Invasive Species Specialist Group of the IUCN Species Survival Commission

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ISSG ANNIVERSARY

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WORLD CONSERVATION CONGRESS

ISSG ANNIVERSARY

IAS IN WESTERN INDIAN OCEAN ISLANDS

The proceedings of: The Indian Ocean Commission Workshop on Invasive Alien Species and Terrestrial Ecosystem Rehabilitation for Western Indian Ocean Island States - Sharing Experience, Identifying Priorities and Defining Joint Action - Organised by the IUCN Indian Ocean Plant Specialist Group with the help of the IUCN Invasive Species Specialist Group and held in the Seychelles in October 03 are available as a zip file from the ISSG website *www.issg.org* (follow the link The Proceedings of the Regional Workshop on Invasive Alien Species and Terrestrial Ecosystem Rehabilitation for Western Indian Ocean Island States)

INVASIVE ALIEN SPECIES AT THE WORLD CONSERVATION CONGRESS

The World Conservation Congress is the general assembly of IUCN members, which takes place every three to four years. The Congress combines the business of the Union with technical conservation fora and provides an opportunity for the sharing of information and experience among IUCN's worldwide constituency of members, Commission members, stakeholders and partner organizations. The Congress encompasses three principal elements: conducting the business of the Union, assessing the work of IUCN Commissions and taking stock of conservation.

COMMISSION DAYS (16 and 17 November)
ISSG will give two presentations during the SSC Commission days.

KNOWLEDGE MARKETPLACE, 18 November 2004 (12:00 - 14:00), Roundtable A2
The European Strategy on Invasive Alien Species, adopted by all European countries in December 2003, provides a unique opportunity for a coordinated approach at regional scale to address the threats posed by invasions. Aim of the roundtable is to discuss options for future work. This is organised by the Council of Europe and ISSG (Piero Genovesi).

GLOBAL SYNTHESIS WORKSHOP
Invasive alien species and biodiversity - Coping with aliens (Subtheme 1)
Break Out 1 A: Impacts of invasive alien species on livelihoods, 19 November 2004, 09:00-11:30
Through a series of presentations and discussions, this session will explore the impacts of invasive species on selected wild and managed ecosystems, agriculture and development as well as tourism. At the end of the session, entries for a photographic competition on Invasive Alien Species will be displayed and judged.
Break Out 1 B: Options for conservation of species and ecosystems affected, 19 November 2004, 14:00-16:30
This session will focus on invasive alien species as a global issue with global and local solutions, and examine prevention, eradication, control and economic evaluation. It will also examine challenges, knowledge gaps and the necessity for risk assessment when species are to be intentionally moved. ISSG will have a presentation (Mick Clout).

International Trade: Friend or foe of biodiversity?
(19 November 2004). This sub theme will also include some discussion on IAS in its debate on trade and the environment.

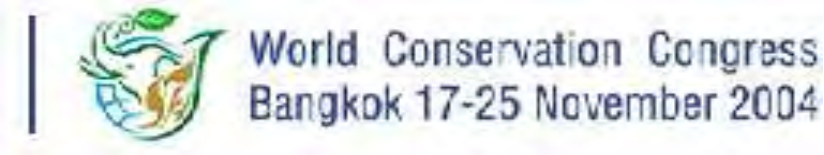
CONSERVATION PLATFORM – Global Invasive Species Programme (GISP) (19 November)
The Platform will launch new partnerships, products and initiatives of the Global Invasive Species Programme and its partner organizations. The GISP Partnership is up and running again and supporting some innovative new work to tackle invasive species. ISSG (Mick Clout) will be one of the presenters

TRAINING WORKSHOP, 20 November 2004, (09:00 - 13:00), Training Room 4 .
"Invasive alien species management for practitioners in gumboots, flip flops or suit and tie: there is always something you can do!" Organised by ISSG (Maj De Poorter) in cooperation with GISP (the Global Invasive Species Programme). The training session will be an introduction to understanding various ways of preventing as well as fighting back against invasive alien species - (impacting biodiversity and livelihoods), focusing especially on what can be achieved locally and with limited resources. Information on freely available sources of global best practice will be included in the session. The overall theme is "There is always SOMETHING you can do"

DRAFT MOTIONS
Several draft motions deal with Invasive Alien Species

ISSG BOOTH: in the Atrium Zone (A22) - please visit us! Information about ISSG's activities, and demonstrations of the Global Invasive Species Database.

GISP BOOTH: in the Plaza zone (P56)



PRECAUTION IN THE CONTEXT OF INVASIVE ALIEN SPECIES

The impacts on biodiversity and ecosystem functioning, caused by invasive alien species (IAS), are often more surprising or more complex than the impacts of agricultural weeds, for example.

Surprising: for instance, in New Zealand, wasps (including *Vespula germanica* and *V. vulgaris*) are alien invasive species and they consume large amounts of native invertebrates. In addition, and surprisingly in view of the respective sizes of the animals involved, the wasps are detrimental to the native forest parrot, the Kaka (*Nestor meridionalis*) – wasps increase to very high densities in the southern beech forests and deplete the honeydew resources which the Kaka require as a source of energy to maintain breeding condition (Beggs 2001).

Indirect impacts on native species can also be surprising. In a study from 1994 - 1997, it was observed that the majority of Lake St Lucia's nesting Nile crocodiles selected open, sunny, sandy areas in which to deposit their eggs. Nests were only found in shaded sites in the Mpate river breeding area and these nests were shaded primarily by the invasive alien plant *Chromolaena odorata*. Shaded site soil temperatures at 25 cm depth, were on average 5.0 - 6.0 °C cooler than sunny site soil temperatures at the same depth. Shaded site temperatures were well below the pivotal temperature for St Lucia's Nile crocodiles and as a result a female-biased sex ratio would be expected. (Leslie & Spotilla, 2000)

An established alien species may be "dormant" and show no signs of being invasive for years or decades, before rapidly expanding in range and abundance and becoming invasive (Crooks and Soulé 1999, Mack *et al.* 2000). Triggers can include changes in ecological conditions – human disturbance, or even natural disturbances like hurricanes. An example is the spread of invasive trees in the Florida Everglades, which was delayed until the area became more prone to anthropogenic disturbance (Crooks and Soulé 1999) and/or hurricanes. Another reason why it may take time for invasiveness to show up is that it may require cumulative interactions with other alien species. Avian malaria (*Plasmodium relictum*) was introduced to Hawai'i in exotic birds kept by settlers, but it needed a vector to spread. This was made possible following the introduction of the southern house mosquito (*Culex quiquefasciatus*) in the water barrels of a sailing ship in the 1820s. Hawaii's unique native birds succumbed quickly because, unlike non-native birds, they have no resistance to avian malaria. The interaction of the alien disease and the alien vector cumulated into the extinction of at least 10 native bird species in Hawai'i - and many more are threatened.

Not only can interactions with other alien species trigger invasiveness in previously non-invasive species it can also create a risk that an already invasive species might become even more invasive. For example, in New Zealand there is no evidence that exotic conifers can utilize indigenous mycorrhizal fungi. It is possible that this is a factor that restricts the spread of these conifers into New Zealand's native forests. However, the exotic *Amanita muscaria* is often found as a mycorrhizal associate of introduced conifers *(Pinus spp., Pseudotsuga menziesii*). Once this fungus is established in the native forests, what is the risk that the conifers may follow? (Johnston P.R. 2002 pers. comm. In email on Aliens-L listserver).

Such interactions can reach the level of 'invasional meltdown' -alien tramp ants *(Anoplelis gracilipes)* have formed extensive super colonies on Christmas Island (Australia) since the mid-90ies. Red crabs are highly vulnerable to these crazy ants. The extirpation of native land crab population has had manifold consequences for the dynamics and structure of the native forest, but is also facilitating secondary invasions. This includes facilitation by crazy ants – through absence of red crabs- of invasion of native rainforest by Giant African Land Snail (*Achatina fulica*), woody alien weeds and alien cockroaches (Green *et al*, 2001))

Conclusion: Of course, many, if not most, alien species will not become invasive. But given that the impacts from alien species can be direct, indirect, cumulative and/or complex, unexpected, surprising and counter-intuitive, and that they often only show after considerable lag times, any alien species must be considered "guilty" until proven "innocent", where the risk of becoming invasive is concerned. Alternatively, this has also been expressed by IUCN and GISP respectively as: In the context of alien species, unless there is a reasonable likelihood that an introduction will be harmless, it should be treated as likely to be harmful (IUCN 2000). Or: Every alien species needs to be managed as if it is potentially invasive, until convincing evidence indicates that it presents no such threat (McNeely *et al* 2001):

Given that the impacts from alien species can be direct, indirect, cumulative and/or complex, unexpected, surprising and counter-intuitive, and that they often only show after considerable lag times, any alien species must be considered "guilty" until proven "innocent", where the risk of becoming invasive is concerned.

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Maj De Poorter and Mick Clout
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Based on presentations given by M De Poorter at "*Invasive Alien Species and the International Plant Protection Convention*, Braunschweig, Germany, September 2003" and Mick Clout at "*Invasive Plants in natural and Managed Systems – Linking Science and Management* in conjunction with the 7th International Conference on the Ecology and Management of Alien Plant invasions (EMAPi7)), Florida (USA), November 2003".

Photo: Stowaways (Landcare Research)

National Invasive Species Committee formed (Nationwide, Palau)

The National Environmental Protection Council (NEPC) of Palau created a National Invasive Species Committee. The creation of the Committee is one outcome of an Invasive Species Prevention Course held in Palau in August 2003. The participants in this course represented government and private agencies, companies and organisations with an interest in invasive species issues in Palau.

One of the main recommendations from the participants of the course was that there be a single governmental body to coordinate all invasive species in Palau. This recommendation was brought to the NEPC, which endorsed it and forwarded it to the President, who then directed the NEPC to take this responsibility. In response, the NEPC has formed the Invasive Species Committee. The Committee's primary responsibility will be to develop a National Strategy to prevent and manage invasive species, and to coordinate invasive species efforts in Palau. (24)

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INVASIVE ALIEN SPECIES AND GLOBALISATION: WHAT ARE THE LINKS?

Readers of this Newsletter are already intimately familiar with the problems of invasive alien species, and their economic and ecological impacts. Many of us may feel that we are fighting a losing battle, but perhaps this is because we are fighting the symptoms rather than the causes. In fact, I believe that we are experiencing a significant homogenisation of many aspects of our lives, ranging from culture to food to consumer products. The economic integration that is enabling us to become wealthier (notwithstanding the inequitable distribution of this wealth in many countries) is also driving this homogenisation and is feeding the problem of invasive species along the way.

Global trade has increased from USD192 billion in 1960 to USD6 trillion today. A visit to any harbour in the world will see large stacks of containers, many of which are never inspected either on departure or on arrival and, often enough, are subsequently loaded onto trains or trucks for further transport before they are opened. Little wonder that the spread of everything from bacteria to insects and mammals is increasing at a rapid rate.

As just one example, the Asian gypsy moth *(Lymantria dispar)*, which was first reported in the United States in 1991, entered as egg masses attached to ships or cargo from Eastern Siberia. The caterpillars of this species are known to feed on more than 600 species of trees and, as moths, the females can disperse over long distances. This species could cause vastly more damage than the European gypsy moth which already defoliates some 1.5 million hectares of forest per year in North America.

Another aspect of globalisation that some of those working on invasive species give inadequate attention is the transport of micro-organisms that cause diseases in humans or animals. With some 700 million people crossing international borders each year, the potential for them to carry diseases between countries is great and growing. The SARS virus is one dramatic example that led to billions of dollars in damages due to loss of tourism revenues in Asia, Canada, and elsewhere. By considering disease organisms as IAS, we have an opportunity to build a broader alliance in the continuing battles against invasions, and many of the general public will find disease organisms, such as West Nile virus, to be much more worrying than mere ecosystem disruption.

Many of us are working on addressing IAS problems at the tactical level, developing biological controls, early warning systems, and quick-response capabilities. All of this is to the good, but we also need to work at the strategic level, and a good place to start is the World Trade Organisation. Governments certainly do not look favourably on anything that disrupts free trade but under the 1952 International Plant Protection Convention, reinforced by the Convention on Biological Diversity, governments have a responsibility to ensure that species in international trade do not become invasive and that products in international trade do not inadvertently carry pathogens that may cause harm. While national legislation is essential, international cooperation might be even more important given the international trade aspects of the problem. A system of permits, managed as part of the international trade regimes, coordinated by the WTO, would likely provide more resources for addressing the problem of invasive alien species and certainly move the issues higher on the agenda of those who are pursuing economic benefits through free trade. We need to ensure that free traders are not free riders, externalising the economic and ecological costs of invasive alien species on the wider society.

Because the diverse ecosystems of our planet have become connected through numerous trade routes, the problems caused by invasive alien species are certain to continue. As with maintaining and enhancing health, education, and security, perpetual investments will be required to manage the challenge presented by these IAS. Generating these investments will require that we work even more effectively in convincing economic interests of the importance of incorporating invasive species concerns into all aspects of their enterprise.

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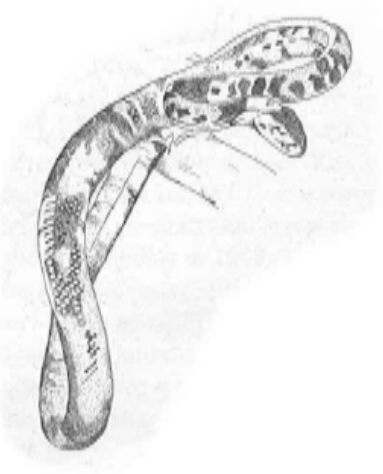

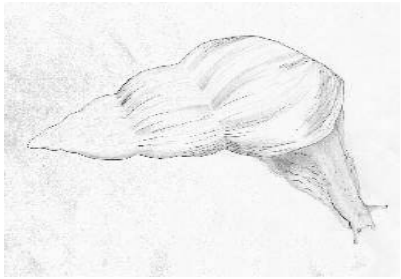

A REVIEW OF BIOLOGICAL INVASIONS IN PROTECTED AREAS

Protected areas (PAs) form the last remnants of less degraded landscapes and ecosystems around the world. They are islands amongst an array of different land uses, and serve as benchmarks of healthier ecosystems. Although the formal motivations behind proclaiming protected areas may be varied, most would agree that the conservation of biodiversity is a key issue common to all protected areas.

In many areas the motivation for proclaiming PAs was for the protection of prized hunting species or stunning scenery and vistas. Due to this, the problems that early managers faced were largely of poaching or injudicious use of resources, which were anyway perceived as unlimited. In the early days of conservation, management was not based on scientific understanding, but rather on good biological observation and a common sense appraisal of the situation at hand.

Invasive alien species (IAS) were frequently cultivated and intentionally dispersed in protected areas for a variety of reasons. Only when deleterious impacts were being observed was the problem of biological invasions recognised. Many sources point to the invasion of alien species being the second greatest threat to biological diversity, second only to habitat fragmentation (IUCN, 1997). Considering the formally protected areas such as national parks, which are more commonly assured of legal protection from habitat fragmentation, invasions may become the greatest threat to many protected areas.

The last significant synthesis of the impacts of IAS in PAs was done by Macdonald, Loope, Usher & Hamann in the book 'Biological Invasions: a Global Perspective' (Drake *et al* 1989). This chapter, which dealt with wildlife conservation and the invasion of nature reserves by introduced species, suggests that the introductions of species invasions is likely to increase, with increasing frequency (Macdonald et al. 1989). This certainly appears to have been the case in South Africa's Kruger National Park (KNP), where the alien plant list has increased from six taxa in 1937 to over 370 taxa (Foxcroft et al. 2003).

Interestingly, Macdonald *et al* (1989) show that the increase in number of visitors to a reserve leads to an increase in the number of introduced plants species. This is probably due to the importation of propagules by the visitors themselves, or by attaching to vehicles. Considering the ever-shrinking sources of funds to support conservation areas and lowering of government subsidies in many countries, protected areas have to become more reliant on tourism for revenue. If the hypothesis that an increase in tourism will lead to an increase in biological invasions holds true, the short-term benefits of increased revenue will place an ever-increasing demand on resources in the long-term. This, as more funding is required to control invasions, and larger areas are being lost to unmanageable problems, possibly resulting in lower tourism potential.

Macdonald *et al* (1989) also indicate that habitat modification leads to an increase in alien plant species, through building of roads, campgrounds and other facilities. More recently, studies in Chile indicate that roads represent primary pathways for invasions into PAs (Pauchard & Alaback, 2004). Further, road edges are also shown to act as reservoirs for propagules, providing continuous pressure and resulting in invasion further into the PAs. In the KNP, park staff have clearly been responsible for the importation and cultivation of some of the most serious and costly plant invasions (Foxcroft, 2000; Freitag-Ronaldson & Foxcroft, 2003). Considering all the potential pathways of invasions into PAs, roads and ornamental use are surely one of the few pathways that can be managed through well-planned programmes and pro-active measures.

If any management of biological invasions is going to be efficient, early warning systems need to be established. However, many managers simply cannot identify many of the invading alien species (Macdonald, 1991), and rely on a few organisational experts to cover vast areas. In practical senses, this is simply not possible, and rangers, game guards, tour guides and others staff (and suitably trained volunteers), that are operating in the field on a daily basis need to be responsible for detecting and reporting invasions.

Control operations are widely in place. This indicates that Pas are aware of the seriousness of the problem. However, follow-up and maintenance operations, which are critical components, are frequently cut short or neglected, allowing the system to revert to its former invaded state. This is frequently due to lack of long-term planning and budgeting, as well as a result of shrinking revenue for protected areas being channelled into income generating ventures.

As with many other aspects of PA management, fences and other artificial boundaries are ecologically meaningless. Protected areas, even those of millions of hectares, are islands and need to adopt an approach that is outward looking and considers the broader physical and social environment.

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Technical Workshop on the Implementation of a Global Invasive Species Information Network (GISIN)

The Global Invasive Species Information Network (GISIN) took another step towards becoming a reality during the recent Technical Workshop on the Implementation of a Global Invasive Species Information Network (GISIN)).

The workshop, which was held in Baltimore on the 6-8 April 2004, was hosted by Annie Simpson and a team from the National Biological Information Infrastructure (NBII) and was attended by 76 experts from 26 countries.

GISIN is seen as a one-stop shop providing access to invasive species information from many diverse databases. These databases may contain species fact sheets, observation data, maps, images, bibliographies, project details or experts' names. The challenge is to standardise critical data elements so that search results are meaningful.

To build on the work accomplished in past meetings organised under the Global Invasive Species Programme (GISP), attendees at the workshop divided into three working groups to develop a GISIN funding and organisational framework, to discuss the implementation of GISIN, and to develop capacity for others to participate in GISIN.

