methods. A holistic approach is this needed, based on greater awareness of the public and decision-makers, prevention of unwanted introductions and, where prevention fails, eradication when feasible and desirable or containment and effective control of new IAS.

This approach requires a framework of biosecurity policies, actions and clear allocation of roles and responsibilities. IAS are a cross-cutting issue, which requires co-ordination and commitment of several different sectors, close co-operation between ministries with different mandates and international co-ordination of relevant efforts and strategies. In practice, however, the generally limited public and political awareness of the IAS threat often leads to inadequate participation and political commitment.

To address the biological invasion, some countries (notably New Zealand, Australia, USA, Hungary and several island states) and some regions have begun to implement comprehensive bio-security policies, managing in some cases markedly to reduce threats posed by IAS. In contrast, Europe lacks a regional strategy and common policy on IAS. European States are required to address the invasive alien species issue under several international instruments. The main aim is to prevent or minimise biological diversity loss caused by invasive alien species in Europe through the development and implementation of a co-ordinated European strategy.

## **INTERNATIONAL ACTIONS: GLOBAL LEVEL**

Recognising the problem several international conventions, governmental and non-governmental organisations deal in some sort with the biodiversity loss caused by alien species.

According to the CBD: Article 8. (h) *"Each Contracting Party shall, as far as possible and as appropriate prevent the introduction of, control or eradicate those alien species, which threaten ecosystems, habitats or species"*.

Answers to the pre-formulated questions 86-102 of the Second National Reports on the implementation of the CBD focus on the impacts of biological invasion and alien species. Decisions of the Conference of the Parties (COP) and recommendations of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) call on Parties to take action to monitor and prevent invasions, and to rehabilitate ecosystems that have been invaded.

In its decision IV/1 C entitled "Alien species that threaten ecosystems, habitats or species", the COP requested SBSTTA to develop guiding principles for the prevention, introduction and mitigation of impacts of alien species. SBSTTA 6 references to the discussion of the "Guiding Principles" and explanation of the controversial points: GP1 – Precautionary approach; GP4 – State rights and responsibilities; GP10 – Intentional introduction (UNEP/CBD/COP/6/3 Annex).

In its work, SBSTTA in co-operation with the GISP has reiterated that the introduction of invasive alien species is a major threat to biological diversity (UNEP/CBD/SBSTTA/5/5). The threat to biodiversity due to invasive alien species is considered second only to that of habitat loss.

The 5<sup>th</sup> meeting of the CBD COP urged Parties, other governments, and other relevant bodies to give priority to the development and implementation of invasive alien species strategies and action plans.

At the 7<sup>th</sup> meeting of the Conference of the Contracting Parties to the Convention on Wetlands (Ramsar Convention) in San José, Costa Rica between 10-18 May 1999, invasive species and their impacts on wetlands were among the most important questions.

At the 17<sup>th</sup> meeting of the Animals Committee of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) held in Hanoi (Viet Nam) between 30 July and 3 August 2001, it was noted that few CITES listed species were actually invasive, but there remained general support for maintaining contact with the IUCN/SSC Invasive Species Specialist Group (ISSG) and the CBD on this issue. ISSG agreed to collaborate in the production of a list of potentially invasive CITES species.

The IUCN Species Survival Commission (SSC) - ISSG has developed a Global Invasive Species Database (and Early Warning System). Key features of this database include its accessibility (it is available on Internet) and ease of use. A simple habitat-matching model is used to predict which other global regions are potentially at risk of invasion. These developments are carried out as part of the GISP, co-ordinated by the Scientific Committee on Problems of the Environment (SCOPE). IUCN, CAB International and UNEP are partners in GISP. The 100 of the World's Worst Invasive Alien Species list and database are an integrated subset of the Global Invasive Species Database.

This list focuses mainly on American and Australian circumstances, so a European regional list is needed. In 2002 a Nordic/Baltic regional workshop will be held in Estonia to develop a network of interoperable databases on invasive or invasive alien species of the Nordic/Baltic region. During this workshop participants will work towards the development of a regional database network to facilitate information exchange on invasive alien species both within the region and globally.

The 6<sup>th</sup> meeting of SBSTTA of the CBD (Montreal, 12-16 March 2001) was mainly devoted to discussion of Invasive Alien Species.

