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CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE
AND NATURAL HABITATS

**Bern Convention Group of Experts
on Invasive Alien Species**

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**Groupe d'experts de la Convention de Berne
sur les espèces exotiques envahissantes**

Brijuni, Croatia, (5-7 May 2009)

/

Brijuni, Croatie (5-7 mai 2009)

**Implementation of recommendations
on the Invasive Alien Species**

/

**Mise en œuvre des recommandations
sur les espèces exotiques envahissantes**

**National reports and Contributions /
Rapports nationaux et Contributions--**

*Document prepared by
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1. ARMENIA / ARMENIE

SHORT INFORMATION ON INVASIVE PLANT AND ANIMAL SPECIES IN ARMENIA

Invasive species are now one of the greatest threats to natural ecosystems, and their investigations and control and limitation are one of priorities in nature conservation. Also they threat agriculture, forestry, fishery as well human health. We define invasion as the act of exotic species entering natural communities, potential displacing native vegetation. At present, data on the spread and distribution of invasive plant species in the territory of the Republic of Armenia, and their impact on agricultural and natural areas are missing. One of the objectives of this research proposal is the study of the recent spread of invasive species and their impact on biodiversity and natural ecosystems used as pastures, hayfields and disturbed forests. There is only one publication on this problem: M. Fayvush "Invasive species as threat to natural ecosystems of Armenia". It has theoretic character and serves for attraction of investigators to this problem.

Armenia is a Transcaucasian republic, bordering Georgia, Azerbaijan, Turkey, and Iran. It is a landlocked country with a total area of 29,740 km². Armenia is generally a mountainous country, having its lowest point at 375 m above sea level and culminating at 4095 m, with an average altitude of 1850 m. Variations in altitude have important effects on the climatic and landscape zones, and consequently on the vegetation of the country.

During last years (since 1992) the economic and energy crisis mainly threatened Armenia's forests. Poor forest management combined with illegal wood cutting for fuel and construction damaged about 10 % of the total forest area. At the same time, overgrazing destroyed the grasslands surrounding the villages and degraded the formerly unspoilt pastures of remote mountains.

Similarly to other Eastern European countries the period of economic transition seriously affected the development of the country agriculture. Small individual economies have become unprofitable in the majority of cases. Modern agricultural technology is of no avail on small private farms. As a result on the one hand the process of enlargement of agricultural economies started, and on the other hand remarkably big territories of agricultural land became abandoned and are not utilized as appropriate during last years. Also now Armenia is the main route between Iran and Georgia and further Russia. The deficiency of the state quarantine service has much facilitated the entry of new alien plant species in particular along transport routes. These alien species are potential hazards to biodiversity, agriculture and natural ecosystems. In addition, it is possible that some of the large stocks of crop seed stocks received as humanitarian assistance were contaminated by weeds.

Armenia is a unique country, it has very rich composition of ecosystems of different origin. Now there is a threat for changing natural ecosystems as a result of invasions alien plant and animal species. It is well known that many weed invasive species distribute in disturbed natural ecosystems. Now there is a situation in Armenia that weed species distribute in natural ecosystems, which used as pastures and haylands, as well as in cutted and disturbed forests.

Until present time the problem of invasive species was practically not in the focus of attention in Armenia. Within last 50 years segetal flora and vegetation of the republic was investigated more or less in details. What about alien, invasive plant species – there were no special investigations carried out. New species detected on the territory of Armenia, herbarium sample of it was stored in the herbarium of the Institute of Botany of the NAS RA (ERE). The most interesting cases were published in articles about new findings in the flora of the republic. Species that were specially introduced and used for town and settlement greenery or artificial afforestation and further penetrated to natural ecosystems were totally out of attention. The first national report on Armenia biodiversity (1999) had a small section dedicated to alien invasive species.

A little bit more attention was paid to indigenous, expansive species. During geobotanical investigations of forage lands of Armenia investigators marked species composition, level of

infestation of natural hayfields and pastures; influence of pasture on the spread of separate species of weed plants; also different measures of fighting against them were suggested.

The main reason of lack of studies of invasive species of Armenia is probably underestimation of this problem importance from scientific community and governmental structures. It was considered that due to the mountainous and indented landscape of the country and absence of big plain territories invasive species could not harm greatly natural flora and vegetation of the republic.

Thanks to our efforts the attitude towards the problem of invasive species of Armenia has changed a little. In year 2005 a scientific research topic was approved with governmental funding, that included the spread of main invasive and expansive species in the territory of Republic. For full up to date investigation this funding is of course insufficient, but the first step is done.

According to results of preparatory work (literature and herbarium materials review), as well as by results of preliminary fields investigations we created a list of species that require immediate attention (Annex 1). This list contains both species known as invasive in other regions of the world and new recently revealed in the republic plant species, and registered indigenous expansive species. Since 2005 during field works we started data collection on the spread of those species, their ecological peculiarities, and level of penetration in natural ecosystems. All these data will be placed in appropriately designed DAISIE computer database. The full analysis of preliminary data will be carried out in the nearest future and species that are most threatening for natural ecosystems and correspondingly require immediate investigation will be separated.

The most concern is causing at the present time one of the really alien species *Ailanthus altissima*, which is spreading in natural ecosystems of the north and south of Armenia, as well as in disturbed ecosystems of Central part of Republic. Other introduced species (*Robinia pseudoacacia*, *Gleditschia triacanthos*, *Helianthus tuberosus*) are met in natural ecosystems relatively rarely yet. *Robinia pseudoacacia* is penetrating natural ecosystems rather intensively in the North Armenia. But taking into consideration their high invasion potential the control of their spread is necessary. Species that occasionally penetrated republic territory (*Ambrosia artemisiifolia*, *Galinsoga parviflora*, *Galinsoga ciliata*, *Sphaerophysa salsula*) are also requiring constant control of their spread. The most attention and deep investigation require indigenous expansive species, especially those, which are growing plentifully in abandoned fields, create a reserve of seeds and penetrate into natural ecosystems.

In the last 2 years special investigations were organized on the distribution and ecological peculiarities of some species known as invasive in different regions of the world. These species are: *Tanacetum vulgare*, *Cardaria draba*, *Cirsium arvense*, *Cirsium incanum*, *Chondrilla juncea*, *Leucanthemum vulgare*. Also the list of potentially invasive species was enlarged during the field observations. For example, *Astragalus galegiformes* (North Armenia), *Silybum marianum* (North and South Armenia), *Chamaesyce maculata* (Central Armenia), *Sphaerophysa salsula* (Central Armenia) were included in this list.

Presently Armenia is experiencing spontaneous dissemination of several species including jackal (*Canis aureus*), porcupine (*Hystrix leucura*), Persian squirrel (*Sciurus persicus*), musquash, pheasant, Caspian turtle (*Mauremis caspica*), crucian, silver carp, white carp, sazan (*Cyprinus carpio*), rainbow trout, crayfish.

Certainly in such a situation with invasion of alien fauna representatives in the country it is not feasible to undertake radical measures.

Annex 1

Invasive and expansive species of plants that are a potential threat for natural ecosystems of Armenia

Species	Introduction	Status	Threat
<i>Acer ibericum</i>	Aborigine	Expansive species	Intensively spreading in arid and semi-arid communities
<i>Acer negundo</i>	Introduced	Potentially invasive species	Independently spreading in towns and settlements, more rarely in the disturbed habitats
<i>Acroptilon repens</i>	Aborigine	Expansive species	Plentiful on disturbed habitats, abandoned fields
<i>Ailanthus altissima</i>	Introduced	Invasive species	Intensively penetrates natural ecosystems
<i>Alliaria petiolata</i>	Aborigine	Potentially expansive species	Widespread in Armenian forests, but not plentiful and do not of an immediate threat
<i>Amaranthus retroflexus</i>	Aborigine	Invasive species	Widespread in Central Armenia, especially on disturbed areas and in the towns
<i>Ambrosia artemisiifolia</i>	Accidentally introduced	Potentially invasive species	Revealed at first in the north of Armenia in 1983 (Gabrielian & Tamanyan 1985, Avetisyan 1995), currently is spreading in Erevan city and Ararat valley
<i>Anemone fasciculata</i>	Aborigine	Expansive species	Intensively spreading in sub-alpine meadows
<i>Anthemis cotula</i> <i>Anthemis trifid</i>	Aborigine	Expansive species	Intensively spreading in meadows, abandoned fields and edges of forests
<i>Arctium palladinii</i>	Aborigine	Expansive species	Intensively spreading on disturbed habitats, especially on forest glades
<i>Artemisia vulgaris</i>	Aborigine	Expansive species	Intensively spreading on disturbed habitats
<i>Astragalus galegiformis</i>	Aborigine	Expansive species	Intensively spreading on forest edges, roadsides in North Armenia
<i>Caltha palustris</i>	Aborigine	Expansive species	Intensively spreading on wetlands in middle and upper mountain belts
<i>Cardaria boissieri</i> , <i>Cardaria draba</i>	Aborigine	Potentially invasive species	Intensively spreading on disturbed habitats, abandoned fields
<i>Carduus hamulosus</i> , <i>Carduus nutans</i>	Aborigine	Expansive species	Intensively spreading on disturbed habitats
<i>Centaurea behen</i>	Aborigine	Expansive species	Intensively spreading in steppe communities
<i>Centaurea diffusa</i>	Aborigine	Potentially invasive species	Weed in the cereals fields, penetrating into natural ecosystems (steppes)
<i>Centaurea iberica</i>	Aborigine	Expansive species	Intensively spreading in disturbed habitats in arid and semi-arid zones
<i>Centaurea solstitialis</i>	Aborigine	Potentially invasive species	Widespread in disturbed habitats
<i>Chamaesyce maculata</i>	Aborigine	Expansive species	Widespread in disturbed habitats in semi-desert
<i>Chenopodium botrys</i>	Aborigine	Expansive species	Widespread in disturbed habitats
<i>Chondrilla juncea</i>	Aborigine	Potentially invasive species	Widespread in disturbed habitats
<i>Circaea lutetiana</i>	Aborigine	Expansive and potentially invasive species	Intensively spreading in disturbed forest habitats

<i>Cirsium anatolicum</i> , <i>Cirsium arvense</i> , <i>Cirsium congestum</i> , <i>Cirsium incanum</i> , <i>Cirsium vulgare</i>	Aborigine	Expansive and potentially invasive species	Intensively spreading in disturbed habitats, especially on abandoned fields
<i>Clematis orientalis</i>	Aborigine	Expansive species	Intensively spreading along rivers of Ararat valley
<i>Conium maculatum</i>	Aborigine	Expansive species	Intensively spreading in disturbed habitats, the spread in sub-alpine communities is registered
<i>Consolida orientalis</i>	Aborigine	Expansive species	Intensively spreading in steppes, semi-deserts, very plentiful in abandoned fields
<i>Conyza canadensis</i>	Aborigine	Invasive species	Intensively spreading in forests, especially in disturbed areas
<i>Crupina vulgaris</i>	Aborigine	Expansive species	Intensively spreading in steppes
<i>Descurainia sophia</i>	Aborigine	Expansive species	Growing mainly in ruderal habitats, penetrating forest and meadows
<i>Erigeron acer</i> , <i>Erigeron annuus</i>	Aborigine	Expansive species	Intensively penetrating steppes and meadows
<i>Erodium cicutarium</i>	Aborigine	Expansive species	Intensively spreading in disturbed habitats in arid and semi-arid zones
<i>Euclidium syriacum</i>	Aborigine	Expansive species	Intensively spreading in disturbed habitats in arid and semi-arid zones
<i>Euphorbia seguieriana</i>	Aborigine	Expansive species	Intensively spreading in steppe pastures by first signs of overgrazing
<i>Galinsoga ciliata</i> , <i>Galinsoga parviflora</i> <i>Geranium tuberosum</i>	Accidentally introduced Aborigine	Potentially invasive species Expansive species	Widespread in towns, settlements; not registered yet in natural ecosystems Intensively spreading in abandoned fields
<i>Glechoma hederacea</i>	Aborigine	Expansive species	Intensively spreading in disturbed forest habitats
<i>Gleditschia triacanthos</i>	Introduced	Potentially invasive species	Spreading along irrigation channels in Ararat valley
<i>Helianthus tuberosus</i>	Introduced	Potentially invasive species	Are cultivated on small squares, rarely met on ruderal and disturbed habitats
<i>Heracleum antasiaticum</i> , <i>Heracleum schelkovnikovii</i> , <i>Heracleum trachyloma</i>	Aborigine	Expansive species	Spreading in disturbed habitats in humid and semi-humid zones
<i>Impatiens glandulifera</i>	Accidentally (?) introduced	Potentially invasive species	Found in North Armenia, needs special control
<i>Iva xanthifolia</i>	Accidentally introduced	Potentially invasive species	Found in West Armenia, needs special control
<i>Leontodon hispidus</i>	Aborigine	Expansive species	Spreading in steppes and meadows
<i>Lepidium latifolium</i> , <i>Lepidium rudemale</i>	Aborigine	Expansive species	Spreading in disturbed habitats
<i>Leucanthemum vulgare</i>	Aborigine	Expansive species	Intensively spreading in abandoned fields, penetrates meadow and steppe communities
<i>Lythrum salicaria</i>	Aborigine	Potentially invasive species	Widespread on wetlands
<i>Onopordum acanthium</i>	Aborigine	Potentially invasive species	Spreading in disturbed habitats
<i>Papaver macrostomum</i>	Aborigine	Expansive species	Intensively spreading in steppe and meadow communities
<i>Peganum harmala</i>	Aborigine	Expansive species	Spreading in disturbed habitats
<i>Picris hieracioides</i>	Aborigine	Expansive species	Spreading in disturbed habitats
<i>Polygonum alpinum</i>	Aborigine	Expansive species	Intensively spreading in sub-alpine