The Global Invasive Species Programme (GISP) and the Inter-American Biodiversity Information Network (IABIN) will contribute to the organisational framework. IUCN- the World Conservation Union is the parent organization of the Invasive Species Specialist Group (ISSG), which presented valuable guidance to participants on the types of information that should be collected.

The Global Biodiversity Information Facility (GBIF) provides a working example of information system integration and will provide assistance related to database infrastructure. NISbase is another working example of a distributed information system. Representatives of a number of databases present at the workshop have either joined it or are planning to do so.

Members of CAB International, BioNET International, and the Global Taxonomy Initiative contributed to the discussion on taxonomy and unique identifiers for data sources. A capacity building database that will allow others to easily join the network is being developed by Silvia Ziller and a group of database developers from South America.

It is plain to see that momentum is building and the challenges are being overcome one by one. A steering committee is planning the next moves and invasive species information managers are being invited to join in the development of this important network.

Further information
GISIN: *http://invasivespecies.nbii.gov/as/gisin.htm*
Working model that links 6 participating databases: *http://www.nisbase.org/nisbase/index.jsp*

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LOWER MEKONG BASIN FISHERIES AND AQUACULTURE OF INDIGENOUS FISH SPECIES

The Lower Mekong Basin (LMB; including parts of Cambodia, Lao PDR, Thailand and Viet Nam) has an exceptionally diverse flora and fauna, including at least 1,200 finfish species (Coates *et al*. 2003). This represents over 4% of all fish species covered in FishBase (*www.fishbase.org*). The species are distributed over 91 families, which is more than any other river. LMB fisheries are highly productive, yielding some 2.5 million tonne annually, or about 2% of the world capture fisheries. The capture fisheries involve an estimated 40 million, or 2/3 of the LMB population (Sverdrup-Jensen, 2002). LMB fish consumption is among the highest in the world at some 56 kg/person/year. The productivity of the system is driven by the annual flood, when the river inundates roughly 100,000 km^2, or 16% of the LMB. There are signs that the capture fisheries are declining. Captures of large bodied species are decreasing and the average size of fish within a given species is getting smaller. There reasons for the decline is complex, but related to the construction of dams, conversion of wetlands for agriculture and increasing fishing pressure (Sverdrup-Jensen, 2002).

Photos Niklas S. Mattson. Top:Fish farmer, Takeo province,Cambodia. Bottom: Fish Farmer, Champassak Province, Lao PDR

Aquaculture in the LMB is developing rapidly, including a large proportion of small-scale, low-input systems. Aquaculture is widely seen as a way to compensate for declining catches as well as a way to mitigate poverty in rural areas. However, the links between the capture fishery and aquaculture is strong, since many aquaculture inputs originate in the fishery. Fish seed is often obtained from the wild and important fish feed include low-value or "trash-fish". Further, maintenance of brood stock and breeding programmes of indigenous species relies on the availability of healthy wild stocks.

In the second half of the 20th century aquaculture development and extension in the LMB and elsewhere in the tropics focused on a few established species, such as Chinese and Indian major carps, tilapia and common carp. These species were already domesticated and their culture systems well studied. About 17% of the world aquaculture production is estimated to be contributed by alien species (Bartley and Casal 1998). This may sound high, but compared to food production in general it is quite modest; Pimentel *et. al* (1999) estimated that alien species contributed more than 98% of the US food system. On the other hand, among factors causing loss of biodiversity, alien species are considered second only to habitat loss (*http://www.biodiv.org/programmes/cross-cutting/alien/*).

In the LMB there are yet few examples where alien fish species have become a serious problem. In the Mekong delta in Viet Nam, Mozambique tilapia (*Oreochromis mossambicus*) causes problems in shrimp farms. Another example is the introduction of the African catfish *(Clarias gariepinus)* and the hybrid with the indigenous *Clarias macrocephalus*, which appears to be affecting the abundance of the indigenous *Clarias batrachus* (Welcomme and Vidthayanon 2003). The most prominent impacts by an alien species on aquatic ecosystems are caused by the South American golden apple snail (*Pomacea canaliculata*) which was introduced for aquaculture in the 1980's. It has now spread to many SE Asian countries and its voracious feeding behaviour affects, in particular, peri-urban wetlands (Carlsson 2004).

It is clear that alien fish species have contributed to in-

creased aquaculture production, which has had positive economic and social effects in the LMB. Globally, most cultured plants and animals are alien to the areas where they are used, and it is probably unrealistic to expect that aquaculture will be an exception. However, indigenous species are less likely to cause environmental problems, and in the medium and long term things need to change. In the LMB indigenous fish species are generally preferred by farmers and consumers, and if domesticated strains and culture techniques become available the proportion of indigenous species produced is likely to increase.

To address the lack of domesticated indigenous fish species for aquaculture in the LMB, the Fisheries Programme of the MRC (Mekong River Commission, *http://www.mrcmekong.org*) is implementing a project on *Aquaculture of Indigenous Mekong fish Species* (AIMS), funded by the Danish International Development Assistance (Danida). The purpose is to develop and promote indigenous alternatives to alien species. To achieve this in a sustainable way, fisheries agencies of Cambodia, Lao PDR, Thailand and Viet Nam (the four Mekong River Commission Countries) are supported to carry out the activities. The activities include research into culture techniques and training. An important function of *Aquaculture of Indigenous Mekong fish Species* is also to support regional networking among riparian aquaculture and fisheries scientists.

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Table 2. Status of AIMS priority species on-station. The number in the coloured cells is the average of a score from 0 to 3 given to the respective species by counterparts in each of the countries. The interpretation is as follows: 0 = no progress (blank); 0 – 1 = some progress (dark); >1 – 2 = average, ok (medium); >2 – 3 = above average, good (light).

Species/place	Broodstock	Breeding	Nursing	Grow-out	TOTAL
Anabas testudineus	3.0	3.0	2.5	1.5	2.5
Barbonymus gonionotus	2.8	3.0	2.8	2.8	2.8
Cirrhinus microlepis	1.5	1.5	1.8	1.8	1.6
Cirrhinus molitorella	3.0	3.0	3.0	3.0	3.0
Hemibagrus wyckioides	3.0	3.0	2.0	1.0	2.3
Leptobarbus hoevenii	2.0	2.5	2.5	2.0	2.3
Osphronemus exodon	3.0	2.0	1.0	3.0	2.3
Pangasius bocourti	2.5	2.5	2.5	2.0	2.4
Pangasianodon hypophthalmus	2.5	3.0	2.5	2.5	2.6

Table 2. Status of AIMS priority species on-farm. For explanations, see Table 1.

Species/place	Broodstock	Breeding	Nursing	Grow-out	TOTAL
Anabas testudineus	2.5	1.5	1.0	1.5	1.6
Barbonymus gonionotus	2.5	2.5	2.5	2.7	2.5
Cirrhinus microlepis	0.0	0.0	0.0	1.7	0.4
Cirrhinus molitorella	1.0	1.0	1.0	3.0	1.5
Hemibagrus wyckioides	2.0	1.0	1.0	1.0	1.3
Leptobarbus hoevenii	0.5	0.5	1.0	2.5	1.1
Osphronemus exodon	1.0	1.0	1.0	3.0	1.5
Pangasius bocourti	1.5	1.0	1.0	2.0	1.4
Pangasianodon hypophthalmus	1.5	1.5	2.0	3.0	2.0

THE IMPORTANCE OF ISLAND HOPPING - AN ACCOUNT OF THE USEFULNESS OF CAPACITY BUILDING FOR ISLAND PEOPLE IN ECOLOGICAL RESTORATION

More than 30% of the species known from the small Indian Ocean island of Mauritius are threatened with extinction, principally through the effects of invasive alien species. Some very effective species recovery, island restoration and mainland restoration efforts on a small scale have been carried out in Mauritius to date. However, with the time lag between the full impact of alien invasion and extinction, it is clear that conservation work in Mauritius needs to move towards larger scale mainland ecological restoration if her remaining terrestrial biodiversity is to be secured in the long run. To undertake this work effectively involves several key challenges: the technical challenges of scaling up efforts, the financial challenges of making programmes sustainable and last but not least the capacity challenge. Till now, a great deal of the expertise underpinning Mauritian conservation has come from abroad. Encouragingly a new generation of Mauritian conservationists is now emerging. It is vital that these Mauritians are trained in the latest ecological management techniques to bring Mauritian conservation to the next level.

Much of the early work in ecological restoration in insular ecosystems such as the use of island reserves for managing threatened species and the control of introduced pests on the mainland was pioneered by the visionary naturalist Richard Henry in New Zealand. In the late 1800's, Richard Henry described the impact of pests (stoats, cats, ferrets - all introduced from Europe) on native species in New Zealand and translocated the kakapo (a giant flightless parrot) from the mainland to an island off the coast of the South Island. This was the first big step in ecological restoration on islands. Those techniques were then transferred and improved upon from one generation to another in New Zealand. Mauritius has been benefiting from New Zealand expertise from the 1980's; beginning with the work of Don Merton and his team eradicating goats and rabbits off Round Island (an island rich in endemics), followed by Echo parakeet nest saving and rat eradication on Flat island.

In 2002 Alan Saunders from the ISSG and John Mauremootoo then of the Mauritian Wildlife Foundation had the insight to launch the first Mauritius-New Zealand exchange for Mauritian capacity building in ecological restoration. I was the first Mauritian ecologist to go to New Zealand for a 7 months training in 'Mainland Island' management. This involved learning the latest techniques in pest/weed control and eradication integrated with threatened species management. 'Mainland Island' is a term used by New Zealanders for a piece of forest of important conservation value that is under intensive pest and weed control for the management of threatened flora and fauna.

Whilst there, I worked in 3 major mainland islands, and learnt 'Mainland Island' planning, implementation, monitoring and adaptive management. I worked with the experts using the latest and most efficient time and cost effective techniques of pest and weed control. I found the techniques and tools used for weed/pest surveillance, control and monitoring very useful and practical and I also had the chance to see how quarantine (both mainland and island) worked in New Zealand. Monitoring threatened species (both plant and animal species) and using them as an indicator for effectiveness of pest and weed control stuck me as a particularly important not only for an understanding of the current effectiveness of pest and weed control but also to see how quickly threatened species were benefiting from such control. Such monitoring also enables staff to perfect their skills known as 'adaptive management' and also allows them to be accountable to both the public and the government.

Those techniques and tools, adapted to local specificities can be replicated for ecological restoration of insular systems elsewhere. Capacity building of conservationists from smaller island states by islands such as New Zealand with more human and financial resources is the first step for the major challenges to conserve and appreciate the uniqueness of island biodiversity by and for local people.

Acknowledgements

I wish to thank the Commonwealth Science Foundation, the Department of Conservation and the Auckland Regional Council for their financial support and the countless New Zealand conservationists who have made this training possible, useful and enjoyable.

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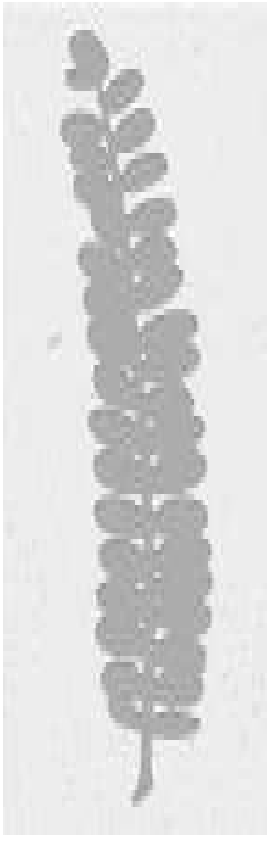

INTERNATIONAL TRADE AND INVASIVE ALIEN SPECIES

International trade is one of the main vectors of invasive alien species (IAS), moving alongside with traders, tourists and other travellers. To control the impact of IAS, it is more efficient to prevent the entry of a species than to act after it has invaded. Developing policies to address this problem is a major challenge that has risen steadily on the international agenda. The 7th meeting of the Conference of the Parties to the Convention of Biological Diversity (CBD) recently called for strengthened institutional coordination at international, regional and national levels on IAS "as a trade-related issue" and invited the World Trade Organisation (WTO) to consider "the risks from invasive alien species".

Several trade-related measures can be taken to prevent the introduction of invasive alien species: The "Guiding principles for the Prevention, Introduction and Mitigation of Impacts of Alien Species" considered in the context of the CBD recommend border controls to minimize unauthorized or unintentional introduction of alien species. Intentional introductions should be subject to authorization based on a prior risk assessment using a precautionary approach. In addition, States should identify common pathways for unintentional introductions and proceed against them.

The extent to which such measures are compatible with the WTO Agreement on Sanitary and Phytosanitary Measures (SPS) is not yet certain. The SPS Agreement regulates trade measures taken to protect human, animals or plant life or health against risks arising from, inter alia, the entry or spread of pests and diseases. It requires members to base their measures on "sufficient scientific evidence" and on "international standards […] where they exist". Thus, a precautionary approach to risk assessment does not necessarily conform to the requirements of the SPS agreement. Some sources of standards like the International Office of Epizootics and the International Plant Protection Convention are explicitly referenced. The Parties of the CBD did not decide to establish international standards on IAS that could be recognised under the SPS agreement[1].

Other international instruments containing measures relating to IAS and trade include the Code of Conduct for the Import and Release of Exotic Biological Control Agents, the International Council for the Exploration of the Sea Code of Practice on the Introductions and Transfers of Marine Organisms, the International Maritime Organization Guidelines for the Control and Management of Ship's Ballast Water to Minimize the Transfer of Harmful Organisms and Pathogens and the Action Plan of the Agreement on the Conservation of Africa Eurasian Waterbirds under the Convention on Migratory Species.

Though the linkages between IAS and international trade are manifest, the legal and policy framework has not yet evolved sufficiently. Within the CBD, Parties will have the opportunity to move forward on the trade related aspects of controlling IAS. Other international bodies and private industry should continue to tackle IAS in their particular contexts. In particular, the conservation community should strive for increased multilateral consensus on trade measures for IAS, ensure that the SPS Agreement allows sufficient policy space for precautionary measures, help to develop regionally based risk analysis and trade measures, enhance national capacity and interaction between the relevant bodies.

The interlinkages between trade and invasive alien species are one important topic for the Global Synthesis Workshop on ***"International Trade: Friend or Foe of Biodiversity?"*** **at the IUCN World Conservation Congress in November 2004.** Apart from that, **several components of IUCN work on the trade-related aspects of IAS.** A joint project of the Policy, Biodiversity and International Agreements Unit, the Environmental Law Centre and the Precautionary Principle Project explores the links between the Precautionary Principle in relation to invasive alien species and the SPS Agreement while a further study in cooperation with the Global Invasive Species Project and the Nature Conservancy on *International Trade and the Regulation of Invasive Species* aims to provide information about the relationship of trade-related invasive species measures and trade agreements, identify opportunities to move forward on IAS prevention, and reduce any "chilling effect" posed by trade agreements.

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[1] As recommended by the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA)

INVASIVE ALIEN SPECIES IN BRAZIL

Brazil is the largest country in South America and its borders confront other nine countries. It holds nearly 20% of the planet's biodiversity, as well as the largest percentage of freshwater species. Although invasive alien species are a growing reality in the continent, they are still widely unnoticed by most, and expanding over precious natural resources and species.

The first event on biological invasions in Brazil was organised by the Global Invasive Species Programme (GISP) along with the Brazilian Ministry of Environment, in 2001. Compromises made then by the government have developed into a National Policy on Biodiversity, issued in 2002, bringing up several recommendations for research, prevention and control of biological invasions. A call for projects to produce a national survey on invasive alien species (IAS) was issued in 2003 by the Ministry of Environment and is being carried out by five organizations in Brazil: the Institute of Oceanography of the Sao Paulo University, in charge of marine species; the Federal University of Viçosa, of freshwater species; the Horus Institute and The Nature Conservancy, of terrestrial species; EMBRAPA (Federal Research Agency), of species that affect agriculture, grazing and silviculture; and the Oswaldo Cruz Foundation, of species that affect health.

The Horus Institute and The Nature Conservancy had previously started producing data on IAS that affect natural ecosystems since 2002 and have so far registered the occurrence of 150 invasive and potentially invasive species in the country. Given the diversity in Brazil, the occurrence of species is always linked to natural ecosystems, including a few Brazilian species that have been translocated within the country and become invasive. Examples are *Cichla ocelaris* (tucunaré), a fish of the Amazon basin introduced into the Parana River where it became an invasive species, and *Mimosa caesalpiniifolia* (sabiá), a small thorny tree native to the dry northeast and invasive in the wet Atlantic Forest.

Widespread animal species are *Limnoperma fortunei* (golden mussel), introduced through Argentina in ballast water, *Achatina fulica* (giant african snail), *Sus scrofa* (European boar), *Lepus europaeus* (European hare), *Oreochromis macrochir* (tilapia), *Cyprinus carpio* (carp), *Clarias gariepinus* (African catfish), and *Rana catesbeiana* (bull frog) throughout the Atlantic Forest, most of which were intentionally introduced.

Certain species which have a clear history of invasion in other parts of the world, and which have proved to become far more of a problem than a solution, are currently being promoted in Brazil. The best example may be *Azadirachta indica* (neem), a species widely invasive throughout West Africa, recognised by farmers as a threat to economic sustainability. Neem is currently "the species of the moment" in North Eastern Brazil, where the dry climate of the Caatinga is a restriction to non-native species. Neem has been so successfully promoted that by now nearly every rural property has a few trees planted for producing "natural herbicides" for crops and medicinal substances. No consideration has been taken for potential invasions, and if it does become invasive, it will be established in all North Eastern states, probably already in all municipalities. *Acacia mearnsii* (black wattle) follows the same trend in South Brazil, and is only beginning to be observed as invasive in riparian areas within Southern grasslands and subtropical forests.

Common invasive plant species are: *Eragrostis plana, Ulex europaeus*, *Pinus elliottii* and *Pinus taeda*, especially in Southern grasslands; African grasses in the genus *Brachiaria* all over the country, and covering large extensions of central savannas; *Hedychium coronarium* (white ginger), *Artocarpus heterophyllus* (jackfruit), *Acacia mangium*, *Elaeis guineensis* (oil palm) in the Atlantic Forest; *Hovenia dulcis* (japanese cherry), *Eriobotrya japonica* (loquat), *Melia azedarach* (china berry), *Ligustrum lucidum*, *L. japonicum* (tree privet) and *Pittosporum undulatum* (mock orange) in different forest types in the South; *Prosopis juliflora* (mesquite) and *Mangifera indica* (mango) in riparian areas in the Northeast. Species currently promoted for bio-diesel production are *Ricinus communis* (castor bean) and *Elaeis guineensis* (oil palm), possibly characterising the "ecological" production of fuel as an environmental problem.

