

## Environmental and socioeconomic impacts of native, alien and neonative bark beetles

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Global trade is constantly increasing the translocation of species from one place to another, while anthropogenic environmental modifications such as climate or land-use change are driving species to move beyond the boundaries of their native ranges. These species, defined as aliens and neonatives respectively, along with native pests, may threaten biodiversity and human activities. Since these species' impacts are expected to increase in the future, defining and acknowledging them is important so that they can be managed or prevented. The aim of this study is to compare the harmfulness of species in their native, neonative and introduced ranges. It is hypothesized that alien species cause the greatest environmental and socioeconomic impacts, followed by neonative and native species. This because alien species have a higher probability than neonatives and natives to be a novelty for the native biodiversity of their introduced range. Indeed, if native species come into contact with an alien that has different traits compared to the ones to which they are already accustomed (e.g. new predatory strategies), they have a high probability to be negatively affected by this species. The environmental impact of a species can also affect human activities due to the change in services and goods provided by the ecosystem. This hypothesis was tested using bark beetles of the genus *Dendroctonus* as model group. Negative environmental and socioeconomic impacts were evaluated using the Environmental Impact Classification of Alien Taxa (EICAT) and Socioeconomic Impact Classification of Alien Taxa (SEICAT) frameworks. Contrary to the expectations, alien bark beetles appeared to be the ones with the least harmful impacts, while native and neonative bark beetles had the greatest impacts and their level of harmfulness was similar. Indeed, sometimes novelty might be disadvantageous for aliens as well because they could encounter native species with traits that are unfamiliar to them. Novelty in abiotic conditions may also have played a role in this result since a context to which the alien species is not used can lead it to be less harmful than in its native range. An alien species could also take some time to adapt to the new environment and more harmful negative impacts might be expected in the future. On the other hand, socioeconomic impacts could not be analyzed in view of the limited availability of data. This study emphasizes the fact that species in their neonative range could be as harmful as in their native range and even more harmful than in their introduced range. While for alien species, especially the ones that are most likely to cause negative impacts, prevention is the most viable option, neonatives' spread and abundance must be controlled.

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