



Confronting introduced species: a form of xenophobia?

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Received 17 March 2003; accepted in revised form 9 May 2003

Key words: biological invasion, introduced species, nativism, Nazis, racism, xenophobia

Abstract

Critics from the fields of history, philosophy, sociology, gardening, and landscape architecture have recently attacked attempts to control introduced species as infected by nativism, racism, and xenophobia. Many appeals against introduced species, beginning in the 19th century, focus on aesthetic issues. It is impossible to prove a particular aesthetic judgment is in no way underlain by xenophobia or racism. Certainly the Nazi drive to eliminate non-indigenous plants was related to the campaign to eliminate non-Aryan people, while the writings of some early 20th century garden writers are laden with the language of contemporary nativism. Most judgments about the aesthetics of introduced species, however, cannot be clearly linked to such motives. Further, invasion biologists and conservationists today depict their motivation as preventing ecological or economic harm, as did their precursors a century ago. Because such harm is readily documented, this stated motivation is highly plausible, and attempts to impute baser motives are unconvincing if not tortuous. Critics of efforts to control invasions often ignore their ecological and economic impacts. These impacts, rather than aesthetic judgments or appeals to questionable concepts of naturalness, constitute a cogent, ethical basis for management of introduced species. Claims that modern introduced species activity targets all introduced species, not just invasive ones, and neglects benefits of certain introduced species have no basis in fact and becloud an urgent, important issue.

Introduction

Introduced species have produced a major global change, harming native species and communities throughout the world and also causing enormous economic damage (Simberloff 2000; Mack et al. 2000). Although Elton (1958) accurately described the outlines and scope of the threat they pose, until recently research on introduced species (except for some agricultural weeds and disease vectors) was largely the domain of academic ecologists studying arcane matters. For instance, the speed with which recently introduced species developed new morphologies or behaviors yielded major insights into the workings of evolution.

Various threats posed by introduced species became clear by the mid-1980s. In a primarily academic vein, the Scientific Committee on Problems of the Environ-

ment (SCOPE) of the International Council of Scientific Unions established an international program of symposia to investigate the issue, with several regional reports (e.g., Mooney and Drake 1986) and an international summary (Drake et al. 1989) that defined the global scope of the problem. Problems caused by introduced species were included as a priority item (article 8h) in the 1992 'Rio' Convention on Biological Diversity, and an international organization, the Global Invasive Species Programme, was established in 1997 to begin to implement this article (Mooney and Neville 2000).

Within the last decade, many nations have recognized the impact of some introduced species as an enormous problem and have attempted to improve administrative and legal solutions. In New Zealand, the Biosecurity Act of 1993 is a far-reaching statute governing many aspects of the introduced species problem,

and its activities were strengthened in 1997 by the establishment of a government Biosecurity Council (Parliamentary Commissioner for the Environment 2001). In 1995, the South African government initiated a massive public works project, the Working for Water Programme, to grapple with the problem of introduced plants (McQueen et al. 2000). In the United States, acknowledging that existing legal and management frameworks had proved far too lax, President Clinton's Executive Order 13112 of 1999 mandated the formation of a federal National Invasive Species Council that produced a National Management Plan in 2001, the first attempt at a coordinated national response to the problem (National Invasive Species Council 2001). Other nations have produced initial surveys of the scope of biological introductions (e.g., Sherley 2000; Weidema 2000; Claudi et al. 2002), while there are recent syntheses on the impacts of introduced species on less studied environments such as marine ecosystems (e.g., Pederson 2000). Popular authors have written many books for the lay audience on the subject in the last decade, both synthetic overviews (e.g., Bright 1998; Devine 1998; Cox 1999; Low 1999; Van Driesche and Van Driesche 2000; Baskin 2002) and detailed accounts of specific invaders (e.g., Goldschmidt 1996; Meinesz 1997). Popular media – newspapers, news magazines, television – now prominently feature both the general problem and the ‘invader of the week’ – Formosan termites, snakeheads, killer bees, spotted knapweed, Madagascan hissing cockroaches.

Documented impacts of introduced species are many. For conservationists, the main threat is to the very existence of native species. For the most comprehensive roster of threatened species in the United States, including those listed under the Endangered Species Act and in the Natural Heritage System databases, Wilcove et al. (2000) were able to determine the cause(s) of the threat for 1880 of the nearly 2500 species. Many are threatened by more than one factor. Introduced species are the second-leading cause (after habitat degradation/loss), causing or contributing to the threat to 49% of these species – more than the next three categories (overexploitation, pollution, and disease) combined. There is no comprehensive global tabulation of causes, but examination of threats for specific regions or taxa depicts a similar importance for introduced species. For instance, a recent tabulation (Birdlife International 2000) of the causes of threat to the 1186 bird species believed to

be imperiled shows three major factors, sometimes working in concert. Habitat degradation/loss is again the leading cause (1008 species), followed by over-exploitation (367 species) and introduced species (343 species). For birds, direct harvest (overexploitation) is believed to be a greater factor than for most other taxa. The particular ways that introduced species threaten the existence of native species are remarkably diverse; the main mechanisms are predation, parasitism, herbivory, vectoring of pathogens, modification of critical habitat, hybridization, and competition (Simberloff 2000).

