

A novel approach could help manage the impact of invasive species

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Credit: Tima Miroshnichenko from Pexels

Some species of plants and animals can cause harm when introduced to areas where they aren't found naturally. They can affect biodiversity, ecosystems, health and livelihoods. On the other hand many newcomer

species are harmless. The number of introduced species is growing fast worldwide and there are now too many to control. To decide which ones to focus on, scientists and managers need to compare their impacts.

Traditionally, the [impact](#) of introduced species has been measured in a number of ways. The most common has been to look at [their economic impact](#). This could include, for example, yield losses in agriculture and other forms of monetary impact.

Other scoring systems measure environmental impact. For example the International Union for the Conservation of Nature is the largest global [nature conservation agency](#) and uses the [Environmental Impact Classification for Alien Taxa](#) to classify introduced species according to the severity of their impacts on native species. It creates something like a blacklist of the most environmentally damaging invaders.

But species can affect other aspects of human well-being, like health, material assets, safety, and social relationships. For example, some plants produce allergenic pollen that prevent sensitive persons from participating in outdoor activities. Other introduced species are vectors of human diseases, such as the tiger mosquito that can transmit a pathogen that causes Dengue fever. Not only the people that get infected are concerned, but many more that change their activities to avoid getting exposed to the intruder. It's very difficult to put a price on such impacts.

To get a more rounded view of measuring the impact of introduced species we borrowed a Nobel Prize-winning approach from welfare economics. Collaborating in an international team of scientists from three continents we drew up a new assessment tool called the [Socio-Economic Impact Classification of Alien Taxa](#).

We started with the premise that human well-being depends on the

options people have to shape their lives. These determine what they actually do: their activities. Introduced species, by changing the environmental or economical settings, can change people's options, and thus their activities. We use these changes in people's activities as a measure of how much their lives are affected by introduced species. Our way is different to previous measurement tools because it looks how species affect the every day lives of people – and not just from a monetary perspective.

New tool to compare species

Our method for studying invasive species can help guide decisions on where to spend management resources.

It assesses the changes that an introduced species makes to the activities that people are involved in. It looks at how the species affects people's opportunities to achieve what they value doing.

Our method uses a five-point scale, from no real change in activity to massive, irreversible disappearance of an activity from a region.

Take the example of the cane toad (*Rhinella marina*) in Australia. Introduced to the country in 1935 as a way to control insects that were a pest on sugar cane crops, the toad then went on to spread over large areas. It has had a devastating impact on animals that [indigenous people hunt for food and use as totems](#), causing potentially irreversible change to cultural practices of certain communities in Australia.

Another example is the water hyacinth (*Eichhornia crassipes*). Introduced to Lake Victoria in the 1980s from Rwanda via the river Kagera, it now threatens fishing, agriculture and human health which in turn has forced people to give up their livelihoods and move away. The introduced species in these two examples very strongly impact the livelihoods of

human beings.

In contrast, most introduced agricultural pests in developed countries are well controlled by pesticides. Although the annual costs of pesticides in countries like the United States reach several billion US dollars, most pests just make the crops a bit more expensive, but customers will still buy them. Thus these pests do not change people's activities very much – despite the impressive monetary costs.

The new tool measures these different impacts on the same scale, enabling users to compare and classify the impact of different species.

Benefits

The system has the advantage of capturing information that wouldn't be considered when only monetary values are taken into account. For example money-based systems fail to capture the impact of introduced species on health, security and culture.

In richer countries, the socio-economic impact of introduced species can be tackled through the use of technology or adaptive behaviour. But this isn't the case in poor countries where, in extreme cases, introduced species can cause irreversible societal changes. The new tool helps to flag the cases where [people](#)'s lives are most affected by introduced [species](#) and thus to allocate resources to help mitigating such impacts where it is really needed.

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