Invasive Alien Species: the Urban Dimension

Strengthening local action in Europe's urban areas

5 September 2013, IUCN Global Headquarters, Gland, Switzerland

Abstracts

Opening speech

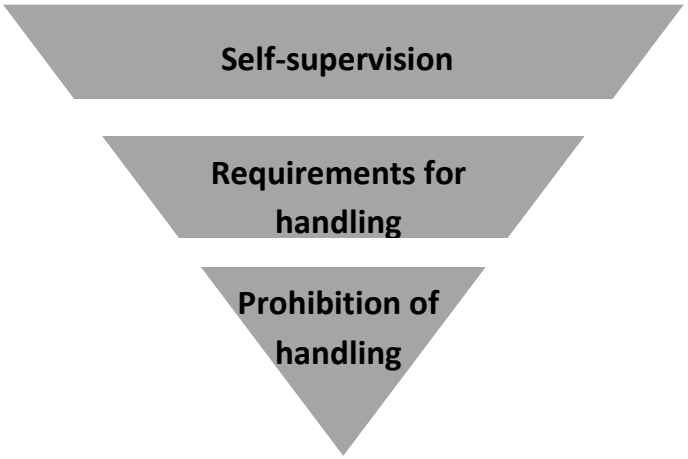
Gian-Reto Walther, Scientific officer of the Species, Ecosystems, Landscapes Division
Swiss Federal Office for the Environment

The national inventory of alien species in Switzerland[1] lists about 800 established alien species and identifies among them 107 invasive alien species. The Swiss Biodiversity Strategy[2] formulates as strategic goal: The spread of invasive alien species with the potential to cause damage is contained. The action plan to the Swiss Biodiversity Strategy is due in early 2014 and will consist of a comprehensive work package to achieve the targets of the strategy.

In the national legislation, invasive alien species are treated in several laws, e.g. the federal acts on the protection of nature and cultural heritage, on the protection of the environment, on hunting and the protection of wild mammals and birds, on fisheries, on forest, and on agriculture, with their relevant ordinances. Since 2008, the national Ordinance on the Handling of Organisms in the Environment (Release Ordinance, RO)[3] is in force. It includes alien species in particular and consists of a multi-level approach in dealing the handling of alien species. The precautionary principle is applied as a general requirement for handling organisms. Any person who intends to market organisms for the use in the environment must first assess the hazards and impairments by the organisms and arrive at a justifiable conclusion that none of these are to be expected. As a subsequent step, the ordinance formulates requirements for handling alien organisms, and as a final step, the ordinance lists those invasive alien species that may not be handled directly in the environment, other than in the case of measures to control them. In its present version the list contains 11 plant and 3 animal taxa. The number of animals does not cover species for hunting or fishing, as they are regulated in separate laws. Invasive species management is a task shared between the federal and cantonal authorities. The federal authorities are responsible for giving concrete form to regulations concerning the management of invasive alien species, and for coordinating management efforts at the inter-cantonal, federal and international level. The cantonal authorities supervise the market and the duty of care when handling organisms in the environment and prescribe the necessary measures to be taken in the case of complaint. Due to the high institutional and topical complexity, a national strategy on invasive alien species is currently in elaboration, therefore there is even more interest in the topic of this conference and the possibility to exchange knowledge and experiences.

[1] http://www.bafu.admin.ch/publikationen/publikation/00028/index.html?lang=en
[2] http://www.bafu.admin.ch/publikationen/publikation/01660/index.html?lang=en
[3] http://www.admin.ch/opc/en/classified-compilation/20062651/index.html

The multilevel principle for handling organisms in the environment according to the Swiss release ordinance:



Opening speech

Ulrich Witte, Head of the department of environmental communication and cultural assets, Deutsche Bundesstiftung Umwelt

When speaking about the Deutsche Bundesstiftung Umwelt conservation projects, there are three principles:

- At first, there are the **projects of practical nature conservation** in the framework of the department for environmental research and nature conservation: the support guidelines determine nature conservation in agricultural land, the development of degraded living environments and nature conservation in natural landscapes or in nature reserves and also nature conservation in populated areas.
- Second, alongside these pure nature conservation activities, the DBU also supports many **nature conservation projects focussing on communication and education** – such as this conference; around 30% of the activities in the environmental communication department directly concern nature conservation. At the moment, amongst other activities, a project is being prepared with IUCN for the European Green Belt in Southeast Europe.
- The third principle for nature conservation lies with the aforementioned **nature heritage sites**, which are directly connected with the fall of the iron curtain in Europe. Through the German reunification many large areas of the inner border, military real estates, former mining areas and so called publicly owned areas were assigned to the state. Around 62,000 hectares, of which ¾ are forestry land, spread across 50 individual areas, were assigned to the DBU as a federal charity. The areas are successively being turned into nature protection areas by the Naturerbe GmbH, and special guidelines are developed for every area. Beyond the nature conservation measures, the DBU carries out additional education and communication projects on their own land, in specific locations such as on the Baltic island of Rügen.

The DBU is hugely active in Germany, around 95% of the projects take place there, but we are also active internationally. The focus of the international campaign lies in Central and Eastern Europe, and in some cases beyond this region. Until now around 450 projects have been supported internationally, of which 400 alone are in Central and Eastern Europe. Almost 60% of these activities are education projects! Alongside the PhD scholarship programme for German universities, the DBU provides a separate international scholarship programme for Central and Eastern Europe, which at the moment includes 18 countries.

The topic of invasive species has been addressed by the **DBU since the middle of the 1990s.** Current plans involve neophyte management of the lower Danube in Bulgaria and Romania (this concerns the handling of bastard indigobush [Amorpha Fructicosa]), a project for neophyte management on the river Neisse in the three-border region of Germany, Poland and the Czech Republic (the project deals with knotweed and giant hogweed; due to their massive distribution, both types are the subject-matter of many

DBU projects for river restoration) and lastly an on-going project for the risk assessment of the invasiveness of neozoa on the common wall lizard [Podarcis muralis], for example, in Germany.

Within the German PhD scholarship programme, the subject of invasive species has also become interesting. Three current dissertations from scholarship holders covering the following topics have been completed:

- the distribution of quagga mussels [Dreissena rostriformis bugensis] in Germany,
- the identification of species of invasive types of crabs in the southern North Sea and
- the coexistence between native and imported types of crayfish in Central Europe.

Dissertations on the research of raccoon populations in Germany and the competition between the invasive signal crayfish [Pacifastacus leniusculus] and native species of fish have almost been completed.

Invasive alien species, a serious threat to Europe's biodiversity

Jonathan Jeschke, Assistant Professor, Department of Ecology and Ecosystem Management, Technische Universität München

Invasive alien species are animals, plants or other organisms introduced by man into places out of their natural range of distribution, where they become established and disperse, generating a negative impact on the local ecosystem and species. Based on this IUCN definition of invasive alien species, I give an introduction to the topic. I outline the invasion process which consists of several stages that invasive alien species go through: they (1) are transported beyond their native range; (2) are released or escape into the wild in the non-native range (stages 1 and 2 together can be termed *introduction*); (3) establish at least one self-sustaining population in the wild in the non-native range; and (4) disperse/spread in the non-native range.

With respect to stage 1, species can be transported either intentionally or unintentionally beyond their native range. I show that plants and vertebrates are typically intentionally transported, whereas invertebrates are typically unintentionally transported, for instance in the ballast water of ships. Sometimes, intentional and unintentional introduction of alien species occur simultaneously; for example, North American crayfish were intentionally introduced to Europe, but as some of them were infected with crayfish plague, this disease was unintentionally introduced to Europe. In general, pathogens as well as genetically modified organisms (GMOs) and synthetic organisms can be introduced to Europe from elsewhere in the world and become invasive, but such organisms are not routinely considered in discussions about invasive alien species.

Alien species can have various ecological and socio-economic impacts in their non-native range. I focus on biodiversity impacts and outline that alien species can reduce biodiversity due to several mechanisms, e.g. competition with native species, predation, or transmission of diseases. Overall, currently available data suggest that the percentage of alien species having negative effects on biodiversity is higher for animals than plants. On the other hand, there are more known alien plants in Europe than alien animals.

I close with data showing that alien species have a higher invasion success than frequently assumed. Consequently, preventing the transport and escape/release (stages 1 and 2 of the invasion process) of alien species is crucial in order to prevent future negative impacts of invasive alien species. This is of particular relevance for cities, as these are important points of entry for alien species.