A "side-event" was organised during SBSTTA-6 to present in more details the actions of the Bern Convention on IAS and discuss with participants Document T-PVS (2001) 12. At SBSTTA-6, a draft recommendation was adopted that "*welcome(d) the initiative of Council of Europe (Bern Convention) to help the implementation of Article 8(h), including the development of a European Strategy on Invasive Alien Species*". That draft recommendation includes options for future work.

The Bern Convention Secretariat and the European Section of IUCN-ISSG presented 3 documents:

- T-PVS (2001) 10 – Bern Convention action on invasive alien species in Europe
- T-PVS (2000) 65 rev.2 Guidelines for eradication of terrestrial vertebrates
- T-PVS (2001) 12 – Contribution to a European Strategy on Invasive Alien Species

## **INTERNATIONAL ACTIONS: REGIONAL LEVEL**

Several international, regional and sub-regional instruments ratified or adopted by a large number of European countries address various aspects of the IAS issue. The earliest instruments aim to control the introduction and spread of pests and diseases to protect human, animal and plant health. Conservation treaties reference alien species for their possible impacts on native species and ecosystems. Technical guidelines have been developed for some transport and production sectors that present risks of unintentional introductions or escapes from containment. These instruments indicate actions that States need to take: several generally urge States to improve working programmes, avoid duplication of efforts, promote co-operative actions and explore synergies among actors.

In addition, because alien species use transport and trade pathways, regional and national measures to prevent or minimise unwanted introductions have implications for the multilateral trading system. The World Trade Organisation (WTO), mainly through the Agreement on the Application of Sanitary and Phytosanitary Measures, sets out binding principles and rules and recognises sources of international standards that should, where available, be followed in national measures.

In Europe, at the political level, two main institutions are responsible for regional conservation policies: the Council of Europe, which with 42 member States represents a large proportion of the entire European region, and the European Union (EU), which currently has 15 member States and the accession of further states is on the agenda.

### ***Council of Europe***

Within the Council of Europe, the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1979) is the main legal instrument for the development and implementation of conservation policies. In Article 11 paragraph 2.b, the Convention specifically requires “*each Contracting Party...to undertake to strictly control the introduction of non-native species*”.

The Bern Convention is one of the very few international instruments that has developed specific technical references for addressing IAS. Since 1989, the Bern Convention has carried out a wide range of relevant activities to strengthen implementation by its Parties, including the adoption of recommendations on general IAS issues and on specific problems posed by IAS, the production of technical reports, the organisation of workshops and the establishment of a group of experts on alien species.

### ***European Union***

Within the EU, conservation policies are defined through the EU Biodiversity Strategy and implemented through regulations or directives that are binding instruments for member States. With regards to IAS, member States must take measures to ensure that any introduction of an alien bird species does not prejudice the native fauna and flora (Council Directive 79/409/EEC on the Conservation of Wild Birds). They must also regulate the deliberate introduction in the wild of any alien species so as not to prejudice natural habitats and wild native fauna and flora (Council Directive 92/43/EEC on the Conservation of Natural habitats and of Wild Fauna and Flora).

The EC regulation for the implementation of CITES within the EU provides a basis for controlling imports of certain species that may become invasive (Regulation 338/97, Article 4.6(d)). More recently, the EU Biodiversity Strategy states that: “*The presence or introduction of alien species or sub-species can potentially cause imbalances and changes to ecosystems. It can have potentially irreversible impacts, by hybridisation or competition, on native components of biodiversity. Applying the precautionary principle, the Community*

*should take measures to prevent that alien species cause detrimental effects on ecosystems, priority species or the habitats they depend on and establish measures to control, manage and wherever possible remove the risks that they pose” (COM (1998)42).*

## **NATIONAL ACTIONS**

The current spectrum of national activities is diverse. For example Slovakia has some popularising publication about invasive trees and other vascular plant. Austrian experts prepared their own invasive list, which includes two major points. First of them is “Neozoa/Neophyta species that occur in selected areas of Austria only, but show tendencies to become invasive” and the second one is “Neozoa/Neophyta species that threaten directly or indirectly the biodiversity of natural or near-natural Austrian ecosystems”.

### **Example of national actions: the United Kingdom**

The Environment Agency in England and Wales prepared a guideline collection called “Guidance for the control of invasive plants near watercourses”. Proposals for chemical and mechanical eradication are included in this issue.

The UK Government announced in the Rural White Paper for England that it will be carrying out a fundamental review of the policy on non-native species. At present there are a number of statutory and non-statutory options available to deal with the problems caused by non-native species, but these are uncoordinated and tend to focus on individual sectors, such as agriculture. The review is being carried out with the involvement of government, industry, conservation bodies and the general public.

