

# Invasive species management –

what taxonomic support  
is needed?



Unless greater management steps are taken to prevent harmful introductions that accompany increased trade, invasive species will cause increased ecological changes and losses of ecosystem services in all scenarios.

**Millennium Ecosystem Assessment, 2005**



## The problem

The challenge of managing risks from invasives (invasive alien species) is urgent and growing in scale with globalisation and climate change. The problem is worldwide, and managing it requires international as well as local action. Invasives threaten biodiversity conservation and sustainable use, agricultural productivity, crop storage, fisheries, forestry, trade, biosecurity, health and more.

Each stage of invasives management – prevention, detection, eradication and control – includes important but often unrecognised contributions from taxonomy: expertise, products and services based on high-quality biological collections and accurate species information. However, this input occurs effectively only in a very few countries. Even where capacity exists, taxonomic expertise and facilities are often in decline or have an uncertain future. In the majority

of countries the required technical capacity, information and resources are lacking or absent.

The *risks* from invasives are constantly changing in response to *climate change* and globalisation; managing the risks requires simultaneous *global action*

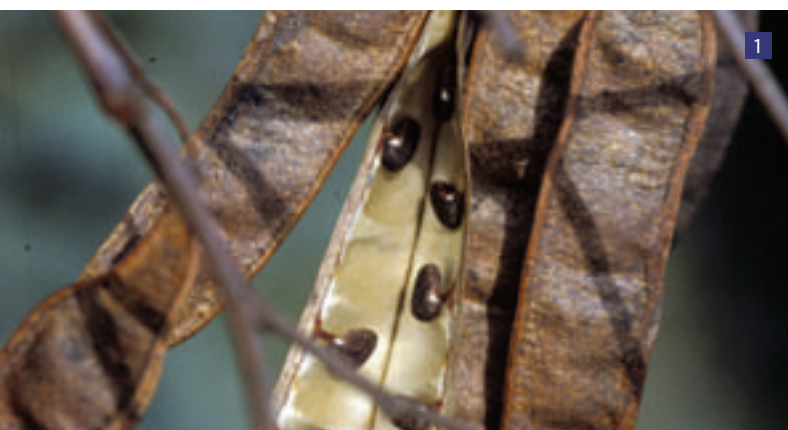
## The assessment

Many policy and strategy-level sources emphasise the need for greater taxonomic support to combat invasives. Yet, this information is widely scattered, sometimes unavailable or either highly generalised or specific for a given geographic region or sector (e.g. agriculture). In the first assessment of its kind, BioNET and NHM London have consulted selected documentary and expert sources to assess

- what types of taxonomic support are most required globally to manage and combat invasives, and
- how the required taxonomic support can best be delivered.

The assessment finds the required taxonomic information and support to be widely unavailable, inaccessible or otherwise lacking. It goes on to examine the end-user, institutional and supra-institutional actions and changes that are necessary to ensure that taxonomic output is created and can continue to be delivered to meet invasives threats.

It is now possible to use taxonomic data to *predict* the risk of biological *invasion* for different pathways and different *ecosystems*

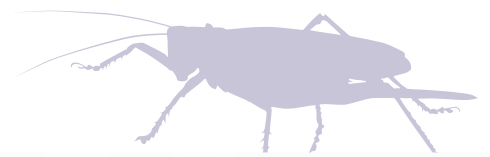
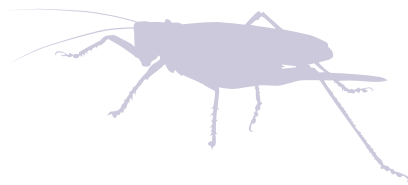
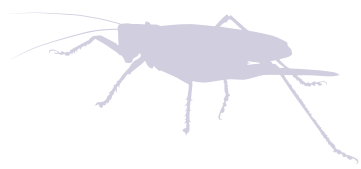


**1** Black Locust – *Robinia pseudoacacia*  
Seeds of 547 weed species were recently intercepted in 12 Chinese ports. Identification aids help border inspectors prevent biological invasions.  
Photo: Ohio State Weed Lab Archive, Ohio State University, Bugwood.org.