A growing list of species can be found at the Horus Institute website www.*institutohorus.org.br*. Fact sheets of the species are being produced for access through the website, intended to supply information in the Portuguese language, which is very scarce.

The advancement of knowledge and awareness on biological invasions in Brazil and South America is of essential importance for the protection of a large part of the world's biodiversity. International collaboration and pressure are important elements in this equation. Regulations for the use of species are lacking, while the pressure of private production initiatives using invasive alien species is a growing factor. There is still no consideration for environmental impacts in decisions for the introduction of new species, and not enough awareness at any level, from scientists in universities to government officials or protected area managers.

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PACIFIC ANT PREVENTION PLAN (PAPP)

Ants are notorious invaders, particularly those species known as "tramp" ants. They easily disperse worldwide through commerce and other human-assisted avenues, often cause significant economic and environmental damage, and are often extremely difficult or impossible to eradicate or control. Due to the difficulty and expense of controlling or eradicating these invaders, the most cost-effective approach to addressing the problems they cause is to prevent their establishment.

An excellent example of an ant species for which prevention measures are especially warranted is the red imported fire ant (RIFA) *Solenopsis invicta*. One of the world's most significant ant pests, RIFA has been extremely successful at spreading around the tropical and sub-tropical world via commerce. Outside of its native range in South America it has caused considerable damage, including millions of dollars in damages to agriculture; injury and death to people, domestic animals and wildlife; and millions of dollars in damage to electrical and communication systems, and other electrical equipment. The history of its invasiveness shows that once established, RIFA is very difficult and costly to eradicate and extremely expensive to control. Consequently, the most efficient and effective option for dealing with this pest is to implement comprehensive preventative measures.

There are a number of other invasive "tramp" ant species, which also cause significant damage and should therefore also be subject to comprehensive preventative measures. These other ants spread using similar pathways to RIFA and require similar measures to prevent their spread and establishment. The most serious threats are from: *Solenopsis geminata* (tropical fire ant), *Anoplolepis gracilipes* (yellow crazy ant), *Pheidole megacephala* (big headed ant), *Monomorium destructor* (Singapore ant), *Tapinoma melanocephalum* (ghost ant), *Solenopsis papuana, Paratrechina longicornis* (crazy ant), *Wasmannia auropunctata* (little fire ant), *Linepithema humile* (Argentine ant), *Monomorium pharaonis* (Pharaoh ant) and *Technomyrmex albipes* (white footed ant).

Prevention of RIFA and other invasive ant species from establishing on Pacific islands is best addressed through a regional approach. This is primarily due to the ease with which these species spread. Should RIFA become established on one island in the Pacific, it would provide a source for it spreading to other islands/countries. Such island invasions in the Pacific are likely to lead to considerable economic and biodiversity loss and hardship for communities. Therefore a regional prevention plan is warranted.

Goal: *The goal of the Pacific Ant Prevention Plan is to prevent RIFA and other invasive ant species with economic, environmental and social impacts, entering and establishing in or spreading between, or within, countries of the Pacific Region, thereby protecting economic, social and environmental interests in the area.*

The Pacific Ant Prevention Plan (PAPP) lays out the recommended procedures, organisation and measures required to achieve the goal. It includes objectives under two broad headings of entry and establishment. In addition, a number of actions have been identified that are likely to be required in order to meet each objective.

Prevention of entry measures required include:

- appropriate legislation, regulations or standards to deal with invasive ants pre-border and at the border;
- risk analysis that covers the region but which can be adapted for implementation to each country or territory;
- regional trade agreements which accommodate risks associated with invasive ants; and
- operational measures which can be applied to each territory and will actually prevent ants gaining entry.

Prevention of establishment measures required include:

- a range of surveillance measures appropriate to quickly identify the presence of a new invasive ant in each territory;
- appropriate incursion response procedures and the capability to enact them;
- a regional public awareness strategy to ensure the ant species concerned have appropriate public profiles so the risks of their establishment are well understood by sections of the community; and
- an active research programme to ensure the measures used to prevent establishment have a sound scientific base and thus will have the greatest likelihood of success.

During March 2004, at the joint Regional Biosecurity, Plant Protection and Regional Animal Health meeting held in Suva, Fiji, the Pacific Invasive Ant Group (PIAG), presented the PAPP proposal. The proposal was the work of the PIAG made up of members from New Zealand's Department of Conservation, Ministry of Agriculture and Forestry, National Pest Plant Reference Laboratory, Landcare

Photo: S.B Vinson (Texas A & M University)

Research Ltd, Victoria University, and AgriQuality, Hawaii's representatives from The Nature Conservancy, United States Geological Survey, United States Department of Agriculture and from Australia the Fire Ant Control Centre. Other key players instrumental in the proposal are the South Pacific Regional Environment Programme (SPREP), and the Secretariat of the Pacific Community (SPC). The whole initiative is coordinated by the Invasive Species Specialist Group (ISSG) of The World Conservation Union (IUCN).

The following recommendations were unanimously endorsed by the Pacific Island, Country and Territory delegates at the conclusion of the meeting:

- The meeting recognised that red imported fire ant (RIFA) and other invasive ants as some of the most serious pests (pest threats) in the region. Unlike other quarantine pests RIFA can cause direct impact on human, animal and plant life and can devastate island ecosystems (environment) and livelihoods.

- The meeting supports the efforts of the Pacific Invasive Ant Group and recommends that SPC, SPREP and PICTs work together to prevent the entry of this pest into the PICTs.

- The meeting also recommends an increased awareness campaign, training on identification of red imported fire ant and other invasive species to enable surveillance and monitoring in the PICTs.

- The meeting recommends that SPC-Plant Protection Service focus on the following new arthropod pest(s) threats: RIFA and other invasive ants and to draft preparedness plans

For the PAPP to succeed long term, it is absolutely vital that the Pacific regional partners (Australia, New Zealand, all the Pacific Islands, Countries and Territories, USA and Hawai'i) act collaboratively to support, fund and implement the plan.

With the continuing support of SPC, ISSG, SPREP and members of the Pacific Invasive Ant Group, funding is currently being sought to employ a coordinator to facilitate the implementation of the above recommen-dations and the highest priority components of the plan.

To down load a copy of the Pacific Ant Prevention Plan follow the link provided:*http://www.issg.org/PAPP.htm*

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PUBLICATIONS

Economic Impact of the Spread of Alien Species in Germany

Next to the loss of habitats the increasing number of alien species influences and changes worldwide native flora and fauna. The spread of invasive alien species may also have an economic impact.

This study by the Department of Ecology and Evolution of the J.W. Goethe-University Frankfurt on behalf of the Federal Environmental Agency, Germany provides an overview of the annual economic costs arising in Germany from alien species (neobiota), in which 20 representative species have been examined in detail. The study thus represents a snapshot of the current real annual costs. In total, the enumerated costs for these species add up to an average annual expenditure of • 167 million. The following topics have been dealt with individually:

- Losses to agriculture, forestry, and fishery
- Increased maintenance costs for roadways
- Damage to waterways and rivers
- Alien species that are health hazards
- Endangerment of native species

Because of the nature of available data, as well as the different biology and ecology of the alien species, each had to be treated individually, and the associated costs vary greatly from species to species. Moreover, not all of the species investigated cause economic losses. Accordingly, a nuanced approach to alien species is essential. Ongoing, multi-year studies incorporating cost/benefit analysis will be necessary to resolve remaining issues.

The results have been published in the series "TEXTE" No. 80/03 (229 pp.) of the Federal Environmental Agency, Berlin, Germany.

Publications of the "TEXTE"-series will be distributed outside Germany free of charge and can be ordered directly from the Federal Environmental Agency (Umweltbundesamt, ZAD, P.O.B. 33 00 22, D 14191 Berlin, Germany) or per email*: umweltbundesamt@stk.de*
The publication can also be downloaded via Internet at *http://www.umweltbundesamt.de*

ONGOING MOVEMENT TO ESTABLISH THE INVASIVE ALIEN SPECIES ACT IN JAPAN

The new Invasive Alien Species Act was promulgated as of 2nd June, 2004. It is the first regulation in Japan that comprehensively deals with issues caused by invasive alien species (IAS). The Act will be enforced within one year from the promulgation.
For the details, please refer to the following website (all the information is available in English):
http://www.env.go.jp/en/topic/as.html

Japan is importing an enormous number of living organisms. For example, about 620 million live animals were brought into Japan in 2003 alone. This mass importation is causing habitation of many alien species. So far, 108 species of vertebrates, 246 species of insects and 1,553 species of vascular plants have been identified as alien species in Japan. Some of these species are invasive. The invasive alien species are mainly causing three different types of damage.
They are: 1) Damage to ecosystems e.g. Java mongoose *(Herpestes javanicus)* decreasing habitats of endangered native animals such as Okinawa rails (Rallus Okinawa), 2) Damage to human safety e.g. snapping turtles *(Chelydra serpentina)* possibly biting and injuring humans, and 3) Damage to agriculture, forestry and fisheries, e.g. raccoon *(Procyon lotor)* eating some agricultural products.

Unfortunately existing legal framework was not enough to comprehensively deal with these damages by IAS. The Phytosanitary Act, for example, can only prevent damage to agricultural plants. This is the reason why a new regulation to control the whole aspects of damages by IAS has been proposed. Needless to say, significance of the IAS issue was also evoked by Article 8 (h) of the Convention on Biological Diversity stating the problems of alien species.

The Invasive Alien Species Act was approved by the Japanese Diet and promulgated as of June 2, 2004. The purpose of this act is to control IAS properly and to prevent the three damages mentioned above. The framework consists of the following three main points.

The first point is on banning various actions regarding IAS. Raising, planting, storing, or carrying IAS will be prohibited unless competent ministers give permission for the dealings (i.e. the Minister of the Environment. For matters related to the prevention of adverse effects on agriculture, forestry and fisheries, the Minister of Agriculture, Forestry and Fisheries shall be added). The permission will be issued only when the applicants can keep the IAS out of the Japanese ecosystem. The permission is also prerequisite for importing or transferring IAS. Discarding IAS to the wild in Japan is not allowed at any time. Additionally, microchips will have to be implanted to some IAS for identification.

Imposing severe penalties is another characteristic of the first main point. An offender will be put in prison for up to three years or fined up to three million yen (equivalent to US$27,000). As for a corporation that violates the Act - up to 100 million yen (equivalent to US$908,000) will be charged. These penalties are much more stringent than existing regulations for protecting biodiversity. This is partly because importance of protecting ecosystems is gradually better recognised in Japan.

The second point is mitigation of IAS in Japanese ecosystems. The competent ministers will announce official mitigation strategies for respective IAS. Mitigation measures such as capturing, collecting or killing IAS will be taken based on the strategies. The mitigation will be performed by the competent ministers with other active organisations, such as other national government agencies, local government and private organisations. When setting up the mitigation strategies, priority-setting is recognised as very important for effective enforcement of the mitigation due to limited funds and staff.

The third point is judgment of Uncategorised Alien Species (UAS) before their import. UAS are alien species having the possibility to be categorised as IAS through detailed investigation. In short, UAS are suspected of IAS. They are expected to be designated in groups of species because names of some UAS are unknown. According to this Act, importers and exporters of UAS into Japan have to request the detailed investigation of UAS to the competent ministers. Then, for up to six months, import of UAS will be restricted in order to complete the investigation. After the investigation, UAS having risks to cause damages will be designated as IAS immediately while UAS having no risks will not be regulated by this Act as long as new evidence does not show up indicating that the alien species have risks to cause damages.

In addition to the three main points, the act has two features. One is establishment of the basic policy. The Japanese Cabinet will decide it for the efficient implementation. The contents include the basic framework of the regulation, principles concerning the selection, handling, and mitigation of IAS, and so on.

The other is attachment of a certificate for import. IAS, UAS, and the similar alien species will be obliged to attach a certificate to verify its type as an importation procedure. This certificate will become a powerful tool for customs officers to prevent illegal import of alien species.

As previously mentioned, the IAS Act was promulgated very recently. After making the basic policy and designating IAS and UAS, the Japanese government will enforce the Act within one year from the promulgation. Public con-

sultation procedure on the first draft of the basic policy was already conducted between July 8 and August 7. We received around 10,000 comments of agreement and disagreement to the draft, whereas only a few comments are made during public consultation procedures in general. Based on the comments, the draft is going to be revised and approved by the Cabinet in this coming fall.

For the efficient implementation of this new act, some challenges have to be overcome. For instance, we need to wide the act's target range as much as possible. More specifically, tens of IAS and thousands of UAS are expected to be designated for the first step. Likewise, there are several challenges such as arranging enough staff members for the smooth enforcement, preparing effective countermeasures against unintentional introduction of alien species, and establishment of efficient mitigation techniques.

Thorough research, database creation, consensus building, fund raising, education, international cooperation, etc. will be the keys to solve the above issues. Specifically, when considering the fact that all alien species are coming from abroad, international cooperation to exchange relating knowledge, data, techniques, and so forth are inevitable. The Japanese government hopes to diffuse this new regulation internationally and obtain worldwide understanding and cooperation.

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NOTES

NEW: Golden Apple Snail (GAS): CD-ROM

The golden apple snail (GAS), *Pomacea* spp. CD-ROM provides a quick and easy access to about three decades of literature on ecology, damage, management options and utilization. GAS is classified as an alien invasive pest of rice, taro and other plants that grow in aquatic environments. It includes over 400 articles, and over 100 images. The information is sourced from experts around the world. This CD-ROM is designed as a reference tool or a resource package for agricultural technicians, researchers, advisers, students and for those engaged in GAS research, extension and training. The CD-ROM is easy to use, as all the software needed is supplied on the disc. The information is easily accessed through Adobe Acrobat Reader. Information on this CD-ROM is searchable by author, title, and year of publication, journal title, and keywords. Future plans include developing web wizards, establishing mirror sites for web page and translating CD contents into Spanish, Chinese, Thai, Khmer, Vietnamese, Indonesian, and other languages. We envisage that the cooperation between the GAS collaborators and institutions now contributing will continue to improve and strengthen in future as well.

Citation: Joshi, R. C., Baucas, N.S., Joshi, E. E. and Verzola, E. E. 2003. Scientific Information Database on Golden Apple Snail (*Pomacea* spp.). CD-ROM. Baguio: Department of Agriculture-Regional Field Unit-Cordillera Administrative Region (DA-RFU-CAR) in collaboration with Department of Agriculture-Philippine Rice Research Institute (DA-PhilRice), Agricultural Librarians Association of the Philippines (ALAP) and The Department of Agriculture-Cordillera Highland Agricultural Resource Management Project (DA-CHARMP).

For orders
Each CD-ROM is priced at 500 Philippine Pesos (local purchase) and 50 US Dollars (foreign purchase exclusive of postage and handling). ISBN 971-92558-7-0
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REPORT ON THE WORKSHOP INVASIVE ALIEN SPECIES AND THE INTERNATIONAL PLANT PROTECTION CONVENTION: An expert consultation of phytosanitary services and environmental protection agencies

1. This paper provides a brief report on the workshop entitled "Invasive Alien Species and the International Plant Protection Convention" and the resulting recommendations. The workshop was held in Braunschweig, Germany from 22-26 September 2003 with funding from the Federal Ministry for Consumer Protection, Food and Agriculture of Germany. The workshop was organized by the IPPC Secretariat, in cooperation with the Federal Biological Research Centre for Agriculture and Forestry (BBA), Plant Health Department, in Braunschweig.

2. Experts from phytosanitary services and environmental protection agencies, as well as those dealing with regulatory issues, attended the workshop. There were approximately 110 participants, representing 60 countries, with 57 from developing countries and 53 from developed countries. Funding was provided to cover the travel costs of 49 participants.

3. This workshop was set up to help phytosanitary experts, environmentalists, and regulators exchange ideas and learn how the IPPC and related tools may help in the management of invasive alien species (IAS). The programme addressed issues that confront both phytosanitary services and environmental protection agencies with regard to IAS. Presentations and discussions sought to explain the role of the IPPC, International Standards for Phytosanitary Measures (ISPMs) and systems developed through the IPPC framework, such as Regional Plant Protection Organizations (RPPOs), and to identify how these systems can contribute to the management and mitigation of risks posed by IAS relevant for plants. The workshop resulted in recommendations being made by participants. A summary of these recommendations follows.

4. Recommendations for participants:

- Disseminate information gained from this workshop to stakeholders (various ministries, agencies, colleagues, students) within individual organizations, between departments and regionally and share your new knowledge of how to use the IPPC framework in managing IAS.
- Apply knowledge gained at this workshop and promote the use of ISPMs for IAS management.
- Network with other participants from this workshop to share expertise and exchange ideas.
- Start and participate in a pest risk analysis working group.
- Ensure your country's NPPO contact information is up to date on the IPPC's web site (www.ippc.int).
- Meet your NPPO contact point or environmental protection agency counterpart and discuss an approach to managing IAS issues jointly.

5. Recommendations for NPPOs:

- Broaden the scope of plant protection laws and regulations where needed to include IAS and biodiversity concerns.
- Establish pest risk analysis working groups.
- Develop pest risk analysis capabilities incorporating biodiversity concerns.
- Promote the use of IPPC standards for quarantine purposes including the management of IAS.

6. Recommendations at the national level for work between NPPOs and environmental protection agencies:

- Develop strong linkages between environmental, plant protection and agricultural ministries and related organizations in order to articulate common goals and work together to reach those goals.
- Inventory existing legislation and identify gaps with reference to IAS issues.
- Review, define and clarify institutional framework and legal mandates of different national agencies in order to identify gaps and reduce duplication.
- Create synergy through better coordination and cooperation of NPPOs and environmental protection agencies.
- Improve communication between the CBD focal point and the IPPC contact point.
- Evaluate capacity to deal with IAS and make the most efficient use of capacities for management and surveillance of IAS.
- Develop a national plan or strategy to deal with IAS.
- Establish or adapt existing pest alert systems for inclusion of IAS affecting plants.
- Develop and initiate research programmes on IAS and areas of biodiversity.
- Encourage public and political awareness and education on IAS issues.

7. Recommendations for RPPOs:

- Facilitate a regional approach to exchange information on the identification of IAS that are of regional concern, coordinate pest risk analysis on a regional scale and share expertise.
- Hold workshops to inform members on application of the IPPC and CBD for the management of IAS.

8. Recommendations for parties to the CBD:

- Recognize the use of ISPMs for protecting plant biodiversity as part of *in situ* biological conservation efforts.
- Urge parties that are not contracting parties to the IPPC to become contracting parties and to accept the new revised text as soon as possible.

