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The Aliens in Our Midst: Managing Our Ecosystems

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CHAPTER 16

The Aliens in Our Midst: Managing Our Ecosystems

BANU SUBRAMANIAM

I begin with a central and profound insight of the feminist and cultural studies of science: that nature and culture, science and society, and biology and the social are not binary opposites. Rather, they are co-constituted and co-produced. We need to go beyond the idea of nature shaping culture and culture shaping nature and move toward an understanding where nature and culture are seen as inextricably interconnected and indeed as constitutive of each other. Instead of the binary formulation of nature and culture, we should begin thinking in terms of Donna Haraway's (1999) memorable phrase *naturecultures*. There is no nature and culture, only naturecultures. I use the field of invasion biology as an illustrative case in point.

It will come as no surprise to readers of this volume that we live in times of numerous environmental crises, in particular perceived crises of our ecosystems. While there are many sites and sources of the problems that have been identified, one prominent source in the biological and popular literature is that of invasive species. It is argued that some exotic and foreign species are entering the nation, growing and reproducing aggressively and in the process destroying native habitats and landscapes. The central problem is seen as a proliferation of exotic and foreign species, and the solution proposed is the eradication of these species in order to save native ecosystems. As Preston and Williams (2003) sum up: "Invasive alien species are emerging as one of the major threats to sustainable development, on a par with global warming and the destruction of life support systems." Considered as biological "pollutants," invasive species are seen as a major

threat (Simberloff 2000) and a costly “catastrophe” for native biodiversity (McNeely 2001). They are seen by the National Wildlife Foundation as a “major threat” to biodiversity, second only to habitat loss and degradation, and the Minnesota Department of Natural Resources has similarly described them as a “major cause” of biodiversity loss throughout the world.¹

Politicians and environmental activists alike call for immediate action (Carlton 1999). Invasive species have been recognized as a major threat by the United Nations and almost every national and state government (Simberloff 2000). Each has its own invasive species program to monitor and control the spread of invasives. The Rio Convention on Biological Diversity (1992) recognized the threat of invasive species. There are now global invasive species programs at the United Nations and other international organizations. The U. S. government has declared invasive species as a “critical problem.”² In 1999 a Presidential Executive Order (EO 13112) resulted in the formation of the Federal Invasive Species Council, co-chaired by the Secretaries of the Interior, Agriculture and Commerce.³ Every state government in the United States has an invasive species program, and “most wanted” invasive species lists are now ubiquitous.

The public attention is likewise striking and strident. Newspaper articles, magazines, journals, and websites all demand quick action to stem the rise of exotic biota (Subramaniam 2001). Newspapers and media outlets regularly report on local “threats.” There are books, journal issues, and indeed entire journals, like *Biological Invasions*, devoted to this field. Indeed, over the past three decades, there has been a huge explosion of work on invasive plant species. The frenzied alarm has been sounded by groups on the right and left, environmentalists and nonenvironmentalists alike. At the level of research and policy, this is a fertile area.

The U.S. Department of Agriculture, state governments, and National Science Foundation committees—as well as environmental groups such as Nature Conservancy and Sierra Club—all have invasive species programs. Environmental and local plant societies successfully engage their citizens to give up their weekend to help destroy foreign species and/or introduce native plants and animals into local habitats (Neyfakh 2011). Looking through biological journals and popular magazines and newspapers, it would seem that biologists and nonbiologists, environmentalists and nonenvironmentalists, scientists and lay citizens are in agreement about the problem of foreign species. Most cities and states have advisories on desirable and undesirable plants for the household garden. In short, from the president on down, government and local agencies and the public have been calling for urgent action, usually using militaristic language (Larson

2005) urging us to “fight the invaders” and defend the nation against the “growing threat from non-native species” (Herbert 1998).

While this campaign against foreign species rages on, a growing number of academics and activists are pointing out the problem of this formulation of foreign species as inherently “evil” and as the source of the problem of our ecosystems (Milton 2000; Sagoff 2000; Slobodkin 2001; Subramaniam 2001; Theodoropoulos 2003; Brown and Sax 2004; Colautti and MacIsaac 2004; Brown and Sax 2005; Gobster 2005; Sagoff 2005; Coates 2006; Larson 2007; Warren 2007; Davis 2009; Davis et al. 2011). Why? In order to better understand the breadth and depth of these critiques, we need to move to think natureculturally and reinvigorate understandings of ecosystems that place humans and their complex histories squarely within ecosystems in both how we understand environmental problems and their solutions (Odum 1997; Larson 2007). Indeed a version of this debate was played out on the pages of *Nature* in 2011 (Davis et al. 2011; Simberloff et al. 2011).