The main impacts of invasive alien species in cities

Riccardo Scalera, Programme Officer, IUCN Invasive Species Specialist Group

The aim of this presentation is to show the multifaceted impact of invasive alien species (IAS) in urban environments, by providing a selection of examples highlighting the role of pathways and associated factors (e.g. the economic crisis, the luxury effect). In fact, urban environments play a crucial role in biological invasions. Human settlements are often the point of origin of many invasive alien species, which from these areas then spread into adjacent landscapes along transport corridors such as railways, waterways and

roads, in many cases eventually arriving to invade natural areas. On the other hand, urban areas are privileged centres for some of the most prominent pathways and vectors, including trade of pets, ornamental plants, etc. which can increase the propagule pressure that facilitates the invasion processes. Besides, a number of potential pathways concentrate within urban environments, such as botanical gardens and zoos, along with nurseries and private gardens. Not surprisingly, many studies have demonstrated that cities are hotspots of invasions, particularly for plants.

Besides the clear impact on biodiversity (e.g. the threat posed to native wildlife posed by feral cats), alien species may also affect ecosystem services, which in turn can have an impact on human well-being. Some alien species might have an impact on a specific ecosystem service, as in the case of the Spanish slug, which affects provisioning ecosystem services, as it feeds on horticultural plants. Other alien species may affect multiple ecosystem services, as in the case of the Japanese knotweed, which may profoundly change ecosystem functioning by altering species composition, physical habitat components, nutrient cycling, primary production, etc.

There are also IAS acting as vectors of disease (like the Asian tiger mosquito) and affecting human health (like the Common ragweed), as well as IAS causing extensive damage to infrastructures (e.g. the tree of heaven), and the landscape (Red palm weevil). For example the Tiger mosquito is an aggressive daytime-biting insect native to South-East Asia associated with the transmission of more than 20 human pathogens (these include yellow fever, Rift Valley fever, chikungunya, dengue, West Nile and Japanese encephalitis viruses). Another example is the Common ragweed, one of the most pollen-allergenic plants, representing a serious health risk for humans. The pollen of this species native to North America is a potent trigger of hay fever, rhinoconjunctivitis, and may often cause severe asthma-like symptoms. The associated economic costs are estimated to be around 4.5 billion euro per year (e.g. almost 2 million euro per year in the Milan province only).

In relation to damages of infrastructures, the tree of heaven (a pioneer plant native to China and introduced to Europe in the 18th century as an ornamental plant in parks and gardens) can easily grow close to buildings and at road embankments, including in tiny gaps on abandoned buildings and in cracks in street pavements, including historic and archaeological buildings where its extensive root system can cause serious damage, particularly in south Europe (Italy and Portugal).

The Red palm weevil is an Asiatic beetle responsible for significant damage to a wide variety of palm species, and for this reason represents a real threat for all Mediterranean countries which grow palms as amenity trees in the gardens and in the streets of towns and on sea fronts. In fact, because date palms constitute one of the characteristic landscape elements in coastal cities, the death of individual trees can markedly impact the overall landscape perception.

Similarly, the melodious notes of native black birds, wrens and robins are now replaced in some European urban parks by the frequent loud screeching calls of monk parakeets and rose ringed parakeets, which are thus rapidly changing the genuine “soundscape” of European towns.

The economic cost of invasive and non-native species: a case study from Ireland and Northern Ireland

John Kelly, Globally Treatened Species Programme Manager, Royal Society for Protection of Birds

The impact of invasive species is not just an issue for biodiversity. Invasive species are known to affect key economic sectors such as agriculture, tourism and the construction sectors. However, these economic impacts are often overlooked or under-reported. The situation is even more complicated when one considers the Total Economic Impact consisting of both market (use) and non-market (non-use).

In the fist study of its kind for Ireland and Northern Ireland, the estimated annual (market) cost of invasive species to the economies of Ireland and Northern Ireland is €202,894,406 and €58,623,034, respectively. The combined estimated annual cost of invasive species on both economies is €261,517,445. Correcting the estimate for Great Britain for inflation (see Williams, 2010), the current estimate of the annual cost of invasive species to the United Kingdom economy is €2.3 billion. The current estimate of the annual combined UK and Ireland cost is €2.5 billion.