9. Recommendations for contracting parties to the IPPC:

- Support the creation of a simple tool kit on the implementation ISPMs.
- Support additional training workshops for developing countries, specifically on pest risk analysis and inspection.
- Develop more detailed guidelines on the criteria for invasiveness within the framework of ISPM No. 11 Rev. 1 (*Pest risk analysis for quarantine pests including analysis of environmental risks*).
- Encourage the use of simple language in ISPMs.

10. Recommendations for both the IPPC and CBD Secretariats:

- Clarify overlapping issues and gaps between areas of work.
- Harmonize terminology, especially the terms "invasive alien species" and "pest".
- Facilitate better cooperation between IPPC contact points and CBD focal points.
- Consider the possibility of developing a joint work plan.
- List reliable sources of information on pests, pest alerts, pest risk analysis and phytosanitary regulations.
- Create model(s) for country use to develop legislation (e.g. elaboration of the Phytosanitary Capacity Evaluation Tool).
- Organize workshops or seminars where environmental, plant protection and agricultural agencies meet regularly to review application and lessons on IAS issues and hold an additional joint workshop on IAS to help coordinate NPPOs and environmental protection agencies. Some of these workshops should be held in languages other than English.
- Encourage regional cooperation through RPPOs and regional information networks.
- Consider developing a programme to ensure exchange of information at the global level both for quarantine and IAS purposes.
- Develop guidelines on invasiveness.
- Organize training and capacity building for developing countries, especially in pest risk analysis and inspection.
- Encourage additional technical assistance for developing countries to improve the management of IAS.

11. As a result of this workshop, the International Plant Health Risk Assessment Network has been formed to develop methods to harmonize the implementation of phytosanitary pest risk analysis. This network is tentatively planning to hold a workshop on pest risk analysis in the fall of 2005 in Canada.

12. Presentations and exercises from the workshop are currently available on the IPP (www.ippc.int). A handbook on the management of IAS through the use of the IPPC framework is currently being edited and will be published in 2004 if adequate resources are available.

Report written by Brent Larson of the IPPC Secretariat. The paper was prepared for the Sixth Session of the Interim Commission on Phytosanitary Measures.

The paper is also available, along with presentations and workshop exercises, at the following: http://www.ippc.int/id/26901

Aliens editor and Japanese knotweed on field trip from the "Invasive Alien Species and the International Plant Protection Convention" workshop. Photo: Jens Unger

NOTES

CLASSICAL MUSIC CD FOR CONSERVATION

"Wild Music" is a CD of classical music, featuring the New Zealand Symphony Orchestra, conducted by Hamish McKeich, to raise public awareness of conservation. 'Wild Music' features music by New Zealand composers Christopher Marshall and Douglas Lilburn, as well as Tchaikovsky, Dvorák, Elgar, Saint-Saëns, de Falla, and MacCunn.

The project was conceived by New Zealand Department of Conservation ecologist Dr Eric Dorfman and Concert FM, Production Manager Kate Mead. Concert FM is a network of Radio New Zealand. Each work on "Wild Music" is chosen to illustrate a different conservation issue. For instance, the introduction of pest fish, an escalating problem in New Zealand waterways, is highlighted by "Aquarium," a miniature for two pianos and orchestra from Saint Saëns' Carnival of the Animals.

It is available for sale in CD stores. People wishing to source CDs can do so directly through the opuscds.com website: *www.opuscds.com/cd/35781*.

Cinderella species and what happens after midnight?

'Cinderella species' is a term that has been used for over a decade to describe a number of promising economic plants, including many tree species. These are supposed to be like the girl in the children's fairy tale of the same name, who appeared ordinary, but with a magic spell from the fairy godmother, was transformed into something of great beauty to behold. However, maybe those of us who continue to use the term would be wise to read to the end of the story….

The fairy godmother told Cinderella that the spell would last only until the clock struck twelve, when all the magic would be undone. For a large number of exotic tree species introduced around the world, midnight has certainly passed, and where once were timber, fuel and fodder plantations to be proud of, there are now widespread weedy invasions. Whereas Cinderella was forewarned by the fairy godmother of what would happen at midnight, those now having to live with 'Cinderella species' were not given any indication of the potential dangers that have now come to pass. Should not those individuals and organisations from the research and development community and private sector who promoted these species in the first place now accept some responsibility, and make immediate and strenuous efforts to resolve the problems caused?

Foresters have been very successful in the selection, introduction, promotion and plantation of many exotic, fast-growing tree species for the benefit of rural people. However, some of these 'miracle trees' have proved to be so well-adapted to local conditions, that they have escaped from cultivation and spread widely as aggressive weeds, threatening, rather than improving livelihoods. The species are too numerous to mention, but one can find species of Acacia, Ailanthus, Albizzia, Alnus, Casuarina, Eucalyptus, Leucaena, Pinus, Prosopis and so on in most lists of invasive species. They were introduced for their ability to provide valuable resources to local people as well as variety of other services. Many remain the main plantation species in some countries but are the subject of eradication and control programmes in others, with all possible combinations in between. Why this difference?

Where trees have been introduced, indigenous knowledge on their utilisation has rarely followed particularly with multipurpose species, and combined with inadequate management, many have often become unwelcome guests. So what are we to do with these? Many were identified as species meriting concerted efforts for research and development decades ago, whereas now they earn much more attention as noxious weeds in most countries where they have been introduced. After decades of work, it appears that the research and development community cannot decide what to advise, with perceptions of these species ranging from the most useful and productive trees tolerant of the poorest sites, to the common opinion today that they are weedy invaders worthy only of wholesale eradication. What is a weed to one farmer may be a source of livelihood to another, but the extent of this dichotomy of opinion regarding such introduced species is sending a very confused message to extension workers, foresters and farmers alike.

Plant them, or pull them up? A little bit of both maybe, but more importantly 'improve their management and utilisation' is suggested as the way forward for many of these trees, not only to control invasions, but also to improve local economies. We are beginning to see the emergence of a consensus of opinion on general recommendations for the future development of invasive tree species involving improved and integrated control, management, utilisation and commercialisation.

However, any developments in the management and utilisation of weedy invasions are severely hampered by the lack of information on present status, including geographic spread, density, species present, uses, management, and livelihood and environmental impacts. Given the impact of these trees on land use and livelihoods, be it positive or negative, data collection and stakeholder consultation is urgently required, leading to comprehensive national and regional strategies agreed by all concerned.

Let us not forget that the story of Cinderella did have a happy ending, as can the story of invasive species. This had nothing to do with magic, but came from commitment and hard work – the prince tried the lost slipper on the feet of all the girls in the kingdom, before he eventually found the princess of his dreams, and in the most unlikely of places. Likewise, overcoming the problem of invasive species will not be achieved by waving a magic wand, but only through a deep resolve and the involvement of local people, in looking at available and potential solutions for the specific problems in various countries – until we too find the perfect fit.

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THREAT ABATEMENT PLANS – COMBINING INVASIVE ALIEN SPECIES MANAGEMENT AND BIODIVERSITY CONSERVATION (AUSTRALIA)

The significant impact of invasive alien species (IAS) to biodiversity has been widely acknowledged (see IUCN 2000), yet little has been done to link IAS management with biodiversity conservation, especially from an on-ground perspective (Mahon 2000; Downey 2003a). Reasons for this failure may be attributed to: (i) IAS management has not been aligned with available information on alien species impacts to biodiversity (Mahon 2000); (ii) information on the species directly impacted by each IAS is inadequate (Downey 2004); (iii) the legislative requirements for alien species management – i.e. some species are listed under several Acts, while others are not listed under any Acts (see Downey 2003a); and (iv) the separate historical management approaches of these two disciplines (Saunders *et al*. 1995; Downey 2003a).

In Australia, legislation has been established to address threats to biodiversity, as part of the Commonwealth and New South Wales (NSW) Threatened Species Acts i.e. through the listing of *key threatening processes*. Under NSW *Threatened Species Conservation Act 1995* (TSC Act), any IAS can be listed as a *key threathening process*, provided it meets defined criteria (see NPWS 2004; Downey 2003b; Downey & Leys 2004 for further discussion). To date, nine alien species have been listed, with several others being considered (NPWS 2004). Once listed as a *key threathening process*, the preparation of a t*hreat abatement plan* (TAP) is required under the Act. A *threat abatement plan* must outline a strategy to abate, ameliorate or eliminate the threat posed by the *key threathening process* to threatened biodiversity, independent of land tenure.

This paper presents an overview of *threat abatement plan* s for alien species, using four case studies - Red foxes (*Vulpes vulpes)*, feral cats (*Felis catus)*, bitou bush (*Chrysanthemoides monilifera)* and gambusia (*Gambusia holbrooki*) under the TSC Act.

Threat Abatement Plans (TAPs)

To date, all the IAS t*hreat abatement plans*, either finalised or being drafted, are separated into two groups based on the level of available information on the biodiversity at risk and the presence of effective control options. t*hreat abatement plan*s for which there are either no effective controls and/or information on the impacts are limited, aim to address such deficiencies. The other group of *threat abatement plan*s establish an on-ground strategy which merges IAS management and biodiversity conservation. A discussion on each of the four IAS t*hreat abatement plan*s, either approved or in draft form, is presented below.

Gambusia threat abatement plan

Predation by the plague minnow (G*ambusia holbrooki)* contributes to the decline of native frogs, fish and aquatic macro-invertebrates. The control options available and information on the complete range of species at risk is limited. The actions of the approved Gambusia TAP are targeted toward: (i) minimising human dispersal of Gambusia through enhanced regulation, public education and awareness programmes; (ii) reducing the impact at priority sites for key threatened frog species; (iii) linking the management of Gambusia to broad scale water reform and river health programmes; and (iv) promoting research both into more effective control options (including genetic control) and the impacts on native frog species (NPWS 2003).

Feral cat threat abatement plan

While many species are thought to be threatened by feral cats, little objective data is available to ascertain which species are at risk, in part because feral cats are difficult to study as they are wary of traps, shy and elusive. The *draft* Feral Cat TAP (DEC in prep.) aims to overcome this lack of knowledge by modelling the species at risk from predation, using a similar model to the Fox TAP (see below). Also, the control options for feral cats are limited, with no effective broad-scale control option currently available. The proposed actions in the *draft* Feral Cat TAP are associated with: (i) the development of best-practice guidelines for trapping; (ii) research into a cat specific toxin and baiting system which is humane; (iii) identification of priority species most at risk of cat predation; (iv) public education and awareness, particularly relating to impacts to biodiversity; and (v) gaining community support for the implementation of feral cat management once effective control options become available.

Red fox threat abatement plan

The Fox TAP was the first TAP to be completed (see NPWS 2001). The plan establishes priorities for fox control, in particular it identifies which threatened species are at greatest risk from fox predation and at which sites fox control for these species is most critical. Thus a total of 81 priority sites for fox control have been identified, providing recovery actions for 34 threatened species (11 mammals, 15 birds and 8 reptiles). Undertaking collaborative fox control programmes across all land tenures at these sites is the central action of the plan. The plan also establishes best practice guidelines for fox control, which seek to maximise the effectiveness of control programmes while minimising the non-target impacts. In addition, the plan has research actions to refine these guidelines. Finally, the Fox TAP establishes monitoring programmes to measure the response of priority threatened species to fox control. These monitoring programmes provide direct and objective performance measures for the plan. The Fox TAP is currently the largest

project for the conservation of threatened species in New South Wales. An independent review of alien animal management in NSW concluded that the Fox TAP was the best approach for dealing with alien predators (English & Chapple 2002).

Bitou bush threat abatement plan

Bitou bush is the single greatest threat to coastal plant communities in NSW. A *draft* Bitou TAP has recently been released for public exhibition (DEC 2004). While, this plan was modelled on the Fox TAP, many components had to be reworked. Approaches relevant for foxes were not appropriate for bitou bush. In addition, there was not the supporting body of evidence available on bitou bush impacts to biodiversity that there was for foxes. A model was developed in consultation with botanists and land managers – an approach that led to a continual increase in the knowledge of the species at risk, from three to 63 plants during the development of the plan (see Downey 2004). The *draft* TAP identifies 11 plants, two endangered plant populations and four endangered ecological communities that are at greatest risk from invasion at 60 priority sites. The draft Bitou TAP establishes five broad objectives, which aim to: (i) develop a strategic framework for delivering control of bitou bush to areas of high conservation value (in terms of threatened biodiversity); (ii) develop and promote best practice management; (iii) monitor the effectiveness of control programmes in terms of the recovery of threatened biodiversity; (iv) foster community education, involvement and awareness; and (v) identify and fill knowledge gaps where possible.

Discussion

The threat abatement planning process has lead to a framework that enables priorities to be established to reduce the adverse impacts of IAS on biodiversity (English & Chapple 2002). In this way, resources can be better allocated for both effective control of IAS and biodiversity conservation. The Fox TAP, in its fourth year of implementation, is a good example of how this is being achieved in the field. *threat abatement plans* address concerns raised in the United States, where criticisms of their threatened species legislation suggested that multiple species recovery planning should be focused on species with similar threats rather than co-occurrence (see Clark & Harvey 2002). The four IAS *threat abatement plans* outlined here provide conservation outcomes for more than 130 species – approximately 100 of which are formally listed as threatened under the TSC Act. The number of species impacts is likely to increase as information on the species affected becomes available, for example the *draft* Bitou TAP identifies another 70 species potentially at risk for which insufficient data was available to model their impacts (DEC 2004).

The preparation of the four *threat abatement plans* discussed here provide models for future IAS *threat abatement plans*. However, the success of this approach of combining IAS management and biodiversity conservation is dependent on the support and implementation on the ground of these plans by stakeholders, land managers and the wider community. In addition, where multiple threats are present the implementation of recovery plans will aid broader biodiversity conservation.

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ALIEN FISH IN RIVER DOCE STATE PARK, BRAZIL AND THE NATIVE FISH EXTINCTION IN TROPICAL LAKES; PROPOSAL FOR ALIEN SPECIES MNAGEMENT MANAGEMENT

The Atlantic Forest Biome, in Brazil, is one of most important biodiversity hot spots on the planet, due to the species endemism and threat levels (*Conservation International*). There are approximately 140 lakes at River Doce Basin, with 1/3 (about 26) of fish species of the basin. Among these, 56 are placed in the left margin of the River Doce and of these, 32 in River Doce State Park, a natural reserve with 36,000 ha of Atlantic Forest. These characteristics added to the geological formation, the system occurrence in Atlantic Forest Biome and the presence of the endemic dog fish, *Oligosarcus solitarius* (Menezes 1987) are important to consider this system as unique in Brazil and of "special" biological importance to the conservation of fish in south-eastern Brazil (*Biodivesitas Foundation*).

In these lakes there were successive invasions of fish from other basins of South America as well as African and Asian basins. The first introductions, in the early 1970's, were of peacock bass (*Cichla ocellaris)* (Bloch & Schneider, 1801) and red piranha (*Pygocentrus nattereri) (*Kner, 1858). In the late 1990's, the oscar, *Astronotus ocellatus* (Agassiz, 1831) was introduced, as well as the African catfish, (*Clarias gariepinus)* (Burchell, 1822), the tambaqui, (*Colossoma macropomu)* (Curvier, 1818) and tilapia, (*Oreochromis niloticus niloticus)* (Linnaeus, 1758) by accidental aquaculture escapes. The singing catfish, (*Hoplosternum litoralle)* (Hancock, 1828) was introduced more recently for its use as bait for fishing.

After alien fish colonisation in lakes outside River Doce Park, the regional dispersion, including the Park and neighbouring areas, has continued using two methods: i) the linkage, in high rainy seasons, among lakes and streams, establishing temporal invasion corridors, and; ii) local people fishing for alien species either for sport or food. Consequently, there has been a massive extinction of fish species in these lakes, reducing the species richness and diversity of the fish community. Extreme situations occur where there are only three fish species in a lake, one native and two alien (peacock bass and red piranha). The native species extinction possibly results from the high predation and competition abilities of the alien species. Most of these fish show strong parental care and have an ictiophagous diet. The only native species that is not threatened by alien species, at least, not in any great numbers, is the wolf fish, (*Hoplias malabaricus)* (Bloch) which also shows parental care and has an ictiophagous diet.

Recently we reported that the alien fish occurrence can be explained using models based on distances between lakes and streams, which corroborates their linkage as an important dispersion corridor. These distances are inversely related with the permeability of the corridors and hence with the probability of alien species spread among lakes. Lakes that "escape" this rule present the same alien species that are preferred by local people.

Abiotic conditions (pH, turbidity, oxygen, conductivity) of Doce River lakes are very different from conditions of the original basins of alien species (e.g. Amazonian Basin), but this did not affect the colonisation potential and the abundance of these alien species - this is evidence of the high efficiency of these species in colonising new basins.

When putting together the information on incidence of alien species, their effects on the native community, the dispersion forms among lakes and the occurrence under conditions that are varied as well as very diferentfrom those of the original basin, it is possible that the use of traditional management techniques, such as the exclusion by fisheries, do not obtain satisfactory results. Alien fish eradication programs have frequently produced results that were below expectation due to the high economic costs, the inefficiency of methods and the unexpected effects on other ecosystem elements such as native species (these effects are almost impossible to avoid in the aquatic ecosystem).

Based on this information, the Grupo de Ecologia de Organismos Invasores and the Laboratório de Ecologia Quantitativa (Universidade Federal de Viçosa), are combining their efforts on a management plan, with the initial aim to reduce the potential spread by local people. While preparing this plan, we are also developing models to predict areas of great susceptibility to fish invasions (considering biotic and abiotic aspects), with the aim of reducing the further future impacts.

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INTERNATIONAL PET ANT TRADE
INCREASING RISK AND DANGER IN EUROPE - (*HYMENOPTERA, FORMICIDAE*)

Summary
In Europe, Austria, France, Germany, Spain and UK, for the past few years an ever-increasing trade in pet ants has been observed. Internet companies provide formicaries, accessories and living ants of European origin, as well as from overseas (South America, Indonesia, Australia).

In this article I discuss various risks of this trade: escaping ants may establish and cause economic or biodiversity impacts, carry diseases that switch over to indigenous species and bastardise local faunas. Even "intraspecific" faunal bastardisation may occur.

I suggest urging governments of all nations to ban the trade of invertebrate species, in particular ants and exotic species, for commercial and non-scientific purposes. Exceptional permits should only be granted when escape-proof keeping can be guaranteed.

Introduction
During the past 2-3 years, there has been an ever-increasing interest in keeping various ant species as pets at home. In the US it is illegal to trade ant queens, however, in Europe, where restrictions are mostly lacking, a couple of Internet-shops have established where the ant keepers can order living ant colonies, formicaries and accessories. Since these shops advertise and sell ants from nearly all over the world, there is some cause for concern. Information on the amount of this trade can be obtained from a number of Internet forums (URLs given below). From the forums it is also clearly recognizable that the species in question are usually not identified, often sold under wrong names or just with a genus name, e.g. "*Pheidole* sp.", this being a genus with 900 species worldwide, among them several already known as major pests.