			communities
<i>Populus alba</i>	Aborigine	Expansive species	Spreading on wetlands
<i>Rhynchocorys orientalis</i>	Aborigine	Expansive species	Intensively spreading in meadows
<i>Robinia pseudoacacia</i>	Introduced	Potentially invasive species	Rarely met in natural communities, do not of a threat yet
<i>Salix caprea</i>	Aborigine	Expansive species	Intensively spread in disturbed forest habitats
<i>Sanicula europaea</i>	Aborigine	Expansive and potentially invasive species	Intensively spread in disturbed forest habitats
<i>Scandix stellata</i>	Aborigine	Expansive species	Intensively spread in abandoned fields, penetrates meadow and steppe communities
<i>Siegesbeckia orientalis</i>	Aborigine	Expansive species	Spreading in steppes and semi-deserts
<i>Silybum marianum</i>	Aborigine	Expansive species	Enlarged a lot its area in South and North Armenia within last years.
<i>Solidago virgaurea</i>	Aborigine	Potentially invasive species	Widespread in forest and meadow communities
<i>Sonchus oleraceus</i>	Aborigine	Expansive species	Spreading in wetlands
<i>Sphaerophysa salsula</i>	Accidentally introduced	Invasive species	Revealed first in Armenia in 1990 (Zakharian & Fayvush 1991); within those years is spread in Ararat valley
<i>Spinacia tetrandra</i>	Aborigine	Expansive species	Spreading in semi-deserts
<i>Tagetes minima</i>	Introduced	Invasive species	Was introduced as ornamental plant, now spread in disturbed ecosystems
<i>Tanacetum parthenium</i>	Aborigine	Expansive species	Spreading in steppes
<i>Tanacetum vulgare</i>	Aborigine	Potentially invasive species	Is distributed on disturbed areas in Central Armenia
<i>Tribulus terrestris</i>	Aborigine	Expansive species	Intensively spreading in disturbed habitats in arid and semi-arid zones
<i>Tripleurospermum caucasicum</i> , <i>Tripleurospermum transcaucasicum</i>	Aborigine	Expansive species	Intensively spreading in meadow and steppe communities, especially during overgrazing
<i>Veratrum album</i>	Aborigine	Expansive species	Intensively spreading in meadow associations during overgrazing
<i>Verbascum georgicum</i> , <i>Verbascum laxum</i>	Aborigine	Expansive species	Intensively spreading in abandoned fields and disturbed habitats
<i>Xanthium italicum</i> , <i>Xanthium spinosum</i> , <i>Xanthium strumarium</i>	Aborigine	Potentially invasive species	Widespread in disturbed habitats
<i>Xeranthemum squarrosum</i>	Aborigine	Expansive species	Intensively spread in steppes and semi-deserts, especially in disturbed habitats

2. BULGARIA / BULGARIE

POLICY AND ACTIONS ON INVASIVE ALIEN SPECIES IN BULGARIA

The invasive species are one of the highest threats to the biodiversity. They exert an influence on the environment, economy and the human health and they require active and purposive policy at all levels – international, regional and national for reaching result from the implemented activities in defense of the native species and habitats and reducing the damages over the economy.

Bulgaria participates in the common actions of the European countries in regard to the invasive species.

Legislation and policy

The legal matter, connected with the Invasive alien species in the Bulgarian legislation is established by the Biological Diversity Act and the Plant Protection Act.

In compliance with the Biological Diversity Act, the activities concerning the introduction into wild, the import and breeding and raising of non-native animal and plant species are granted authorization by the Head of the National Forestry Board in respect to the tree, bush and game species and by the Minister of Environment and Water – in respect to all other species, provided that there will be no threat of any damage of the natural habitats and native species. With preventive aim, the Minister of Environment and Water and the Head of the National Forestry Board are granted right to ban the aforementioned activities towards some specific species by their orders. Such interdictions are still not imposed.

The phyto-sanitarian conditions for import of plants, vegetative and other products are regulated by the Plant Protection Act. The law specifies frontier stations, carrying out phyto-sanitarian control at import and export. The Ministry of Agriculture and Forestry is the authority which is in charge to ban or to limit the import of plants and vegetative products being of great risk.

IAS are subject of the National strategy and the National action plan for biodiversity protection (2005-2010).

The policy of the country is directed toward prevention and control over the ways of penetration and spread of the IAS, information exchange and practical actions against species which are a threat on national scale. At the same time the regional connections and information exchange are developed in order to discover and to fix the problem right from the very beginning, when the chance for success is considerably higher and the necessary resources – smaller.

Actions in regard to the IAS

An assessment of the IAS has been completed in the country over plants, animals and fungi and the influence they exert on the local species and the natural habitats. As a result we have at our disposal lists of invasive and potentially invasive species and recommendations concerning the measures which are to be taken in order to reduce and suppress where it is possible their impact.

Many research centers do work on the problem with the IAS, including the thematic in their research programs. In the course of time they go deeply into their level of knowledge and they enlarge the field of research. Scientific research is done over plant species, fungi, some invertebrates (in particular Arthropods), which are pests against the local species, as well as over marine and freshwater species penetrating into Black sea and continental basins. List of scientific projects on IAS is presented in Annex 1.

The investigations showed that the most endangered are the aquatic-habitats habitats. The main ways of penetration of alien species are the river Danube and Black sea. Alien species carry away by shipping and ballast waters, but also by unintentionally imported by the human species for cultivation in maricultures. Only in the last 6 years in the Bulgarian part of the Danube River, 3 new invasive mollusk species and one invasive fish species were found:

- *Corbicula fluminea* – Asian mollusk species, found for the first time in 2001; currently widely distributed in the whole Bulgarian stretch of the Danube and upstream its tributaries
- *Anodonta (Sinanodonta) woodiana* – East-Asian mollusk species newly found in 2005
- *Dreissena bugensis* – mussel species native to the Dnieper and Bug Limans of the northern Black Sea, now widely distributed in the North America; newly recorded in the Bulgarian part of the Danube River in 2006.
- *Perccottus glenii* – a predatory fish species originated from Far East, that is rapidly increasing its range in Europe. 12 specimens were caught for the first time in the main channel of the River Danube (Bulgaria) during a period of elevated water discharge in April 2005.

It has been ascertained that during the last 10 years around 20 alien plant species settled in natural habitats have been registered.

Attention must be paid to the insects as real and potentially invasive species. They conquer easy new territories, they are flexible and their impact on the native species some times is significant. Finally, it should be noticed also the thread coming from species breeded as pets.

At the same time some special measures are implemented mainly towards invasive species with detrimental economical consequences. They are connected with a research of the biology and the ecology of the species, their natural enemies and the methods and the means for diminution of their populations as well as reducing of their harmful impact on the technological processes. It can be indicated as examples *Dreissena polymorpha*, *Rapana tomasiana*, *Cameraria ochridella* etc.

Measures for limiting and reducing of the spreading of invasive plant species such as *Amorpha fruticosa*, *Fallopia japonica* etc. are implemented in some protected areas and other sensitive territories along Danube river and the Black see coast.

Meetings

- Scientific Conference “Alien Artropods in South East Europe – crossroad of three continents” - 19-21 September 2007, Sofia
- National Workshop on Invasive Alien Species in Bulgaria, 20-21 October 2008, Sofia

A workshop with the support of the Council of Europe and participation of Bern Convention experts has been carried out in October, 2008. Interested institutions, scientific and NGO, working on the problems of IAS has participated in the workshop. General theoretical questions related to IAS has been included in the programme, the policies at national and international level, examples from the experience of other countries, results from the investigations and projects under realization in different scientific institutions have been presented. The participants have assessed the achievements, they indicated the weaknesses and the most important priorities for the future work. They specified as difficulties the lack of common legislation base and system for reaction in frame of EC, as well as the insufficient communication, ineffective use of the possibilities of the existing data bases, the lack of indicative lists of species, which are to be banned for import or such being a threat for specific regions of Europe.

The participants in the workshop have made proposals for future actions regarding the IAS, including development a National Strategy for IAS, ban for import/use of specific species, improvement the coordination and communications, increasing the capacity of the administration, involving the scientific potential to assess the risk from IAS, implementation of pilot-projects, awareness-raising and improvement of the regional cooperation. The full text of the conclusions is presented in Annex 2.

Conclusion

Bulgaria assesses the serious threat from IAS in ecological, economical and social aspect. So far their impact on the native ecosystems of the country is in the frame of extend realized for the continental regions of Europe. Along with the development of the economical, and transport connections, the ongoing climate changes and the increasing of the anthropogenetic impact on the nature, it is expected increasing of the adverse effect from the alien species.

In this connection, the future activities has to be directed toward increasing the prevention, support for the logistic, carrying out control and monitoring over the ways of penetration, support for the adaptive mechanisms and reducing the impact from the already established species.

April, 2009

Annex 1

List of the Scientific Projects on Invasive Alien Species

- Fifth Framework Programme of the European Commission CONTROCAM “Sustainable Control of the horse chestnut leafminer, *Cameraria ohridella* (Lepidoptera, Gracillariidae), a new invasive pest of *Aesculus hippocastanum* in Europe” – Project Nr. QLK5-CT-2000-01684. (www.cameraria.de) finished
- Sixth Framework Programme of the European Commission AL ARM “Assessing Large-scale environmental Risk with tested Methods” (www.alarmproject.net) – Project Nr. 506675 on-going
- SEE-ERA. NET RESEARCH PROJECT ID 10627 – Assoc. Prof. Rumen Tomov (partner) “POPULATION GENETICS OF HIGHLY INVASIVE INSECT PEST”, координатор Dr. Lopes Vaamonde
- “Investigation on leaf-mining insects (Lepidoptera) in Bulgaria Project BY-AH -5/ 2005. National Scientific Fund
- Species composition of the flea beetle (Coleoptera, Chrysomelidae) on Solanaceae plants in mountain and semimountain areas in Bulgaria” Project 112/07.04.2005 University of Forestry
- Sixth Framework Programme of the European Commission DAISIE “Delivering Alien Invasive Species Inventories for Europe” (www.europe-aliens.org) on-going
- SCOPES programme of the Swiss government – “Non-indigenous insects and their threat to biodiversity and economy in the Balkans” (www.cabi.org) on-going
- Collaboration in several projects of CABI Switzerland, concerning biocontrol of alien insects
- Collaborative project Bulgaria-China “Invasive scale insects of ornamental plants in Bulgaria and China” Trencheva, Trenchev, Tomov – ongoing 2008-2010, Beijing Forestry University, Beijing, China,
- Assessment of Invasive Species in the Bulgarian Flora and Mycota and Measures to Control their Impact on the Native Species and Ecosystems (funded by the Ministry of Environment and Waters)
- Investigation and control of species of the genus *Ambrosia* (Asteraceae) in Bulgaria which caused allergies (funded by the National Fund for Scientific Researches, Ministry of Education and Science)
- Assessment of Invasive Species in the Bulgarian Fauna and Measures to Control their Impact on the Native Species and Ecosystems (funded by the Ministry of Environment and Waters)
- Assessment of Zebra Mussel (*Dreissena polymorpha*) Infestation Risk Using GIS for Water Basins in the North-West Bulgaria (funded by the International Research Office of the U.S. Army Engineer Research and Development Center, ERDC)
- Biology and Ecology of Invasive Gobiid Species (Gobiidae, Pisces) in the Lower and Middle Danube River (together with the Czech Academy of Sciences, funded by the National Science Fund - Ministry of Education and Science and Czech Grant Agency)
- Genetic, Biochemical, Morphological and Biological Characteristics of Populations of *Carassius gibelio* (Bloch, 1782) in Bulgarian Water Basins (funded by the National Science Fund - Ministry of Education and Science)
- Zebra Mussel (*Dreissena polymorpha*) - wilde and invasive areas of distribution - recent knowledge, methodology and further investigations. (together with Austria, Romania, FIR of Macedonia, funded by the Austrian Federal Ministry of Science and Research

- Assessment of the alien species influence on the native populations of Mugil spp. (pisces) in the Mediterranean region in connection with parasite communities (together with Spain, funded by EU, program INTAS)
- Invasive and native species of crustaceans (together with Spain, funded by EU, program CSIC)
- Investigation of the ballast water of ships, arriving to Port Wana for determination the presence of invasive species.
- International Action for Sustainability of the Mediterranean and Black Sea Environment – Specific support Actions, IASON
- Improvement of the scientific background for assuring sustainable development in the Black Sea coastal zone

Annex 2

Proposals from the participants at the National Workshop on Invasive Alien Species in Bulgaria Sofia, 20-21 October 2008:

