

Alien Invasion or Welcome Immigration?: Assessing Terminology, Bias, and Miscommunication Regarding “Invasive Species”

When you think of the term “invasive species,” what comes to mind? A stowaway snake slithering off a cargo ship and wreaking havoc in backyards? Exotic fish discarded in local streams by irresponsible owners? Whatever it is, it likely isn’t positive. While an important topic in ecological management, invasive species have become a heavily stigmatized subject for the general public—a boogeyman if you will, overwhelming gardeners and farmers, and encroaching on native wildlife. Every day, scientists warn that invasive species are one of the biggest threats to biodiversity. Yet, peoples’ ingrained notions of invasive species and their perceived threats—and the critical lack of public information transparency regarding their potential impacts—have significant implications for environmental management and legislation and pose a serious problem for any future actions taken.

To understand the deep associations people have with invasive species, we must start with the very word itself, and how it differs from other similar phrases. The term “invasive species,” may suggest the idea of an attack or annexation, and promote feelings of unease, fear, and the primal instinct to protect oneself from these “invaders.” The term “invasive” is generally used to describe species that are not endemic, or naturally found in an environment, and that *do harm* to the local ecosystem, human health, and/or a region’s economy.¹ “Non-native” species, on the other hand, are species that are not endemic to an area, but that are passive in their environmental impacts.² Even more confusing, the phrase “alien species” is sometimes used as synonymous with “invasive species,” but in fact need not be harmful. From a scientific point of view, however, these definitions sometimes get blurred; A 2017 paper on the public’s perceptions of “invasive alien species” defines a “biological invasion” as the introduction—accidental or purposeful—of a species, harmful or not, into a region outside of its natural habitat.³ Furthermore, many of these phrases may conjure images of illegal immigration, segregation, and preservation of racial purity, and may play a role in propagating stigmas against non-native species. Due to these negative connotations, many scientists advocate for less provocative terminology, such as “introduced species.”

In September of 2014, the residents of Berks County, Pennsylvania, found themselves with some new neighbors. Small, brown and red with black spots, the aptly named Spotted

¹ “Invasive Species.” *National Wildlife Federation*, www.nwf.org/en/Educational-Resources/Wildlife-Guide/Threats-to-Wildlife/Invasive-Species#:~:text=Invasive%20species%20are%20among%20the,risk%20due%20to%20invasive%20species. Accessed 1 Feb. 2024.

² “Invasive & Non-Native Species” *National Parks Service*, U.S. Department of the Interior, www.nps.gov/subjects/invasive/learn.htm#:~:text=It%20is%20often%20thought%20that,native%20species%20that%20do%20harm. Accessed 1 Feb. 2024.

³ Shackleton, Ross T, et al. “Explaining People’s Perceptions of Invasive Alien Species: A Conceptual Framework.” *Journal of Environmental Management*, Academic Press, 2 Aug. 2018, www.sciencedirect.com/science/article/pii/S0301479718304274.

Lanternfly is native to China, but in the last ten years has spread all around the world, and in the process garnered a reputation as an ecological ‘persona non grata.’ The lanternfly is defined as invasive in the United States, due to its devastating impacts on crops across New England. In the last few years, the situation has gotten so bad that state governments, mainstream media outlets, and environmental organizations have instructed residents to kill the bugs on sight. Notably, in a 2022 skit, Saturday Night Live poked fun at the widespread mania, but in the process arguably humanized the lanternfly and swayed many into hesitancy regarding killing them. “Oh I’m aggressive? I’m the one who’s doing the aggressive, Michael Che? They’re [the ones] telling their children to stomp me to death!” said Bowen Yang, roleplaying a spotted lanternfly.⁴ This visceral reaction people have to invasive species can also extend beyond non-native species. Whether the subject is “weeds” or “pests,” we tend to hold similar biases toward anything that in any way poses a threat to the reality we have created, even if the species in question is not explicitly dangerous to people or the surrounding environment. When the National Invasive Species Council was established in 1999 by President Bill Clinton, the definition given to invasive species was “an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.”⁵ The introduction of an economic aspect in some ways obscures any actual ecological impacts, and goes to show that the line between scientific consensus and political/financial motivations can become blurry.

