

The low-down on invasion science

QUEST talked to Professor Dave Richardson, Director of the DST-NRF Centre for Excellence for Invasion Biology (the C•I•B).

So what is 'invasion science'?

It is a rapidly growing field of study that seeks to understand the 'nuts and bolts' of how invasive species 'work', the multiple dimensions of the phenomenon of biological invasions, and options for managing invasions in the face of rapid global change.

The field seems to have a lot of definitions and emphasis on terminology. Why is this?

It is important to understand several basic principles when we talk about biological invasions and invasive species. Most important is that when we talk of alien species (also called 'exotic' or 'non-native' species), we are referring to those species that have been moved to new areas (outside the natural range of the species) *through human activity*. Such species, transferred by humans to completely new areas, very often behave very differently to those that change their distributions in response to alteration of habitats or changing climates. Alien species very often leave key natural enemies behind in their native ranges – this allows them to reproduce more prolifically in their new ranges.

Most alien species do no harm, and are either benign or useful. Useful alien species include most of our crops, livestock, garden plants and pets, and there is no argument that these species are highly beneficial.

Some alien species reproduce prolifically in their new ranges and can establish self-sustaining populations – they are termed 'established' or 'naturalised' alien species. Most species in this category of alien species also cause no harm.

A small proportion of alien species, in addition to being able to persist, can also disperse widely in their new ranges, bringing them into contact with native species and ecosystems in the new range. These are 'invasive' species, and many of them cause substantial damage by interfering in various ways with the invaded ecosystems. Such species often require expensive management.

The Cape Floristic Region is one of South Africa's biodiversity hotspots. Image: Bridget Farham





Arum lilies in their natural environment in South Africa. Image: Bridget Farham



A rainbow trout in hand. Image: Mike Anderson, Wikimedia Commons

What about alien species that are both useful and invasive?

This is a major challenge. Many alien species provide clear benefits, but also spread and cause substantial damage. The rainbow trout is a good example of a species that causes such a conflict of interests. Trout fishing is enjoyable for fishermen, and bodies of water containing trout can be a source of income for landowners who sell fishing rights. On the other hand, trout are voracious predators that threaten many of our native fish species. Stakeholders see things differently regarding such species, and conflicts are difficult to resolve. Attempts to manage such species are often controversial.

Why is the study of invasive species important in a country like South Africa?

South Africa is extraordinarily rich in biodiversity and is home to three biodiversity hotspots. Many invasive alien species that proliferate and spread have negative effects on native species and alter the functioning of our ecosystems. Many South Africans, especially people in rural areas, depend on services provided by natural and semi-natural ecosystems, such as water from mountain catchments and grazing provided by natural rangelands. Invasive species are an important threat to the sustainable delivery of services from our terrestrial, freshwater and marine ecosystems.

Do South African species become invasive elsewhere?

Definitely! Many South African plants and some animals have been taken to other countries for their commercial and/or ornamental value. Once in these countries some of the species have become invasive. Examples of these are the Arum lily (*Zantedeschia aethiopica*) and several species of *Watsonia* which are major invaders in Australia. The common platanna (*Xenopus laevis*) is indigenous to South Africa, but was exported to many parts of the world and is now invasive on four continents.

What can I do as a South African citizen to curb the spread of invasive alien species?

The most important thing is to be aware of the many problems associated with invasive species and to know which species are alien and which are invasive. Do not grow plants or keep animals that are known to be invasive – they may well jump your fence and establish along river courses or in protected areas where they could have serious impacts. Report new invasive species to the National Environmental Crimes and Incident Hotline – 0800205005.

Where can I find more information on results of the C-I-B's research?

The best way is to visit the C-I-B's website (<http://academic.sun.ac.za/cib/>) regularly and to like us on Facebook. We constantly update these sites with news of our research. Our annual reports, with details of our work, are published for public viewing on our website. **Q**