1. To develop a National Strategy on IAS: A general document with a long-term perspective and including: a legislative review, the competent authorities involved and their responsibilities, and activities to be undertaken. The National Strategy should also include an action plan with the institutional and financial frameworks, and have a focus on prevention and mitigation of impacts of IAS. The Strategy should include consideration of changes needed in the legislation concerning the key sectors for IAS: the Forestry Act, the Hunting Act, and the Fisheries and Aquaculture Act.
2. To establish a database of all alien species in Bulgaria, including invasive and non-invasive species. This database should include information on how to recognize IAS, including fact-sheets, and be linked to existing databases in Europe. The database should also include information on the IAS which present a higher risk to nature as well as information on species distribution, habitats impacted, and source of the introduction. This database should be available in Bulgarian and English, and accessible through the internet and published in the Clearing House Mechanism (on-line access).
3. To make a list of the top ten worst invasive species in Bulgaria: including those species with the most negative economic and environmental impact in the country, and to develop urgent measures and action plans for these species, including monitoring, project development and funding, without waiting for the finalisation of the National Strategy.
4. To urgently create a black list for IAS whose introduction should be forbidden, and linked to legislation.
5. To establish a list of species not to be used when dealing with forestry, fisheries, horticulture or erosion. These practices should be controlled at the regional or municipal level to limit the distribution of IAS. The use of substitute native species should be encouraged.
6. To make a list with the top ten most valuable and vulnerable habitats in Bulgaria, from a national and international perspective, and to develop special measures and concrete proposals to prevent and reduce the impact of IAS on these endangered habitats. This should be part of an inventory of habitat-specific work to enrich the database and address the impacts of IAS.
7. To establish an on-line register of experts, including regional experts.
8. To set up a coordinating unit/working group at the Ministry for Environment and Water, to be a focal point for the activities and projects linked to IAS, and which should include representatives of national and local authorities, scientists, NGOs, and the private sector.
9. To increase the capacity of government officials to deal with IAS issues, including State and regional administration responsible for nature protection.
10. To carry out pilot projects for priority IAS in order to mitigate their impact, funded through the National Environment Programme.
11. To involve the country's scientific capacity to assess risks, impacts on ecosystems and socio-economic effects of IAS.
12. To carry out an extensive awareness-raising and education campaign, including media, NGO and private sector involvement. This should include the production of brochures, posters, publications, etc. to inform the public about IAS and how to recognise them, as well as their economic and environmental impacts, in order to reduce the practices linked to the introduction of IAS. Good practices on handling IAS in Bulgaria and abroad should also be disseminated. It is also critical to target teachers, children and young people in this campaign.

13. To increase regional co-operation in the Balkans and Black Sea regions on IAS issues, under the framework of the Bern Convention, but also take part in the Biodiversity Working Group of the Black Sea Commission and cooperate in the Danube, as it is the main source of IAS in Bulgaria, through collaboration with the Secretariat of the International Commission on the Protection of the Danube River (ICPDR). Further cooperation on IAS should be promoted within the operational programmes with Greece and Romania, and including in the cross-border Natura 2000 sites.

3. CROATIA / CROATIE

FOLLOW-UP REPORT ON THE ACTIVITIES RELATED TO THE IMPLEMENTATION OF THE RECOMMENDATIONS NO. 57 (1997) AND NO. 77 (1999) OF THE BERN CONVENTION TO THE BERN CONVENTION GROUP OF EXPERTS ON INVASIVE ALIEN SPECIES

Legal frame work

Introduction of alien wild taxa into nature is regulated through provisions of the *Nature Protection Act* (OG 70/05, 139/08). This Act defines nature as an overall biological and landscape diversity protected on the whole territory of the Republic of Croatia, both in the areas of conserved and «wild» nature and in the built-up and economically used areas.

Introduction of alien wild taxa into nature on the territory of the Republic of Croatia (RC) is forbidden, but exceptionally it can be authorized by the competent authority (Ministry of Culture, Nature Protection Directorate) if scientifically and technically founded and acceptable from the standpoint of nature protection and sustainable management. The permit shall be issued on grounds of a study on the assessment of the risk of introduction into nature, but it is a subject to prior approval from the minister competent for agriculture, forestry and water management.

On the basis of the Nature Protection Act the two ordinances that regulate IAS problematic came into force.

Import of live specimens of alien taxa is regulated in more detail within the *Ordinance on transboundary movement and trade of protected wild species* (OG 34/06).

The method of preparing and implementing risk assessment studies with respect to introduction of alien wild taxa into nature is regulated in more detail within the *Ordinance on the method of preparing and implementing risk assessment studies with respect to introduction, reintroduction and breeding of wild taxa* (OG 35/08).

In the case of accidental introduction of alien taxa, or if there is a grounded suspicion that such introduction is to occur, the Minister shall prescribe the measures for proceeding with the scope of destroying, eradicating or preventing further propagation of introduced alien species.

Development and implementation of *the National strategy on invasive alien species* as one of the Action plans foreseen by *the 2nd National Strategy and Action Plan for the Protection of Biological and Landscape Diversity (NBSAP) of the Republic of Croatia* (OG 143/08) is planned in 2009. NBSAP gives the current status of invasive alien species in Croatia and defines strategic objectives and action plans for their fulfilment (Chapter 3.3. Eradication of IAS).

The provisions regulating the introduction of non-native/alien species into nature are also incorporated into different regulations of other sectors:

- the *Hunting Act* (OG 140/05) permits introduction of new wildlife species into hunting grounds (preceded by the approval of the minister competent for nature protection)
- the *Islands Act* (OG NN 34/99, 149/99, 32/02 and 33/06) prohibits introduction and breeding of non-native game species on islands, except in enclosed hunting grounds
- the *Animal Protection Act* (OG 135/06) prohibits setting free of pets and introduction of non-native species into nature
- the *Marine Fishery Act* (OG 46/97, 48/05) prohibits farming of non-native fish and other marine organisms, unless permitted by competent authority (CA) for marine fishery and previously approved by the CA for environment and CA for nature protection and preceded by the opinion of authorized scientific institutions for marine research

- the *Freshwater Fishery Act* (OG 49/05) prohibits farming and introduction of non-native freshwater fish, as well as import and trade of living specimen of these species, unless permitted by CA for freshwater fishery and previously approved by CA for nature protection, based on studies of environmental impact assessment
- the *Forestry Act* (OG 140/05) proscribes usage of those species approved on the basis of the expert study and recommends usage of native species in reforestation to avoid all negative impacts on nature.
- *Ordinance on management and supervision of water ballasts* (OG 55/07, 38/08) was adopted in 2007 on the basis of the *Maritime Code* (OG 181/04). In the past twenty years, ballast water was recognized as the great threat and a main cause of introduction of invasive alien species, especially into marine ecosystems. The central state administration body in charge of maritime affairs is responsible for dealing this issue at national level.

Present state

Problems with IAS are known from the year 1910 when 11 specimens of *Herpestes javanicus auro-punctatus* had been introduced on the island of Mljet. Introduction of alien species in the Adriatic Sea has probably started even earlier, but the biggest problems appeared in second part of 20th century. One part of alien species reached Adriatic by sea currents, what was provoked by changing of current system (circulation) in the Mediterranean Sea.

Some IAS have a huge negative impact on Croatian biodiversity.

- **Alien green algae in the Adriatic - *Caulerpa taxifolia* (M. Vahl) C. Agardh and *Caulerpa racemosa* (Forsskål) J. Agardh.**

Caulerpa taxifolia was initially observed at three locations: Starogradski zaljev (Stari Grad Bay) and Malinska in 1994, Barbatski kanal (Barbat Channel) in 1996.

Stari Grad Bay (1994) - expanding population (main site of 70 ha and two remote sites) in spite of occasional removing/eradication activities with aim of complete eradication of remote sites and control of main site. Malinska - decreasing due to low winter temperature and eradication (size of site cca.1 m²). Barbat channel - eradicated.

Also invasive, green algae *Caulerpa racemosa* was first found in autumn 2000 near Pakleni Islands. By the end of 2005, this alga was observed at 43 locations from Cavtat to the island of Vis including one near Vrsar (Istria). The latest discovery was in Sedlasti bok Bay in National Park Komati in November 2006. Eradication of *Caulerpa racemosa* is difficult and less effective than *Caulerpa taxifolia*.

- **Marine alien fish species**

At least 35 new species became new elements of the Adriatic ichthyofauna until 2007, represented by 22 families out of which eight are new for the Adriatic: *Hemiramphidae*, *Leiognathidae*, *Haemulidae*, *Siganidae*, *Ipnopidae*, *Zoarcidae*, *Monacanthidae*, *Cylopteridae*. Two new species have been recorded since 2007: *Terapon theraps* and *Fistularia commersoni*.

- **Other marine alien species**

There are other marine alien species, being more or less invasive: seaslug *Bursatella leachi*, *Melibe fimbriata*, limpetlike snail *Siphonaria pectinata*, red algae *Asparagopsis amata*, *Asparagopsis taxiformis*, *Womersleyella setacea*, etc.

- **Freshwater alien fish species**

During the last century at least 17 alien species of freshwater fish were introduced into rivers of the Danube and Adriatic catchments areas. The Adriatic catchments area, rich in endemic fish species, is extremely threatened in this regard. Some of invasive alien freshwater fish are *Oncorhynchus mykiss*, *Carrasius gibelio*, *Lepomis gibbosus*, *Ameiurus melas*, *Gambusia affinis*, *Pseudorasbora parva* etc. In 2008 species *Percotus glehnii* was recorded for the first time.

- **Other fresh water alien species**

There are more freshwater invasives, especially invertebrates, such as clams *Corbicula fluminea*, *Dreissena polymorpha*, *Anodonta (Sinanodonta) woodiana*, snail *Potamopyrgus antipodarium*, crayfish *Orconectes limosus* and *Pacifastacus leniusculus* etc.

- **Invasive alien plant species**

Invasive alien plant species are considered to be one of the greatest threats to the diversity of flora and its conservation. Up to 2006, there were no organized efforts in plant invaders inventory, monitoring or appropriate actions against plant IAS in Croatia. Diverse data on distribution, taxonomy, vegetation, biology, etc. of plant IAS have been sporadically collected for centuries. Recently, within the frames of the Department of Botany (Faculty of Science, University of Zagreb) and Croatian Botanical Society, botanical basis and the majority of international standards were developed for all botanical activities, including alien plant species research and monitoring.

The first national project about invasive Croatian flora (*Croatian botanical standards for IAS prevention and monitoring*) started in 2006 and was financed by the State Institute of Nature Protection. The suggested strategy for invasive alien plants treatment was as follows:

- 1) Adoption of national criteria and standards for terminology and categories of alien flora by botanists and other related experts;
- 2) Developing the database and standard forms with required data about alien plants in Croatia;
- 3) Creation of a preliminary check-list of plant IAS in Croatia;
- 4) Investigation and documentation of threats posed by IAS;
- 5) Management plans development and control of IAS;
- 6) Dissemination of information and public sensitisation and awareness raising.

The results so far represent the realization of the first three objectives of the suggested strategy:

- 1) Proposals for Croatian national standards in terminology and criteria for alien flora treatment have been completed and were published in the scientific article:

Mitić B., I. Boršić, I. Dujmović, S. Bogdanović, M. Milović, P. Cigić, I. Rešetnik and T. Nikolić (2008): Alien flora of Croatia: proposals for standards in terminology, criteria and related database. *Nat. Croat.*, Vol. 17, No. 2: 73–90;

- 2) A separate module »Allochthonous plants« was specially developed and incorporated in the Flora Croatia Database as a publicly accessible web service (<http://hirc.botanic.hr/fcd/InvazivneVrste/Search.aspx>);
- 3) A preliminary check-list of IAS for Croatia has been created and was published in the scientific article:

Boršić I., M. Milović, I. Dujmović, S. Bogdanović, P. Cigić, I. Rešetnik, T. Nikolić and B. Mitić (2008): Preliminary check-list of invasive alien plant species (IAS) in Croatia. *Nat. Croat.*, Vol. 17, No. 2: 55–71.

- **Invasive vertebrate species**

Special threat to islands biodiversity represent species like Mediterranean form of black rat *Rattus rattus* and Italian lizard *Podarcis sicula*, game species (fallow deer *Dama dama*, spotted deer *Axis axis*, wild-boar *Sus scrofa*, mouflon *Ovis aries musimon* and *Ovis orientalis*) and others.

Some of game species have negative impact on the biodiversity. For example, mouflons (*Ovis aries musimon*) on the Pelješac peninsula which destroy traditional grape vineyards because of lack of natural pasture, barbary sheep (*Ammotragus lervia*) which has been introduced into the Mosor mountain area, coypu (*Myocastor coypus*) at the Mirna river estuary etc.

Activities in 2008

- **International Symposium**

2nd International Symposium “*Intractable Weeds and Plant Invaders*” was held from September 14 to 18, 2008 in Osijek in organisation of EWRS – European Weed Research Society and Faculty of Agriculture, J.J. Strossmayer University, Osijek, Croatia. Other information on the symposium (including its final programme) could be found on <http://www.tera.hr/ewrs-osijek-2008/>

- **Statement of Commitment to Combat Invasive Species**

In May 2008 Republic of Croatia committed to the effort to combat invasive alien species, including the prevention, detection, management, and eradication of invasive alien species through the development and use of international, regional and national mechanisms.

- **Project “*Monitoring of invasive Caulerpa*”**

Ministry of Culture continues to finance efforts on control of expansion and eradication in five marine protected areas (Brijuni, Kornati, Telašćica, Mljet and Lastovo), although eradication is possible only for small colonies and is recommended only in National Parks and areas of high biological or cultural values. Eradication is conducted at Channel Soline and Grate Lake in National Park Mljet (corral reef).