NATURE IN-PLACE AND NATURE OUT-OF-PLACE

As it turns out, the idea of native and foreign plants emerges largely through nationalistic ideas of wanting to define national flora. The concept of “nativeness” was first outlined by English botanist John Henslow in 1835 and was soon adapted to define “a true British flora” (Davis et al. 2011). As with all binaries, the category “true” simultaneously articulates what is “not true,” and the now familiar binary of the native/alien emerged, although no general policy about native/aliens developed. In recent decades, the renewed interest in plant invasions can be traced to Charles Elton’s 1958 book *The Ecology of Invasions*, though “invasion biology” emerged as a discipline of its own only around the 1970s (Davis 2009). It is important to note that we have historically imagined our relationship with the biota of the world in numerous and diverse ways. In his influential book *Ecological Imperialism*, Alfred Crosby (1986) argues that the roots of European domination of the Western world lie in their creating “New-Europes” wherever they went, especially in North and South American, Australia, and New Zealand. Rather than thinking of European domination as the result of technology, Crosby argues that we should understand it as simultaneously biological and ecological. Where Europeans went, their agriculture and animals went; they thrived, and indigenous and local ecosystems collapsed. This vast migration of species ushered in a bioinvasion of mass proportions by the conquerors’ animals, plants, weeds, and germs, thus yielding a “great reshuffling” (Crosby 1986; Weiner 1996; McNeely 2001; Warren 2007).

Some plants were now ubiquitous across the globe; as Crosby remarks, “the sun never sets on the empire of the dandelion.”

Over the past decade, I have followed with great interest the explosion of work and the sustained panicked campaigns decrying the influx of foreign and exotic species, especially the ones that are invasive. These campaigns highlight the erosion of native and local habitats and the destruction of nature. Books and articles have proliferated into a veritable industry against invasive and exotic plants. Alongside the panic on invasive species of plants and animals are the hotly debated politics on human immigration into the United States. What are particularly striking to me are the remarkable parallels between the campaigns against human immigrants and those of foreign plants and animals (Subramaniam 2001).

Like human immigrants, alien plant and animals are seen as “other,” looking different, even ugly, and definitely not from here (Robichaux 2000). They are seen as unhygienic and germ-ridden, and colonial and racist narratives of dirt, disease, and hygiene abound in these narratives. Like humans, a characteristic hallmark of invasive species is their supposed aggressive reproductive capacity. The repeated and familiar trope of third-world female hyperfertility, rampant overpopulation, and the ensuing resource depletion, aesthetics, and poverty haunt narratives of foreign plants/animals and humans. Repeatedly, alien plants are characterized as aggressive, uncontrollable, prolific, invasive, and expanding. One article sums it succinctly: “They Came, They Bred, They Conquered” (Bright 1999). Despite the aggressive reproduction, they are seen as silent and stealthy, often invisible and ignored. E.O. Wilson states: “Alien species are the stealth destroyers of the American environment” (McDonald 1999). Articles remind us that alien plants are “evil beauties”—that while they may appear to look harmless and even beautiful, they are evil because they destroy native plants and habitats (Cheater 1992). Their persistence and ability to withstand extreme situations makes them difficult to eradicate. Finally, there is the charge of irreversibility: Once these plants gain a foothold, they never look back. Singularly motivated to take over native land, aliens become disconnected from their homelands and will never return and are, therefore, “here to stay” (Cheater 1992). In each of these parallels, alien/foreign species are presented as “problems” and native species as “victims.” Paralleling human immigration, this rhetoric proposes the need to protect natives from the aliens. Paralleling human immigration, we hear calls to “fence” borders and develop policies to keep alien/exotic flora and fauna out of the nation and eradicate them within. It would appear that environmentalists worry about foreign plants and animals and anti-immigration activists worry about human immigration, with little interaction between

them. Yet in tracking the rhetoric between humans and plants and animals, it is evident that xenophobic rhetoric gains force as it travels between anti-immigrant rhetoric of human migrants and the rhetoric of biological invasions of plants and animals (Subramaniam 2001). Suddenly, across sites, the “alien” is now rendered the problem and the “native” the victim.

