

NETWORKING INFORMATION ON IAS IN AMERICA: FIRST STEPS TOWARD STANDARDIZED RISK ANALYSIS TOOLS

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The problem of invasive alien species in America

America is the continent where some of the most well known cases of biological invasions occur, e.g. invasive goats and pigs in the Galapagos Islands. America is also a continent of contrasts, probably as a consequence of its history, with huge differences in the knowledge and awareness of problems of biological invasions. The main challenges for the majority of countries in the region include lack of knowledge of the gravity of the problem of invasive exotic species in government circles, the scarcity of organized information or the difficulties of accessing information, problems of coordination and differences in perception between different agencies at the national level and lack of interest and academic commitment in providing critical information for management. The limitations listed make information exchange difficult and this is becoming more critical for improving our capacity for prevention and control.

I3N, an initiative for standardizing and sharing information at a continental level

Fortunately, significant steps have been taken on an international scale to advance in appropriate management of invasive exotic species in America, especially during the last five years. In particular, the efforts of the Invasive Species Network (I3N), which belongs to the Inter-American Biodiversity Information Network (IABIN), should be noted. This intergovernmental organization promotes the compilation, standardization and publication of information about invasive exotic species, and also related projects and experts, in internet. I3N produced and distributed a database and a web interface, held training seminars and provide funds for promoting their use in countries of the region. Eighteen countries in America are currently at different stages of implementing the I3N initiative. The maintenance of common standards and local control of information are important principles of I3N, which provides free internet hosting of IAS records created by member countries and freely distributes a Microsoft Access database template for creating invasive species records; freely distributes a Web interface template for managing, accessing and serving invasive species records on the Internet; and also provides the I3N Search Tool that indexes all of the IAS records and resources on member country web sites (http://i3n.iabin.net/search/mercury_search.html).

The I3N database of invasive alien species

The I3N database of invasive alien species was developed through a partnership between the NBII, I3N-Brazil/Horus Institute, the Nature Conservancy Brazil, and I3N-Argentina/Universidad Nacional del Sur, with technical collaboration from Global Invasive Species Database of the IUCN Invasive Species Specialist Group and Hawaiian Ecosystems at Risk project. The tool is available in Spanish, Portuguese and English and allows network members to collect and share standardized information on IAS taxonomy, introduction details, biology, ecology, impacts, control methods, occurrences, contacts, projects, and references. The data on each occurrence of a species includes detailed geographic information, an evaluation of the state of invasion (if the species is contained, if it was detected in the wild, if a spontaneous population has become established or if it has become invasive) and a description of the impact, or impacts, associated with the presence of the species in that site in particular. The template includes a built-in functionality for generating XML-tagged species fact

sheets and for producing trilingual reports consisting of detailed or summary species lists, projects, and contacts from the database. The database includes a web interface that permits the development of a national system that includes data providers who work by putting data on-line and a level of administration that checks each item before publishing it on the web.

Internet: readily accessible information

The publication of data in internet is the best guarantee for data exchange and the best tool for validating the information. At present, seven countries have published their national data on internet using the I3N tools (Table 1) and another three, Ecuador, Guatemala and Peru, are in an advanced state of implementation.

Country	Institution	URL
Argentina	Universidad Nacional del Sur	http://www.inbiar.org.ar
Brasil	Horus Institute for Environmental Conservation and Development	http://i3n.institutohorus.org.br/
Colombia	Alexander von Humboldt Institute	http://ef.humboldt.org.co/
Costa Rica	Asociación para la Conservación y el Estudio de la Biodiversidad, ACEBIO	http://invasoras.acebio.org/
Jamaica	Natural History Division - Institute of Jamaica	http://jamaica.paradigma.com.ar/
Paraguay	Guyra Paraguay Association	http://www.i3n.org.py/
Uruguay	Facultad de Ciencias - Universidad de la República	http://uruguayi3n.iabin.net/

Table 1- Countries that have published their national databases on internet using the I3N interface web

I3N value added tools

In January 2008 the development of the first two I3N value added tools was completed: a Risk Analysis Tool for the prevention of alien plants establishment and invasion and a Vectors and Pathways Analysis Tool, both developed to work in association with the database on invasive alien species in the network.