- **Project “*Invasive spinycheek crayfish species in Croatia*”**

In order to explore the distribution of spinycheek crayfish and its impact on the population of the native Danube crayfish (*Astacus leptodactylus*) on the rivers Danube and Drava and adjacent Nature Park Kopački rit, as well to assess the knowledge of the local inhabitants on the invasive species and to educate them on this growing problem, the State Institute for Nature Protection has financed the project “*Invasive spinycheek crayfish species in Croatia*” conducted by the Association for Ecological Research “BIOSHOCK”.

The project was focused on comparison of the population size and density of native and invasive species in side channels and in main river course, comparison of the morphological characteristics of native and invasive species, trial catching of the spinycheek crayfish and assessment of the catching effort needed for the eradication of this invasive species from the side channels in order to stop the further spread to the main river course of Drava, and intensive informational and educational activities with relevant stakeholders.

The second phase of the project will follow in the 2009, with more focus on the eradication efforts and slowing down the spreading.

- **Project “*Invasive invertebrate species in freshwater ecosystems of Croatia*”**

Faculty of Science of the University of Zagreb (project manager: Radovan Erben, Prof. PhD) is conducting a project “*Invasive invertebrate species in freshwater ecosystems of Croatia*”. The project is financed by the Ministry of Science, Education and Sports. The goals of the project are to determine the distribution of the invasive species and the speed of spreading, to identify new invasive species, and raise public awareness on the problem. As a result, a detailed digital map on the distribution of the invasive species will be created, and a network for their monitoring and control will be established.

- **Project “*Developing a management plan for alien invasive plant and animal species on the island of Cres*”**

This project is financed by the donation of the Royal Netherlands Embassy in Zagreb. NGO Eko-centar Caput Insulae – Beli is conducting the project. As one of the results of the project, a booklet “*Alien invasive plant and animal species on the Island of Cres*” was published.

- **Project “*Education and research of the invasive alien species of freshwater ecosystems in Croatia*”**

This project is financed by donation of the Ministry of Culture. NGO Kapibara is conducting this project.

In 2008 the State Institute for Nature Protection published a “Manual for inventory and monitoring of biodiversity”, which includes monitoring of invasive alien species of some freshwater fish and vascular plant species.

There is a need to organize prevention of unwanted introductions of alien species on the national level, to recognize and valorise the level of IAS impacts on native biological and landscape diversity. The identification and implementation of needed actions still require cooperation between different governmental bodies, scientific institutions, NGOs and general public, both at the national and international level.

4. ESTONIA / ESTONIE

Bern Convention Group of Experts on Invasive Alien Species 8th meeting

ESTONIAN REPORT ON IAS IN ESTONIA

Estonian Nature Conservation Act states that controlling the abundance of a non-native species accidentally released in the wild shall be organised by the Environmental Board (EB) (§ 57-3). The deliberate release of non-native species is illegal (§ 57-1). EB is actively controlling the abundance of alien hogweeds (*Heracleum mantegazzianum*, *H. sosnowskyi*). To actively work with new protected or invasive species we need an action plan as it is stated in Nature Conservation Act (§ 49-1-3): an action plan shall be prepared for controlling a species if the results of the species inventory indicate a significant negative impact to the environment caused by the increase in the population of the species, or a danger to the health or property of persons.

So to add new alien species to be controlled (and hopefully eradicated) by EB, EB or the Nature Protection department of MoE need to find competent scientist, who would write the new action plan. Action plan includes everything from the species biology, ecology and distribution to actions required to eradicate the species and the budget of the eradication. For the writing of action plan, money needs to be applied from the Environmental Investment Centre (EIC). If we get the money the action plan will be written and it has to be approved by a board of Ministry officials and scientists. Approved action plans are funded according to the action plans budget.

At the moment one action plan is being written for raccoon dog. Also we are planning to investigate the usefulness and practicality of action plans on signal crayfish and American mink.

So we are happy to say that we have means for eradication of IAS. But we have no means for rapid response. We can apply for money usually 3 times a year, we have no guaranty that we get the money. Also writing and approving of the action plan takes time. So if new and important IAS is found it takes about a year before the EB can officially take measures for its eradication.

Some times new alien species is somewhat appalling to general public, then this can be used to our advantage. For example then Spanish slug was found in Estonia in some gardens, the local house owners were really active themselves in the eradication work.

5. FINLAND / FINLANDE

IAS STRATEGY FOR FINLAND

Both the EU and the Convention on Biological Diversity demand the Member States to prepare their national strategies concerning Invasive Alien Species. The preparation process to establish a National Strategy and an Action Plan on IAS in Finland was launched in the late 2008, and the process will be finished by the end of the year 2010. The Ministry of Agriculture and Forestry is responsible for the preparation.

As a kick off for the work, an IAS expert seminar with around 160 participants was organized in Helsinki in October 2008. The seminar also raised a wide media and public interest which is important since one of the goals of the strategy is to increase the public awareness of the IAS problem. The symposium dealt with various aspects of species introductions: game and fisheries, horticulture, agricultural and forest pests, aliens in the Baltic Sea, aliens in the ship traffic, public information, as well as the EU strategy of Invasive Alien Species under preparation was presented.

For the preparation work of the Finnish IAS strategy, an advisory group was appointed with a wide representation of appropriate institutions and different stakeholders. The species level work will mainly be carried out in the four separate preparation subgroups concerning the Baltic Sea, inland waters, terrestrial plants and terrestrial animals.

Of alien species in Finland, the discussion has centered around the rabbit. This is mostly because rabbits abound in the very center of Helsinki. The population originates from pet rabbits which were either accidentally or on purpose released in mid 1980s. For 10-12 years the population remained very small but is now expanding rapidly to neighbouring cities.

6. FRANCE / FRANCE

ACTIVITES MENEES PAR LA FRANCE SUR LES ESPECES EXOTIQUES ENVAHISSANTES - AVRIL 2009

1. UN CADRE LEGISLATIF ET REGLEMENTAIRE CONSTRUIT

Les principales dispositions concernant les espèces exotiques envahissantes sont intégrées dans deux codes : le code de l'environnement et le code rural.

Code de l'environnement :

➤ Protection de la faune et de la flore :

L'article L.411-3 prévoit une réglementation visant à l'interdiction d'activités (introduction, commerce de certaines espèces...) portant sur des spécimens d'espèces de faune et de flore sauvages pouvant présenter un risque d'invasion avec un impact négatif sur la biodiversité.

Les articles R.411-1 et suivants du Code de l'environnement permettent à l'autorité administrative d'établir des listes d'espèces soumises à ces mesures. La rédaction de textes fixant les listes de ces espèces est en cours. Un premier arrêté relatif aux interdictions portant sur deux espèces de jussies est entré en vigueur en 2007. Pour la France métropolitaine, deux arrêtés interdiront prochainement certaines activités (commercialisation, introduction dans la nature, ..) portant sur d'autres espèces envahissantes de faune et de flore sauvages. Un dispositif spécifique sera mis en œuvre pour l'Outre mer français.

La réglementation relative à la faune sauvage captive comprend d'ores et déjà des restrictions de détention de spécimens d'espèces potentiellement envahissantes (deux arrêtés en date du 10 août 2004), essentiellement les tortues nord-américaines et des amphibiens. Le principe général est de soumettre à autorisations administratives la détention de spécimens d'espèces non domestiques présentant des risques, en particulier pour l'environnement. C'est le cas de la tortue de Floride qui ne peut être détenue par des particuliers. Elle est également interdite à la détention pour les établissements de vente.

Le code de l'environnement prévoit également la possibilité d'intervenir sur le terrain pour des opérations de contrôle ou de destruction de spécimens de l'espèce introduite.

➤ Chasse et espèces nuisibles :

L'article L.427-8 du code de l'environnement prévoit la destruction d'animaux nuisibles. L'arrêté ministériel du 30 septembre 1988 modifié définit les espèces susceptibles d'être classées nuisibles par les préfets de département. Certaines espèces figurant sur cet arrêté sont des espèces exotiques envahissantes.

➤ Pêche et protection du patrimoine piscicole :

Le code de l'environnement interdit l'introduction de certaines espèces exotiques envahissantes dans les eaux concernées. Il s'agit par exemple du poisson chat ou de la grenouille taureau.

- Le code rural (article L251-1 et suivants et les articles réglementaires en découlant) comporte des dispositions phytosanitaires qui organisent la protection des végétaux et des produits végétaux contre les organismes qui leur sont nuisibles. Une très large partie de ces espèces est constituée d'espèces envahissantes. Le code rural comporte également les dispositions vétérinaires qui peuvent concerner des espèces exotiques envahissantes.
- Le code de la santé publique ne vise pas directement des espèces exotiques envahissantes, mais certaines dispositions peuvent être utilisées lorsque ces espèces sont vecteurs d'agents pathogènes (bactérie, virus ou parasite).

L'article L. 3114-5 du code de la santé publique permet de définir les mesures de lutte contre les insectes vecteurs d'agents pathogènes pour l'homme. L'article R3114-9 du code de la santé publique définit les mesures susceptibles d'être prises par le préfet en vue de lutter contre les maladies humaines

transmises par l'intermédiaire d'insectes. Parmi ces dispositions, figurent notamment la surveillance entomologique des insectes vecteurs (dont la surveillance de la résistance de ceux-ci aux produits insecticides) ainsi que des mesures permettant de réduire la prolifération des insectes vecteurs (actions d'information et d'éducation sanitaire de la population). Lorsque ces insectes vecteurs sont des moustiques, le dispositif législatif est complété par la loi de 1964 modifiée relative à la lutte contre les moustiques qui permet la mise en œuvre de mesures de prospection, de traitement, de travaux et de contrôles des populations de moustiques.

2. STRATEGIE D'EMISE EN ŒUVRE :

La lutte contre les espèces exotiques envahissantes ayant un impact négatif sur la biodiversité représente une politique d'importance, qui s'est traduite par des engagements forts lors du Grenelle de l'Environnement ainsi qu'au sein même de la Stratégie nationale pour la biodiversité.

Plusieurs axes d'intervention sont actuellement développés :

- La constitution d'un réseau de surveillance des invasions biologiques représente un axe majeur, qui permet de définir les zones d'implantation de ces espèces envahissantes, d'informer les acteurs concernés et la population, de hiérarchiser, de coordonner et évaluer les actions mises en œuvre. Le principe est de disposer d'un double réseau (l'un pour les espèces animales, l'autre pour les espèces végétales) mobilisant également les établissements publics. Son organisation doit voir le jour en 2009.
- la prévention par la poursuite de l'élaboration de la réglementation : comme précisé ci-dessus, les arrêtés listant les espèces envahissantes vont être achevés afin de compléter celui relatif aux jussies.
- la police de la nature : les actions de police mises en œuvre par les services de l'Etat et ses établissements publics vont être renforcées afin de prévenir et de sanctionner les infractions aux réglementations liées aux espèces exotiques envahissantes ;
- la lutte contre les espèces envahissantes présentes sur le territoire : elle doit être opportune (évaluation des coûts/bénéfices) et reposer sur une détection rapide des nouvelles implantations d'espèces envahissantes ; cette action comporte donc à la fois la mobilisation d'une capacité d'expertise pour l'élaboration des mesures et la mobilisation des moyens pour mettre en œuvre les programmes de lutte. Une priorisation des actions de lutte selon une analyse coûts/avantages sera entreprise dès 2009. De plus, cette priorisation tiendra particulièrement compte du facteur « impact potentiel de l'EEE sur la santé humaine ».

S'agissant de la lutte contre *Aedes albopictus*, un plan antidissémination de la dengue et du chikungunya en France métropolitaine a été mis en place en 2006 et est régulièrement actualisé. Ce plan a pour objectif de détecter le plus précocement possible la présence du vecteur *Ae. albopictus* et les patients potentiellement viremiques, afin de permettre la mise en œuvre rapide et coordonnée de mesures de contrôle du vecteur et de protection des personnes. La sensibilisation et la mobilisation du public est une composante essentielle de cette lutte dite intégrée. S'agissant de la lutte contre l'ambrosie à feuilles d'armoïse (*Ambrosia artemisiifolia*), des mesures de lutte ont été mises en place localement. Il est prévu de les renforcer et de les coordonner pour une plus grande efficacité (notamment dans le cadre du Plan national santé environnement 2).

- la sensibilisation du public et l'animation de réseau.

Un programme particulier est développé pour les régions ultra-périphériques (Outre-Mer), du fait de la fragilité de leurs écosystèmes menacés par les invasions biologiques, surtout en milieu insulaire. C'est pourquoi, dès 2009, une stratégie spécifique est en cours d'application.

Une coordination européenne/internationale des actions de surveillance, de prévention et de lutte est nécessaire afin notamment de favoriser la synergie des actions entreprises par des pays voisins. La mise en place d'une stratégie européenne de gestion des espèces exotiques envahissantes conduirait à une plus grande efficacité des mesures de lutte engagées contre les espèces portant atteinte à la biodiversité, à l'agriculture et à la santé humaine.

7. IRELAND / IRLANDE

NATIONAL REPORT - IRELAND

Bern Convention Group of Experts on Invasive Alien Species

Legislation:

The Wildlife Act 1976 and the Wildlife (Amendment) Act 2000 are the primary pieces of legislation containing provisions in relation to invasive alien species in Ireland. It is prohibited, without licence,

- to release, wilfully cause to escape or transfer within the State for the purpose of establishment in the wild any species of wild animal or spawn and any wild bird or the eggs thereof;
- to transfer any species of wild animal or wild bird or the eggs of such a wild bird from any place in the State to any other place in the State for the purpose of establishing it in a wild state in such other place
- to plant or otherwise cause to grow in a wild state in any place in the State any species of flora, or the flowers, roots, seeds or spores thereof.'