I – The risk of bastardisation of faunas
As with any intended or casual release of foreign organisms in a given ecosystem, the exotic species in a few instances may establish viable populations and thus bastardise the local faunas. Even known invasive ant species may be released in countries where they have not been found as yet, because the dealers and customers as laymen are unable to differentiate between hazardous and (perhaps) harmless congeners.

Ants in particular are a greater risk to local faunas than other exotic organisms: They are generally highly dominant members in most terrestrial ecosystems. And, if released, it is usually not one or a few single specimens that may die before having the chance to reproduce (as for example the numerous spiders, millipedes, scorpions, mantids etc coming free every year). A complete ant colony, whether escaped or set free by the keeper may find and reorganize itself in a suitable place and, provided that favourable ecological conditions are given, begin to reproduce. Potential inbreeding among the progeny of a single queen is not a serious problem in ants, as is often erroneously believed. In any case most (potentially) invasive species are polygynous and have several reproducing queens in a colony. Pet ant keepers prefer polygynous ant species because they are believed to survive longer in captivity. In addition, "spectacular" species are sought after, such as the Australian bull ants (*Myrmecia* sp.), or leafcutter ants (*Atta* and *Acromyrmex* spp.) and weaver ants (*Oecophylla* sp.) - all offered for sale in Germany and other European countries.

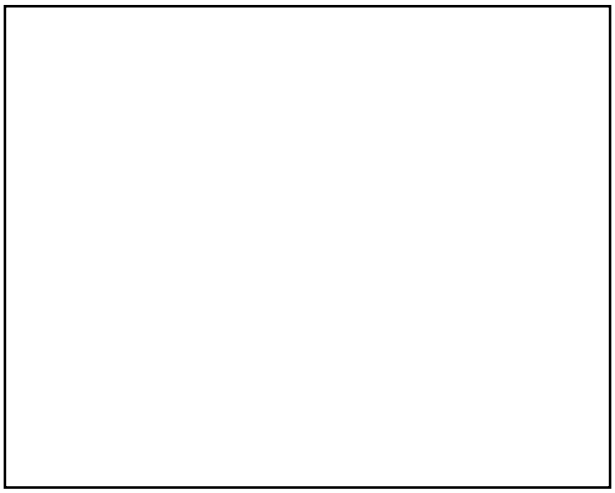
II – The risk of developing additional pest and/or invasive ant species
Germany presently is plagued by about a dozen introduced ant species. Most of them are confined to hot houses, green houses of Botanical gardens, zoos etc. A few are invading homes, hospitals, restaurants etc., among them the Pharaoh's ant, but also a few *Pheidole* species. Others surviving in the open are the Argentine Ant (*Linepithema humile*) and *Lasius neglectus* (Dekoninck *et al* 2002; see also *http://www.creaf.uab.es/xeg/Lasius/Ingles/index.htm*). Both have the potential of eradicating numerous native ant species.

Most pest ants probably have arisen from widespread synanthropic species that have been carried around the world through traditional commerce. Pet ant keepers and dealers are always demanding "new", "interesting" species. Ant collectors and dealers will hence try to bring ever more species from nature hat never had the "chance" to be distributed by man. Among the numerous *Pheidole* species that are very popular because of their big-headed soldier caste, there may be dozens of potential pest ants.

Since both dealers and customers are laymen, they are unable to correctly identify the ant species in question. Many are sold with evidently incorrect (nonexisting) names, or only identified up to the genus (*Pheidole*, *Messor* and others). Ant taxonomy is very difficult, even for the few contemporary professional myrmecologists, and many groups (genera) are taxonomically unsettled as yet, so it is absolutely impossible both for dealers and customers to assess whether or not a given species may be an actual, or possibly future, pest.

III – The risk of ant parasites switching over to native species
All animals carry parasites, which, if released in a foreign habitat, may switch over to native species, threatening them, even if the original host species cannot survive in the new environment. These parasites may be mites, nematodes, protozoans, fungi, bacteria etc. Some ant species are known to be intermediate hosts of tapeworms. In southern France a *Tetramorium* species is known to carry a tapeworm infesting domestic fowl (genus *Raillietina;* Nadakal *et al* 1971).

As yet, extremely little has been known on the parasite fauna of ants, but I have done some studies on tapeworms (Buschinger 1973), on fungi (Sanchez-Peña *et al*. 1993), and on gregarines, all found in ants (Kleespies *et al* 1997), so I have good reason to infer that many more ant species may carry one or other potentially dangerous parasite species. A gregarine species found in North American, *Leptothorax* ants from Montana, were able to infest European *Leptothorax* in laboratory experiments, and even the Pharaoh's ant. Unfortunately it did not affect this species to an extent where its use for biological control would be justified (Buschinger & Kleespies 1999). Though apparently no incidence of such a parasite transfer among foreign and native ants has been recorded as yet, it nevertheless appears a real possibility.



IV – "Intraspecific bastardisation of fauna" – a neglected risk

With "intraspecific bastardisation of fauna" I mean that not only the introduction of a foreign species into a native fauna or ecosystem may become hazardous, but also the introduction of members of a species into distant populations of the same species. In Europe there are numerous species with a very wide range, from Mediterranean through sub arctic habitats. We may assume that their local populations usually have developed special adaptations to the local climatic conditions etc. If transferred to a sufficiently distant place they may either disappear (if they do not tolerate the local conditions – the best case), or hybridise with the resident population, which might weaken the adaptiveness of the local population. A further problem in this context is that expensive studies on biogeography and phylogeography may be jeopardized.

One frequently studied question in Europe is whether a given species has arrived from the Mediterranean refugia, after the ice age, to the North of the Alps via the eastern or western route. With modern DNA techniques it is possible to reconstruct such routes, but if (for example) an ant species from France escapes in eastern Austria and by chance establishes a population there, this may invalidate a lot of research efforts.

V – URLs of Internet ant-sellers and forums

German "antstore" *http://www.antstore.de* (238 members as at 15 January 2004)
German Ameisenforum *http://www.ameisenforum.de* with a lot of discussions on the topic of introduction of exotic ants. (559 members, many of them also in the antstore forum).
France *http://www.akolab.com/fourmis/forum/index.php* (in French; forum but also trading ants) (274 members)
Spain *http://www.upseros.com/comunidad/hormigas/phpbb2/index.php* (forum which doesn't advertise ants, but the owner sells ants on demand by e-mail) (258 members).
Great Britain *http://www.zsuk.co.uk/* presently does not advertise ants, but has formerly sold many colonies, e.g. leafcutter ants. Not all of the registered forum members are ant keepers, but quite a high number are.

The *German antstore* in particular is importing ants from Australia, SE-Asia, and Central America to Europe, and also distributes ants from southern Europe in central and northern Europe. In Germany and most European countries there is no legal restriction on the trade with exotic animals, except for those endangered in their countries of origin.

As yet, there is no ant species known which would be endangered by taking them from the field in their countries of origin. I do know only about restrictions in the USA where trading ant queens (not workers) across borders is illegal. The American Forum for ant enthusiasts, where these restrictions are frequently discussed is: *http://pub8.ezboard.com/bantfarm* (608 members on 15 January 2004).

VI – Conclusion

Of course, ants are not only imported by those specialised companies, but as yet mainly by ordinary trade (with plants, fruit, wood etc.), and also many colonies are taken home by tourists. However, trading pet ant colonies may considerably increase the numbers of imported colonies and also of additional species, handed over to private customers - who can be as young as 12-13 years old.

I think it would be worthwhile for IUCN (and othes) to inform the governments of all nations on this quite recent development, suggesting legal restrictions on exotic arthropode trade, both because of dangers for their native faunas and of additional invasive species whose eradication is always very expensive and nevertheless usually fails (see fire Ants, Pharao's ant, Argentine ant etc.; VANDER MEER *et al*. 1990).

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NOTES

NEW REGULATIONS TO KEEP "INVASIVE" SPECIES OUT OF BALLAST WATER

On 13 February 2004 over 100 countries signed a UN treaty that seeks to regulate ballast water management in the shipping industry. The two-tiered treaty, 10 years in the making, is sponsored by the UN's International Maritime Organisation (IMO). The first tier includes regulations that apply to all ships, while Tier 2 gives countries the option to take additional measures before allowing ships to enter their ports. After much deliberation, countries agreed on a phase-in period for different regulations, beginning in 2009 and ending in 2016.

Mimosa pigra in Lochinvar National Park, a Ramsar site in Southern Zambia: Looming ecological disaster?

Introduction

The Kafue Flats are perhaps one of the world's largest and most biologically diverse floodplain systems. The floodplain lies entirely within the Kafue basin catchment area and supports fifty percent (50%) of Zambia's total population. Lying almost entirely in the Southern Province of Zambia, the floodplain normally floods to an enormous extent of about 5,000 to 6,500km^2 at the peak of the flood period in March. The floodplain hosts two of the world-renowned protected areas, the Lochinvar and Blue Lagoon National Park both Ramsar sites.

The floodplain is currently sandwiched between two large dams which are located approximately 300 km apart. These dams have completely altered the hydrological regime of the system. Backwater from the downstream dam and dry season releases from upstream one have created a permanently flooded area within the floodplain that was not present in the past. The ecological consequences of these changes for the floodplain, which hosts two national parks more so Lochinvar, have been extensive. Hydrological and vegetation changes have impacted the habitat for important local and wildlife communities including an endemic and semi-aquatic antelope known as the Kafue lechwe (*Kobus leche kafuensis)*. Lochinvar is also renowned for its large numbers of bird life, both migratory and resident. In fact over 400 species have been recorded in the area. Water birds are especially abundant and of particular interest are the wattled cranes (*Bugeranus carunculatus*)**.** These are rare and considered endangered in the IUCN Red Data List. Other birdlife exist in the area with the common ones being cormorants, darters, pelicans, goliath herons, ospreys, kingfishers and fish eagles. The flats are important grazing grounds for the pastoral tribes that have been dependent on them for hundreds of year feeding area for cattle for the Tonga and Ila tribes. These tribes have been dependant on the varied functions, products and attributes of the Kafue Flats wetland system. The changes have also been compounded by the severe droughts that have affected the area in the recent past.

Mimosa invasion

The most dramatic change in vegetation is associated with the colonisation of parts of the floodplain by the invasive alien plant, *Mimosa pigra (*Figure 1& 2). Initially sighted and reported in the early 1980s (Thompson, 1986). Unknown to park managers, the plant spread over the years within the park and the adjacent buffer zone called the Game Management Area (GMA). Unmanaged and unmonitored it has spread extensively, especially within Lochinvar National park encroaching over 2,000 ha of

Figure 1 – Mimosa growing in Lochinvar National Park

Figure 2 - Mimosa pod in Lochinvar NP

grassland area. The plant has also affected other areas in the world such as Kakadu National Park (a Ramsar site) in Australia and other areas in Vietnam (e.g. Lonsdale *et al*, 1985). This plant clearly monospecific within the flats implying that is taking up critical grassland habitats and replacing the native vegetation of the area.

Conclusion

Could such an infestation qualify for a possible ecological disaster? This is a critical question that needs to be answered. The site is clearly degraded and has undergone changes in ecological character. Habitat fragmentation has taken place within the floodplain particularly within the protected area (Lochinvar National Park). With the advancing invasion, most of the grazing ground for the antelope and other wildlife is being taken over. Clearly the native vegetation in the flats is being out-competed and the whole wetland has been subject to relatively rapid change. There is critical need to learn about invasion dynamics in wetland ecosystems in Zambia. Preliminary palaeoecological results from my study have indicated that this plant did not exist in the flats in the early 1900s and some plant species observed within the sediment core collected at Lochinvar do not seem to exist now. Not only is the mimosa infestation a major environmental threat but also an economic one. Unfortunately little is known on the socio-economic impacts of this species of local livelihoods and clearly the invasion is interfering with the lifestyle of the local communities and hence the impacts need to be investigated. The need to manage this invasion cannot be overemphasized and the time to do it is sooner than later.

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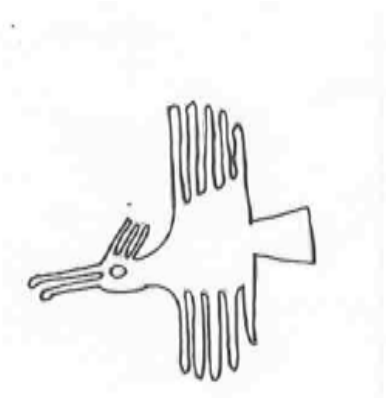

TRUSTS, THE COMMUNITY AND CONSERVATION

This article outlines my experiences with being with a Trust and the lessons I've learnt that I believe are applicable to the formation and operation of all Trusts or Community organizations involved in conservation.

The Manawahe Kokako Trust was initiated after a talk given by myself (as a Department of Conservation Ranger) to the Whakatane Rotary Club on the "Recovery of kokako *(Callaeas cinerea)* in the Te Urewera National Park".
After the meeting I was approached by several members who said they were looking for a project that they could financially support as well as have hands on involvement. I suggested that the protection of kokako at Manawahe could be an option. I approached the farmers and a forestry company, on whose land the birds were resident and was given verbal approval for animal control for protection of kokako on their properties. This I did as a private citizen not a DoC employee and all my subsequent involvement with the Trust has been in that capacity.

Kokako had been taken from this area in 1993 to go to Kapiti Island and there was some ill feeling towards Department of Conservation as there had been no follow up information given to the residents on the kokako's fate, also there was a concern expressed that the remnant kokako might be taken in a similar fashion if it suited the department.

The Trust comprised of local landowners, two Department of Conservation employees (Jeff Hudson and Grant Jones) and three Rotarians, one an ex mayor.
The Trust document used was copied from the existing Kaharoa Trust document. It was altered to suit the Manawahe situation where consultation with the Department of Conservation was desirable but not necessary (The Kaharoa Trust project is on Department of Conservation administrated land which requires the Trust to follow Departmental guidelines).

The Whakatane Rotary Club gifted $3000 seeding money to the Trust as well as $500 from membership fees from Rotarians.

Experience of successful kokako protection in the Te Urewera was the model used in laying out bait stations lines and pulsing toxin fills in kokako territories. Success was obvious from the first breeding season where four kokako chicks were seen post breeding. This was the only form of monitoring undertaken.
It was felt exact replication of proven methods should produce the same kokako recovery once removal of rats and possum had been achieved.

To do further monitoring would require major expenditure beyond the skill and time allowed by most members i.e. contractors would have to be employed.

Trustee's and trust members and volunteers go out 5 or 6 weekends during the year filling bait stations and re opening or cutting tracks. The work is usually finished by lunchtime and is followed by a barbecue. Kokako are usually seen in the course of this work which is very inspiring for the members. Two open days are held a year with up to 50 people at a time taken to see the birds. This project has a very high profile in the local community with a couple of newspaper articles on the project each year.

Results to Date
In 1998, there were 4 pairs at Manawahe by 2004 there were 19 pairs. Most of these will be young birds and the breeding capacity is expected to increase each year. The original protection area was about 150 hectares and this has been increased to 250 hectares.

Funding to Date
After the original seeding funds from Rotary, sponsorship has come from

- Fletcher Forests
- State Insurance
- Whakatane District Council

And now our major and only sponsor is the bay of Plenty Regional Council which has supplied $27000 over three years from the Environmental Enhancement Fund. This money was used for increasing the protection area as well as paying for monitoring costs of rats, possums and kokako, a condition of funding.

KEY LESSONS

1. The ease at which Trusts can be set up
2. Membership should be apolitical;

That way it engenders support from the wider community without isolating or predetermining support.

3. The issue should be local
4. Achievable targets set with visible results obtained within a short timeframe
5. Core volunteers not to be overworked; Core numbers at Manawahe are usually 8 regulars with maybe another six at times. They all have full time jobs so any voluntary work should not remove a whole weekend. More extensive work beyond their capacity should be contracted out
6. A Community conservation Trust needs a social aspect where people can enjoy being together as well as working together. Diverse membership enhances this relationship.

Expertise- Manawahe and Kaharoa Trusts both have Departmental volunteers as members and Trustee's. This ensures that the most efficient and up to date methods are used and gives real direction and efficiency to their projects. Trust groups can waste a lot of time and money through ignorance and in the end not obtain the results they were after, thus undermining their aims and jeopardizing the Trust itself.

Success breeds success

7. A Trust needs to be established with an efficient, well-balanced and mixed expertise group, this allows the expertise within the group to bid easily and successfully for new funds. By this I mean the inclusion of people with business skills and people with outdoor expertise.
8. Trust projects need not to be expensive if they have capable volunteers willing to undertake the majority of tasks in their project.
9. The most important lesson is how much goodwill there is in the community for these sorts of trusts to succeed!!!

Conservation Trusts have made a significant contribution to the National recovery of at least one threatened species.
Of the three largest populations of kokako in the Bay of Plenty, two; Kaharoa and Manawahe, are managed by Trusts not by the Department of Conservation.
The Department of Conservation *Kokako Recovery Plan's* long-term goal is to have 1000 pairs of kokako by 2020 in 23 managed sites. The work undertaken by these Trusts is a significant contribution to this goal.
It also must be recognized that the Department is unlikely to achieve many of its aims unless the community undertakes an active role in conservation, whether is on public land or not.
If conservation is to be undertaken on private land the Departments resources are unlikely to be stretched to assist except in the most minimal way.

Jeff Hudson
Manawahe Trust

Photo: Sarah King

PUBLICATIONS

TAXONOMY TARGETING INVASIVES (PUBLISHED BY BIONET- INTERNATIONAL)

From the introduction: "This collection of case studies, drawn from the Why Taxonomy Matters series, illustrates the role of taxonomy in Invasive Alien Species (IAS) management. With examples from various sectors, the case studies highlight how taxonomic expertise, surveys, information and analysis are of crucial importance to recognising and solving ecological, agricultural, trade, health and other problems caused by IAS. Taxonomy is a critical tool for combating the threat from IAS.

Without access to expert support, misidentifications are made, costing precious money and time when rapid decisions need to be made, for example at border posts and regulatory agencies. Only when a suspected IAS is correctly identified can effective control or mitigation measures be implemented, drawing where possible on best practice learnt from tackling the IAS elsewhere. Prompt and reliable identifications, supported by networking that promotes the sharing of experiences, information and expertise, may eliminate the need for costly eradication programmes. Where elimination programmes are needed, taxonomists help to develop the most environmentally benign, economic yet effective methods.