Is this panic entirely about our concern for the natural world and a fast-changing ecosystem? Here, history should give us pause because it turns out that there is a pattern to when xenophobic narratives emerge. We should remember that our anxieties about social incorporation, associated with expanding markets, increasingly permeable borders, growing affordability for transport, and mass immigration, have historically spilled into our conceptions of nature. For example, Nancy Tomes (2000) documents how our panic about germs has historically coincided with periods where groups perceived as “alien” and difficult to assimilate were engaged in heavy immigration to the United States. She documents these germ panics in the early 20th century in response to the new immigration from eastern and southern Europe and in the late 20th century, to the new immigration from Asia, Africa, and Latin America.

I theorize that the recent hyperbole about alien species is embedded within a similar panic period over changing racial, economic, and gender norms in the country (Subramaniam 2001). The globalization of markets, the global production and consumption of goods, and the real and perceived lack of local control feed nationalist discourse. September 11, the specter of terrorism, and a volatile globe have intensified emotions and rhetoric. Since the financial crisis, a weak economy and high anxieties about unemployment (coupled with outsourcing and the movement of production abroad) have only heightened the stakes. These shifts continue to be interpreted by some elements of both the right and the left as a problem of immigration. Immigrants and foreigners—the product of the “global”—continue to be used as scapegoats for the problems in the “local.” These shifts and trends are evident in the national rhetoric surrounding alien and exotic plants and animals (Subramaniam 2001).

The fear of invasions is not unique to our time or nation. Rather, there is a long and indeed global history of invoking the concept of invasiveness, and in all these cases the idea of the invasive has gone hand in hand with particular political and social problems. For example, during colonial rule in India, the British used the rhetoric of invasive plants to manage plants and through new regulations on plants also disciplined and contained their colonial subjects (Iqbal 2009). Similarly, the links between plant control, gardening, horticulture, and human control through eugenics are well documented. The idea of “gardening states,” promoted in Nazi Germany,

which concerned itself with “eliminating bad weeds from the national garden and thereby constructing sharply exclusionary national identities,” is not accidental (Mottier 2008). After all, horticulture and agriculture are all rooted in the idea of “culture” (Cardozo and Subramaniam 2008). The links between plant/animal control and human control are well documented; perfection in gardens and peoples are rooted in an ongoing struggle against “difference” (Mottier 2008). The control of human populations has always been linked to the health of the environment. History reminds us that the roots of conservation biology are deeply intertwined in the history of eugenics—the fear that the black and brown hordes will come knocking on the doors of a “white nation” has a long history and persists today in the discourses around environmental refugees of climate change (Stern 2005; Hartmann 2010).

This fear of the outsider has brought in a pervasive nativism that permeates conservation biology (Paretti 1998). Nativism strongly grounds most of the literature against biological invasions, as seen in the idea of “Going Local: Personal Actions for a Native Planet” (Van Driesche and Van Driesche 2000). Such rhetoric conjures up a vision where everything is in its “rightful” place in the world and where everyone is a “native.” Even in the most progressive visions of the environment, however, the true natives, of course, are the white settlers who reached the Americas to displace the original natives.

DEFINING NATIVE AND EXOTIC

The interconnections between nature and culture run deeper than the xenophobia that may span our view of foreign plants, animals and humans. The very definitions of what constitutes a native or an exotic plant are problematic. According to the U.S. Department of Agriculture, “Invasive plants are introduced species that can thrive in areas beyond their natural range of dispersal. These plants are characteristically adaptable, aggressive, and have a high reproductive capacity. Their vigor combined with a lack of natural enemies often leads to outbreak populations.”⁴ All definitions of invasive species highlight their foreign origin, their aggressive growth, and hyperfertility. Biologically speaking, it is important to note that the categories of native/exotic are not as easy or clear-cut (Helmreich 2009). More central to issues of native/exotic plants are questions of what gets to be called a “native” species. Which year marks the cut-off point to demarcate the native from the foreign? Given that the majority of U. S. Americans are immigrants themselves, the reinvention of the “native” as the white

settlers and not “Native Americans” is striking. The systematic marginalization and disenfranchisement of “Native Americans” makes the irony all the more poignant.