The Wildlife (Amendment) Act, 2000 strengthened the legal basis for controlling the introduction of potentially invasive alien species. The Minister for the Environment, Heritage and Local Government may issue regulations prohibiting possession or introduction of any species of wild bird, animal or flora, or part, product or derivative thereof that may be detrimental to native species. Where an alien species has been introduced, measures can be taken, as far as feasible and appropriate under the Wildlife Act, to ensure that such introductions do not pose a potential hazard to native species.

A review has been undertaken by the "Invasive Species in Ireland Project" of legislative provisions relating to invasive species in Ireland and their enforcement which has made recommendations for improvements. The review, which was published in 2008, evaluated legislation in the Republic of Ireland and Northern Ireland and recommended legislative changes in both jurisdictions in order to address the increasing threats of invasive species on the island of Ireland.

Recent developments in legislation include Regulations made in relation to muntjac deer. In response to confirmed reports of muntjac deer in Co. Wicklow, the Minister for the Environment, Heritage and Local Government signed Regulations in September 2008 declaring a 12 month open season on muntjac deer. The Department of the Environment, Heritage and Local Government is also examining the appropriate regulatory measures to be taken to control the possession and dispersal of ecologically harmful and invasive species of plants and animals in Ireland. It is expected that this issue will be addressed in regulations to be made under the Wildlife Acts 1976 and 2000 later this year.

Policy:

A proposal for addressing the impact of invasive alien species on native biodiversity has been published in The National Biodiversity Plan for Ireland (2002-2006). For example:

- Action 28: 'Prepare strategies, in consultation with Northern Ireland, to control introduced species and to prevent, or minimise, future (accidental or deliberate) introduction of alien species, which might threaten biodiversity. Unless clearly safe, all deliberate introductions of alien species into Ireland will require a risk assessment'.
- Action 29: 'All public bodies will endeavour to use native species, landraces and breeds and the public will be encouraged to do so'.

- Action 30: 'Ireland will seek to ensure that relevant laws and instruments, including those concerned with trade, - both within the EU and internationally - do not contribute to the problem posed by alien species and Ireland and will support the development of specific international instruments to address alien species'.

The current National Biodiversity Plan which was published in 2002 is under review and the area of invasive species is a key theme that will receive particular attention. A new Plan is due for publication later in 2009.

All Ireland Strategy on Invasive Species

Ireland is developing and implementing measures to tackle IAS in partnership with the Northern Ireland administration. A review of invasive species in Ireland was jointly commissioned by National Parks and Wildlife Service (NPWS) of the Department of the Environment, Heritage and Local Government and the Northern Ireland Environment and Heritage Service. This report was presented to both Ministers in March 2004 and it was agreed that both agencies (Environment and Heritage Service in Northern Ireland and NPWS in the Republic of Ireland) would work together and with others to tackle the invasive species problem. In response to the recommendations of this report the 'Invasive Species in Ireland' project started in May 2006 and runs until May 2009. Full details of the project can be found on www.invasivespeciesireland.com. The budget for this project is €280,000.

The Invasive Species in Ireland project has the following aims:

1. Reducing the risks of invasions of new species
2. Developing contingency plans in conjunction with stakeholders
3. Producing management plans to help control and manage new and established invasive species and vectors
4. Engaging key stakeholders
5. Developing codes of good practise in conjunction with stakeholders
6. Raising public awareness
7. Recommending surveillance, monitoring and recording programmes
8. Reviewing legislation

A risk assessment protocol has been developed and over 600 risk assessments have been carried out on established and potential invasive species to identify those species that pose the greatest threat to biodiversity on the island of Ireland. Exclusion strategies, contingency plans and management strategies are being prepared for these species. The highest risk to biodiversity in Ireland is from freshwater invasive species, in particular ornamental pond plants and fish.

Exclusion strategies and contingency plans have been prepared for non-native crayfish species, wild boar and non-native deer (muntjac, Chinese water deer and roe deer) and Japanese kelp. Management plans have been prepared for the invasive tunicate *Didemnum*, chub, floating pennywort (*Hydrocotyle ranunculoides*) and ruddy duck. Management plans currently in preparation include those for invasive mammals on seabird islands, giant rhubarb, Hottentot fig, New Zealand pigmyweed, fringed water lily, parrot's feather and Chinese mitten crab. There are a number of widely established species for whom island wide eradication is impossible so best practice management guidelines have been prepared along with templates for the development of site specific management plans. These include Japanese knotweed, Himalayan balsam, giant hogweed and *Rhododendron ponticum* and cherry laurel. All strategies and guidance documents are available on the website.

Codes of Practice are also being developed in conjunction with relevant sectors. The Horticulture COP is complete and COPs for the aquaculture sector and recreational water users are in development.

An extensive stakeholder engagement programme has been underway for the last three years, one element of which is the All-Ireland Invasive Species Forum, this forum meets annually and

has over 100 organisations involved including central and local Government, state agencies, industry, academia and the NGO sector. An Invasive Species Conference was also held in November, 2008 in order to review progress on the project. There are four technical working groups on marine, freshwater, terrestrial invasive species and education and awareness. Details on Forum membership and activities can be found on the Invasive Species in Ireland website. Education and awareness materials have been produced and are available for download from the site. In addition to this, invasive species will be the focus of Ireland's biodiversity awareness campaign Notice Nature (www.noticenature.ie) this year and materials for schools and the construction, business and tourism sectors are being developed.

A review of the project has been undertaken by NPWS and the Northern Ireland Environment Agency (formally the Environment and Heritage Service) and it has been decided to tender for a new three year contract for the project from May 2009.

Research:

The National Research Centre for Biodiversity and Conservation Biology in Northern Ireland (Quercus) (<http://www.quercus.ac.uk>) has some projects on IAS: 'All-Ireland review of introduced species' (a cross-border project) and 'Impacts of invasive aquatic amphipods'. A report on the situation of invasive alien species in Ireland was carried out by Quercus (2004). Ireland is represented in the DAISIE and ALARM project teams.

The Environmental Protection Agency as part of the Science, Technology, Research & Innovation for the Environment (STRIVE) Programme 2007 – 2013 has funded a €280,000 project on alien invasive species in Irish waterbodies. This project will address the knowledge gap identified under the Water Framework Directive for alien invasive species in Ireland's River Basin Districts, and produce a monitoring and reporting strategy. This will be achieved by: literature review of impacts on natural ecosystems, vectors, spread potential and control options; analysis of impacts of selected invasive species on structure and function of natural ecosystems (primarily by innovative studies of impacted and non-impacted foodwebs using stable isotopes in exemplar waterbodies); and preparation of an archived GISbased database of aquatic aliens in Ireland. This project is being carried out by a consortium of Queens University Belfast, EnviroCentre, the Central Fisheries Board and the National Biodiversity Data Centre.

Research is also being carried out into the impacts of curly leaved waterweed (*Lagarosiphon major*) in Lough Corrib (Central Fisheries Board), control of giant rhubarb (*Gunnera tinctoria*) on Clare island (National Botanical Gardens) and there are a range of projects on the zebra mussel invasion and impacts on Irish lakes.

Eradication/control programmes:

Active control programmes for *Rhododendron ponticum* and *Heracleum mantegazzianum* are in place. Some control measures have been undertaken in Killarney National Park where introduced Sika deer have interbred with Red deer. Eradication is not feasible for Grey squirrel which have reached pest status in some localities.

Control programmes are underway for *Lagarosiphon major*, *Hydrocotyle ranunculoides* and zebra mussels. There are smaller site specific control projects, many of which are now being undertaken by local authorities in Ireland. In relation to *Lagarosiphon major* NPWS has funded the purchase by the Central Fisheries Board (CFB) of a weed cutting boat to be dedicated exclusively to removing the invasive species from Lough Corrib in County Galway. Additional funding of €200,000 has also been provided by the NPWS to the CFB in 2008 for work involving the removal and control of the species in the lake. The Central Fisheries Board has also secured over €700,000 under the EU LIFE+ programme to cover a 4-year period from 2009 to 2013 to target the control of *Lagarosiphon* and the restoration of natural communities in Lough Corrib. The project will also exchange and disseminate information on control methods and progress through links with other European control teams and policy makers. NPWS is providing matching funding for this project.

In addition a project is underway to investigate measures for the control of *Gunnera tinctoria* on Achill Island in Co. Mayo. The project is funded by Mayo County Council and by NPWS through

the Biodiversity Fund which is administered by the Heritage Council. *Gunnera tinctoria* is a large herbaceous plant that forms dense colonies that shade out and suppress native vegetation. This species is a vigorous seeder and also has the ability to spread vegetatively. Intense effort is required to control this species.

National Parks and Wildlife Service
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Dublin
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8. POLAND / POLOGNE

STATUS OF WORK WITH IAS IN POLAND 2007-2009 REPORT TO THE BERN CONVENTION

Building awareness and support

The level of public awareness of biological invasions and support for solving this problem improves in Poland. For instance, for the past few years there has been a growing concern about the invasion of an alien butterfly, chestnut leaf miner *Cameraria ohridella*. The invasion was widely publicized in media. As a result, many campaigns were organised to control the species in different places of the country and by different stakeholders (local governments, NGOs) with a remarkable level of participation from the general public.

In 2008, a new portal on alien animals in Poland was opened in the Institute of Nature Conservation, Polish Academy of Sciences (www.iop.krakow.pl/gatunkiobce). The portal includes detailed profiles on 120 alien animals in the Polish fauna, analyses of trends of biological invasions in Poland and recommendations aiming at reducing the problem. The recommendations are closely linked to European Strategy on IAS. There have been nearly 46 000 visits to the portal by now. The information from the portal will be published in 2009 as a 2-volume book.

In 2009, a new portal Alien Species in Poland was launched by the Institute of Nature Conservation, Polish Academy of Sciences (www.iop.krakow.pl/ias). Its main element is the database on alien species. There are also news on biological invasions and other resources available. Over 2 months of its operation, the portal received nearly 3,500 visits.

Collecting, managing and sharing information

The online database "Alien species in Poland" (<http://www.iop.krakow.pl/ias/Baza.aspx>) has been developed since 1999 at the Institute of Nature Conservation, Polish Academy of Sciences. Currently there are 1060 species in the database. The level of detail in species accounts in the database ranges from just species name, to comprehensive datasheets. Some information is only available in Polish at the moment - it will be translated into English soon. In future, new alien species will be added to the database and data concerning the species already recorded will be updated.

The database contributes regional exchange of information on alien species and to regional cooperation in order to solve the problem. It was included into the NOBANIS project (www.nobanis.org) and used to provide information to the EU-funded project DAISIE (www.europe-alien.org). The new structure of the database was developed according to recommendations by Global Invasive Species Information Network (GISIN), therefore the Polish data will be easily shared at the global level in future.

There is an ongoing work in a number of academic centres to study the specific impact of different invasive alien species in Poland. Recent projects include research into adverse effect of an Asiatic nematode *Asworthius sidemi* upon European bison *Bison bonasus*, testing the level of hybridisation between Asiatic sika deer *Cervus nippon* and native red deer *Cervus elaphus*, and assessing the threat from IAS in Polish national and landscape parks.

Strengthening national policy, legal and institutional frameworks

In 2007 the Council of Ministers adopted the National Strategy for Conservation and Sustainable Use of Biological Diversity with the Action Plan for 2007-2013. It includes some needs and priorities related to biological invasions:

- Recording and monitoring of alien species and exploring the sources and routes of their expansion, impact on native species and ecosystems special and economic effects of that impact.
- Working out the principles and programme for preventing introductions, elimination, control of spreading and control of numbers of alien species, in particular those which pose the most serious threat to native resources of biological diversity.

- Implementation of the programme for preventing introductions, elimination, control of spreading and control of numbers of alien species, in particular those which pose the most serious threat to native resources of biological diversity.

Under the National Strategy, institutions taking part in activities aiming at reduction in adverse effects of alien species and possible sources of financing those activities were identified, and institutions coordinating them (Ministry of the Environment) were indicated. The Action Plan estimates the costs and possible sources of financing tasks related to reducing the threat posed by IAS in the period 2007-2013 at approx. 3,500,000 PLN (approx. € 830,000).

In 2008, a new Nature Conservation Act was adopted. For the first time in the Polish legislation, a definition of alien species was introduced, close to the definition recommended by the CBD and Bern Conventions. More comprehensive regulations were introduced for import, keeping and trade of invasive alien species. A new decree is currently being developed to determine the list of alien species subjected to these restrictions. Another decrees under development are relevant to most invasive alien mammals and regulate live-trapping and hunting seasons.

The Ministry of Agriculture is responsible for amending Inland Fisheries Act that regulates introduction of alien fish species into freshwater. The project prepared in 2008 took into consideration the Council Regulation (EC) No 708/2007 of 11 June 2007 concerning use of alien and locally absent species in aquaculture.

Regional cooperation and responsibility

Poland contributes to regional cooperation and responsibility in IAS-related issues, including participation in NOBANIS and DAISIE projects, and the Carpathian Convention and HELCOM. Trans-border initiatives include cooperation with Germany on resolving IAS-issues in the lower Oder river basin.

Prevention

Use of alien species in forestry is regulated and controlled through forest breeding principles, which regulate share of alien species. The amendments in the new Nature Conservation Act will contribute to preventing introduction new invasive alien species that are imported, kept and traded of invasive alien species.