Taxonomic knowledge and skills are at the centre of anti-IAS measures. Expertise needs to be mobilised and shared. Taxonomic capacities need to be accessible to all countries to support the prompt identification and monitoring of IAS threats and delivery of control programmes. Capacity is being developed but significant further investment is required. Is this difficult to justify when the benefits far outweigh the costs at ratios such as 50:1?"

BioNET-INTERNATIONAL, the Global Network for Taxonomy, is an initiative that promotes demand-driven capacity building in taxonomy to address sustainable development needs of developing countries

Further information:
BioNET-INTERNATIONAL*: www.bionet-intl.org*

ISSG IS PROUD TO ANNOUNCE the Translation and reprint of the *100 of the World's Worst Invasive Alien Species* booklet.

Lowe S., Browne M., Boudjelas S., De Poorter M. (2004) *100 de las Especies Exóticas Invasoras más dañinas del mundo. Una selección del Global Invasive Species Database.* Publicado por el Grupo Especialista de Especies Invasoras (GEEI), un grupo especialista de la Comisión de Supervivencia de Especies (CSE) de la Unión Mundial para la Naturaleza (UICN), 12pp. Primera edición, en inglés, sacada junto con el número 12 de la revista Aliens, Diciembre 2000. Versión traducida y actualizada: Noviembre 2004.

Lowe S., Browne M., Boudjelas S., De Poorter M. (2000) *100 of the World's Worst Invasive Alien Species A selection from the Global Invasive Species Database*. Published by The Invasive Species Specialist Group (ISSG**)** a specialist group of the Species Survival Commission (SSC) of the World Conservation Union (IUCN), 12pp. First published as special lift-out in *Aliens 12*, December 2000. Updated and reprinted version: November 2004.

S. Lowe, M. Browne, S. Boudjelas, M De Poorter (2004) *100 des Pires Espèces Exotiques Envahissantes du monde. Une Selection à partir de la Global Invasive Species Database*. Publié par le Groupe de spécialistes des espèces envahissantes (GSEE) un groupe de spécialistes de la Commission de la sauvegarde des espèces (CSE)) de l'Union mondiale pour la nature (UICN) 12pp. première edition (en anglais), en tant qu' encart dans Aliens du 12 Décembre 2000. Version traduite et mise à jour : Novembre 2004.

With acknowledgements to **BioNET-INTERNATIONAL** for its financial support, and many thanks Bernardo Zilletti and Laura Capdevila-Argüelles (G.E.I. Grupo Especies Invasoras, España) for providing the Spanish translation.

For a hardcopy, contact *issg@auckland.ac.nz.* Pdf versions are available on the ISSG website.

NOW AVAILABLE ON LINE:
TURNING THE TIDE: THE ERADICATION OF INVASIVE SPECIES

Proceedings of the International Conference on Eradication of Island Invasives
Edited by C. R. Veitch and M. N. Clout

The Proceedings of the International Conference on Eradication of Island Invasives, held at the University of Auckland in February 2001, is now available online:.

This 424 page book titled: "Turning the Tide: The Eradication of Invasive Species", edited by Dick Veitch and Mick Clout, contains 52 papers from conference presentations and the abstracts from a further 21 of the presentations.

Download from: *http://www.issg.org/Eradicat.html*

Hardcopy available (for sale) at ISSG office. Proceeds of the hard copy support ISSG's work.

Recent publications from GISP (2004) include:

Regional workshop proceedings and national reports : They can be downloaded from the GISP website. A limited number of hard copies have been printed (contact GISP for further information)

Southern Africa:
Prevention and management of invasive alien species: proceedings of a workshop on forging cooperation throughout southern Africa [551 KB]
Invasive alien species in southern Africa: national reports and directory of resources [1.29MB]
South and Southeast Asia:
Prevention and management of invasive alien species: proceedings of a workshop on forging cooperation throughout South and Southeast Asia [625 KB]
Invasive alien species in South-Southeast Asia: national reports and directory of resources [656 KB]
Austral-Pacific region:
Prevention and management of invasive alien species: proceedings of a workshop on forging cooperation throughout the Austral-Pacific [1.8 MB]
Invasive alien species in the Austral-Pacific region: national reports and directory of resources [3.75 MB]
These reports are the products of three regional workshops convened by GISP and its partners in 2002 to assess invasive alien species challenges and opportunities for regional collaboration
Please contact GISP at *gisp@nbi.ac.za* if you have any problems downloading the documents of your choice.

West African region:
Prevention and management of alien species:forging cooperation throughout West Africa English (pdf, 2.2 MB) French (pdf 2.39 MB)

Source:
Dr Phoebe Barnard
Global Invasive Species Programme
www.gisp.org

Pathways of Introduction of Forest Insects and Pathogens

Situation

Forests in North America have suffered enormous damage caused by insects and diseases introduced from abroad. Several tree species have been virtually eliminated as integral components of the forest, including the American chestnut (*Castanea dentata* (Marsh.) Borkh.). Other species have undergone severe declines. As these trees disappear, the entire ecosystem is affected. For example, the grizzly bear (*Ursus arctos horribilis)* depends upon the seeds of the whitebark pine (*Pinus albicaulis* Engelm.) for fattening up before its hibernation. Yet ninety percent of whitebark pines in the northern Rocky Mountains have been killed by the introduced pathogen white pine blister rust (*Cronartium ribicola* J.C. Fisch.).

Significant but less damage has been caused by such introductions on other continents. In Asia, most damaging has been the pinewood nematode (*Bursaphelenchus lignicolus (xylophilus)*). The nematode has spread essentially throughout Japan and in several provinces in China. In Japan, annual loss of pine timber was 2.4 million cubic meters by the 1970's. First detected in China In early 1980's, the nematode has caused significant economic losses despite strict measures aimed at mitigating the

damage. Insects introduced more recently, such as *Dendroctonus valens*, are also causing damage. An outbreak of this insect in the 1990s has killed more than 6 million trees, especially *Pinus tabuliformus* and *P. ungeana* – cultural importance.

In Europe, the Asian longhorned beeetle *(Anoplophora glabripennis)* has been introduced in Austria, France, and Germany; its close relative, the citrus longhorned beetle *(Anoplophora)* is established in Italy. The pinewood nematode is established in Portugal. The sudden oak death pathogen (*Phytophthora ramorum*) has been found in nurseries in 12 countries; the pathogen has spread from the nurseries to landscape trees in the United Kingdom and the Netherlands.

In South Africa and New Zealand, there have been several introductions of insects or pathogens that threaten exotic trees used in plantation forestry or as windbreaks, or in amenity plantings.

Efforts to manage important pathways for introduction of forest insects and diseases

Experts have identified four important pathways for the introduction of forest insects and diseases: imports of 1) forest products (logs, lumber, chips); 2) wood packaging; or 3) woody plants; and 4) hitchhikers on ship superstructures. None is adequately regulated at present to curtail introductions. However, promising efforts are under way at the international or regional levels with regard to the last three.

1) Imports of forest products (logs, lumber, chips)
The most famous example of a damaging introduction *via* log imports is that of Dutch elm disease (*Ophiostoma ulmi* (Buis.) Narruf.) to North America in the 1930s. Individual countries currently regulate such imports – sometimes in a piecemeal fashion. For example, following completion of a risk assessment, the United States requires that imports of coniferous logs and lumber from Siberia and most of China be subjected to heat treatment (56°C for 30 minutes) in the exporting country. In contrast, the same species and commodities may be imported from Europe without prior treatment if the importer promises to ship them immediately to a government-approved facility for heat treatment within 30 days. No pest risk assessment has analyzed the risk posed by these latter imports.

2) Wood packaging
Wood packaging is the pathway by which the Asian longhorned beetle *(Anaplophora glabripennis*), pine wood nematode (*Bursaphelenchus lignicolus*), and other invertebrates are moved. Since inspection is not effective in preventing introductions *via* this pathway, the parties to the International Plant Protection Convention have adopted an international standard (ISPM # 15, "Guidelines for Regulating Wood Packaging Material in International Trade") which requires that all wood used in packaging be treated by either heat treatment or fumigation. However, these treatments will not eliminate all potential forest pests from this pathway. Concern focuses primarily on two issues: whether allowing bark to be present will reduce the efficacy of the treatment measures; and whether wood packaging can be re-infested with damaging organisms after it has been treated.

3) Imports of woody plants
More than a dozen damaging insects and plant diseases have probably been introduced to North America *via* trade in woody plants, including the chestnut blight (*Cryphonectria parasitica* (Murr.) Barr). Alarmed by the apparently increasing frequency of such introductions, forest management and phytosanitary agencies in the United States, Canada, and Mexico have begun developing a North American regional standard for imports of living plant. The draft standard emphasizes a systems approach incorporating certification of nurseries as producing "clean stock", and strict record-keeping to facilitate tracing of plants found to be infested or diseased.

4) Superstructures of ships, containers, and automobiles
Moths in the Lymantridae family (gypsy moths and related insects) attach egg masses to virtually any hard, vertical surface, including ship superstructures, shipping containers, and automobiles. To prevent transport of these damaging insects, the United States funds a program under which Russian officials inspect cargo ships in Siberian ports before their departure. To reduce moth concentrations near harbors, officials turn of artificial lights during flight periods and carry out suppression trapping of the insects. Canada, Australia, New Zealand, and Chile also receive information about pest levels in the Siberian ports. This effective program should be expanded to include other Asian countries in which the same moth species are found.

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INVASIVE SPECIES SPECIALIST GROUP (ISSG) REPORT AUGUST 2004

The Invasive Species Specialist Group (ISSG) is a network of expert volunteers, organised under the auspices of the Species Survival Commission of IUCN (The World Conservation Union).

The Invasive Species Specialist Group was established in 1993. It currently has around 160 voluntary members from over 40 countries and is chaired by Prof Mick Clout at the University of Auckland (UOA), New Zealand. The ISSG office employs 7 permanent staff. The mission of ISSG is: *"to reduce threats to natural ecosystems and the native species they contain, by increasing awareness of alien invasions and of ways to prevent, control or eradicate them".*

Invasive Alien Species (IAS) are found in all taxonomic groups and have affected native biota in virtually every ecosystem type on earth. They are a major threat on a global scale and addressing IAS is of major significance to biodiversity and sustainable livelihood outcomes. For this reason, ISSG advocates for special attention to IAS management but also for consistent mainstreaming of IAS issues into activities that aim to stem the loss of biodiversity and ecosystem services or aim to support sustainable livelihoods.

Some of the highlights of ISSG's achievements in the last four years include:

(1) Assisting IUCN and IUCN Members or Partners

- ISSG on behalf of IUCN HQ, organised the IUCN scoping workshop (May 2002), in which representatives from Programmes, Regional and National IUCN offices and external advisors confirmed the significance of Invasive Alien Species issues for IUCN's work, and planned for IUCN's further involvement.
- Preparation of material for and/or participation in IUCN delegation for CBD meetings (SBSTTA5, SBSTTA6, COP6, COP7)
- Co-organising Workshop on IAS as part of the "Management Effectiveness Stream" at the World Parks Congress (Durban, September 2003) which resulted in the recognition of IAS management needs as an "emerging issue"
- Facilitating IAS component in Global Biodiversity Forum on environment and trade, (September 2003, Cancun, Mexico) ; Assistance to IUCN briefing document on IAS and Trade for CBD-COP7.
- Assisting with inclusion of IAS issues into IUCN's World Heritage Convention work, including feasibility study on IAS management on Cocos Island (Costa Rica) and Missions to other WH sites like Djouj (Mauritania, Senegal), Galapagos (Ecuador).
- Close cooperation with IUCN Marine Programme, Biodiversity Policy Programme, Environmental law Centre, Regional Offices in Meso-America, East Africa and Mediterranean, Japan's Biodiversity Networks and many others within the IUCN family.
- Contributing to Council of Europe IAS strategy (adopted at December 2003)
- Planning for IAS component at World Summit on Sustainable Resources (S. Africa Sept 2002), with New Zealand delegation
- Assisting and contributing to the Global Invasive Species Programme (GISP)

(2) Publications

- *Turning the Tide: The Eradication of Invasive Species,* Proceedings of the International Conference on Eradication of Island Invasives (2002)
- *100 of the World's Worst Invasive Alien Species* (2000)
- *Aliens* : bi-annual newsletter
- *Aliens-L*: a listserver dedicated to invasive alien species that threaten biodiversity which allows users to freely seek and share information

BOX1: Global Invasive Species Database

A big thank you goes out to all the experts who have contributed information or reviewed profiles for the GISD, and to supporters and partner organisations who have helped make the project a success. I would also like to take this opportunity to introduce Shyama Pagad. Shyama has been processing most of the information going into the GISD for the past year and is largely responsible for the rapid progress. Originally from Bangalore, she has a background in horticulture, sustainable development and GIS. Finally, I would like to collect some information on who is using the GISD and what they are using it for. Please tell me what you know by emailing me at m.browne@auckland.ac.nz

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Manager, Global Invasive Species Database
http://www.issg.org/database
ISSG
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(3) The Global Invasive Species Database

The Global Invasive Species Database (GISD) provides a broad audience with easy access to authoritative information on IAS. It disseminates globally sourced information, including good practice, case studies, specialist's

Box 2: Cooperative Initiative on IAS on Islands (CII) - examples

Eradicate cane toads (*Bufo marinus*) and prevent their re-colonisation on Viwa Island, Fiji

Cane toads were initially brought into Fiji to combat the sugar cane beetle problem in the 1930s but have had a significant negative environmental impact. The proposal to eradicate cane toads (and invasive mammals) from Viwa Island (0.6km^2), near Suva, has been determined to be a high priority. This is mainly to protect the critically endangered Fijian ground frog (*Platymantis vitianus*).

The anticipated outcomes for this potential demonstration project are the eradication of cane toads, a recovery of Fijian ground frog numbers, and the protection of a number of birds. There should also be significant socio-economic benefits such as an improved water supply (artesian wells), enhanced crop yields, and more land-use options – including nature tourism.

This project is supported by the residents of the sole Viwa village and has academic support from the University of the South Pacific (USP) and other institutions (Griffith University, DOC). A feasibility study has been undertaken that concluded that eradication is achievable if executed over a sustained period – though techniques will need to be developed. This project aims to involve local community members as volunteers, as well as student researchers from USP.

Eradication of cane toads has not been accomplished before. Therefore, this would be a world "first" with significant implications for managing tropical islands elsewhere where cane toads have invaded or may invade. This project would provide important potential social and economic benefits as well as biodiversity ones. Important new approaches and techniques with potential global applications could also be developed.

Fijian ground frog . Photo: Claire Morrison

Mont Panié multi-species control programme, New Caledonia

The Mt Panié region in New Caledonia is a global 'hotspot' - 75% of plants found here are found nowhere else on earth. However, in this region invasive mammals have a number of negative effects; pigs cause significant impacts on subsistence food production and rats disrupt natural forest regeneration processes. Rats and cats have been also implicated in the decline of vulnerable New Caledonian wildlife.

The potential aims of this demonstration project are to control multiple species within a designated area in the Mt Panié reserve and develop long-term capacity amongst the local community to undertake invasive species control. This project will build support and capacity to effectively control invasive mammals and develop control and monitoring skills amongst local operators. The focus of this project is on control, rather than eradication.

This project is supported by Conservation International, Maruia Trust, Nouvelle Caledonie and Province Nord Government. A preliminary assessment at Mt Panié (conducted by the ISSG and DOC) suggests approaches used to control invasive species in New Zealand are likely to be transferable to New Caledonia.

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Photo: Lindsay Wilson

knowledge and experience. The database has a dual aim: to raise awareness about invasive alien species, their impacts, and the opportunities to fight back; and to be a management tool assisting decision makers, practitioners and communities to address their IAS problems. The database has undergone a series of enhancements thanks in part to a Memorandum of Cooperation that ISSG and the US National Biological Information Infrastructure (NBII) signed early in 2002. Now the GISD contains profiles of more than 250 species that threaten biodiversity, ranging from micro-organisms to plants and animals. Future plans include ongoing population of the database with more profiles and development of a CD-ROM version of the database for those who have poor, or no access to the Internet, - bridging the digital divide. We are also developing a global master list of invasive species (focussing on biodiversity impacts), which will assist with early warning and prevention. In addition, we are cooperating with Island Conservation and Ecology Group (Santa Cruz, USA) in the development of an Eradications Register to increase the exchange and sharing of practical expertise. In addition, the GISD will become a key contributor to the new Global Invasive Species Information Network which is under development.
The GISD project has been remarkably successful thanks to the voluntary work of invasive species specialists from all over the world who either create or review the information it contains. [http://www.issg.org/database].

(4) Cooperative Initiative on Invasive Alien Species on Islands.

The ISSG is hosting and coordinating the Cooperative Initiative on Invasive Alien Species on Islands (CII). The aim of the CII is to facilitate cooperation and build capacity to manage IAS on islands. This initiative followed from calls from Small Island Developing States and was developed (under the umbrella of GISP) as a joint initiative involving the New Zealand Government and the Invasive Species Specialist Group (ISSG) / IUCN. It was launched in April 2002 at CBD-COP 6 and activities started in June 2002 with seed funding from the New Zealand Agency for International Development (NZAID) and the Pacific Development and Conservation Trust (New Zealand).

Achievements include:

- Facilitated the development of the Pacific Ant Prevention Plan (PAPP) and coordinating further efforts, resulting in endorsement by the Pacific Island Countries and Territories in March 2004. Jointly with the Secretariat for the Pacific Community (SPC) Secretariat for the Pacific Environment Programme (SPREP) and the Pacific Invasive Ant Group, we are now actively seeking to secure funds for a fulltime coordinator (to be based at SPC).
- Development and design of two courses in IAS management (SPREP Pacific Invasive Species Prevention Course and a Generic Course in IAS Management for GISP).
- Development of 3 publications on IAS for GISP (Best Practice Manuals for Prevention and for Early Detection/ Rapid Response, Toolkit for Managing IAS on Islands).
- Facilitated the following feasibility studies:
  - Feasibility of Eradication of cane toads and rats from Viwa Island (Fiji) to alleviate threats the endangered Fijian ground frog (*Platymantis vitianus*).
  - Feasibility of Eradication of a suite of invasive mammals and weeds for biodiversity gains on Cocos Island, Costa Rica.
  - Feasibility of Control of a suite of invasive mammals on Mont Panié, New Caledonia.
- Developed the Pacific Programme of the CII, with the New Zealand Agency for International Development (NZAID) into a WSSD Type II partnership, with NZAID providing 3 year funding for coordination.

