New alien species invasions still rising globally

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Up to 16% of all species on Earth could qualify as potential alien species and if they invade new regions, impacts will be difficult to predict, according to new research involving UCL.

The study shows that the number of newly emerging alien species—those never before encountered as aliens—continues to rise, posing a significant challenge to biosecurity interventions worldwide.

Approaches to tackle the growing issue largely rely on knowledge of species' invasion history elsewhere, giving new previously unrecorded alien species a higher chance of slipping through border controls and eluding early response management.

The study, published today in *PNAS* and led by scientists at Senckenberg Biodiversity and Climate Research Centre (BiK-F), the University of Vienna and UCL, analysed a global database of 45,984 records detailing the first invasions of 16,019 established alien species from 1500 until 2005 to investigate the dynamics of how alien species spread worldwide.

Between the years 2000 and 2005, one quarter of records are of species that had not previously been found anywhere as an alien, which is a worryingly high proportion.

For plants, mammals, and fishes, the proportion of newly emerging alien species has remained constant during the last 150 years but the total number of alien species has increased.

Insects, molluscs and other invertebrates have the highest proportion of emerging alien species. Birds are the only group exempt from the trend, showing the lowest proportions of emerging alien species, with a distinct decline noted recently.

"Humans have been moving species to new places for thousands of years, so we might have expected that most species that have the potential to become aliens would already have done so. Instead, it seems the pool of new aliens is far from dry" explained study co-author, Professor Tim Blackburn (UCL Genetics, Evolution & Environment, and Zoological Society of London).

"While most new records do relate to the spread of species we already knew were aliens, the fact that one in four relates to a completely new alien species is both surprising and troubling."

Previously, growth in alien species numbers has been largely attributed to increases in import volumes, human mobility and land-degradation.

However, statistical models in this study suggest that the high proportion of emerging alien species cannot be solely explained by these drivers and is actually likely to be due to the incorporation of new regions as a source of potential alien species. The team estimated that there are therefore many potential alien species yet to emerge.

"With measures being taken to prevent alien species introductions and spread, there has been a

decline in the proportions of newly emerging alien species from established sources, such as historical European colonies. However, this decrease has been offset by newly emerging alien species elsewhere and it is likely that we can expect many more new invasions starting to appear from regions with large and growing economies," explained co-author Dr. Ellie Dyer (UCL Genetics, Evolution & Environment and ZSL).

"These findings will be extremely helpful for horizon scanning studies that aim to identify "door knocker" species, which are those not yet recorded but are suspected of presenting a high risk of arrival and detrimental impacts.

More information: Hanno Seebens el al., "Global rise in emerging alien species results from increased accessibility of new source pools," *PNAS* (2018). www.pnas.org/cgi/doi/10.1073/pnas.1719429115

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