Early Detection and Rapid Response

There are remarkable examples of early detection in Poland, including finding a ctenophore *Mnemiopsis leidyi* in the Baltic waters in 2007. However, a comprehensive system of early detection and rapid response is not yet introduced for biological invasions threatening biological diversity. Over the past few years some new alien species established in Poland, including Canada goose *Branta canadensis* and Aegyptian goose *Alopochen aegyptiacus*.

Mitigation of impacts

Alien mammals are controlled by hunting but with limited success. Two alien species of crayfish and three alien species of fish are subject to control in accordance with the Ordinance of the Ministry of Agriculture and Rural Development. There are local initiatives to mitigate impacts from e.g. chestnut leaf-miner *Cameraria ohridella*, Japanese knotweed *Fallopia japonica*, and Giant Hogweed *Heracleum mantegazzianum*.

Restoration of native biodiversity

There are local project to restore native species affected by biological invasions, including restoration of native noble crayfish *Astacus astacus*. This includes limiting the spread of the alien Signal crayfish *Pacifastacus leniusculus* and Striped crayfish

9. NORWAY / NORVEGE



Direktoratet for **naturforvaltning**

INVASIVE ALIEN SPECIES (IAS) - RELEVANT ACTIVITIES IN NORWAY REPORT TO THE SECRETARIAT OF THE BERN CONVENTION, 2009

One major achievement in the work on IAS in general in Norway has been the production of a cross-sectoral strategy on IAS, involving ten different Ministries, and led by the Ministry of Environment (ref. "Strategy on Invasive Alien Species", Min. of Environment 2007, 56 pp.) An English translation of this strategy can be downloaded from www.government.no by typing **T 1460 E** in the search field.

Norway's policy is that each sector is responsible for the environmental impacts of its own activities. The strategy describes Norway's goals and principles for dealing with alien species and specific measures that will be implemented in all relevant administrative sectors. The strategy is intended to ensure that there is a common understanding and a consistent way of dealing with problems relating to alien species, regardless of which sector is affected or is responsible for addressing the problems.



Strategy on Invasive Alien Species

Published May 2007



The strategy focuses on new measures and does not describe activities and measures that have already been carried out and completed. It is also intended to provide a basis for coordinated development of measures and instruments in the longer term.

The Government has based its strategy on the precautionary principle. The main focus is on efforts to prevent alien species from being introduced to Norway. We will also follow a restrictive approach to granting permission for the intentional introduction of alien species. We will intensify efforts to control and contain and, if appropriate, eradicate alien species that are a threat to Norwegian biodiversity or to commercial activities based on natural resources and the environment.

This strategy does not deal with disease control measures within the health sector, where alien species have impacts for primarily on human health and not on animal health or biodiversity. Nor does it apply to genetically modified organisms (GMOs), for which Norway has established legislation and cooperation routines under the Gene Technology Act.

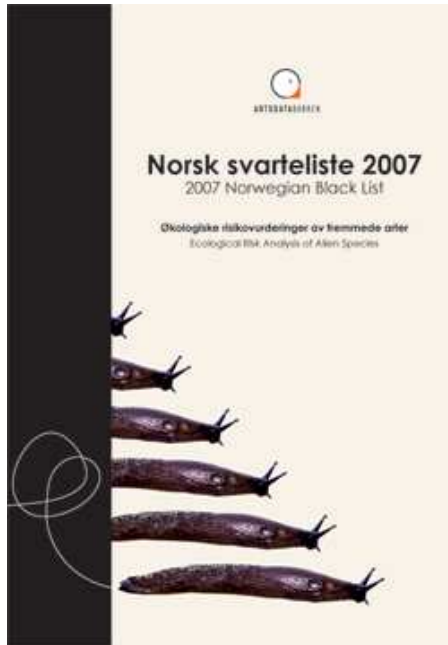
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Another important publication is “The 2007 Norwegian Black List. Ecological Risk Analysis of Alien Species”, Artsdatabanken 2007 (151 pp), which has been produced by the Norwegian Biodiversity Information Centre. The Black List is an overview of ecological risk analyses for a selection of the alien species recorded in Norway. A risk analysis has been performed for 217 of the 2483 listed alien species. The risk analyses have been carried out by a team of experts composed of scientists from six research institutions. A total of 93 species have been placed in the *High risk* category, 83 in the *Unknown risk* category (owing to inadequate information) and 41 species in the *Low risk* category.

This publication (which also includes a description of the procedure used for the risk assessment) is available from www.biodiversity.no. Further information on alien species from the Norwegian Biodiversity Information Centre may be found on the website <http://www.biodiversity.no/ThemePage.aspx?m=148>.

Within nature management the Directorate for Nature Management (DN) in Norway has a special responsibility for following up several of the national goals described in the National strategy. http://www.regjeringen.no/Upload/MD/Vedlegg/Planer/T-1460_eng.pdf The work on IAS in DN was reorganized in 2004, starting with the establishment of a new “Team for Invasive Species”, with a total of 11 members from various sections in the DN. The Team initiates and coordinates activities against invasive alien species.

Relevant publications

Some relevant research papers have been ordered by the DN:

- Three scientific institutions were in 2005 asked to describe effects of alien plants, including alien tree species, on a) indigenous flora; b) the agricultural landscape; and c) forest ecosystems: DN-utredning 2005-6. Changes in the Norwegian flora. (In Norwegian; 21 pp)
- Fremstad, E. & Elven, R. 2006. The large *Heracleum* species in Norway. - NTNU Rapport botanisk serie 2006-2 (in Norwegian; 35 pp)
- Sæthre, M.-G., Hermansen, A. & Nærstad, R. 2006. Economic and Environmental impacts of the introduction of Western flower thrips (*Frankliniella occidentalis*) and Potato late blight (*Phytophthora infestans*) to Norway. – Bioforsk Report vol. 1, no. 64, 2006
- Staverløkk, A. & Sæthre, M.-G. 2007. Stowaways in imported horticultural plants: alien and invasive species – assessing their bioclimatic potential in Norway. - Bioforsk Report, vol. 2, no. 66, 2007; 70 pp
- Melis, C., Nordgård, H., Herfindal, I., Kauhala, K., Åhlén, P.-A., Strann, K.-B. & Andersen, R. 2007. Raccoon dogs in Norway – potential expansion rate, distribution area and management implications. - NTNU Zoologisk rapport 2007-3; 49 pp
- Gjershaug, J.O., Rusch, G.M., Öberg, S. & Qvenild, M. (2009; in press). Alien species and climate in Norway. – NINA Report 468. [This report presents predicted distribution patterns of selected aquatic, terrestrial and marine alien species in a changing climatic regime in Norway]
- A research activity expected to be finally reported during 2009 is made by the research institution “Bioforsk” and is concentrating on developing optimal methods for eradication of the Japanese rose *Rosa rugosa*

Relevant support to various organisations

Other relevant activities initiated or supported by the DN have included budgetary support since 2005 to various municipalities, regional authorities and NGOs in their effort to eradicate, control or reduce the negative impacts of invasive plant and/or animal species. Examples of relevant activities here are:

- Collaboration with the Norwegian Public Roads Administration on a strategy against alien and invasive plant species along roads
- Inclusion of invasive alien species in the *Norwegian National Programme on Mapping and Monitoring of Biological Diversity* since 2008. € 150 000 was used for this purpose in 2008. The main focus is on including mapping and monitoring of IAS in already existing activities

Legislation work and information activities

Norway has developed regulations to control, and possibly to eradicate, particularly harmful and/or problematic invasive alien species. One example is the active role Norway has been playing in establishing effective regulations against the spread of IAS through international shipping in the International Maritime Organisation's (IMO) *International Convention for the Control and Management of Ships' Ballast Water and Sediments* which was signed in February 2004. Norway ratified this Convention in October 2006. A new Regulation to accommodate the requirements of this Convention into Norwegian legislation is expected to be finalised soon.

Work on new regulations on import of aquatic organisms ("the aquarium regulation") and terrestrial invertebrates ("the invertebrate regulation" as well as a regulation against uncontrolled import of live, alien earth worms (*Lumbricidae*), mainly organisms used in the zoo trade, has been initiated. The approach in both the aquarium regulation and the invertebrate regulation is to prepare "positive lists" of organisms that can be imported without a need for permission. However, importers can apply for a permit to import organisms that are not included in the list. One new regulation is particularly designed to discontinue the further sale and marketing of the two invasive alien North American freshwater species *Elodea canadensis* and *Elodea nuttallii*.

In 2008, DN also issued a recommendation to discontinue the growing, importing, marketing and/or exchanging of a number of invasive alien plants; *Rosa rugosa*, *Lupinus polyphyllus*, *Heracleum mantegazzianum*, *Heracleum persicum*, *Fallopia japonica*, *Fallopia sachalinensis*, *Impatiens glandulifera*, *Solidago canadensis*, *Aruncus dioicus*, *Acer pseudoplatanus* and *Acer platanoides* (the latter outside its natural range of distribution).

In the near future Norway will pass a new Act on biological diversity, to replace the slightly outdated Nature Conservation Act from 1970. This new Act will have a full chapter on IAS.

Action plans against invasive alien species

Norway has developed Action Plans against some selected IAS. The oldest, and by far the most extensive, Action Plan against an IAS has been the highly profiled work to try to eradicate the salmon parasite *Gyrodactylus salaris* from our watercourses; a work on which the Norwegian society through the years has spent millions of Norwegian kroner, and a fight that by far has not been won yet.

Another action plan that has been implemented for some years is concentrating on trying to keep the Norwegian waters free of signal crayfish (*Pacifastacus leniusculus*) and its parasite the crayfish plague (*Aphanomyces astaci*). Until 2006 Norway, together with Estonia, were believed to be the only two European countries where the signal crayfish had still not been established. However, in October 2006, the species was documented to live in a rather small freshwater lake in Southern Norway. Nevertheless, Norway has financed the construction of a concrete bar across a small riverlet inside Swedish territory to block the migration of the signal crayfish into the Norwegian side of this watercourse.

In 2008 Norway initiated two new Action Plans; on the raccoon dog, cfr. DN, 2008: Action plan against the raccoon dog *Nyctereutes procyonoides* (20 pp; in Norwegian), and, mainly by the Ministry of Agriculture and Food, on the Spanish slug (*Arion lusitanicus*, 2008; 17 pp; in Norwegian).

For 2009 Norway plans to develop three more Action Plans:

- Eradication of selected alien freshwater fish species
- Action Plan against the American mink (*Mustela vison*) in selected nature reserves, particularly in protected areas for seabirds
- Action Plan against the Japanese rose (*Rosa rugosa*) in selected nature reserves in Norway. A research project aiming to test different methods to eradicate *Rosa rugosa* (mentioned above) has met local resistance and there has also been some uprooting of plants, removal of signplates, etc. Some people living close to the research area, which is also a recreation area, want to keep this invasive rose species, as it is considered beautiful and may also give shelter for the wind. Information and cooperation with local communities seem to be important in these kinds of projects.

Other activities

On the marine side activities are going on to study the effects of the red king crab (*Paralithodes camtschaticus*), the Japanese seaweed (*Sargassum muticum*), the red macroalgae *Heterosiphonia japonica*, and possibly also the Pacific giant oyster (*Crassostrea gigas*). A National plan for mapping and monitoring of invasive alien marine species is due to be completed in 2009.

Norway has actively participated in the NOBANIS (Nordic-Baltic Network on Invasive Species) efforts on producing fact sheets for selected invasive alien species (cfr <http://www.nobanis.org/>). Norway has also actively participated in the Neobiota Conferences, both with posters from selected research activities and with participation from the management side.

Trondheim, April 16th, 2009

Svein Båtvik

Senior adviser

Directorate for Nature Management

10. SPAIN / ESPAGNE

REPORT ON THE ACTIVITIES ON INVASIVE ALIEN SPECIES (IAS) IN SPAIN.

For the 8th meeting of the Group of Experts on Invasive Alien Species of the Bern Convention
Croatia, 5-7 May 2009

Introduction

Invasive Alien Species (IAS) represents one of the most important threats to biodiversity in the world. Their effects can be viewed not only on the environment but on the economy and also on human health. Many international organizations have included the control of IAS among their priorities. In this respect a special mention must be done for the International guidelines elaborated by the Convention on Biological Diversity for the elaboration of National Action Plans. Regarding the European Union, there is the document of the Commission (COM 2006 (216) final), including the proposition to prepare an EU Strategy on IAS taking into account the Bern Convention European Strategy. This EU Strategy will be likely approved during this year.

Legal Framework

The main problem is the absence of a legal support focusing on the global aspects of IAS. This necessity has already been exposed in former meetings. The international character of the problematic and its implications not only on nature conservation, but on health, economy, international trade and many aspects of the human activity, seems to be asking for a global legislation. In this context a European legal framework, through a Directive or other legislative proposition could be a great support for the development of national legislation and the control of IAS in Europe in a global perspective.

In Spain the Law on the Conservation of the Natural Heritage and Biodiversity from 2007, the major legal corpus in nature conservation, creates the “Catálogo Español de Especies Exóticas Invasoras” (*Spanish Catalogue of Invasive Alien Species*) dependent of the Ministry of Environment and Rural and Marine Affairs. This National Catalogue, in process of elaboration, will include the most dangerous species or subspecies of IAS that represent any serious threat for native species, habitats, agriculture or economy. The inclusion of a species in this National Catalogue will mean the prohibition of private possession, transport, traffic and trade, including foreign trade. The Law also establishes that the Regional Authorities must carry on the monitoring of the exotic species potentially invasives.

