

Drivers of Biodiversity Loss:

INVASIVE SPECIES



LAND & SEA
USE CHANGE



INVASIVE
SPECIES



OVER-
EXPLOITATION



POLLUTION



CLIMATE
CHANGE

Over the past 50 years, the natural world has experienced unprecedented rates of change with devastating implications.¹ Today, approximately one million species are at risk of extinction globally and integrally linked ecosystem services— from disease buffering to pollination— are at risk of loss. The direct drivers of biodiversity loss with the largest global impact are changes in land and sea use; direct exploitation of organisms; climate change; pollution; and invasion of nonnative species. These drivers are largely a result of underlying societal values and behaviors; if left unaddressed, they are predicted to continue or increase their detrimental impact. Transformative action is needed to alleviate these threats and the species declines that they contribute to.

Over recent decades, globalization has led to an increase in the international flow of people and goods, allowing more species to colonize areas outside their natural ranges. **Invasive species** can have devastating impacts on native biota, causing decline or extinction of native species and negatively affecting ecosystems. They reproduce rapidly, out-compete native species for food, water, and space, and are one of the main causes of global biodiversity loss.

Key Facts

- Nearly one fifth of the Earth's surface is at risk of plant and animal invasions, impacting native species, ecosystem functions and nature's contributions to people.¹ Invasive species are considered a high threat in Oceania and North America.
- Cumulative records of nonnative species have increased by 40% since 1980, associated with increased trade and trends in human population.² Invasions are predicted to increase another 40% by 2050.³
- Estimated global damages from invasive species between 1970 and 2017 total \$1.3 trillion.⁴ The annual U.S. cost from invasive species is estimated to be \$120 billion, with more than 100 million acres affected (i.e., about the size of California).^{4,5}
- At least 42% of the species listed as threatened or endangered under the U.S. Endangered Species Act are at risk primarily because of invasive species.^{4,6}
- Nearly 40% of the invasive plants now in the U.S. were originally introduced as ornamentals;⁷ these species affect nearly every ecosystem of the U.S. and continue to expand into new areas.⁸
- In recent years, the National Invasive Species Council budget has been cut by 50% and the associated Invasive Species Advisory Committee was terminated, impeding the ability of federal agencies to work with each other and with nonfederal stakeholders to address invasive species.⁹
- Invasive species can also have implications for public health: For instance, Japanese barberry, a popular ornamental shrub, has naturalized in more than half of the lower 48 U.S. states and has the potential to create suitable habitat for ticks that transmit Lyme disease.



INVASIVE SPECIES

Increased globalization has caused species introductions in ecosystems outside of their native ranges.

Nearly all U.S. ecosystems- and half of species listed under the Endangered Species Act- are impacted by invasive species.

Invasive species introduction and expansion can be curbed by making more effective use of national and global policy tools and monitoring.



Possible Solutions

- *Strengthen domestic regulations and rapid response regarding invasive species.* Regulations prohibiting invasive plants from entering the U.S. at border inspections or government regulation of sales can help stem the inflow of invasive nonnatives. Because management is costly, regulations are typically restricted to invasive species with the most severe negative impacts. Earlier detection and more rapid response to invasions could help improve the threat.¹⁰
- *Strengthen domestic laws.* It will also be important to make laws consistent from state-to-state. Additionally, provisions in the Lacey Act are focused on preventing the introduction and movement of injurious species by a listing process that prohibits import of injurious wildlife. This can be further applied to combat invasive species spread.¹¹
- *Improve and expand upon international policy and efforts related to invasive species management.* Target 9 of the Aichi Biodiversity Targets aims to identify and prioritize invasive nonnative species. There are also more than 40 international legal instruments dealing with the issue of invasive nonnative species, including CITES and the Ramsar Convention on Wetlands (as well numerous national laws). However, there are many legal, institutional, and social barriers to effective

invasive species management. These include information management challenges, resourcing, risk perception and lack of public support, and definitional and jurisdictional issues.¹

- *Increase restoration efforts.* Restoration of lands through invasive species removal can help maintain healthy ecosystems. [National Seed Strategy for Rehabilitation and Restoration](#) was created in 2015 to foster interagency collaboration to guide development, availability, and use of seed needed for timely and effective restoration.
- *Applying Indigenous knowledge to inform management.* Integration of Indigenous peoples' knowledge into invasive species management can promote a more holistic approach and work to benefit some of the communities most effected by invasive species. Indigenous peoples have a long history of dealing with environmental changes and species introductions; many Indigenous groups are actively responding to invasives though their work is generally underreported.
- *Address exacerbating factors.* To minimize the spread of invasive species, other stressors such as climate change, habitat degradation, pollution, and over-exploitation must be minimized. See related factsheets for possible solutions related to other drivers of biodiversity loss.

References

1. IPBES. 2019. Global assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Brondizio, E.S., Settele, J., Díaz, S., Ngo, H.T. (eds). IPBES secretariate, Bonn, Germany. DOI 10.5281/zenodo.5517154
2. Seebens, H. et al. 2017. No saturation in the accumulation of alien species worldwide. *Nature Communications*. DOI 10.1038/ncomms14435
3. Seebens, H. et al. 2020. Projecting the continental accumulation of alien species through to 2050. *Global Change Biology*. DOI 10.1111/gcb.15333
4. Pimentel, D. et al. 2005. Update on the environmental and economic costs associated with alien-invasive species in the United States. *Ecological Economics*. DOI 10.1016/j.ecolecon.2004.10.002
5. Diagne, C., et al. 2021. High and rising economic costs of biological invasions worldwide. *Nature*. DOI 10.1038/s41586-021-03405-6
6. Leu, M., et al. 2019. Temporal analysis of threats causing species endangerment in the United States. *Conservation Science and Practice*. DOI 10.1111/csp2.78
7. Lehan, N.E., et al. 2013. Accidental introductions are an important source of invasive plants in the continental United States. *American Journal of Botany*. DOI 10.3732/ajb.1300061
8. Allen, J.M. & Bradley, B.A. 2016. Out of the weeds? Reduces plant invasive risk with climate change in the continental United States. *Biological Conservation*. DOI 10.1016/j.biocon.2016.09.015
9. Simberloff, D., et al. 2020. U.S. action lowers barriers to invasive species. *Science*. DOI 10.1126/science/aba7186
10. Beaury, E.M., et al. 2021. Invaders for sale: the ongoing spread of invasive species by the plant trade industry. *Frontiers in Ecology and the Environment*. DOI 10.1002/fee.2392
11. Burgos-Rodriguez, J. and Burgiel, S.W. 2020. Federal legal authorities for the early detection of and rapid response to invasive species. *Biological Invasions*. DOI 10.1007/s10530-019-02148-w