What is most disturbing about projecting anxieties attending contemporary politics onto alien/exotic plants is that other potential loci of problems are obscured. Thus blaming the foreign origins of a plant or animal rather than the contexts of invasion misidentifies the problem. The language of invasive species misidentifies the problems that face us and misplaces and displaces the locus of the problem. It scapegoats the foreign for a problem they did not create and whose removal will not solve the problem. The problem is not the foreign species per se but rather human overdevelopment that has created ecological disturbances and changing ecosystems and species composition (Mack et al. 2000; Hierro et al. 2006). Fundamentally, weeds are often early successional species that thrive in newly upturned earth. Furthermore, alien species do not do well in all contexts—they appear to thrive in habitats with low species diversity, areas with high heterogeneity in habitats, and, most important, disturbance. This explains why there are huge numbers and quantities of European weeds that took root in the United States while hardly any U.S. weeds appeared in Europe in the same historical period. Invasibility emerges; it isn’t a characteristic of species, and, as such, it has to be understood as a response to particular ecological habitats (Marvier 2004). Indeed, species that are “invasive” outside their native ranges are unlikely to be so within their home ranges (Hierro et al. 2006). Let us not forget that disturbance also alters species composition among native species, and native species can also be invasive. A displacement of the problem on the intrinsic “qualities” of exotic/alien plants and not on their degraded habitats produces misguided management policies. Rather than preserving land and checking development, we instead put resources into policing boundaries and borders while blaming foreign and alien plants for an ever-increasing problem. Unchecked development, weak environmental controls, and the free flow of plants and animals across nations all serve certain economic interests in contemporary globalization. Displacement of blame onto foreigners does not solve the problem of the extinction of species and the degradation of habitats.

By way of a solution, the recurring call for a return to a native nature is also problematic. The idea of a static “native” nature that we should preserve forever is contrary to biological processes. Shifts in species composition have been ubiquitous in evolutionary history and should not surprise us. While there have been many “apocalyptic” scenarios of invasions proclaimed in the news, the major extinction threats are not backed by data (Davis et al. 2011). Most campaigns to eradicate invasive species simply

have not worked. Rather, in contrast, new arrivals can often help an ecosystem rather than hurt it; alien species have often increased biodiversity while helping local habitats and native insects and birds flourish (Sagoff 2000; Sagoff 2005; Davis et al. 2011; Neyfakh 2011). The anti-invasive species campaigns thus mischaracterize native/alien. Most Americans do not realize that many of their prized flora and fauna are foreign in origin. Mark Sagoff (2000) points out that the broad generalizations of exotic/alien plants obscure the heterogeneity of the life histories, ecologies, and contributions of native and exotic plants. For example, he points out that nearly all U.S. crops are exotic plants while most of the insects that cause crop damage are native species. Indeed, some native species, such as the Colorado pine beetle (*Dendroctonus ponderosae*), have proven to be invasive and have caused great damage while foreign species like honeybees are economically valuable (Raffles 2011). The ring-necked pheasant (the state bird of South Dakota), purple lilac (the state flower of New Hampshire), and red clover of Vermont are all foreign in origin (Davis et al. 2011; Neyfakh 2011). The categories of native and exotic house too much diversity to be useful criteria for ecosystem management. Classifying organisms by their “adherence to cultural standards of belonging, citizenship, fair play and morality does not advance our understanding of ecology” (Davis et al. 2011). We need to remember that human disturbance is not new and in some parts of the world is many centuries old. Ecologists argue that in some areas that have been disturbed for hundreds of years, plant and animal communities have evolved to create new ecological equilibria (Pringle et al. 2009).

In restoring nature to an arbitrary past, why do we only want to restore the plant/animal world and not the human world to its original configurations? This is especially troubling since most invasive species did not magically migrate but were rather introduced by humans (Marinelli and Randall 1996). Indeed, we should understand invasions as *invited invasions* (Cardozo and Subramaniam 2013). Yet why are the solutions always only about flora and fauna? To what lengths will we go to “restore” our world to some nostalgic imagined vision of the past? Whose nostalgia? As Mark Thompson (2011) points out, while invasive species do damage, so do roads and “green” bioenergy plants that have being erected in service of our communities. As a field, restoration ecology has embraced biological, mechanical, and chemical interventions with gusto. Small orange flags dot many of our landscapes, where they mark sites of our increasingly herbicide-ridden landscapes. Will we chemically bombard ourselves to satisfy our nostalgia? What does it mean to restore our world to 1985 or 1945 or 1490, at the cost of polluting our soil and groundwater, only to artificially manage a vision of a nature of yesteryear? What are we saving and for whom?