The elaboration and approval of national strategies for control or eradication of species especially dangerous is also foreseen in the Law. The first National Strategy has been the **National Strategy for the Control of Zebra Mussel**, a document elaborated and coordinated by the Ministry of Environment and Rural and Marine Affairs that has been approved by the National Conference for Environment on September 2007.

Spanish Action Plan on IAS

The Spanish Ministry of Environment and Rural and Marine Affairs has promoted the elaboration of an Action Plan on Invasive Alien Species at national level. This Action Plan has been published on 2006 with the title: “*Especies Exóticas Invasoras: Diagnóstico y bases para su prevención y manejo*” (Invasive Alien Species: Diagnosis and Background for Prevention and Management). This publication includes the analysis of the current situation of IAS in Spain and its ecological and economical problematic, making a risk analysis and suggesting prevention measures.

The Action Plan identifies the most dangerous species and proposes a preliminary list of IAS established in Spain, a black list of IAS in Spain with 77 animal species, 8 fungi species and more than 130 plant species. There are also lists of species of urgent eradication, for example *Oxyura*

jamaicensis, *Alectoris graeca*, *Coturnix japonica*, *Ammotragus lervia*, *Mustela vison*, *Myocastor coipui*, *Gambusia holbrooki*, *Esox lucius*, *Silurus glanis*, *Trachemys scripta* or *Dreissena polymorpha* between the animals or *Caulerpa taxifolia*, *Eichornia crassipes*, *Cortaderia selloana*, *Pennisetum setaceum*, *Carpobrotus edulis*, *Robinia pseudoacacia*, *Nicotiana glauca* and *Azolla filiculoides* on plants species. Eradication of other species such as feral dogs and cats, rabbits or rats is also recommended in some particular situations.

Several regional governments have been elaborated or developed their own strategies on IAS. Most of the Autonomous Communities have also designed programs of control or eradication of the most problematic species of IAS.

Information and Publications

Two news and important books on IAS has been publishes by the Ministry in 2008.

The first one, “*Ecología del mejillón cebra (Dreissena polymorpha) en el tramo inferior del río Ebro. Problemática y posibilidades de control*” by Imanol Cía. This study is the most detailed work on zebra mussel carried out in Spain. Contain the most rigorous information about spreading out of the species at the lower stretch of the Ebro river and included the review of the state of art in the subject of precautionary measures, contingency plans and eradication of the zebra mussel.

The other one is “*Vertebrados invasores: problemática ambiental y gestión de sus poblaciones*” (Invasive vertebrates: environmental risk and population management), by Jorge Orueta, and exhaustive handbook on management and control measures of this kind of animals.

Prevention and control

The Ministry of Environment has continued the programs of control or eradication under its responsibility. Many other activities are developed by Autonomous Communities, local authorities and NGO.

In the National Park Network, the Ministry has continued whit the main IAS programs in the National Parks of Canary Islands as the control of rats, cats and dogs that threaten the coastal birds in Timanfaya National Park (island of Lanzarote) or laurel pigeons in Garajonay NP (island of La Gomera). Also there programs in the National Parks of the Canary Islands to eradicate the species that affect the indigenous plants, for example *Ammotragus lervia* in Caldera de Taburiente NP (La Palma) or rabbits and wild sheep in Teide NP (Tenerife).

In other National Parks where the management has been transferred to Autonomous Communities, as Doñana National Park, the Regional Authorities continues with the control programs existents as those for *Azolla* and *Carpobrotus*.

The Ministry also supports some programs in public domains (rivers and coasts) as the eradication of *Eichornia crassipes* in Guadiana river and rats and rabbits and gulls in the Chafarinas Islands.

In coordination whit the regional or local authorities, the Ministry continues whit important national or local projects. The most important of these programs are:

- National control of Ruddy duck (*Oxyura jamaicensis*). This species is the most important threat for the global endangered and native White headed duck. 245 birds have been shooted since 1984 in this control program. 177 birds were Ruddy ducks and 68 were hybrids. That number represents almost the whole of the ruddy and hybrids ducks watched in Spain in this period of time.
- Control of American mink (*Mustela vison*) in areas where the European mink, one of the most endangered carnivore species in the world, exists. Between 1999 and 2008 has been extirpated more than 2.400 American minks in areas nearby to the European species distribution.

Also the Autonomous Communities have important programs for the control of most harmful IAS present in its territory.

For example, the Government of the Canary Island supports the program for the control of exotic snakes, like Royal snake (*Lampropertis gatulus*), that threatened the endemic fauna in some islands. Also carries out the program for the control of *Rhynchophorus ferrugineus*, species that causes great damages in Canary palms.

En Andalucía exist the “Andalucian Program for the Control of IAS focusing in 36 species of plants, 4 acuatic invertebrates and 8 vertebrates.

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11. SWEDEN / SUEDE

National Strategy and Action Plan

In December 2008 a proposed national strategy and action plan for alien species was submitted to the government. The strategy and action plan was developed in cooperation between the Swedish Environmental Protection Agency, the Swedish Forest Agency, the Swedish Board of Agriculture, the Swedish Board of Fisheries, Swedish Customs, Swedish Maritime Administration and the Swedish Species Information Centre. The Swedish parliament is expected to approve the strategy and action plan in the autumn 2009 as a part of the national Environmental Objectives, which is the main steering framework for all environmental work in Sweden. The national strategy and action plan for alien species highlights that costs for implementing the action plan (18.5 – 747 million SEK per year) are small in relation to the costs that invasive alien species may mean if no action is taken (12 species cost 1,1 – 4,5 billion SEK/year).

The national strategy and action plan proposes to establish a common, national functioning system for management of alien species and genotypes that is cost effective and dimensioned to the actual and potential risks. It includes the development of a Swedish joint cooperative group to coordinate and support work with IAS. It will be composed of representatives from the sector authorities, country administration boards, cities, universities and research organizations and stakeholders. A Species information and reporting system for IAS connected to the Species Gateway will be developed in order to improve reporting and management of IAS. A system for reliable and systematic risk analysis will be developed to be used as the basis for work with risk classification of alien species and development of black, grey and white lists, decisions for granting permits for intentional introductions, as the basis for laws, and for identification of vectors for import and spreading of unintentional introductions and in the development of contingency plans.

12. SWITZERLAND / SUISSE

OVERVIEW OF IAS WORK IN SWITZERLAND CONTRIBUTION TO THE MEETING OF THE GROUP OF EXPERTS ON IAS IN BRIJUNI, MAY 2009

By Dr. Corinne Vonlanthen, Federal Office for the Environment, Switzerland

1. Legal frame work

In October 2008 the revised Ordinance on the Release of Organisms into the Environment (RO) became effective. According to the revised RO (www.admin.ch/ch/f/rs/c814_911.html) Switzerland has among other things to

- set up a monitoring for IAS (art. 51, RO)
- to come up with a strategy to control IAS (art. 52, RO)
- to periodically train people working in the field of IAS (art. 58, RO)

Furthermore, appendix 2 of the revised RO prohibits the sale and/or, trade of certain IAS such as *Crassula helmsii*, *Heracleum mantegazzianum*, *Senecio inaequidens*, *Solidago canadensis* etc.

Moreover, according to the Ordinance on Hunting and the Protection of wild Mammals and Birds and the Ordinance concerning the Federal Act on Fisheries the cantons have to make sure that non-indigenous species such as *Oxyura jamaicensis*, *Nyctereutes procyonoides* etc. will not spread in Switzerland. The Ordinance on Plant Protection requests that places where *Ambrosia artemisiifolia* is found have to be announced and that the plant has to be removed. Other legal regulations (Nature and Cultural Heritage Protection Act, Environmental Protection Act) deal with non-indigenous species in a more general way.

2. Information

Already available is a black / watch list for vascular plants (www.cps-skew.ch). Moreover, we should have a black / watch list for animals by the end of the year.

3. National Coordination

In autumn 2008 Switzerland established a national IAS working group (the so called AGIN - http://www.kvu.ch/d_kv_u_arbeitsgruppen.cfm). In the AGIN the different main stakeholders are involved.

The AGIN has three sub-groups:

- Group A deals with the handling of soil contaminated by invasive plants
- Group B tries to come up with plans to manage/control IAS
- Group C is responsible for prevention

4. Monitoring

According to the revised RO we have so set up a monitoring system. The monitoring project will be launched in the next couple of months.

5. Research projects

Switzerland has several on-going research projects:

- *Fallopia japonica*: in this project different methods to control this species are tested.

- *Aedes albopictus*: this project deals with prevention and control/management actions of this species.

6. Strategy

We are currently writing up a biodiversity strategy. One part of this strategy will deal with IAS. At the same time, we are establishing an IAS action plan.

7. Current status analyses

For certain species (*Sciurus carolinensis*, *Tadoma ferruginea*, *Oxyura jamaicensis* etc.) analyses of the current status in Switzerland were made.

13. TUNISIA / TUNISIE

STATUT OF ALIEN SPECIES IN TUNISIA

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Invasive alien plants are harmful non-native plant species whose introduction and spread threatens the environment, the economy, and society, including human health. They can be introduced into Tunisia from other countries or continents. The current threats caused by invasive alien plants are real and growing. They threaten croplands, rangelands, and natural areas in Tunisia. Degrading agriculture and reducing biological diversity. Increasing and changing patterns of international trade and travel facilitate further incursions of invasive plant species in Tunisia, while environmental factors favour their establishment and spread.

Among the principal invasive plant species of the Tunisian territory we found:

species	French name	Geographical Origin	Distribution in Tunisia	Mode of multiplication
<i>Solanum elaeagnifolium</i>	Morelle jaune	Amérique latine	Sousse, Nabeul, Béja, Kef, Kairouan, Tunis, Sidi bouzid	seeds
<i>Cuscuta australis</i>	Cuscuté du bident	Sud européenne	Everywhere in Tunisia	seeds
<i>Oxalis floribunda</i>	Oxalide de florifère	Amérique	Everywhere in Tunisia	seeds & bulb
<i>Eleusine indica</i>	Eleusine	Inde	Cap Bon	seeds
<i>Galinsoga parviflora</i>	Galinsoga à petite fleur	Néo tropicale	Cap Bon	seeds
<i>Datura ferox</i>	Datura	Asie	Cap Bon	seeds
<i>Ipomoea stolonifera</i>	Ipomée stolonifère	Amérique	Mahdia, Bekalta, Sousse	Seeds, stolons, & rhizomes & bulb
<i>Cyperus bulbosa</i>	Souchet bulbeux	inconnue	Sahel	Seeds & bulb
<i>Carpobrotus edulis</i>		Afrique du Sud	Everywhere in Tunisia	Propagate

With these species, other species were introduced voluntarily by the man. Among these species :

- -Haloxylon persicum
- -Heliotropium curassavicum
- -Conyza canadensis
- -Calotropis prostrata
- -Nicotiana glauca

14. UNITED KINGDOM / ROYAUME-UNI

UNITED KINGDOM UPDATE

This report is a brief update on selected items of progress as regards action on Invasive Alien Species in the UK.

Policy co-ordination

As explained in the 2007 report, the UK has adopted two bio-geographical approaches comprised of strategic work on an all-Ireland basis and a joint-GB approach involving the administrations of England, Scotland and Wales. The latter is overseen by the GB Non-native Species Programme Board, supported by a GB Secretariat: <http://www.nonnativespecies.org/>

National strategy

At the time of the April 2007 Reykjavik meeting, the Invasive Non-native Species Framework Strategy for GB was in draft form. It was launched in May 2007 and can be found at the Secretariat website above. The Strategy is increasingly often being referred to in other areas of activity – both within and outside Government as awareness of the IAS issue is improving.

Implementation activity

Risk analysis:

The first 7 completed risk assessments have been published on the Secretariat website for public use/comment and a further 69 are now in progress. Target species for risk assessment have been identified in consultation with a range of stakeholders.

Rapid response:

A GB working group of key government departments and bodies is developing a protocol to set out how the various bodies will work together using their existing powers and resources, to implement rapid response in future.

Media and Communications:

A GB working group comprised of government departments and bodies, as well as non-governmental bodies, is developing an overarching GB media and communications plan to guide raising awareness and understanding of IAS issues.

This will also be informed by the results of a survey undertaken to investigate public attitudes and understanding of wildlife management and IAS issues. Final report expected shortly.

Data, Surveillance and Monitoring:

A three year project has been started to develop a comprehensive GB data repository on non-native species. The intention is to facilitate the collation of data from various sources to produce distributional information and identify trends for reporting via a relevant biodiversity indicator, to produce reports for the GB Board, to provide a clear location for reporting from any source and therefore produce alerts to support rapid response. It is expected that in due course this will also be capable of engaging with any European Early Warning System.

A formal invasive non-native species indicator has been developed and will be formally launched on 22 May – International Day for Biodiversity, themed on IAS. (See indicator 11 at: <http://www.jncc.gov.uk/page-4233>)

Research and information projects:

In collaboration with EPPO, the third a final project in developing the GB Risk Analysis methodology has been completed and will now be implemented through the GB Risk Analysis Panel.