From a moral standpoint, the conversation becomes even more complex. “Established species” are those which, regardless of their provenance, have become firmly embedded in an ecological system, and now play an important role in that system’s processes. While these species can often still be “invasive,” many times they become integral parts of the ecosystem that other species begin to rely on. In Santa Barbara, there has recently been much controversy surrounding the UCSB campus’s Eucalyptus Grove, with students and faculty alike calling for the removal of the stretch of trees lining Ocean Road. Around the time that most of the native Oak trees were cut down to fuel local houses and businesses, including the nascent Goleta Whaling Station,⁶ Eucalyptus trees were first introduced to Santa Barbara in 1872. Settlers planted them by the hundreds for building materials as they built the city of Goleta into what it is today.⁷ The only issue? Eucalyptus is very flexible, and doesn’t work well as building material. Once the colonists realized their mistake, they abandoned the trees in search of different materials. Eucalyptus trees, however, are extremely resilient and eventually covered much of the area. In addition, they quickly became important habitats for many other species, including the endangered monarch butterfly. Nevertheless, the California Department of Parks and Recreation

⁴ “Weekend Update: A Spotted Lanternfly on Being an Invasive Species - SNL.” *YouTube*, YouTube, 2 Oct. 2022, www.youtube.com/watch?v=K_x4soinsRQ.

⁵ “Executive Order 13112 - Invasive Species.” *Executive Order 13112 - Invasive Species* | National Invasive Species Information Center, www.invasivespeciesinfo.gov/executive-order-13112. Accessed 1 Feb. 2024.

⁶ Modugno, Tom. “Goleta’s Whaling Station.” *Goleta History*, 3 Jan. 2015, goletahistory.com/goletas-whaling-station/.

⁷ Redmon, Michael. “Eucalyptus Trees.” *The Santa Barbara Independent*, 9 May 2011, www.independent.com/2011/05/09/eucalyptus-trees/#.

defines native species as species which pre-date European contact, emphasizing how even the definition of what a *native* species is can be subjective. Despite Eucalyptus being considered “moderately invasive,”⁸ due to its extreme susceptibility to wildfire but otherwise small potential for environmental harm, many have asked what right we have to remove non-native species that have, at this point, already been here for centuries.

While non-native species are clearly an environmental management issue, the stigma surrounding them has also bled into conservation policy. Even if a species is classified as endangered, if it is considered invasive in any regions outside its home territory, those external groups will not be counted in its overall population numbers. Furthermore, the invasive populations will often be targeted for removal or elimination, regardless of the species’ conservation status. A 2019 study of conservation statistics for Australian wildlife found that formal accounts of population numbers underestimated total global ranges by an average of 30% for immigrant species and 7% for emigrant species.⁹ Because of technicalities like these and their negative implications for the wider field of conservation, as well as simply from a moral point of view, many scientists have even bought into what some publications are calling “invasive species denialism,” which—despite its polarizing name—is essentially just a critique of the field of invasion biology and its core values and applications.¹⁰ The paper’s authors also discuss the concept of “nativism” in conservation, or the value put on natural elements that we perceive as native, compared to those which have been introduced, and the increased efforts taken to protect them. This begs the question: to what extent are we willing to go in order to preserve systems’ in a ‘natural’ state, and at what cost? Naturalist and Sierra Club founder John Muir believed in the intrinsic beauty and value of natural spaces, and dedicated his life to establishing frameworks that protected them. However, many of his views centered around the idea of preserving ‘untouched’ nature, and limiting the extent to which humans influenced these ‘wild’ places. Over a century later, this idea of nature as something pristine and fragile continues to pervade our collective consciousness. In California, many people grow up learning to “never pick a California poppy”—a native species, and thus off-limits to human disturbance. And yet, there exist regional variations of the species that have the potential to displace other native species if they move too far from their original territory. Consequently, human removal is sometimes recommended.¹¹ If you’re not aware of the regional variation of this particular species, you may be shocked to find groups of people picking them by the dozens on the side of the road.

⁸ Gross, Liza. “Eucalyptus: California Icon, Fire Hazard and Invasive Species.” *KQED*, 12 June 2013, www.kqed.org/science/4209/eucalyptus-california-icon-fire-hazard-and-invasive-species.

⁹ Wallach, Arian D, et al. “When All Life Counts in Conservation.” *Conservation Biology: The Journal of the Society for Conservation Biology*, U.S. National Library of Medicine, 28 Nov. 2019, pubmed.ncbi.nlm.nih.gov/31782203/.

¹⁰ Munro, David, et al. “On Allegations of Invasive Species Denialism.” *Conservation Biology: The Journal of the Society for Conservation Biology*, U.S. National Library of Medicine, 13 Mar. 2019, www.ncbi.nlm.nih.gov/pmc/articles/PMC6850308/#:~:text=What%20has%20been%20labeled%20invasive,not%20to%20deny%20its%20knowledge.

¹¹ *California Poppy (Eschscholzia Californica) Plant Guide*, United States Department of Agriculture, National Resources Conservation Service, Sept. 2018, plants.usda.gov/DocumentLibrary/plantguide/doc/pg_esca2.docx.