TOWARD NATURECULTURAL ECOLOGIES: NATURECULTURES AS DYNAMIC

I want to be clear that I am not without sympathy or concern about the destruction of habitats, which is indeed alarming. We need to publicize and spread awareness about the destruction of species and habitats. However, in our zeal to draw attention to the loss of habitats, we should not feast or feed on the xenophobia rampant in a changing world. Invasive species rhetoric focuses less on the human-made ecological contexts and degradation of habitats and more on alien/exotic plants and animals as the main and even sole problem. Indeed, while we may all agree that only some species cause problems for the environment, and while officials may agree that only a few individuals are likely to ever resort to terrorism, the deeper political and philosophical question is: What do we do with the “other” others? What of the benign aliens or even those who enrich our world? Does nature have to be in place? Where do we locate human and biotic variation in the grand scheme of life? Are all alien species to be marked? Suspected? The very act of labeling humanity and biota into two categories—native and alien—immediately marks the presumed good from the possible evil. As long as we cannot see human and biotic variation as a continuum in its rich and grand diversity and instead see variation as a binary difference between native/alien and good/evil, our quest for an inclusive, ethical world is lost. Even within the realm of the natural or biological, as we look more deeply, we can see that there are other biological characteristics that better explain the success of some species over others. Many ecologists and conservation biologists have developed alternate models and disagree sharply with the dominant framework of conservation biology (Larson 2007; Davis et al. 2011). In considering biological factors, we ought to embrace a more dynamic and pragmatic approach, focus on the biology and ecological characteristics of species, and study their function in their ecosystem rather than conduct litmus tests on their geography of origin (Chew and Hamilton 2011; Davis et al. 2011; Larson 2007). Plants and animals, like humans, also need a “thoughtful and inclusive response” (Raffles 2011).

However, as I have argued, invasive species is not a “natural” problem alone; it is deeply embedded in the histories and cultures of human populations. Studying “naturecultures” means being cognizant of how science and the humanities are embedded in naturecultural contexts. Therefore, our response must not be just about the biological but also about understanding invasive species as located in their naturecultural histories. Yet just as science does not mirror nature, we must not reduce science

to mirroring politics either (right or left). Both the cultural and scientific worlds house diverse and heterogeneous views with a long tradition of dissent. We have to realize that nature is not that imagined nostalgia for a mythical yesteryear but rather an evolving entity, in and of ourselves. Whether we like it or not, we are defining nature through our action. In a naturecultural world, humans are part of the ecosystem. Taking this stance is not about falling back on an anarchic world where anything goes in the name of a free market or globalization. Rather, it is about taking responsibility for the world we live in and for us, as a community, to define the values that will guide us in our relationship with the natural world. Rhetoric about “natives” supports antidemocratic politics and ultimately yields less than maximally reliable sciences. “Naturecultures” force us to simultaneously attend to and transform *both* societies and the sciences that are dedicated to such projects, thus yielding more maximally objective and democratic results.

The heart of a naturecultural view is that invoking a nostalgic nature of yesteryear to “return” to is an arbitrary and ahistorical position. Naturecultures must be a democratic project, grounded in an imagination of the natures and cultures we want to live in. The natural should be understood to be the naturecultural that it is—shaped by its inhabitants. If we want to return to a nature of 1900, let us be honest in the political, ideological, or aesthetic reasons that guide us rather than invoking some mythical pure nature of yesteryear. We do not need to resort to the naïve and powerful tropes of a fear of the foreign and alien or the calls for a nostalgic mythical past. This is the naturecultural world that can await us. If we do not act, a dynamic naturecultural world fueled with false nostalgia, irresponsible ecological management, overexploited landscapes, overdeveloped lands, and rampant consumerism will surely hurtle us along our current environmental course. The dire crisis of climate change, fast-changing plant and soil communities, among many others is surely all the evidence we need.