The review process will:

- evaluate the effectiveness of current statutory or non-statutory procedures for dealing with the introduction and establishment of non-native species and identify examples of current best practice within the United Kingdom and abroad;
- identify the main vectors for the introduction and spread of non-native species;
- put forward practical and proportionate costed proposals for improving measures to limit the ecological and economic impact of non-native species in the UK and recommend measures to limit the impact of the introduction of native species beyond their natural range. These could include proposals for statutory or non-statutory measures in areas of research and monitoring, trade, and control of non-native species;
- identify appropriate organisations to take forward any measures recommended.

The review will:

- be carried out on a UK basis for terrestrial, freshwater and marine environments;
- cover all species of fauna and flora except agricultural crops and genetically modified organisms;
- take account of the appropriate international and European agreements related to the introduction of non-native species;
- involve all appropriate stakeholders.

### **Reporting Arrangements**

The review has a working group that meets every two months to steer the work of three sub-groups. The sub-groups are covering the specific issues of prevention, monitoring and risk assessment, and remedy and control. The sub-groups will produce reports that will feed into the final report of the review group.

The Review is due to report to the UK Government in summer 2002.

### **Case study: Control of the North American Ruddy Duck in the UK**

Introduced North American ruddy ducks are considered to be the main threat to the survival of the globally threatened white-headed duck as a distinct species. The white-headed duck is the only European species of stiff tail duck. The UK holds the largest population of this introduced species.

The UK Government decided in 1999 to carry out a 3-year control trial of the North American ruddy duck to test the feasibility of eradicating the UK's population of ruddy duck within ten years; determine the financial cost of such a programme; identify the factors which will impact on any national programme and test different methods of humane control.

The results of the first two years of the control trial have been encouraging, with over 2000 ducks controlled – which could represent 30% of the UK population. Operations were interrupted in February 2001 due to the foot and mouth disease outbreak, as most sites holding ducks were located within infected areas. Control has now resumed, but the trial will now not be completed until July 2002.

The UK Government will decide in the summer of 2002 whether to pursue an eradication strategy – taking account of the results of the trial and the efforts of our European partners in controlling ruddy ducks that occur in their countries.

### **Example of national actions: Hungary**

Biological invasion in Hungary deserves the attention of researchers, decision-makers and the public as well. Public interest focuses mainly on human health impacts of some allergenic species, but the society is also sensitive to the degradation of natural values of protected and urban areas. However, the awareness of personal responsibility for the state of invaders and its relation to land use practice is very low.

Two main acts consider the problem of biological invasion in Hungary, one is the ratification of the Convention on Biological Diversity (Act No. LXXXI of 1995), and the other is the Act No. LIII of 1996 on the Conservation of Nature. The agricultural administration has long developed legal measures against pests, diseases and weeds.

### **Invasive plant species**

The most dangerous invasive plant species of Hungarian habitats were listed by a scientific symposium in 1998. Researchers and nature conservation experts selected about 35 invasive plant species. The most susceptible habitats in Hungary are mismanaged agricultural and rural areas and water-determined ecosystems. Dry grasslands and semi-natural forests resist better plant invasions, but disturbance can greatly increase the probability of their mass occurrence.

In several cases, invading species do not only degrade the habitat but also outcompete certain valuable, protected species occupying similar niches in the community. According to the most recent information about 45 000 hectares of grassland are affected with invasive plants (like *Solidago* species, *Ailanthus altissima*, *Elaeagnus angustifolia* and *Asclepias syriaca*) in nationally designated sites. State nature conservation organisation has initiated several programmes for the mechanical control of invasive plant species in protected areas with only locally apparent results so far. Plans for mechanical and nature-friendly chemical control are under development, but recent calculations indicate that these projects would cost more than 4,2 million Euro. The government and also non-governmental organisations yearly launch programmes for ragweed (*Ambrosia artemisiifolia*) control, with substantial public participation, but the results are not detectable so far in the pollen levels.

### **Invasive animal species**

Long standing forestry and agricultural light-trap or other forecasting network has a potentially important role in the early detection of invasive insect species (e.g. *Helicoverpa armigera*).