There are however inherent difficulties in making complete cost estimates of economic impacts. Lack of relevant data sets; failure to collate data in compatible and consistent formats across jurisdictions; reluctance to share information which maybe commercially sensitive; and lack of understanding of invasive species issues in general all lead to difficulties when studying economic impact. In some cases, detailed studies and modelling of economic impacts will be required to overcome these. A major challenge facing any study is that often the data to allow a full assessment of non-market costs simply does not exist. This is the case for Ireland and Northern Ireland. Therefore, the costs presented are considered an underestimate of the Total Economic Impact of invasive species.

F. Williams, R. Eschen, A. Harris, D. Djeddour, C. Pratt,. R.S. Shaw, S. Varia, J. Lamontagne-Godwin, S.E. Thomas, S.T. Murphy (November 2010), The Economic Cost of Invasive Non-Native Species on Great Britain, CAB/001/09, www.nonnativespecies.org

An EU legislative instrument for invasive alien species

Myriam Dumortier, Policy Officer, European Commission, Environment Directorate General

Invasive alien species (IAS) are one of the most important causes of biodiversity loss and can also have serious consequences for the economy and human health. It has been estimated that IAS are costing at least €12 billion per year in Europe. Roughly ¾ of the IAS are introduced unintentionally, while only ¼ is introduced intentionally.
IAS respect no borders. Action in one Member State is often undermined by lack of action in another Member State. Therefore it is important to act jointly at the EU level.
As announced in the EU Biodiversity Strategy, the European Commission will soon propose a dedicated legislative instrument on IAS. Key elements in this proposal will be the need to prioritise, to coordinate and build upon existing systems and to shift attention from reaction to prevention. Prioritisation will be pursued through a list of IAS of Union concern, based on risk assessment and developed in cooperation with the Member States. IAS of Union concern will be banned from the EU, there will be an early warning rapid response system pursuing the swift eradication of any newly establishing population, while established populations will have to be eradicated, contained or controlled. There will be specific attention for priority pathways of unintentional introduction.
Urban areas are hot spots of biological invasions: propagule pressure is high, while ecosystem resilience is low. But urban areas are also hot spots of humans being confronted with invasions. There is plenty of scope for education and awareness raising, as well as for public participation in observing, preventing and tackling invasions. The urban area will thus be key in the successful implementation of the EU dedicated legislative instrument on IAS.

Financial support for the management of invasive alien species

Angelo Salsi, Head of Unit Life Nature, European Commission, Environment Directorate General

LIFE is the only EU program specifically dedicated to environment. Created in 1992 it has financed several thousands of projects all over the Union and also outside its border (LIFE Third Countries). Its main areas of intervention have been nature conservation, waste, water and innovative environmental technologies. In its last configuration, called LIFE+ (2007-2013) it also included awareness raising and information projects.

Invasive Alien Species have been a "frequent customer" of LIFE since its very early days with more than 300 projects dealing with IAS related problems. Some 50 of those exclusively or to a great extent targeted IAS, while the rest included one or several actions on IAS mobilizing millions of Euros to address these issues. During the past six years some 12 million Euros were allocated to IAS related activities. Overall we may conclude that LIFE has been if not the most important, certainly one of the key instruments to mobilize interventions in this difficult sector.

IAS related projects mostly aimed at eradication or control of IAS in specific areas, islands and other NATURA 2000 sites. These projects lead to very significant results, with several cases of complete eradication from a given territory.

To the contrary, activities related to identification and control of pathways and early detection have only been seldom seen in LIFE. This is clearly an area for improvement, but would require the involvement of different stakeholders than those normally active in nature conservation.

Hardly any project has been financed dealing with IAS activities within urban areas, while many of them deal with the impact on natural areas of IAS coming from urban settlements. Several of those deal with control of reptiles released in the wild by humans living in urban areas, but also plants cultivated in our city gardens. This is certainly another sector worth exploring.

LIFE will soon enter into its fifth edition: 2014-2020. It will largely build upon the successes of the preceding programs keeping its main axe of activity on traditional bottom up projects. There we will be able to continue financing IAS related projects like in the past.