But what about cases where introduced species actually are beneficial? A 2022 paper published in *Science* found that, in the face of critical reductions in the number of seed-dispersing fauna worldwide, certain non-native species of birds and mammals may be able to play important roles in dispersing plants, and thereby helping them adapt to changing climates. In fact, on the Hawaiian island of Oahu, the researchers found that 99% of seed dispersal is facilitated by non-native species.¹² They also found that, in the case of the removal or extermination of introduced species in regions which have been heavily defaunated, “the magnitude of dispersal function loss far exceeds the magnitude of species richness loss.”¹³ As climate change forces many species to move, or “track their climatic niches” as the *Science* paper calls it, many call for us to stop “demonizing” such species as “invasives.”¹⁴ Furthermore, because of the extreme variation in the potential impacts of introduced species, as well as how the impacts are heavily influenced by context and location, the topic of invasive species is inherently an environmental sovereignty and stewardship issue. In many scenarios, if an introduced species is deemed potentially threatening to either the local ecosystem, human health, or agricultural output, the scientists and legislators alike advocate for the removal of said species—which more often than not involves the use of pesticides and other poison, hunting, or trapping. However, the scientific consensus on the best course of action in these situations can conflict with local stakeholders.¹⁵ In many cases, these stakeholders are Indigenous communities, which have historically been excluded from environmental management conversations about the very land they inhabit. A research team in Australia has acknowledged this need for more inclusive decision-making; they developed an “adaptive management” framework for the management of feral cats and invasive European red foxes on Minjerribah-North Stradbroke Island, which involves direct conversation and with and survey of the island’s local inhabitants, to assess the most culturally relevant and cost-effective solutions.¹⁶ In addition, simply the lack of consensus on terminology and a deficit of research on introduced species often complicates decision-making regarding management. In Brazil, the management of invasive plant species has been significantly hindered due to limited research on their impacts and a lack of agreement on what invasive species are to begin with.¹⁷

¹² Whitcomb, Isobel. “Invasive Species Aren’t Always the Bad Guys.” *Sierra Club*, 17 Feb. 2022, www.sierraclub.org/sierra/invasive-species-aren-t-always-bad-guys.

¹³ Fricke, Evan C, et al. “The Effects of Defaunation on Plants’ Capacity to Track Climate Change.” *Science*, 13 Jan. 2022, www.science.org/doi/10.1126/science.abk3510.

¹⁴ Bolotnikova, Marina. “It’s Time to Stop Demonizing ‘Invasive’ Species.” *Vox*, 28 Nov. 2021, www.vox.com/down-to-earth/22796160/invasive-species-climate-change-range-shifting.

¹⁵ Shackleton, Ross T, et al. “Explaining People’s Perceptions of Invasive Alien Species: A Conceptual Framework.” *Journal of Environmental Management*, Academic Press, 2 Aug. 2018, www.sciencedirect.com/science/article/pii/S0301479718304274.

¹⁶ Caceres-Escobar, Hernan, et al. “Integrating Local Knowledge to Prioritise Invasive ... - Besjournals.” *British Ecological Society*, 15 May 2019, besjournals.onlinelibrary.wiley.com/doi/10.1002/pan3.27.

¹⁷ Fachinello, Maria Cecilia, et al. “Defining Invasive Species and Demonstrating Impacts of Biological Invasions: A Scientometric Analysis of Studies on Invasive Alien Plants in Brazil over the Past 20 Years.” *NeoBiota*, Pensoft Publishers, 3 Oct. 2022, neobiota.pensoft.net/article/85881/.

One potential way to address this disconnect between the scientific community, stakeholders, and the general public is increased education and communication. In the past few years, TikTok has become an incredibly powerful tool for dispersing information, and indeed serves as the main source of news and social connection for many users. One user, @invasivespeciesdude, is a self-described environmental content creator, and has published dozens of short videos on introduced species, whether they are harmful or not, how to identify them, and what to do if you find one. This type of content, aimed at the average viewer, is fairly effective and arguably an important tool in our efforts to combat misinformation about invasive species. However, as with pretty much any form of content, when the platform is opened up to anyone with the basic set of materials (phone, internet connection), the potential for misinformation can also increase. Therefore, it is also crucial for the scientific community to make their research more accessible to the general public and broaden their communications on their findings. The development of safe, alternative solutions of removing or relocating potentially harmful species on which all relevant parties can agree on is also critical, and will require effective communication with local inhabitants about the needs of them and their community.

Whether introduced species are harmful or beneficial, “invasive” or “non-native,” the perceptions the public have are deeply rooted, and intertwined with cultural, religious, political, and economic values. These perceptions have significant implications for how invasive species are managed, as well as the effects those decisions have on the surrounding ecosystems and communities. It is clear that wider communication and more transparency regarding the related terminology and potential implications, as well as increased involvement of local stakeholders who would be impacted by any species management decisions, are crucial to the future of biodiversity preservation and equitable ecological management.