The horse chestnut leaf-miner (*Cameraria ohridella*) is a member of the lepidopteran family Gracillariidae and was recorded for the first time from Macedonia in 1985 attacking horse chestnut (*Aesculus hippocastanum*). This moth was described as a new species of the genus *Cameraria* in 1986. Up to now the origin of the moth is totally unknown. There has been some discussion that this species was carried to Macedonia from America, and then it spread. However, nowadays it is quiet certain that the origin is not American. There has been discussion for a long time about the possibility of conveyance by human beings. Affects of global climate changing have been mentioned. Totally unexpected, *C. ohridella* appeared in Austria in 1989 from then on, it rapidly spread east and west so that, by 2000, it had colonised major parts of Central and Eastern Europe. First sighting in Hungary was in made in 1993, and serious damage caused by it has been detectable throughout the country since 1994.

A recent American invasive pest on arable land in Europe is the Western Corn Rootworm (WCR, *Diabrotica virgifera virgifera*). It is likely to have arrived in Yugoslavia in the early to mid-1980s. By the end of 2001 it had spread over 182,000 km<sup>2</sup> in Europe (Bulgaria, Bosnia-Herzegovina, Croatia, Hungary, Romania, Slovakia and Yugoslavia). WCR beetles were trapped in 1998 and 1999 in Italy, near Venice airport and in 2000 in Switzerland, near Lugano. WCR spread in Europe has continued in all directions from the original infestation point (Figure 1). It has become an economic pest of corn in Yugoslavia (yield losses up to 70%). Several research projects focus on the potential of biological control of these pests.

In the last few years a locally problematical new mollusc species with invasive tendency called Iberian black slug (*Arion lusitanicus*) was noted. This species causes remarkable damage in gardens in the south-western part of Hungary, just as in some other parts of Europe.

Some fish species have been introduced for consumption and to limit algae production during the 1960s, like the grass carp (*Ctenopharyngodon idella*) and the silver carp (*Hypophthalmichthys molitrix*) that became abundant and threatens the native fish fauna despite intensive fishing. A recent invador of watercourses is the bighead goby (*Neogobius kessleri*) that has arrived from the brackish waters of the Danube Delta and feeds on fish fry.

The situation of mammals is similar to that of fishes, as the population of game animals and non-protected carnivores is regulated. Two introduced species seem to have the potential of becoming invasive, the racoon dog (*Nyctereutes procyonides*) and the racoon (*Procyon lotor*).

### **Monitoring**

Recognising the importance of invasion in the survival of the native biota, the Hungarian Biodiversity Monitoring System (HBMS) has included the repeated survey of invaders in its programme. The HBMS monitors 5 invasive plant species at the landscape, community and population levels since 1998. The first results have described the present conditions and serve as baseline data. Further nature conservation programmes for monitoring invasive terrestrial and aquatic snails and insect species are absolute necessary and scheduled for the near future. The Hungarian Invasive Plant Survey and Control Programme is under development by the Ministry for Environment. The first task is to provide a national assessment of occurrence of the selected 35 invasive species. The objective of the programme is to develop an environmentally friendly control strategy of invasive plants that can be applied at nature reserves.

## **RECOMMENDATIONS FOR EUROPE**

### ***Regional approach***

The development and implementation of a regional approach to IAS issues is one of the actions that could offer significant benefits at the European level. In addition, further actions towards a European policy need to be undertaken.

The potential for trade and transport regulations to contribute to preventing unwanted introductions should be explored, including:

1. The active involvement of sanitary and phytosanitary authorities in a European biosecurity policy, including national authorities for plant protection established pursuant to the International Plant Protection Convention (Rome, 1951).
2. The co-operation of existing bodies of official national organisations for CITES implementation in order to develop a more effective system of border controls specifically aimed at IAS;
3. The active commitment of the CITES European scientific groups to address IAS issue;

Other critical actions at a regional level are: strengthening and promoting harmonisation of legal frameworks and prevention procedures; raising awareness of IAS issues; identification of priority IAS (e.g. elaboration of comprehensive lists of alien species introduced into each country and a “black list” for prevention); and implementation of key projects requiring common efforts and co-operative expertise.

### ***Sub-regional approaches***

Although Europe is characterised by territorial continuity, there are marked biogeographical differences in terms of species, subspecies, populations and ecosystems. A biogeographic approach can be particularly useful for the elaboration of “black lists” and for the development of methods and measures to control or eradicate IAS, including the definition and implementation of specific action plans (e.g. Mediterranean action plan to deal with biological invasions on islands, an Alpine action plan on the grey squirrel, a Baltic policy on the treatment of ballast water). A sub-regional approach is also critical to address monitoring and mitigation for transboundary problematic IAS.