A new entry though will significantly increase its ambitions: Integrated Projects. These will be larger projects built upon existing plans or strategies (e.g. NATURA 2000 Prioritized Framework Programs, Water Basin Management Plans etc.). They will also aim at mobilizing other funds, involving all stakeholders, create the necessary capacity and integrate environment into other policy areas. All this should secure the long term implementation of these plans. In those projects we are sure there will be space to accommodate many IAS related activities with a broader geographical scope and on a longer time scale.

Last, but not least, a new component "Climate Action" will integrate the main environmental axe. It will deal with climate mitigation and adaptation actions.

A lot of new elements to make LIFE even better placed to face the many challenges in front of us and managing IAS is certainly one of them.

The role of voluntary codes of conduct to combat invasive alien species in Europe: the case of horticulture and invasive alien plants

Sarah Brunel, Scientific Officer, European and Mediterranean Plant Protection Organization (EPPO)

Invasive alien plants (IAPs) have huge detrimental impacts on agriculture (i.e. by competing with cultivated plants), on the environment (i.e. by competing with native species) and on human activities in general (by for instance, blocking waterways, or being allergenic). As regulation on IAPs is taking time to be developed and implemented and cannot cover all species, voluntary approaches are crucial. To address this, as 80% of IAPs are introduced and spread for ornamental purposes, a European Code of conduct on horticulture and invasive alien plants has been published by the European and Mediterranean Plant Protection Organization and the Council of Europe. This Code has already been implemented in different ways (varying from translation of the Code to its full implementation) in 12 European countries (Belgium, Denmark, Estonia, Ireland, Italy, the Netherlands, Norway, Poland, Slovakia, Slovenia, Spain and the United Kingdom).

This Code of conduct is addressed to governments and the horticultural industry and trade (plant importers, commercial nurseries, municipal nurseries, garden centres, aquarists) and to those who play a role in deciding which species are grown in particular areas such as landscape architects, municipal parks and gardens departments, recreation and leisure departments. Other than preventing the entry and spread of IAP, this Code of conduct represents a tool to raise awareness among the horticultural industry and trade, as well as among the general public.
The issue of invasive alien species in general is not well understood by stakeholders. Cities, with the greening of public spaces and private gardens, provide a fantastic opportunity to promote substitutes for IAPs, as well as eradications of IAPs. Municipal and garden departments in cities can stop using invasive alien plants from public plantations and replace them with substitutes. Public spaces inspire citizens concerning which species to plant in their gardens, be it in cities or in the countryside, and play a very important educational role on such environmental matters. The city of Sète in the South of France conducted such an initiative by phasing out all invasive alien plants from the municipality plants production and organized as well the eradication of the invasive alien plant Pennisetum setaceum on its territory.

The existing networks of cities involved in environmental activities, through for instance the IUCN networks, could very easily take the issue of invasive alien plants on board with this existing Code of conduct on

horticulture and invasive alien plants. Furthermore, this Code has led to other Codes of conduct being developed by the Council of Europe: a European Code of conduct on botanic gardens and invasive alien plants, a European Code of conduct on zoological gardens and aquaria and invasive alien species, and a European Code of conduct on recreational fishing and invasive alien species which are under preparation.

Reference
Heywood V & Brunel S (2011) Code of conduct on horticulture and invasive alien plants. Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) Nature and environment, no. 162. 95 p.

http://www.coe.int/t/dg4/cultureheritage/nature/bern/ias/Documents/Publication_Code_en.pdf