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NOTES

1. See, for example, Department of Natural Resources: <http://www.dnr.state.mn.us/invasives/faq.html> and National Wildlife Federation: <http://www.nwf.org/What-We-Do/Protect-Wildlife/Invasive-Species.aspx>

2. <http://www.fws.gov/invasives/pdfs/NationalStrategyFinalRevised05-04.pdf>
3. <http://www.invasivespecies.gov/index.html>
4. U.S. Department of Agriculture. National Agricultural Library. <http://www.invasivespeciesinfo.gov/plants/main.shtml#.UEpMyZbflTo>

REFERENCES

- Bright, C. 1999. "Invasive Species: Pathogens of Globalization." *Foreign Policy* 116: 14.
- Brown, J.H., and D.F. Sax. 2004. "An Essay on Some Topics Concerning Invasive Species." *Trends in Ecology and Evolution* 16: 460–465.
- Brown, J.H., and D.F. Sax. 2005. "Biological Invasions and Scientific Objectivity: Reply to Cassey et al." *Australian Ecology* 30: 481–483.
- Colautti, R.I., and J.J. MacIsaac. 2004. "A Natural Terminology to Define 'Invasive' Species." *Diversity and Distributions* 10: 135–141.
- Cardozo, K., and B. Subramaniam. 2008. "Genes, Genera, and Genres: The NatureCulture of BioFiction in Ruth Ozeki's *All Over Creation*." In *Tactical BioPolitics: Art, Activism, and Technoscience*, edited by B. da Costa and K. Philip, 269–288. Cambridge, MA: MIT Press.
- Cardozo, K., and B. Subramaniam. 2013, February. "Assembling Asian/American Naturecultures: Orientalism and Invited Invasion." *Journal of Asian American Studies* 16(1): 1–23.
- Carlton, J.T. 1999. "A Journal of Biological Invasions." *Biological Invasions* 1: 1.
- Chester, M. 1992. "Alien Invasion: They're Green, They're Mean, and They May Be Taking Over a Park or Preserve Near You." *Nature Conservancy* 42: 24–29.
- Chew, M.K., and A.L. Hamilton. 2011. "The Rise and Fall of Biotic Nativeness: A Historical Perspective." In *Fifty Years of Invasion Ecology*, edited by D.M. Richardson, 35–47. Hoboken, NJ: Wiley-Blackwell.
- Coates, P. 2006. *American Perceptions of Immigrant and Invasive Species: Strangers on the Land*. Berkeley: University of California Press.
- Crosby, A.W. 1986. *Ecological Imperialism: The Biological Expansion of Europe, 900–1900*. New York: Cambridge University Press.
- Davis, M. 2009. *Invasion Biology*. New York: Oxford University Press.
- Davis, M.A., M.K. Chew, R.J. Hobbs, A.E. Lugo, J.J. Ewel, G.J. Vermeij, et al. 2011. "Don't Judge Species on Their Origins." *Nature* 474: 153–154.
- Gobster, P.H. 2005. "Invasive Species as Ecological Threat: Is Restoration an Alternative to Fear-Based Resourced Management?" *Ecological Restoration* 23: 261–270.
- Haraway, D. 1999. *How Like a Leaf: An Interview with Thyra Nichols Goodve*. New York: Routledge.
- Hartmann, B. 2010. "Rethinking Climate Refugees and Climate Conflict: Rhetoric, Reality and the Politics of Policy Discourse." *Journal of International Development* 22: 233–246.
- Helmreich, S. 2009. *Alien Ocean: Anthropological Voyages in Microbial Seas*. Berkeley: University of California Press.
- Herbert, J.H. 1998. "Feds to Fight Invaders." *ABC News*, February 3.
- Hierro, J., D. Villare, O. Eren, J.M. Graham, and R.M. Callaway. 2006. "Disturbance Facilitates Invasion: The Effects are Stronger Abroad than at Home." *The American Naturalist* 168: 145–156.
- Iqbal, I. 2009. "Fighting with a Weed: Water Hyacinth and the State in Colonial Bengal, c. 1910–1947." *Environment and History* 15: 35–59.
- Larson, B. 2005. "The War of the Roses: Demilitarizing Invasion Biology." *Frontiers in Ecology and the Environment* 3: 495–500.