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ISSG MEMBERS HELP PLAN A PROGRAMME TO COMBAT ALIEN INVASIONS IN THE CAPE FLORAL KINGDOM OF SOUTH AFRICA

As a small (c90000 km²) isolated area of Mediterranean-type climate at the southernmost tip of a predominantly tropical/subtropical, predominantly summer-rainfall continent, the Cape Floral Kingdom (CFK) exhibits many of the characteristics of an isolated oceanic island. One such characteristic is a heightened susceptibility to invasion by introduced organisms. The significance of alien plant invasions has been recognised by CFK land managers for over half a century, and these invasions have been relatively well-researched and extensive control programmes have been implemented. However, it is doubtful whether, at least until very recently, the tide of alien invasions of the CFK had been successfully turned.

Accordingly, when an application to the Global Environment Facility was recently being put together for financial assistance to help South Africa conserve this biodiversity hotspot, it soon emerged that the problem of alien invasions was one of the cross-cutting issues affecting all the different environments of the CFK. As a result the final C.A.P.E. (Cape Action for People and the Environment) Programme that was recently approved for funding by the GEF included a specific component on the control of Invasive Alien Species (IAS). C.A.P.E. has been approved by the GEF as a 15 to 20 year-long programme with only the first five-year Phase 1 having so far been detailed and funded.

Phase 1 of the CAPE component on IAS has three distinct subcomponents: the first is the formulation of the first-ever comprehensive strategic plan and business plan for the prevention and management of IAS over the entire CFK (this will involve inventory, mapping and prioritization exercises over all taxa and all ecosystem types and the rationalization of institutional arrangements for the management of IAS within the CFK), the second is the creation of two Centres-of-Excellence for research and training in IAS management in the CFK (the one in the Western Cape will focus on terrestrial invasions while that in the Eastern Cape will focus on aquatic invasions), while the third is a pilot programme on the rehabilitation of the endemic and highly threatened fauna of the CFK's freshwater ecosystems through the removal of alien predatory fish species.

A number of ISSG members played important roles in the development of this CAPE Programme: Dr Ian AW Macdonald was the lead consultant for the IAS component, and was aided in this exercise by Dr Guy Preston and Professor Dave Richardson. A large number of non-ISSG members were also involved in this planning exercise, in particular Dr Christo Marais on catchment management aspects, Drs John Hoffmann and Alan Wood on biocontrol aspects, and Dr Kas Hamman and Dean Impson on alien fish invasions as well as Dr Pat Holmes.

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Italy and Invasive Aquatic Species – short account on ongoing activities

Italy is at a crossroads in the Mediterranean, between the establishment of species that come through maritime traffic and aquaculture, the expansion of others that have been introduced through the Suez Canal and of those that are naturally expanding their range through Gibraltar, also as a consequence of climatic change. This resulted in a large number of alien species along the Italian coasts (148 species, last estimate July 2004) and the development of true bioinvasions, including the two *Caulerpa* species, other algae and molluscs, such as *Rapana venosa*, or crustaceans, such as the decapod *Percnon gibbesi*, that is actively colonising the western coasts of Italy.

Pioneer efforts by the NGO Italian Marine Biology Society, that has gathered a group of experts, have been backed by the Ministry of Environment that has funded a project to ICRAM (Central Institute of Marine Research). The aims of the nearly completed project are: knowledge on alien species recorded in Mediterranean Sea, including information sheets, GIS data bank, check lists, genetic information; training of specialists; pilot surveys and ballast water studies in ports. International links, e.g. through the appropriate working groups of ICES (International Council for the Exploration of the Sea) that have met in Cesenatico, Italy in March 2004, the CIESM (International Commission for the Exploration of the Mediterranean Sea) and EMBS (European Marine Biology Symposium) are established in order to coordinate national activities.

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"European Strategy on Invasive Alien Species": toward a regional approach for halting the biodiversity loss caused by invasive alien species.

In the last years, the European Section of ISSG has focused its activity on the production of the "European Strategy on Invasive Alien Species", that was finally adopted last December by the Standing Committee of the Bern convention, a forum convening 45 European states and the European commission.

The development of this document has required many technical workshops, meetings with experts from all European countries, inputs from non-governmental organizations, governments and scientists, and a complex work of coordination of many contributions.

The final result of these efforts is a technical document - describing actions that shall be taken by governments and stakeholders – but with a clear political and legal power, since the Convention on Biological Diversity has formally acknowledged the European Strategy as a tool to implements the guiding principles on invasive alien species at the European level, and the recommendation n. 99 (2003) adopted by the Bern convention calls European states to implement the provisions of the document.

The implementation of the European strategy will indeed concur to the more general aim of halting the loss of biodiversity in Europe in the next decade. But for this aim, it is now critical to assist European states to develop and implement national action plans on invasive alien species, and to promote cooperation among states, scientists and stakeholders on this topic.

For the next future, priority for work of ISSG Europe is thus to promote these processes. An assessment of what states are doing has already started, coordinated by GEI Spain, in order to better identify priorities and options for future work.

To achieve this goal, ISSG Europe will continue its efforts to network European experts, to assist governments in their work on the issue, to cooperate with the European institutions and to support and promote conferences and technical meetings focusing on biological invasions.

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Ten years of the regional Baltic research network on Alien Species

The Baltic Sea is known to host more than 100 aquatic alien species. This human mediated addition to the Baltic flora and fauna is being registered in the Baltic Sea Alien Species Database (*http://www.ku.lt/nemo/mainnemo.htm)*. The database is one of the outcomes of the Baltic Marine Biologists (BMB) Working Group on Non-indigenous Estuarine and Marine Organisms (NEMO) in the Baltic Sea.
In 1994, the BMB decided to establish a new working group to promote studies on alien species in the Baltic Sea. BMB is a non-governmental academic organisation founded in the late 1960s and uniting most of the scholars working in the field of marine biology and ecology in Baltic Sea Area. Establishment of the WG NEMO by this well recognised scientific body became a remarkable event, indicating a growing research interest to the problem of invasive species. One of the key aims of the WG NEMO was to collect and summarise information on non-indigenous aquatic plants and animals in the Baltic Sea and make it available online for international readers. Since 1997, the Database accumulates information on taxonomy, biology, vector and time of introduction, area of origin as well as ecological and economic impacts of alien species.

The BMB WG NEMO organized two advanced MSc and PhD courses on Marine Bioinvasions which attracted young researchers' attention to various aspects of invasion biology. Members of the WG also took part in several joint projects, e.g.: "Initial Risk Assessment of Alien Species in Nordic Coastal Waters", sponsored by the Nordic Council of Ministers and the EU funded Concerted Action " Ballast Testing Monitoring Systems for Risk Assessment of Harmful Introductions by Ships". In 2001, the founders of the group, Erkki Leppäkoski (Ãbo Akademi University, Finland) and Sergej Olenin (Klaipeda University, Lithuania) together with the present convener of the BMB WG NEMO, Stephan Gollasch (GoConsult Ltd., Hamburg, Germany) initiated and later edited a book "Invasive aquatic species of Europe - distribution, impact and management" (Kluwer Academic Publishers, 2002).

At present the BMB WG NEMO comprises about 30 researchers working on functional ecology, risk assessment, ecophysiology and other aspects of invasion biology in the Baltic Sea.

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Why did the beetle cross the sea?
The Search for Invasives in the British Virgin Islands

I have been working in the British Virgin Islands (BVI) since 1993. Like much of the Caribbean, there are many invasive species in the BVI, and a number of them are very damaging. Various islands are troubled by mongoose (*Herpestes auropunctatus*), goats, sheep, coralita (*Antigonon leptopus*), and other invaders. With funding from the Falconwood Foundation, most of my time in the BVI is spent on Guana Island. This is a remarkably diverse private reserve: more species are known from it than from any island of comparable size. Although it wasn't invasives that originally brought me here, I soon became concerned with several species. Most of the work on these issues is conducted with the help of Dr. Skip Lazell (The Conservation Agency) and Clive Petrovic (H. Lavity Stoutt Community College). A few years ago we noticed that the century plants (*Agave missionum*) on Guana were dying. Searching for the cause, our colleagues Barry and Buena Valentine (Ohio State University) discovered that a new species of beetle, the agave weevil (*Scyphophorus acupunctatus*), has recently arrived. Unlike in its native range, where it only attacks senescent plants, in the BVI the beetle attacks pre-flowering adults and even juveniles.

Since then, our main objective has been to document the impact of the beetle. Repeated surveys of multiple islands show that the invasion is still ongoing, and that at the height of the irruption, over 90% of the agave population may be dead or dying. Those that remain are primarily the juveniles, which may then be attacked as they grow. We are also trying to ascertain the method of spread and identify potential means of limiting additional range extensions, but both targets have proven hard to achieve.

Some other issues we've been looking at recently primarily involve reptiles and amphibians. We have now documented the spread of corn snakes (*Elaphe guttata*) in the US Virgin Islands and on Curaçao, and expect them to spread further in the Caribbean in the near future. A few years ago, we identified a population of red-eared sliders (*Trachemys scripta*) on Tortola, and earlier this year have found at least one other freshwater turtle (tentatively identified as *T. stejnegeri*) at the same site. Finally, Jennifer Owen is finishing a Master's project with me, studying the spread and ecology of the Cuban treefrog (*Osteopilus sepetentrionalis*) in the BVI. Unfortunately, we have been able to identify several new island infestations and have evidence that they have a negative impact on native wildlife, and especially native frogs.

CAB International recently summarized Caribbean invasive species issues for the Nature Conservancy. They catalogued some 550 invasive species from the region (available at http://www.issg.org/database/species/reference_files/Kairo%20et%20al,%202003.pdf), yet a number of the species and every single one of the populations mentioned above were not included. This illustrates the magnitude of the problem in the Caribbean: there are many islands, spread over a large area, governed by dozens of regimes and speaking multiple languages. Invasive species have not been a major concern for many of them, and the result is a multitude of poorly-documented and mostly un-addressed invasions.

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CONNECTIONS WITH HOME

I have been in Japan for just on two months now and I am really enjoying getting to know the native plants and animals. In the native forests, everything is so different from home (New Zealand). Mostly, in this part of Japan, the forests are deciduous and dominated by beech (*Fagus* spp.) and oaks (*Quercus* spp.). Many plants are very familiar, such as the dog-tooth violets (*Erythronium japonicum*) and other violets (*Viola* spp.) which are among the first to come up once the snow has melted. Also rhododendrons and magnolias are common understorey plants and, along the forest edge, Japanese honeysuckle (*Lonicera japonica*) is abundant in places. These are some of the connections with home, but for us, in New Zealand, these are all introduced plants that are mostly in gardens.

However, a real connection with home is the row of cabbage trees (*Cordyline australis*) outside the building that I work in at Utsunomiya University. These trees have just finished flowering and I enjoyed the characteristic perfume whenever I left the building during the past couple of weeks. I have seen a couple more cabbage trees outside a brick building further down the road, and when I passed through Kumagaya about three weeks ago I was delighted to see a small group of cabbage trees outside a large building on the main street. Somehow, I felt a lot closer to home because these familiar plants, so reminiscent of New Zealand, were right outside the door. The cabbage tree is endemic to New Zealand, i.e., it doesn't occur naturally in any other country.

But should I get so excited to see a tree from home? Is this what drove the European settlers to import so many plants from Europe? There was the obvious need to provide food especially since not a lot of native plants are very edible (also, persons of British extraction tend to be very conservative in their food tastes!). But there was also the sentimental attachment to "things from home" that were familiar and comforting. That's why the number of introduced plants in New Zealand exceeds the native flora by ten times! The number of plant species introduced to New Zealand is around 24,700 whereas the native flora numbers just over 2,500.

Unfortunately, it is this movement of plant (and other) species between countries that leads to the eventual decline of biodiversity worldwide. We all know the effect that old man's beard (*Clematis vitalba* - introduced from Europe) can have on our native forest remnants, and some New Zealand plants are causing the loss of native vegetation in other countries, e.g., NZ flax (*Phormium tenax*) on the Isle of St Helena and pohutukawa (*Metrosideros excelsa*) near Capetown, South Africa. Native plants should remain in their own countries. If these cabbage trees in Utsunomiya were showing any signs of spreading, I would recommend to the gardeners that they kill them. Fortunately, they are not spreading (unlike the Chinese fan palm (*Trachycarpus fortunei*), introduced from China, which is an invasive plant in Japan as well as New Zealand!).

However, I have learnt a valuable lesson. I should be staunch when I go overseas and not get excited at the sight of a NZ endemic plant. I should drink in the local sights and sounds and not get sentimental about connections with home!

This article was written in June 2004.

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Invasive alien plants in Germany:
Results of a national survey and conservation activities on the federal level

Invasive alien species (IAS) are considered to be the second largest reason for biodiversity loss on a worldwide scale and is reflected in recent international conventions and policies. Nevertheless, in Central Europe IAS are considered to be of lower ecological risk compared to other regions. Of the 3383 established species of higher plants in Germany, 228 are non-indigenous species that have been introduced with traditional land use practises before 1492 (archaeophyte plants) and 363 are so called neophyte plants (introduction after 1492). Another 625 neophyte plant species are at least locally established or occur occasionally. While ¼ of the archaeophyte plants are endangered, about 30 of the around 1000 neophyte plant species are considered to have negative impacts on native biodiversity (invasive alien plants).

Referring to this a survey of interviews with 360 regional and local conservation authorities in Germany in 2003 demonstrates that 96% of the agencies do have "problems with neophyte plants", whereas 57 species are mentioned all together. But only four species/groups present over 50% of all reported cases (*Heracleum mategazzianum, Impatiens glandulifera, Fallopia spec., Solidago gigantea* & *S. canadensis*). There are only a few variations in the species mentioned. *Prunus serotina* and *Rosa rugosa* are especially mentioned in the North of Germany, *Robinia pseudoacacia* and *Acer negando* in the East. In 39% of all cases (n=1908) control measures have been taken, whereas only 23% of these are regarded to be "successful". The calculated costs for those cases where information on the expenses were given (n=214) add up to at least 1,5 Mio. Euro/a.

On the German federal level there are three ongoing and intended projects related to IAS:

1. Web based handbook of invasive alien plant species NeoFlora (*www.neophyten.de/*) offering also a platform for information networking with conservation authorities and volunteers,
2. Development of a Certification System for native seed stock of known local proveniences,
3. National Strategy on invasive alien species, building up a possible institutional and legal framework for all stakeholders involved in the introduction of and/ or affected by invasive alien species.

Together with Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway, Poland, Russian Federation and Sweden, Germany is part in the initiative Nordic-Baltic Network on Invasive Species (NOBANIS) (*www.skovognatur.dk/nobanis*). NOBANIS will be a gateway to information on alien and invasive species in the Nordic and Baltic Region. The project is supported by the Nordic Council of Ministers (*www.norden.org/*).

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CIESM AND BIOINVASIONS IN THE MEDITERRANEAN SEA

Alien macrophytes, invertebrates and fish are found in most coastal habitats in the Mediterranean Sea. Some invasive species have out-competed or replaced native species locally, some are considered pests or cause nuisance, whereas other invaders are of commercial value. The rate of marine bioinvasions has increased in recent decades; collectively they have significant ecological and economic impacts in the Mediterranean. Most of the alien species are thermophilic, originating in the tropical Indo-Pacific or tropical Atlantic and, should global warming affect Mediterranean sea-water temperature, then thermophilic invasive species would gain a distinct advantage over the native biota.

The principal vectors of introduction are, in descending order of importance, passage through the **Suez Canal**, **mariculture** and **shipping**.

The advent and spread of alien species in the Mediterranean Sea were repeatedly discussed in the *Commission internationale pour l'exploration scientifique de la mer Méditerranée* (CIESM) forums over the past three decades, and it was widely perceived that the littoral and infralittoral biota of the sea is undergoing a rapid and profound change.
The genesis of the three volumes of the *CIESM Atlas of Exotic Species in the Mediterranean,* dealing with fish, crustaceans and molluscs, began with an Editorial Panel that provided the conceptual basis for the initiative and invited the authors of each volume. The authors assembled and authenticated the extant knowledge of the scale and impact of aliens taxa in the Mediterranean, drawing on myriad sources. The primary sources include research papers, biota surveys, ecological studies, and fisheries management reports. These records were supplemented and amended by personal communications with scientists of particular taxonomic expertise. The preliminary lists were posted on the CIESM website *(www.ciesm.org/atlas/*) and comments were solicited from the wider marine scientific community. After integrating the additional material, the volumes were published. The website itself is updated on an annual basis.

Introductions brought about by shipping were the focus of a multidisciplinary CIESM workshop held in 2002 that examined the extant knowledge of the scale and impact of ship-transported aliens in the Mediterranean and Black sea region (CIESM workshop monographs, 20). The recommendations that emerged from the workshop called for implementing a Mediterranean-wide program of port and port-proximate surveys using standardized protocols to identify alien species and organisms that pose significant risk to human health that might be disseminated by shipping from the region. Late last year CIESM launched the first basin-wide port-survey program PORTAL - PORT surveys in the Mediterranean Sea for ship-transported Alien organisms, scientists to participate in the first basin-wide port-survey program. To date, 10 participating ports – from Izmir to Barcelona, Livorno to Valetta - have been sampled.

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Slovakia and Invasive Alien Species

Slovakia, like many other countries all over the world, faces the problem with invasive alien species which invade not only human-made ecosystems but penetrate into seminatural and natural ecosystems and also threaten protected areas.

The Ministry of the Environment and the State Nature Conservancy of the Slovak Republic, in particular, have been systematically dealing with the problem since 1997. First of all it started with the mapping of invasive alien species distribution and later, based on results of the mapping, with eradication and control of major species of concern. However, most of the work has been done in relation to invasive alien plant species so far. In 2002 a *List of Alien, Invasive Alien and Expansive Native Vascular Plant Species of Slovakia* (second draft) was published. According to the list 47 taxa are considered to be invasive at the national level and 49 at the regional level. Increased attention as regards mapping and management is being paid to these particular plant species and about 3000 sites of 50 species have been recorded so far. Practical management (mostly eradication and control) is concentrated in protected areas. Good results are for instance with control of giant hogweed (*Heracleum mantegazzianum*) in the National Park Nízke Tatry (Low Tatras) and in the Protected Landscape Area Kysuce. Joint effort to contain/control population of giant hogweed spreading along the Dunajec river in Pieniny National Park both in Poland and Slovakia is a good example of bilateral co-operation in transboundary regions. Areas, where no special protection is provided but invasive alien species have been recorded there, are also subject to management measures. Every year nature conservation bodies take care of approximately 120 localities. As for the other sectors, water management authorities contribute to elimination of invasive alien plant species in connection with regular management of water courses.

Adapted from Photo by R. Wittenberg

Within last two or three years the work on the problems caused by invasive alien animal species has intensified. First drafts of lists of invasive species of fish, mammals have been not only prepared but also evaluation of spread of alien fish species and their impact on native species has been done in selected water courses in Protected Landscape Areas of Latorica, Dunajské luhy and Záhorie in Southern Slovakia.