The London Invasive Species Initiative

Karen Harper, Manager, London Invasive Species Initiative

London has a long history of human movement both in and out of the capital which has facilitated the transport of plants and animals. In modern times, the development of cheap and accessible transport has seen an increase in both the number of individuals and species entering the London area.
London's role as a major international port as well as its variety of available habitat niches and resources highlight why urban areas are known hotspots for new invasive incursions. This together with the range of stakeholders in London, the demands on space and the environment along with restricted resources have been the driving factor behind the development of the London Invasive Species Initiative (LISI).
In 2009 the London Invasive Species Initiative (LISI) grew out of the London Biodiversity Partnership, a group of environmental professionals and land managers within London. It was identified that a consolidated approach to invasive species management was needed along with a point of reference for London related invasive non-native species issues.
LISI now brings together organizations to deliver practical action to prevent, control and eradicate invasive non-native species. While encouraging co-ordination and partnership working to prevent, reduce and eliminate the impacts of invasive non-native species across Greater London.
Works completed by LISI include the Species of Concern list, the London Invasive Species Plan (LISP), Invasive species data recording format and priority on ground works. Other projects are conducted such as facilitation of networking and information sharing which are crucial elements of LISI although harder to quantify.
LISI is currently guided by 10 organisations and government departments which make up the steering group who provide direction and information to LISI. Anyone can request to be on the LISI emailing group and information is sent to interested stakeholders when required. This information sharing is key to facilitating LISI's required approach which is needed for success.
Unfortunately due to the nature of the works that LISI complete and the nature of invasive species in London it is hard to provide any definitive numbers on the success or failure of the LISI project. By keeping a record of the projects completed we will try to evaluate each project separately which will allow for larger scale evaluation when needed.
At present these projects are only a small part of what is required within the London landscape to achieve LISI's aims. In general LISI is limited by the usual issues found when trying to coordinate large numbers of stakeholders with varying restrictions and responsibilities. In addition funding is always a limiting factor especially in these economic times but grants are available such as the one from Department for Environment, Food and Rural Affairs (Defra) which currently funds LISI.
In general LISI has been able to show how far resources can be stretched where there are many people willing to work together which is a template repeatable in a range of different catchments, urban centers and major international cities.

Private gardens, a pathway for spread of invasive plant species

Jan Pergl, Scientist, Academy of Sciences of the Czech Republic

Intentionally introduced plant species form a significant proportion of non-native flora all over the world. Many species that became naturalized or even invasive in new regions following introduction are still being planted in gardens, alongside with those that may become so in the future. For many introduced species factors such as biological traits, date of introduction (residence time) or pathway of introduction are known in well-

studied regions, but the level of propagule pressure is usually unknown. For propagule pressure several proxies are used in invasion biology, but hard data are extremely rare.

The presented project ("Naturalization of garden plants as a result of interplay of species traits, propagule pressure and residence time") is therefore based on a novel approach that combines newly collated data from floristic inventory (used to obtain estimates of propagule pressure), a common garden study (to provide comparative information on species traits under standardized conditions) and exploration of historical sources (to account for the residence time of the species tested in the region), for a set of species differing in naturalisation success in the Czech Republic. By combining the above information sources in one model, we can determine the relative importance of species traits, residence time, propagule pressure and phylogeny in naturalization of species planted as ornamental in private gardens, and explore what is the interaction between (i) biological traits of species, and (ii) stochastic and socio-economic factors represented by the frequency of planting and time since introduction. At the species level, the project will identify particular species that are likely to become invasive, although their invasion may have not yet been realized, and provide managers and state authorities with background information for taking appropriate decisions.

The questions addressed by the project are:

- What is the propagule pressure of selected alien herbaceous species planted in private gardens in the Czech Republic expressed by frequency and duration of planting?
- What is the relative role of biological traits and propagule pressure (incorporating residence time) in determining the naturalisation success of alien species cultivated in gardens?
- Are existing weed risk assessment schemes applicable to the pathways of plant invasions, represented by deliberate planting in private gardens?

The spread of the New Zealand flatworm in Scotland

Brian Boag, Soil Ecologist, James Hutton Institute

The New Zealand flatworm (*Arthurdendyus triangulatus*) was first found in Ireland, England and Scotland in the early 1960s and is an obligate predator of native European earthworms. It was subsequently found in the Faroe Islands. It was reported reduce earthworm numbers to below detectable levels (Blackshaw, 1990) although some earthworm species may survive (Jones et al., 2001; Murchie & Gordon, 2012). It was probably spread from botanic gardens to garden centres, then domestic gardens then farmland and now has a widespread distribution in Scotland (Boag et al., 1997).

The New Zealand flatworm needs damp, cool (0 – 20 ^{o}C) conditions to survive but can survive for long periods (possibly a year) if starved by “degrowing”(shrinking in size to possibly 10% of its original size). It is a hermaphrodite and reproduces by laying, in the summer, egg capsules which usually contain 5-7 young and which are often laid through the dorsal surface and not through the ventral reproductive opening. It probably usually feeds at night on earthworms on the soil surface by digesting the earthworm externally and sucking up the resulting “soup”.

