

# Invasive species have their invasion limits

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Biodiversity loss is happening at an unprecedented rate, and invasive species are one of the main contributors to the global biodiversity decline. Invasive species are alien (non-native) organisms that become overpopulated and cause environmental harm to the native environment. For example, a recent global meta-analysis shows that [30 invasive predator species have been linked to the extinction or endangerment of 738 vertebrate species](#), accounting for 58% of all bird, mammal, and reptile extinctions [1].

For effective biology conservation, some questions are worth answering:

- Do invasive species have any invasion limits? Or are they capable of invading habitats significantly different from their native environment due to their strong adaptability?

A 2022 study published in [Biodiversity and Conservation](#) has attempted to answer these questions [2]. It analyzes the distribution data of 33 of the world's most invasive plants and animals to see whether their niche shifts are significant or not. Niche is referred to as the set of biotic and abiotic conditions in which a species is [able to persist and maintain stable population](#) sizes [3]. There are two types of niches: fundamental and realized niches. The former indicates the abiotic conditions in which a species can thrive, while the latter indicates the [conditions in which a species can thrive with the presence of other species](#) (e.g., competitors and predators) [4].

The analysis suggests that 90% of the world's most invasive species move from one habitat to another similar habitat somewhere on the earth. In contrast, the remaining 10%

of top invasive species are not constricted by the new conditions in the alien environment [2]. *Impatiens glandulifera* is the species that has the lowest niche overlap between its home and invaded environment. [\*I. glandulifera\* is a plant native to the Himalayas but has invaded most areas of Western Europe](#) [5].



Figure: *Impatiens glandulifera* in Germany, taken by Dietmar Rabich (CC BY-SA 4.0); [https://commons.wikimedia.org/wiki/File:D%C3%BClmen,\\_Kirchspiel,\\_Richters\\_Busch\\_-\\_2016\\_-\\_3807-13.jpg](https://commons.wikimedia.org/wiki/File:D%C3%BClmen,_Kirchspiel,_Richters_Busch_-_2016_-_3807-13.jpg)

Based on this finding, it is clear that invasive species do have their invasion boundaries, and the boundaries are constrained by the differences between their home and alien ecosystems. However, such constraints are weakened for some particular species due to their strong adaptability.

From the [information-processing perspective](#) [6,7], species, as [information-processing systems, are more likely to invade the habitats \(infosphere\) with features compatible with their systems](#). Low compatibility results in poor information exchange with the new infosphere, leading to the malfunction and eventual cessation of the system. Suppose the system has a large range of compatibility (strong adaptability) to maintain its information exchange with the new infosphere. In that case, it can persist, adapt, and eventually become invasive to the new infosphere, completely different from the native one.

## References

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