Legislation and invasive alien species

First efforts to tackle the issue of invasive alien species in the national legislation brought the result and the Law on Nature and Landscape Protection approved in 1994 dealt with the problem of alien species. However, its regulations appeared as not very sufficient. The amendment of the Law in 2002 should significantly help to solve the problem of invasive alien species. Some of its regulations also provide protection for ecosystems composed of natural species, including:

- regulation of intentional dissemination of alien species;
- monitoring of occurrence, population size and spread of alien species;
- elimination of invasive alien species.

The law also deals with trade in invasive alien species and obliges owners (administrators, tenants) to eliminate invasive alien species from their land. However, in everyday life law enforcement conflicts with many other problems such as unclear and disputed land ownership, and so the state has to bear the main burden of alien species elimination now. According to the order of the Ministry of the Environment obligation to eliminate invasive alien species applies only to the seven most problematic plant species: *Fallopia japonica, Fallopia* × *bohemica, Fallopia sachalinensis, Heracleum mantegazzianum, Impatiens glangulifera, Solidago canadensis, and Solidago gigantea.*

Enforcing the law – building awareness and support

Law and its enforcement is one side of the coin, the other is how society understands, accepts and supports it. But society often has limited understanding of the range of threats posed by invasive alien species. Building awareness and public support is very important part of the struggle with invasive alien species. The State Nature Conservancy is also developing many activities in this field, for example contributions to local, regional, and national mass-media: newspapers, magazines, radio and TV broadcasting, brochures, leaflets, educational programmes for schools. Printed materials such as a series of five leaflets Invasive Alien Plant Species in Slovakia or Guideline for Elimination of Selected Invasive Plant Species are being distributed to target groups both formally and informally on various occasions with an offer of technical support.

All above-mentioned activities concerning invasive alien species are just the first steps towards solving the problems

posed. A pile of work is still waiting for Slovakia, for instance, development of more active policy aimed at prevention of new invasions, mitigation of impacts, and most of all shared responsibilities with other sectors in society: governmental and non-governmental organisations as well as general public or development of more active co-operation with neighbouring countries, etc.

The State Nature Conservancy believes that good communication with all the relevant stakeholders and building partnership, that it tries to apply, is one of the keys to the success.

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Alien species on Cyprus

Cyprus is an island of oceanic origin which has never been connected to the mainland. Because of this isolation, and some other reasons, it developed a unique biodiversity. Cyprus is considered a biodiversity "hotspot" area and is the only center for endemism for birds in Europe and the Middle East. In addition there is a center of endemism for mammals, with six out of its 11 wild mammals being endemic, and a center of plant diversity. During the last decades a large number of alien invasive species were introduced on the island. I have been working with the identification of these species, trying to provide the appropriate information to the local authorities on how to deal or to prevent the spreading or the importation of additional invasive species, and in some cases with their eradication.

The major problems from alien invasive species arose from the importation of 17 species of fresh water fish, which brought near extinction the endemic grass snake (*Natrix natrix cypriaca*). In addition the introduction of wild boar (*Sus scrofa*) in 1996 in the Troodos National Forest Park is threatening a unique habitat with rich biodiversity. The Troodos National Forest Park, an area of 9 337 hectares, has the highest biodiversity in Cyprus and the highest number of endemic species on the island. Of the 139 endemic plants of Cyprus, 72 are found in the park, and 16 of them are local endemic. Because of this, wild boar has the potential to cause considerable, maybe irreversible, damage to the local fauna and flora.

Another environmental threat is the spreading of the alien plant species *Acacia saligna* (Labill.) Wendl. fil. This is the most serious invasive plant species on Cyprus, threatening many natural habitats. It invades forests, maquis, garigue, phrygana, and marshy areas. Furthermore it invades agricultural land becoming a serious weed. The most serious threat was observed at Limassol Salt Lake where it replaces the reeds and other halophytes of the marshy zone. Another invasive species is *Robinia pseudoacacia* L., which is spreading in forests, maquis, garigue and phrygana vegetation similarly to *Acacia saligna*, but to a lesser extent.

In addition to the above species, the following adventive species are spreading in natural habitats, namely: *Celtis australis* L., *Cercis siliquastrum* L., *Prunus dulcis* (Mill.) D.A.Webb, *Ailantus altissimma* (Mill.) Swingle and *Casuarina cunninghamiana* Miq. The latter is spreading mainly in the marshy zone of Limassol Salt Lake. Furthermore, three species were recently recorded for the first time as adventive to Cyprus that spread in natural habitats: *Fraxinus angustifolia* Vahl, *Pyrus malus* L., *Prunus persica* (L.) Batasch.

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Editorial Note: The next issue of Aliens will have a more in depth article on alien fish in Cyprus.

AQUATIC ALIEN SPECIES IN IRELAND

Ireland as an environment

Ireland lies in a cool temperate region strongly influenced by the warm North Atlantic drift. The predominant prevailing winds from the south-west ensure a year round, although variable, rainfall and the heat releases from the sea result in active air circulation. Water temperatures within the 3,500 lakes seldom fall below 3ºC or rise above 23ºC and have continuous drainage flowing to all coasts. As the central plain is principally made from soils overlying limestones much of the water flow is alkaline. Marginal hill ranges of sandstones, metamorphic and igneous rock and water draining from once extensive bogs result in regional acid water releases.

The estuarine regions are generally small and drain directly to the sea via sheltered partly enclosed harbours (Cork Harbour), large estuaries (Shannon), fjord (Killary Harbour) or rias (Bantry Bay) or have partly enclosed sheltered bays with little freshwater (Strangford Lough). Sea temperatures are highly variable according to water circulation and water depth but coast temperatures range from 5-17ºC.

This landscape emerged from a glaciation of over 10,000 years ago and is an island on the fringe of Europe where the biodiversity is less than on nearby Britain or the European continent. The ice-sheet is thought to have excluded many species from entry. For this reason Ireland is still under successive colonisation and consists of species that at some time would have arrived but have been introduced, to the native and vagrant biota, exotic and cryptogenic species.

The introduced species

It is unclear whether the soft-shelled clam *Mya arenaria* arrived following Viking movements or whether it may have been a late re-expansion within Europe. Nevertheless some early examples of species introductions are known. Monastic movements were responsible for imports of several fishes and perhaps a crayfish *Austropotamobius pallipes*, to enhance their food supply. All fishes in Ireland were either anadromous or catadromous till this time. The success of many of the introduced fishes has resulted in their naturalisation and modification of previous assemblages. Some of these fishes form important recreational fisheries. Most are cyrpinids and some such as the bream (*Abramis abramis*), the rudd (*Scardinus erythropthalmus*) and the roach (*Rutilus rutilus*) hybridise. The predatory pike (*Esox lucius*) is a widely distributed predator. The majority of introductions appear to have occurred during the 20th century. More recently the rainbow trout (*Oncorhynchus mykiss*) has been introduced, but with few exceptions are maintained with stock from hatcheries. The zebra mussel *Dreissena polymorpha* is a recent arrival and still is expanding from its initial colonisation of the inland navigation to isolated alkaline lakes. In its wake exotic amphipods are spreading, some of these deliberately introduced at some past time as a food for fish.

Some localised populations of invasives occur in dock regions, lagoons and estuaries, these include the tubeworm *Ficopomatus enigmaticus*, the barnacle *Balanus improvisus* and the tunicate *Styela clava*. Some species are used in aquaculture such as the Pacific oyster *Crassostrea gigas* and the Pacific clam *Venerupis philippinarum* that are cultivated over extensive local areas and supplied by hatcheries as these are seldom known to recruit in Ireland. Two species of abalone from Europe *Haliotus tuberculata* and Japan *Haliotus discus-hannai* are in cultivation. One species of red alga accidentally introduced to Ireland *Asparagopsis armata* is cultivated for its chemical properties.

The pathways and vectors

Early movements were almost certainly deliberate, being cared for, to aid their survival, during their transit. With the increase in sea traffic some species are likely to have been introduced whose true origin remains uncertain, these include some boring and fouling species. The timber boring shipworm *Toredo navalis*, a bivalve, was probably abundant in ship ports at a time when timber was widely available. However, it has become less abundant perhaps due to less habitat, there being fewer wooden structures in ports, and on account of the presence of leaching organotins used in ship paint antifoulants. Nevertheless shipping has almost certainly been implicated in the introduction of the tunicate *Styela clava*, the barnacles *Balanus improvisus* and *Elminius modestus*, the snail *Potamopyrgus antipodarum* and crustaceans *Limnoria tripunctata* and *Corophium sextonae*. Small craft are also likely to have spread *E. modestus* and *F. enigmaticus*. Indeed the imports of used craft from Britain are the likely mode of colonisation by *D. polymorpha*.

Aquaculture has been responsible for the appearance of both useful and unwanted species such as the crustacean parasites of the gut and gills of the *C. gigas* (*Mytilicola orientalais* and *Myicola ostraea*) that gained access to Ireland following a general lifting of restrictions with Europe in the trade of Pacific oysters. The blood sporozoan *Bonamia ostreae* of the native oyster continues to spread in Ireland to native oysters *Ostrea edulis*. Some benign species are also moved with stock movements of oysters that include the Chinamans hat shell *Calyptraea chinensis*.

Imports of living species such as aquarium and pond plants *Azolla filiculoides* and some *Lemna* species are now widespread in garden ponds and some have become released to the wild. Many other non-native species are on sale in garden centres. With changing conditions these could establish themselves. Aquarium and pond fishes are likely to escape to the wild such as the sturgeons. Lobster imports from North America of *Homarus americanus* intended for direct consumption have been held in walled sea ponds. The unauthorised movement in the 1960's led to an outbreak of gaffkaemia, a bacterial dis-

ease, that spread to native lobsters within the pond and all lobsters were destroyed. The eel parasite *Anquillicola crassus* may have been introduced to Ireland by trucks holding live eel landings in tanks. Eels are collected from fisheries over a wide geographical area that includes Britain and Ireland and in this way the parasite may have spread.

Deliberate movements, restocking as well as natural opportunities for spread have enabled the dace (*Leuciscus leuciscus*) to expand its range in the south and east of Ireland. The natural spread of species, following combinations of drift dispersed by currents and winds, have enabled the rapid spread of the brown algae *Colpomenia peregraina* and *Sargassum muticum* and the green alga *Codium fragile atlanticum.* The spread of the naked dinoflagellate *Gyrodinium aureolum*, that causes caged fish kills, probably spread from elsewhere in Europe with current movements offshore.

Management

Management of exotic species continues to evolve. In trade, codes of practice have, and are, being developed to take account of accidental movements. Management of some species requires a shared responsibility in the prevention of spread and the campaigns to inform the public are met with initial interest that is difficult to sustain. In aquaculture any new species for cultivation and management of current trading practices are advised to follow the ICES Code of Practice. This code has been well tested and forms a reasoned basis for deliberate movements of species. Management of unintentional transmission of species broadcast by shipping poses serious problems as currently the management of this issue worldwide has proceeded ahead of the science and many novel means of controlling ballast water have yet to be tested and intercalibrated. Further, one of the main means of transmission is by ships' hull fouling and species carried by hulls, that include mobile species, are often deduced as arriving in ballast water. One of the main threats is of the spread of microbiota and resting stages of many taxa that may be carried both on hulls and within ballast water. Until these issues are resolved it may be expected that with the anticipated increased trade in shipping, alterations to climate and development in harbours as well as general improvements to water quality following the European Union Water Framework Directive, that further non-native species will arrive. Some of these will be invasive. Monitoring should take place in hubs areas where such species are likely to first arrive so that harmful species, when found, can be controlled at an early time. Species that are not recognised early are unlikely to be eliminated.

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ACTIONS AGAINST IAS:
REPORT OF THE G.E.I. - GRUPO ESPECIES INVASORAS (SPAIN)

GEI, a national NGO, was created in 1998 to address the loss of biodiversity due to the introduction of IAS and to promote and develop initiatives and programmes devoted to the knowledge and conservation of biodiversity.

Despite increasing attention to the problem of biological invasions from the international community and despite isolated instances of alarm in Spain, an initial analysis of the situation revealed firstly a lack of awareness both at a local and at a global level and secondly, the inadequacy of the existing legal and institutional framework. Strategies carried out to face concrete biological threats were far from being integrated into a coherent management programme for invading species (e.g., a campaign to control the *Oxyura jamaicensis* was developed in order to protect the *Oxyura leucocephala* which was under threat). In fact, the reaction against other exotic species whose presence and invasive potential was well known has been very slow (e.g. the *Mustela vison*) or non existent (e.g. the *Myocastor coypus*).

IAS management strategies from different administrations have been and still are contradictory. The implementation of mitigation or contention measures for IAS of hunting and fishing interest is very limited and is also conditioned by pressure groups. In some cases, this has led to the design of measures favouring invading species who have a known negative impact. Likewise, the custom to keep exotic pets and plants at home has increased which has led to the presence in the wild of species such as the *Trachemys scripta*, *Myopsitta monachus* or *Cortaderia selloana*, has never been, save some recent exceptions, the objective of education and awareness campaigns.

The GEI decided upon the development of a strategy geared towards raising awareness among the general public about the problem of invading species. We have also aimed to call the academic community and relevant institutions and organisations to action.

ITINERANT EXHIBITION "ESPECIES INVASORAS DE LA PENÍNSULA IBÉRICA"

Joining didactic communication and scientific rigour, the exhibition included a series of panels, games, models and an audio-visual. A booklet, a diptych and a school notebook complemented the programme. This exhibition contributed to:

1. Increase the information about potential consequences of the introduction of invading species as agents that affect negatively the biodiversity of the Iberian peninsula.
2. Make the public aware of the responsibility involved in having exotic species as pets.
3. Increment social participation and involvement in environmental achievements.
4. Prevent new exotic species from being introduced.

FORUM "INVASORAS"

In 1999, the forum "Invasoras" opened up in order to exchange information among the scientific community about IAS in Spain. The forum now has 130 members.

Objectives:

1. To create a net of experts interested in this area.
2. To promote the flow and exchange of ideas and information.
3. To act as a site where access to all existing information about the problem is given in order to find solutions to each specific problem quickly.
4. To establish debates about existing problems and give solutions.
5. To coordinate action and collaboration.

"EEI 2003" FIRST NATIONAL CONFERENCE ON INVASIVE ALIEN SPECIES

Available Outputs:

"Contribuciones al conocimiento de las especies exóticas invasoras en España".
http://www.invasionesbiologicas.org/documentos/eei2003_libro.pdf

"Anexos: Conclusiones Generales y Grupos de Trabajo".
http://www.invasionesbiologicas.org/documentos/anexos_eei2003.pdf

Forthcoming *Biological Invasions* (special issue):
"Issues in bioinvasion science. 'EEI 2003': a contribution to the knowledge on invasive alien species".
(See also article in *Aliens 18*)

GEI had also followed the development of international strategies on IAS, giving advice to the Spanish government and taking part in international events.

Following international policies on biological invasions, the Ministry of the Environment has commissioned the service of a team (GENA-GEI) to design a National Action Plan for IAS, which will be finalised by the end of 2005. The plan has a two-fold objective: to identify problems created by IAS and solutions in all relevant aspects: prevention, early detection, eradication, management and control,

awareness and education, regulation, policy and research. (See article in *Aliens 18* for more details)

MONITORING THE IMPLEMENTATION OF THE EUROPEAN STRATEGY FOR IAS

The Recommendation 99 (2003) adopted by the Standing Committee to the Bern Convention, recommends that Contracting Parties draw up and implement national strategies on invasive alien species taking into account the European Strategy on IAS. In order to monitor how is implemented the European Strategy by Contracting Parties, the Council of Europe has entrusted a report to know if governments have drafted and implemented national IAS strategies or if they plan to do so in the future, and also which prevention and control measures are being taken. Likewise, to ensure that the knowledge of European Strategy on IAS will reach decision makers, GEI is carrying out a presentation leaflet on the European Strategy on IAS.

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***Aliens* is the bi-annual newsletter of the Invasive Species Specialist Group (ISSG)**. Its role is to put researchers, managers and/or practitioners in contact with each other and to publish information and news of alien invasive species and issues. Contributions should focus on conservation issues rather than economic, health or agricultural aspects of alien invasions. News of upcoming conferences, reports, and news of publications are also welcome, especially where they are of major international relevance. Please send your contributions, marked "for consideration for *Aliens*" to *m.depoorter@auckland.ac.nz*

The New Zealand-based **Invasive Species Specialist Group (ISSG)** is a specialist group of the Species Survival Commission (SSC) of the World Conservation Union (IUCN). It is chaired by Mick Clout. The goals of the ISSG *are to reduce threats to natural ecosystems and the native species they contain - by increasing awareness of alien invasions and of ways to prevent, control or eradicate them.*

***Aliens-L* is a listserver dedicated to invasive species**. It allows users to freely seek and share information on alien invasive species and issues, and the threats posed by them to the Earth's biodiversity. To subscribe, send an email without a subject header to: *Aliens-L-join@indaba.iucn.org* OR *listadmin@indaba.iucn.org* with the message: subscribe Aliens-L. When you have subscribed you will receove a message with instructions for using the list. Most subscribers are English speaking, however, if you would like your message translated into English before posting it, please contact *m.depoorter@auckland.ac.nz* (we can currently deal with short messages in Spanish, Italian, Dutch, French and Arabic).

Cooperative Initiative on Invasive Alien Species on Islands. The aims of the Cooperative Initiative on Invasive Island Alien Species on Islands are: to enhance empowerment and capacity in key areas of invasive alien species (IAS) management on islands; to facilitate cooperation and sharing of expertise; to help enable local, national and regional entities to identify invasive alien species problems, work out solutions and implement them resulting in improvement in the conservation of island biological diversity. ISSG will undertake the facilitation of this initiative, in partnership with New Zealand (as a Party to Convention on Biological Diversity (CBD)) and under the umbrella of the Global Invasive Species Programme (GISP). This initiative is a recent development, and any interested individuals or institutions/agencies are encouraged to participate.

The Global Invasive Species Database is freely available on online at *www.issg.org/database* and mirrored at *www.invasivespecies.net/database*. The development of the database, and the provision of content for it, is ongoing. Priorities range from a focus on the some of the world's worst invasive species to a focus on areas where information and resources are comparatively scarce, including small-island developing states and other islands. The database has images and descriptions for a wide variety of invasive species. Records for these species include information on the ecology, impacts, distribution and pathways of the species, and most importantly, information on management methods as well as contact details of experts that can offer further advice. The database also provides links to numerous other sources of information. A major contribution is provided by IAS experts, researchers and managers who provide information or act as reviewers on a voluntary basis.

IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species *http://iucn.org/themes/ssc/pubs/policy/invasivesEng.htm*

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Websites: ISSG: *http://www.issg.org*
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