### ***National and sub-national approaches***

States need to devote adequate resources to IAS issues; implement international instruments and, when necessary, adopt or revise national legal frameworks to remove obstacles to the actions necessary to deal with biological invasions; identify national biosecurity agencies or co-ordination mechanism to handle collection and circulation of information, authorisation processes and the implementation of mitigation measures, including eradication projects; raise awareness of the IAS issue; and cooperate to develop and apply a comprehensive European policy on this issue.

Sub-national policies for the insular territories (e.g. Portugal: Madeira and Azores Islands; Spain: Canary and Balearic Islands; Italy: Sardinia and Tuscany archipelago) and for ecosystem units (e.g. river catchment areas) can also be implemented.

During its presidency of the European Union, France hosted a high-level scientific meeting in Montpellier, France between 4<sup>th</sup>-6<sup>th</sup> December 2000 with the theme „Biology of Invasions: strategic issues for European biodiversity research”, called BIM 2000.

The delegates of the Montpellier meeting of the European Platform for Biodiversity Research Strategy agreed that:

- the factors favouring the invasion are often regional or global, although the most acute impact of invasions may be felt locally rather than nationally or internationally;
- island ecosystems, and other ecosystems that are historically or geographically isolated, are particularly susceptible to damage from invasion;
- the free movement of people and goods in the internal market favours the movement of potentially invasive organisms, and the expansion of the EU will add many new biological provinces to and from which organisms will be transferred;
- legislation to control invasion must be based on a correct balance between the needs of trade on the one hand, and on the other, prevention, the precautionary principle, and the support of sound scientific understanding of the mechanisms of invasions, including biology, vectors and socio-economic drivers, and of procedures of impact assessment.

The participants decided that the following three key issues have high priority for European research:

1. Develop methods and techniques to recognise and characterise organisms that may be invasive and ecosystems that may be particularly vulnerable to invasion; and develop predictions of invasive behaviour and ecosystem vulnerability to invasion.
2. Improve monitoring methodology to detect potentially invasive organisms early; to track invasions; and to evaluate their ecological and socio-economic impacts, and, where appropriate, to control them.
3. Develop multi-disciplinary scientific support for appropriate policy on prevention, management for control, and legislation, public awareness and information.

The participants of this workshop also agreed that:

- In some circumstances, the advantage given to GMOs by virtue of resistance to ecological constraints may encourage invasive behaviour in the organism itself or in organisms that acquire the genetically modified trait.

## **POINTS RECOMMENDED TO BE CONSIDERED AT THE BUDAPEST CONFERENCE**

Discussion should concentrate on following up existing recommendations:

- the use of the term “Invasive Alien Species” in coherence with the GISP reports,
- a clear support to the adoption of the SBSTTA Guiding Principles on Invasive Alien Species,
  - the precautionary principle should be properly reflected (version 2),
  - the state responsibility for introduction (intentional or non-intentional) implies measures in prevention, mitigation and control (version 1),
- giving importance to the preparation of a regional strategy and the establishment of a common policy on IAS in Europe, which would contribute to the implementation of article 8(h), based in the adopted Guiding Principles,
- underlining the potential role of Bern Convention, the IUCN and other fora, in particular the IPPC, and the European Plant Science Organisation and in synergy with actions in EU and other relevant organisations (FAO, CITES, Ramsar Convention, WTO, GISP),
- recognising the need of a comprehensive European list of invasive alien species, communication structure (through, inter alia, the Clearing-House Mechanism) and/or “Early Warning System”,
- a local or regional update of the worst invasive species list is inevitable,
- support for the establishment of an European list of Invasive Alien Species, as an instrument for promoting more effective prevention measures,
- support for the need of identification and exploration of specific gaps in the regulatory framework and the feasibility of adopting a specific binding instrument on alien species,
- harmonisation of policies,
- improving the technical and scientific knowledge on IAS,
- building capacity for addressing IAS,
- effective control of problematic IAS species is inconceivable without permanent international collaboration,
- maintenance and development of regional or national monitoring systems has a high importance,
- collection and processing of national and regional data on spreading IAS at the global level,
- starting up new mapping projects, harmonisation of national mapping systems,
- after the preparation of an overall strategy on invasive species eradication pilot-projects are needed,
- the burden of proof that a proposed introduction is unlikely to cause harm should be with the proposer of the introduction (version 1),
- more attention should be paid to natural enemies or other nature friendly controlling methods in restoration projects,
- calling in of non-governmental organisation into the local monitoring system or restoration projects could be useful,
- support to research and development of methods to predict and prevent invasive behaviour of GMOs released into the environment.