UK is collaborating with the Plant Protection Service, Netherlands through the EUPHRESO mechanism on a project called DeC claim – (Decision Support Systems for Control of Alien Invasive

Macrophytes). The project will generate a prototype decision support system for optimal control measures for four representatives of the most troublesome growth forms of invasive aquatic alien weeds, Myriophyllids and Stratiotids; namely *Cabomba caroliniana*, *Hydrocotyle ranunculoides*, *Ludwigia grandiflora* and *Myriophyllum aquaticum*. Project will report in 2010.

Research has been undertaken into the feasibility of controlling/eradicating a single small population monk parakeets (*Myiopsitta monachus*), in an urban setting – though no final decision has been made yet. This has involved trialling trapping techniques, nest removal and shooting.

Government is supporting a project to develop a field-guide book on invasive non-native species (similar to other species identification guide books). Target date for final product is December 2010.

A comprehensive guide entitled “Invasive species management for infrastructure managers and the construction industry” has been produced through a project led by CIRIA and supported by other bodies including Government. The report can be found at: http://www.ciria.org/SERVICE/search_bookshop/core/orders/product.aspx?catid=2&prodid=1560

The UK research conducted by CABI into a suitable biological control agent for Japanese knotweed (*Fallopia japonica*) has identified the psyllid *Apahlara itadori* as being extremely specific having used a test plant range of 90 species. The work is now documented in a published paper¹ and an application to release the psyllid is being progressed through appropriate regulatory processes.

Invasive non-native species identification sheets have been produced and welcomed by stakeholders. The first 18 are now available on the GB Secretariat website and a further set of 47 are currently under development.

A project to more precisely quantify the economic impacts of IAS in GB is currently under tender process and should be let by the summer.

Research is planned this summer to test the practical application of a PCR technique (developed in France) for establishing the presence of North American bullfrog (*Rana catesbeiana*) by detecting its DNA in waterbodies. Collaboration with the French scientists has been established and it is hoped the technique could complement existing eradication work on this species and other work on mapping the extent etc of the amphibian disease caused by *Batrachochytrium dendrobatidis* in England. It is hoped it could also be used for detecting other species too.

A preliminary assessment of the UK internet pet trade as an IAS pathway has been completed, follow-up to the report is under consideration.

Following up issues discussed at the 2008 CBD CoP, UK has contributed funding to support development of the PIJAC-GISP Pet Trade Pathway Toolkit.

Control/eradication:

Ruddy duck (*Oxyura jamaicensis*): A total of 1,284 ruddy ducks have been shot on 60 sites between 1 April 2008 and 31 March 2009, (219 in the ‘summer’ period April to August 2008, and 1,065 in the ‘winter’ period September 2008 to March 2009). Control was carried out on 60 sites spanning the north of Scotland to the south of England. An independent count of 103 sites across Great Britain by the Wildfowl and Wetlands Trust in January 2009 found a total of 687 ruddy ducks. Since that date 424 have been culled. A second European workshop was held in Nantes in north-western France in November 2008. This was attended by representatives from France, the Netherlands, Spain and the UK. Information on ruddy duck numbers in Belgium and Germany was also made available to the workshop. It appears that the UK, France and the Netherlands are the only countries with self-sustaining populations. Ruddy ducks remain rare in Belgium, Germany and Ireland, and numbers in these countries are probably less than three breeding pairs in each. In Spain the control programme is ongoing and six ruddy ducks were seen in Spain in 2008, all of which were culled. No hybrids were reported in Spain in 2008.

¹ http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6WB-P-4VJ4WPT-1&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=278b62c11f44786e16f417fbf9568458

In England and Wales, work was undertaken in 2008 to eradicate known populations of *Ludwigia grandiflora*. Monitoring for re-emergence will take place this year.

Discovery in June 2008 of *Didemnum vexillum* in a harbour in Wales led to rapid work to organise survey by divers of the extent of its presence and to check for its presence in other harbours. Detailed reports were submitted to the GB Programme Board and the implementation of a rapid response is currently under consideration, including identifying suitable techniques, costs and delivery arrangements.

Legislation:

Public consultations have taken place in Scotland, England and Wales on use of legislative powers, including the prohibition of sale of specified IAS. Wide-ranging views and opinions were submitted in response and no decisions have been made as yet.

In Northern Ireland and Scotland, work has commenced on reviewing relevant legislation and identifying improvements.

Miscellaneous:

A number of new county based initiatives and local projects focussed on IAS have started, complementing some longer running initiatives. These aim to develop multi-partner approaches to local strategic management of IAS within the context of the national framework. The GB Strategy and Government policy lead provides a clear impetus and context for such projects.

The Government intends to enable land remediation tax relief to incentivise the regeneration of land contaminated with Japanese knotweed recognising it as a significant problem for land development and trialling the use of an economic incentive against IAS.

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15. GEIB Grupo Especialista en Invasiones Biológicas

A PERSPECTIVE ON CLIMATE CHANGE AND INVASIVE ALIEN SPECIES

GEIB Grupo Especialista en Invasiones Biológicas

Invasive alien species are causing profound and usually irreparable changes to natural ecosystems around the world. The spread of these harmful species is accelerating under the influence of a number of global changes, for example the increase in the international trade, disruptive land-use practices, climate change, etc.

There are increasing evidences that climate change will interfere with processes underlying biological invasions although it would be precipitate to make specific predictions with the current level of knowledge.

To predict the impact of climate change on biological invasion is far from easy, because of the proper biology of the species that determines responses to different stimulus, the susceptibility to invasion of the host ecosystem, the vulnerability of native species to climate change and the dynamism of changes in the interactions within ecosystems and human activities. Changes in temperatures may stress native species decreasing the resistance to invasion of natural communities, increasing disturbance elements (such fires, floods, storms, heat-waves, droughts, etc.) as a direct consequence of climate change, could advantage alien species, etc.

The present table summarizes the aspects of global change that favour IAS:

Element of global change	Prevalence of invaders
Increased atmospheric [CO ₂]	+/-
Climate change (↑T)	+
Increased nitrogen deposition	+
Altered disturbance regimes	+
Increased habitat fragmentation	+

There is a general consensus that warming temperatures, the increase in N deposition, altered disturbance regimes, increased habitat fragmentation and also the increase in atmospheric CO₂ concentration will potentially favour IAS leading to new invasions and spread of the already established IAS.

Although the research has advanced in the understanding of attributes of successful invaders, invasibility of communities, residence time, interactions between habitat compatibility and propagule pressure, etc., the enormous complexity of these determinants and existing uncertainties still influence our capacity to predict whether or not an exotic species could turn into invasive and its impacts.

Thus, we need to focus our attention on every aspect that influences the invasion process and their interactions with global change. Climate change has the potential to modify the impacts of IAS by affecting their sources, pathways and destinations.

If climate change alters any factor of the invasion process (including its interactions), IAS will be benefited from these new conditions. In this context, we should detect which points of the invasion process could be affected by climate change: we need to draw up a framework for our essay.

Understanding invasions...

➤ **Process of invasion (arrival, establishment and spread of IAS).**

Climate change influences invasive species by affecting their entry pathways, establishment, spread and colonization of new habitats.

Climate change *per se* is likely to have limited direct effects on movement of IAS along trade routes, but new patterns of international trade in response to changes in climatic conditions have the potential to alter the composition of invasive species that are spread around the world.

- Patterns of spread are determined by the species involved, the suitability of the host ecosystem for propagation, and the incidence of extreme climatic events. For example, wind and water transport is affected by climate; storms, prolonged rainy seasons and flooding determine the dispersal of many invaders. Wind systems affect the long-distance migration routes; wind shifts caused by changes in climate have the potential to affect the patterns of migration of IAS (for example, some pest like locusts or moths). Moreover, climatic gradients are likely to play a role in determining the rate and direction of spread of IAS.
- Disturbances and land transformations offer new opportunities to new species to colonize and spread. Indeed, land-use changes are often brought about by the use of introduced species (new forage species, plantation trees, etc.).

➤ **Ecological resistance of an ecosystem to be invaded.**

Numerous IAS are dependent on the disturbance of native ecosystems to support their colonisation and establishment. Invasion success is also determined by the traits of the host ecosystem: opportunity for colonization, changes in atmospheric patterns, suitability of the habitat, resource availability and the host community, play an important role.

- There is the potential for some species that are currently non-invasive to become invasive in native ecosystems due to climate change. Others, currently invasive, could turn into greater or reduced threats.
- Changes in land-use patterns that increase habitat fragmentation and alter disturbance regimes will increase the prevalence of non-native species. In a fragmented and degraded landscape experiencing rapid environmental change, the niches available to IAS could increase. For example, *Ailanthus altissima* is an excellent coloniser, but is most commonly found in ruderal habitats and less often in areas where competition with native species is high. In a fragmented and degraded landscape experiencing rapid environmental change, the niches available to this species could increase.
- -Land transformation acts to encourage biotic change by causing system changes that provide the opportunity for biological invasion, and by bringing new species from different biogeographic regions into contact with these altered systems.
- Extreme events (for example, severe and prolonged droughts) linked to climate change may cause important impacts on biological systems because they stress indigenous species reducing their resistance to invasions.

➤ **Characteristics of invasive alien species regarding native species.**

The inherent traits of species (both native and exotic) can play a role in the impact of non-indigenous species. Species characteristics include number of seed/propagules produced per generation, diet breadth, size of home range, ability to fix nitrogen, overall body size, adaptation to fire, degree of polyploidy, etc. But species traits are not a determining factor in order to predict if one species has the potential to be (or not) a good invader. Nevertheless, it is possible to detect some traits that could play an important role in predicting future invasive success.

- For example, some insects traits could be an advantage to invade new ecosystems: generalist feeders, cosmopolitan species, phenotypical plasticity, fast growing, multivoltine species, non-diapausing species or species which do not have a low temperature requirement to induce diapause, and those which are able to overwintering in their active stages, can be expected to increase population densities and expand their geographical ranges and may represent a risk in the future.

Invasion process is a complicate sequence of events and there are many uncertainties... Each stage of the invasion process is characterized by unique ecological and social factors. Invasion process linked with climate change brings out some questions to be resolved in the future:

How entry pathways of invaders could be affected by climate change?

Will some ecosystems become more or less susceptible to be invaded?

Will some non-indigenous species that are currently benign become invasive?

Will impacts of existing invaders decrease or become more severe?

Further considerations to be taken into account are :

- The effect of climate change on the risks from IAS will depend on the sensitivity of the species to climate and the specific host ecosystem and region, making difficult to point out without doubt which species could be more or less harmful. Given this level of uncertainty, prevention of invasions (and process of risk minimization) is of vital importance. Nevertheless, in the context of climate change, it could be useful to detect which species traits will be an advantage and which ones will be a disadvantage in order *'to predict'* new invasions. In this sense, it could be useful to evaluate species characteristics across more than one invasion stage taking into account also the consequences of climate change.
- Sometimes, entry pathways (i.e. transport) are not a biological or ecological process; sometimes are a social, economic and political matter. Global change could affect, for example, international trade patterns, thus this concept has to be taken into account when dealing with biological invasions.
- The identification of high-risk potential invasive species, their early detection and rapid response will enhance effective management. Biosecurity strategies will also need to increasingly incorporate climate change projections into risk management assessments.
- Interactions between IAS and their host plants, predators and competitors, in addition to direct effects on species, need to be taken into account when making a risk assessment for IAS impacts and also, for global change impacts. It means that it is not possible to develop a holistic impact assessment of a species without assessing at the same time the impact of the environmental changes on the other species in the same and different trophic levels.
- As disturbance regimes are altered by environmental change, the resilience of natural systems to change is likely to decline and European policy must respond to the increasing environmental risk.
- The final impact of non-native species is also dependent on human perception. Human criteria (economics, aesthetics, human health, ecosystem processes...) can change along the time. This aspect is very important to define future impacts on the context of climate change.

How climate change influences biological invasions is a considerable room for interdisciplinary groups to contribute to these issues. Research is crucial to understand interactions between climate change and biological invasions. However, IAS and their consequences are a present problem which requires not only a theoretical but also operative and pragmatic approach.

16. NOBANIS

The NOBANIS network www.nobanis.org has welcomed 5 new countries to the network and now includes 17 countries. Participating countries are: Austria, Belgium, Denmark, Estonia, Finland, Faroe Islands, Germany, Greenland, Iceland, Ireland (including the Republic of Ireland and North Ireland), Latvia, Lithuania, the Netherlands, Norway, Poland, European part of Russia, Slovakia, Sweden. NOBANIS has therefore revised its name to the European Network on Invasive Alien Species.

The NOBANIS gateway is being developed to make the gateway of even greater practical use for environmental managers, researchers and the interested general public. The newly revised NOBANIS gateway is planned to be fully available by Biodiversity Day May 22, 2009.

The new features being developed include a function for charting information taken from the national databases. Such figures are needed for developing indicators, for presenting the problem of IAS in national strategies and action plans and for developing measures to prevent introductions and harm to biological diversity. They can also be used as a valuable tool in awareness raising. These charts will include:

- a) Trends in introduction of alien species by environment (marine and brackish water, freshwater and terrestrial environments). This is a SEBI2010 indicator for IAS.
- b) Number of alien species in the country chosen and a comparison to the entire NOBANIS regions
- c) Number of alien species by habitat
- d) Number of alien taxonomic groups by pathway of introduction
- e) Number of alien species by pathway of introduction
- f) Ecological impacts of invasive alien species

For each of these charts you will have a chart showing information for the country you select and a comparison between this country and all NOBANIS countries.

Other developments in the NOBANIS gateway will be the addition of information pages on National strategies and Action Plans, Climate Change and IAS and Black Lists on IAS.