**2** Spiralling white fly – *Aleurodicus dispersus*  
1% of species names change each year. Enforcement of legal regulations governing invasives requires certainty about the specimen in hand.  
Photo: G Goergen, IITA ©





## Findings

Three types of need were identified:

### ■ Type I – end user needs:

Taxonomic information is relevant to each stage of invasives management identified in the GISP Invasive Species Toolkit 2001: prevention, early detection, eradication and control.

Type I needs include lists of known invasives, identification support and aids, distribution data and maps, predictive tools, pathway maps and survey and monitoring protocols.

### ■ Type II – institutional needs:

Infrastructure, expertise, information systems and prioritisation of invasive species issues are required within taxonomic institutions in order to deliver on Type I needs.

Type II needs are, for example, reference collections, training and employment of taxonomic experts, providing identification services and tools, digitising point and observational data and using and developing pathway and distribution modelling tools.

### ■ Type III – needs across institutions:

Coordination, technical standardisation and incentives are required if the taxonomic sector is to be responsive to Type II needs. Type III needs include prioritisation and international collaboration in research and training, a system for cross-referencing names of invasive species, global/regional/national strategies for invasives management, expert-expert and experts-users networks, awareness raising and relevant funding.

- 3 Asian tiger mosquito – *Aedes albopictus*  
Will this be carrying diseases in your country tomorrow?  
It is now possible to use data from biological collections to predict biological invasions.  
Photo: Susan Ellis, Bugwood.org.

- 4 African honey bee – *Apis mellifera scutellata*  
Only expert identification can uphold legislation protecting this major crop pollinator from invaders in South Africa.  
Photo: Scott Bauer, USDA Agriculture Research Services, Bugwood.org.



## Recommendations

Taxonomic support for *invasives management* can be dramatically scaled up by building on existing best practice, networks, information systems and tools

Action is required at all levels: end-users, institutions and across institutions.

**End-users:** Meeting the needs of end-users is, in principle, straightforward. Where capacity, facilities and data exist, keys, guides, images, species lists and voucher specimens, to name a few, can be produced. End-users can accelerate the provision of taxonomic support through best practice in use of names, management of data and specimens, commissioning of identification aids and species distribution modelling, etc.

**Institutions:** Taxonomic institutions need to increase their support for invasive management by, for example, the extension of their invasives reference collections, taxonomic and parataxonomic training, digitisation and sharing online of data from relevant collections and the adoption of new molecular and digital technologies for invasives identification.

**Across institutions:** Supra-institutional, coordinated and strategic actions will create the necessary financial and technical environment for taxonomic institutions to increase their supply of taxonomic products and services significantly. For example: international adoption of protocols for invasives identifications and creating a verified list of invasives names will raise the standard of taxonomic support and increase the success rates of invasives management.



## Conclusions

This is the first global level assessment of the taxonomic support needed to manage invasives. It provides a reference and framework for action for agencies and authorities responsible for invasives management; for taxonomic institutions; and for networks, funders, coordinating and policy bodies. The principal beneficiaries of the assessment will be authorities, such as quarantine, parks managers and plant protection organisations, charged with detecting and controlling invasives.

Meeting the needs identified by this assessment will require innovation and targeted investments in taxonomy. Without dramatic change, the picture is bleak: there is



Download the complete assessment from [www.gisp.org/publications](http://www.gisp.org/publications)

a near absence of taxonomic capacity to support invasives management in most (especially developing) countries and a general decline of expertise.

Addressing these needs adequately is achievable and affordable. Much relevant work is underway and could be greatly accelerated through coordinated actions leading to a fruitful environment in which many more taxonomists will have the digitised data, institutional environment, funding support, professional recognition, infrastructure, expertise and information management tools needed to respond in a timely manner to known and emerging invasives risks.

GISP is an international partnership dedicated to tackling the global threat of invasive species.

### Published by

The Global Invasive Species Programme

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### Citation for the assessment

R D Smith, G I Aradottir, A Taylor and C H C Lyal, 2008, Invasive Species Management – what taxonomic support is needed? Global Invasive Species Programme, Nairobi, Kenya.

This work was undertaken by BioNET and NHM London with support from the International Sustainable Development Implementation Fund of the Department of Environment, Food and Rural Affairs (UK); see <http://www.bionet-intl.org/tna>

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GISP's mission is to conserve biodiversity and sustain human livelihoods by minimising the spread and impact of invasive alien species.