- Larson, B. 2007. "An Alien Approach to Invasive Species: Objectivity and Society in Invasion Biology." *Biological Invasions* 9: 947–956.
- Mack, R., D. Simberloff, W.M. Lonsdale, H. Evans, M. Clout, and F.A. Bazzaz. 2000. "Biotic Invasions: Causes, Epidemiology, Global Consequences and Control." *Issues in Ecology* 5: 1–12.
- Marinelli, J., and J.M. Randall. 1996. *Invasive Plants: Weeds of the Global Garden*. New York: Brooklyn Botanic Garden.
- Marvier, M., P. Kareiva, and M. Neubert. 2004. "Habitat Destruction, Fragmentation, and Disturbance Promote Invasion by Habitat Generalists in a Multispecies Metapopulation." *Risk Analysis* 24: 869–878.
- McDonald, K.A. 1999. "Biological Invaders Threaten U.S. Ecology." *Chronicle of Higher Education* 45: A15.
- McNeely, J. 2001. "Invasive Species: A Costly Catastrophe for Native Biodiversity." *Land Use and Water Resources Research* 1: 1–10.
- Milton, Kay. 2000. "Ducks out of water: Nature conservation as boundary maintenance." In *Natural Enemies: People-Wildlife Conflicts in Anthropological Perspective*, edited by John Knight, 229–246, New York: Routledge.
- Mottier, V. 2008. "Eugenics, Politics and the State: Social Democracy and the Swiss 'Gardening State.'" *Studies in the History and Philosophy of Biology & Biomedical Sciences* 39: 263–269.
- Neyfakh, Leon. 2011. "The Invasive Species War," *The Boston Globe*, July 31.
- Odum, E.P. 1997. *Ecology: A Bridge Between Science and Society*. Sunderland: Sinauer Associates.
- Paretti, J. 1998. "Nativism and Nature: Rethinking Biological Invasions." *Environmental Values* 7: 183–192.
- Preston, G., and L. William. 2003. "Case Study: The Working for Water Programme: Threats and Successes." *Service Delivery Review* 2: 66–69.
- Pringle, A., J. Bever, M. Gardes, J. Parrent, M. Rillig, and J. Klironomos. 2009. "Mycorrhizal Symbioses and Plant Invasions." *Annual Review of Ecology, Evolution, and Systematics* 40: 699–715.
- Raffles, H. 2011. "Mother Nature's Melting Pot." *The New York Times*, August 7.
- Robichaux, M. 2000. "Alien Invasion: Plague of Asian Eels Highlights Damage from Foreign Species." *The Wall Street Journal*, September 27.
- Sagoff, M. 2000. "Why Exotic Species Are Not as Bad as We Fear." *Chronicle of Higher Education* 46: B7.
- Sagoff, M. 2005. "Do Non-native Species Threaten the Natural Environment?" *Journal of Agricultural Environmental Ethics* 18: 215–236.
- Simberloff, D. 2000. "Introduced Species: The Threat to Biodiversity and What Can be Done." *BioScience*, December. <http://www.actionbioscience.org/biodiversity/simberloff.html?print>
- Simberloff, D., J. Alexander, F. Allendorf, J. Aronson, P.M. Antunes, S. Bacher, et al. 2011. "Non-natives: 141 Scientists Object." *Nature* 475: 36.
- Slobodkin, L.B. 2001. "The Good, the Bad and the Reified." *Evolutionary Ecology Research* 3: 1–13.
- Stern, A.M. 2005. *Eugenic Nation: Faults and Frontiers of Better Breeding in Modern America*. Berkeley: University of California Press.
- Subramaniam, B. 2001. "The Aliens Have Landed! Reflections on the Rhetoric of Biological Invasions." *Meridians: Feminism, Race, Transnationalism* 2: 26–40.
- Thompson, M. 2011. "Comments to Davis et al." *Nature* 474: 153–154.

- Theodoropoulos, D.I. 2003. *Invasion Biology: Critique of a Pseudoscience*. Blythe, CA: Avvar Books.
- Tomes, N. 2000. "The Making of a Germ Panic, Then and Now." *American Journal of Public Health* 90: 191–199.
- Van Driesche, J., and R. Van Dreische. 2000. *Nature out of Place: Biological Invasions in the Global Age*. Washington, DC: Island Press.
- Warren, C.R. 2007. "Perspectives on the 'Alien' and 'Native' Species Debate: A Critique of Concepts, Language and Practice." *Progress in Human Geography* 31: 427–446.
- Weiner, H. 1996. "Congress Threatens Wild Immigrants." *Earth Island Journal* 11 (4).