Risk analysis tool for the prevention of alien plants establishment and invasion

The principal objective of this tool is to aid decision making concerning the voluntary introduction of plant species by assigning a value for the risk of invasion of the proposed species. This system considers 28 criteria grouped in three categories:

A- Probability of establishment and invasion. The chances that a species will establish a self-regenerating population and advance over natural, or semi-natural, habitats in the locality where it was introduced are assessed. Indicators are used to estimate this probability, such as the antecedents of the species as invasive in other countries; degree of climate matching between the new environment and the region of origin, as well as the similarity between the new habitat and other regions in which the species has become established; the degree of particular ecological requirements of the species; its capacity to establish a population from a small number of individuals or an isolated individual and characteristics related to its reproductive biology (sexual or asexual propagation, number of seeds produced, minimum time to maturity, etc.). The greater the possibility that the species will establish a self-sustainable population and advance over natural or semi-natural habitats in the new region, the higher the risk associated with its introduction.

B- Potential impact. The risk that the species will produce significant impacts on the environment, health, economy or cultural values of the area is considered. Criteria considered to evaluate this aspect are: the capacity of the plant to form dense, closed populations that completely displace native vegetation; its capacity to produce allelopathic compounds; the risk of hybridization with native species; its capacity to alter the structure of the habitat, to change the dominant life forms or the natural disturbance regime (e.g. frequency and intensity of fire), or to modify other ecosystem processes (e.g.

biogeochemical cycles, dynamics of ground water, etc.). The greater the impact that the species might create if it became invasive, the higher will be the risk associated with its introduction.

C- Difficulty of control or eradication. The criteria included in this section are the presence of prickles, spines and thorns that make control operations more difficult; generation time (the shorter the period to first flowering the greater the control effort necessary, as control actions would have to be repeated with greater frequency); the abundance and persistence in seed banks (the greater the number of seeds of the invasive species in the soil and the period over which they retain germination capacity, the more difficult it will be to control them efficiently); the capacity of a plant to sprout after cutting, grazing or burning and the grazing impact; and the availability of effective control methods. The greater the difficulty of controlling a plant if it becomes invasive, the higher will be the risk associated with its introduction.

Each species evaluated is considered according to criteria included in these three categories and given a numerical value, and these are then added to establish the corresponding level of risk.

A methodology for establishing limits between low and high levels of risk of introduction, and for identifying species requiring further analysis, was developed. Data on species that have been introduced into the country in the past are used for this, including plants that have become invasive and others that have not become established beyond the original sites of planting even though they are widely distributed. Levels corresponding to groups of plants of high and low risk are established using this system and these values are used as references for defining limits between risk categories.

Vectors and pathways analysis tool

The main objective of this tool is to reduce the risk of accidental introductions and unauthorized voluntary introductions and to limit the dispersal of species within the country by identifying vectors and pathways associated with different types of organisms. The tool includes a list of vectors and species, or groups of species, potentially associated with each one.

The system evaluates risk of introduction and dispersal of species, assessing the relative importance of different vectors and pathways and identifying the lack of key information in order to optimize strategies of monitoring and prevention. The schema is based on the combined analysis of the probabilities of introduction, establishment and dispersal, as well as the potential impact and chances of control of the species in the case of it becoming invasive. The evaluation is carried out for vector-pathway - species or group of species systems, and the following criteria are considered: presence and abundance of the species in the place of origin or along the pathway, existence and effectiveness of mechanisms of detection and control at the point of origin and/or along the pathway, transport conditions and intensity, probability that the organism establishes a population at the site of arrival (biological characteristics and climate matching), dispersal capacity from the site of arrival, potential impact, detectability, viability of effective measures of containment and control.

Each criterion includes a group of questions whose answers define different levels of relative risk. The scores obtained for each question are combined into a final expression that states the global level of risk.

Main challenges

As has been seen, interesting initiatives already exist for facing the challenge of IAS in America in a coordinated way and it is very important to encourage governments to participate in this issue so that these initiatives continue to grow, to seek the interest and commitment of the academic sector, as well as to maintain and improve the standards that have already been developed as a guarantee of fruitful exchange of information.