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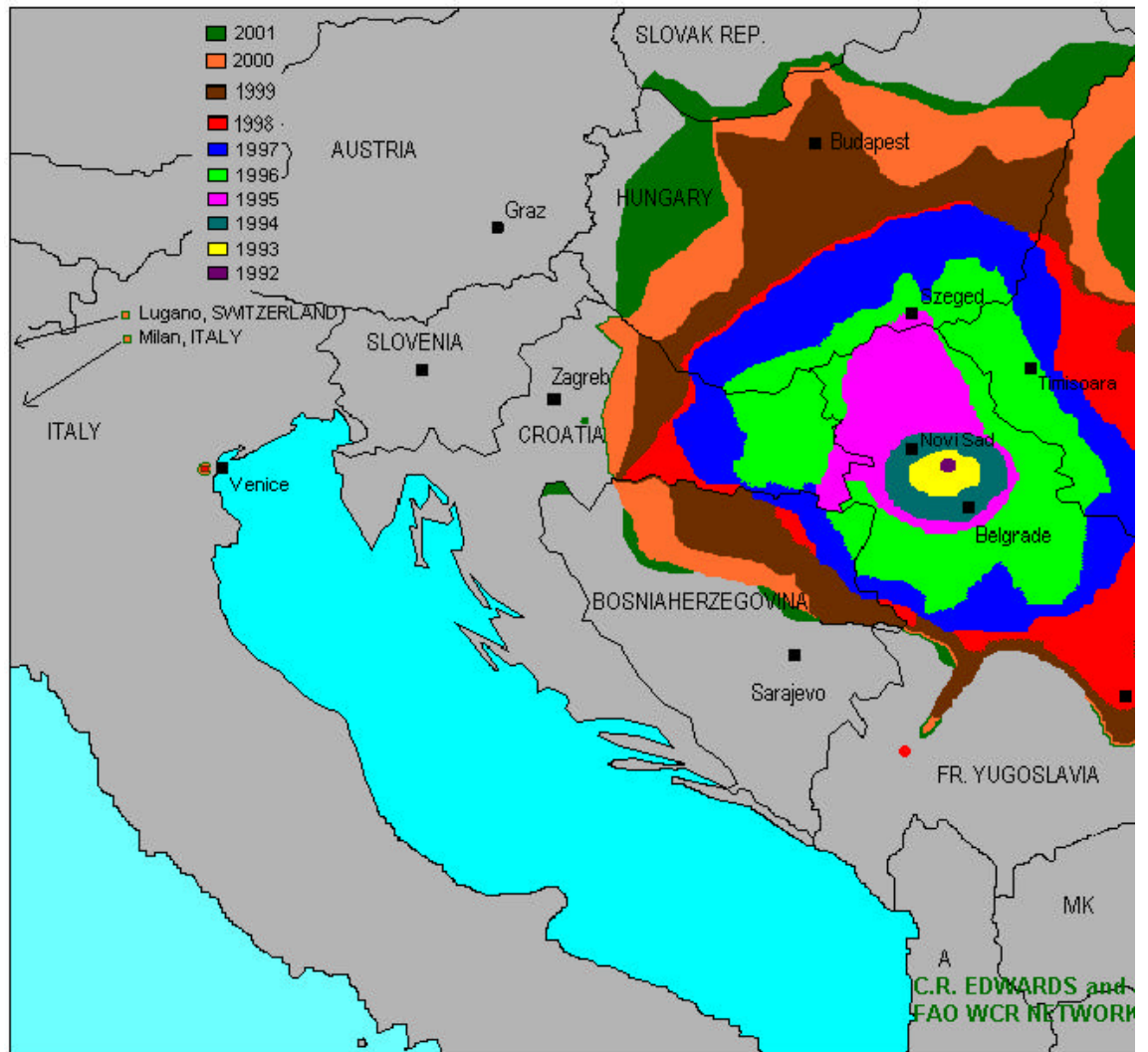


Figure 1. Spread the Western Corn Rootworm (*Diabrotica virgifera virgifera*)  
From C.R. Edwards and J. Kiss (2001) FAO WCR Network (preliminary)