Earthworms are a key constituent of many soils and have a beneficial impact on soil structure, nutrient recycling, drainage and ultimately crop yield but also on above and below ground biodiversity. Boag (2006) estimated that the potential cost of the New Zealand flatworm to Scottish agriculture could be approximately £17m. Earthworms are also a major constituent of the diet of many birds and mammals e.g. shrews, hedgehogs, badgers and moles. Evidence from a site on the west of Scotland where moles had been numerous found that moles had been eradicated in all fields infested with the New Zealand flatworms (Boag & Yeates, 2001). The detrimental impact on the populations of other wildlife species which feed on earthworms has not been assessed.

The potential for the further spread of the New Zealand flatworm and the Australian flatworm (*Australoplana sanguinea*) to continental Europe was assessed using the CLIMEX model and showed that they could possibly become established in parts on north Western Europe (Boag et al., 1995).
In New Zealand there are more terrestrial flatworm species belonging to the genus, *Arthurdendyus*, which feed on European earthworms and better suited to warmer conditions e.g. *A. testacea* (Yeates et al., 1997) and which could possibly become established in other parts of Europe. Of the 14 species of terrestrial planarians at present in the British Isles only three are native the rest are aliens. More effective biosecurity is necessary if yet more are not going to gain entry into Europe. At present there is no research being

undertaken to quantify the potential detrimental impact the New Zealand flatworm might have on agricultural production or below or above ground biodiversity.

References

Blackshaw R.P. (1990) *Annals of Applied Biology* **116**: 689-694
Boag B. (2001) *Aspects of Applied Biology* **62**: 79-84
Boag B. et al., (1995) *Annals of Applied Biology* **127**: 385-390
Boag B. et al., (1997) *European J. Soil Biol*. **33**: 53-56
Boag B., Neilson R. (2006) *Proceedings Crop Protection in Northern Britain* 51-55
Boag B., Yeates G. W. (2001) *Ecological Applications* **11**: 1276-1286
Jones H. D. (2001) *Annals of Applied Biology* **139**: 75-92
Murchie A. K., Gordon A. W. (2012) *Biological Invasions* **8**: 1301-1316
Yeates G. W. (1997) *Annals of Applied Biology* **131**: 351-358

Eradicating American Eastern Grey Squirrels in Genoa Nervi urban park

Luc Wauters, Scientist, Department of Theoretical and Applied Sciences
University of Insubria, Varese

The target species for this case study is the American Eastern grey squirrel (*Sciurus carolinensis*) present in an urban park in the city of Genoa. This population of grey squirrels originated from five specimens introduced from Norfolk (U.S.A.) in 1966 in Genoa Nervi urban park. Today we estimate 200 (150-300) animals, most of them confined in the urban parks system in the eastern outskirts of Genoa.

The grey squirrel is a North American species that has been introduced to many localities of North America, Australia, South Africa, Great Britain, Ireland and Italy. In Europe, the grey squirrel was introduced to Great Britain, Ireland, and Italy. In these countries the spread of the grey squirrel has been associated with a dramatic decline of the native red squirrel (*Sciurus vulgaris*). Hence, wide-scale extinction of red squirrels is likely to occur in Italy and neighbouring countries if the Italian populations of the alien species are not eradicated, or –at least- controlled properly.

In 2010 a LIFE + project (*EC-SQUARE: Eradication and control of grey squirrel: actions for preservation of biodiversity in forest ecosystems*) started, with the aim to control or eradicate the grey squirrel in Northern Italy. In EC-SQUARE we are developing methods to control and eradicate grey squirrels in different socio-ecological contexts. These will be integrated with public opinion assessments to investigate and shape public perceptions of the general problems posed by alien species and, in particular, the grey squirrel. Developing and carrying out specific control methods linked to local public perception of the alien species will allow us to test the efficacy of innovative methods under different local contexts and to introduce new alien species management strategies which will be made available to policy makers at different administrative levels.

A major problem is that the grey squirrel is not perceived as a menace by the general public, but even has a positive appeal in some contexts like (sub)urban parks.

In planning eradication/control strategies, particular attention should be given to the conflicts, which could arise when implementing the project, and methods for managing these conflicts should be identified and used. In particular situations, such as Genoa Nervi park, inside urban areas, where the public is accustomed to see and feed grey squirrels, a removal method that implies killing the animals is not accepted, leading to a strong opposition to the whole project. In these situations, with small populations, the eradication with surgical sterilisation is considered a possible alternative.

In order to take such problems into account the EC-SQUARE task-force has developed a general managing plan (GMP) which analyzes, on a per site basis, the actual population status, taking into account both grey squirrel population dynamics and site landscape characteristics, as well as a characterization of social drivers and pressures. It defines a series of indicators of both population status and social context to define the management actions. To avoid future introductions, the Task Force of the LIFE Project collaborated with different Italian ministries involved in animal trade and management to make a grey squirrel risk assessment as necessary input to enforce a grey squirrel trade ban. The squirrels' trade ban was approved on the 24th December 2012.

For the Genova-Nervi population, the GMP indicated eradication by live-trapping grey squirrels, with subsequent sterilization and detention in captivity of the animals. The possibility to (re)introduce red squirrels in the park after the removal of the grey squirrel was also considered as a sort of 'social compensation' for the citizen: we remove a population of an invasive squirrel and provide a new population of the native red squirrel. This would potentially increase the link between citizens and the native squirrel species, providing evidence that native species could live in urban areas without the need to introduce exotic animals.

The main obstacles are related to the difficulty to have scientifically correct media coverage. Newspapers, television, online media, prefer to emphasize the removal of 'cute' grey squirrels, not reporting or even denying the risks for red squirrels. People are not used to evaluate management options that involve removing animals (with euthanasia or sterilization) with a science-based approach. If they are 'a priori' against these options, they deny any scientific evidence, arguing that it is not true without the need to bring any evidence in their favor.

I will conclude by presenting the important lessons learned by this particular case which will allow us to produce general guidelines to improve the communication with stakeholders and the general public essential for a better management of invasive species in Europe.

The need to involve stakeholders to combat IAS in cities

Neil McIntosh, Deputy Executive Director, ECNC - European Centre for Nature Conservation

Europe's cities are dynamic places – major hubs for transport, heavily populated and largely built. As such, cities are highly vulnerable to the spread of invasive alien species (IAS) – they move around as people engage in trade, tourism, and travel. According to the World Conservation Union, invasive alien species are the second most significant threat to biodiversity, after habitat destruction. In their new ecosystems, invasive alien species become predators, competitors, parasites and diseases of native and domesticated plants and animals. The impact of invasive alien species on native ecosystems, habitats and species is severe and often irreversible. No single area, region or country in Europe is immune from the potential for invasive alien species and many (if not all) ecosystems are already experiencing some impact. However, invasive alien species are most often found in or near urban areas, as well as throughout the settled landscape.

The spread of IAS can be intentional or unintentional, or, in other words, deliberate or accidental. Therefore, it is appropriate, and indeed necessary, to develop controls. The trouble is though that controls may not always be consistently applied, may be ignored, or (sometimes) be opposed: even when controls are developed in order to safeguard (indigenous) natural resources, and protect people's health, life quality and livelihoods. Controls need people and organisations – stakeholders - to work together to ensure the management of IAS, as well as to be properly implemented. Particularly in cities, given the concentration of stakeholders and the (often) significant scope or potential impacts of IAS, it is necessary to involve stakeholders directly to increase understanding. This can be achieved by different means, some of which are potentially more effective than others.

This presentation will take a look at when and how diverse stakeholders can be positively engaged and rallied in defending against and managing IAS. It will also provide examples of different approaches, methods and tools that can be and are applied to proactively include stakeholders in the process. From this, effective practices and key principles will be suggested. Finally, the need to achieve and maintain a balanced approach will be considered: to ensure that cities and urban areas are more resilient against IAS, in ways that also allow 'space for nature' and scope for biodiversity generally. Also, whilst the destructive consequences of invasive species in our ecosystems are well reported, the ways these foreign creatures interact with wildlife are complex – given that and the risks of confusion, how do we enable people to know who the enemy is and when to act?