Introduced species also threaten the existence of community-level biodiversity. It is more difficult to assess the quantitative extent of this threat, partly because the classification of communities is somewhat subjective (Shrader-Frechette and McCoy 1993) and partly because the conservation status of communities has not been studied as well as that of many species (cf. Grossman et al. 1994). There are probably ca. 7000–9000 vegetation associations in the United States that would qualify, by many criteria, as distinct communities, of which 4500 have been so designated (Bryer et al. 2000). Of these, at least 371 are recognized as threatened (Grossman et al. 1994), but the fraction threatened by particular factors cannot yet be estimated. It is evident, however, that entire communities can disappear because of introduced species. For example, the Asian chestnut blight fungus (*Cryphonectria parasitica*) arrived in New York on nursery stock in the late nineteenth century and spread over 100 million ha of eastern North America in less than 50 years, killing almost all mature chestnuts (*Castanea dentata*) (Anderson 1974; von Broembsen 1989). Chestnut had been a dominant tree in many forests, and, though it is not extinct, large individuals are extremely rare, and it is ‘functionally extinct’ in the sense that it is so uncommon that it no longer fulfills its previous ecosystem functions. This was more than just a structural change in the community; for example, chestnut decomposes very rapidly, and nutrient cycling probably slowed down substantially as chestnuts were replaced by oaks (K. Cromack, pers. comm.). Several community types dominated by chestnut surely disappeared entirely. More recently, the red spruce-Fraser fir forest community of the southern Appalachians has been eliminated from most areas and is declining in all because of attack by the European balsam woolly adelgid, *Adelges piceae*, on Fraser firs (*Abies fraseri*) (Grossman et al. 1994; Wear and Greis 2002).

Though Fraser fir as a species is not in imminent danger of disappearing, the characteristic forest in which it was codominant will almost certainly not persist in similar form.

In addition to threatening the existence of native species and communities, introduced species have had many other consequences, including some highly inimical to agriculture and public health. For instance, two recently introduced Asian mosquitoes (*Aedes albopictus* and *A. japonicus*) are a major factor in the spread of West Nile virus in North America (Baskin 2002). Damage by introduced species to agriculture is well known and recently summarized by Huber et al. (2002). Other impacts are less heralded but costly and far-reaching. For example, in North America zebra mussels (*Dreissena polymorpha*) clog water pipes and thus threaten drinking water supplies and commercial uses; through 1994 the cost of attempting to clear them was over \$100 million (Dextrase 2002).

Strikingly, just as policymakers, managers, scientists, and the public are grasping the magnitude of introduced species as an environmental issue, a growing number of critics have attacked attempts to control introduced species as a covert form of nativism, racism, xenophobia, or worse. The criticism is remarkably diverse, from the fields of history, philosophy, sociology, gardening, landscape architecture, and even popular culture.

Below, I examine the history of this criticism and attempt to assess its implications for policy on introduced species.

Garden architecture, gardening, and the Nazis

One strand of this criticism concerns preferences for native plants among gardeners and landscape architects. The argument in this arena is an old one. For instance, in 1882, the most prominent American landscape architect, Frederick Law Olmsted, engaged in a heated debate with the botanist Charles Sprague Sargent about introduced species in a project rehabilitating and landscaping the Muddy River between Boston and Brookline (Olmsted 1888; Sargent 1888; Zaitzevsky 1982); Olmsted advocated and Sargent deplored their use. The upshot is that the Brookline side of the river was planted solely with natives, while the Boston side had many exotics (Zaitzevsky 1982). However, the terms of the debate were wholly aesthetic, with Sargent (1888, p. 266) admitting, 'It is not

easy to explain why certain plants look distinctly in place in certain situations and why other plants look as distinctly out of place . . .' and claiming that non-indigenous species 'inevitably produce inharmonious results' Olmsted (1888, p. 418), conceding that 'planting far-fetched trees with little discrimination has led to deplorable results', was not willing 'to taboo all trees coming from over the sea.'

The most damning charge against anti-introduced species activity was articulated by two German garden architects, Joachim Wolschke-Bulmahn and Gert Gröning (Gröning and Wolschke-Bulmahn 1992, 1994; Wolschke-Bulmahn and Gröning 1992; Wolschke-Bulmahn 1992, 1995, 1997a, b). Broadly, they document a Nazi campaign to 'cleanse the German landscape of unharmonious foreign substance [plant species]' (R. Tüxen 1939, cited by Gröning and Wolschke-Bulmahn 1992). The analogy to Hitler's call for the German volk to be cleansed of foreign components is patent (Gröning and Wolschke-Bulmahn 1992). The vigor with which the Nazis pursued this botanical objective is chilling, especially in light of their frenzied pursuit of their human objective. For instance, Reinhold Tüxen, head of the Reich Central Office for Vegetation Mapping, demanded a 'war of extermination' against Asian *Impatiens parviflora*, analogizing the fight against this 'Mongolian invader' to the larger battle against Bolshevism (R. Tüxen 1942, cited by Gröning and Wolschke-Bulmahn 1992).

However, Wolschke-Bulmahn and Gröning assail not only the Nazis. They trace this Nazi stance backward to perceived racist, nationalistic, and anti-Semitic views of the pioneering German landscape architect Willy Lange (1864–1941) and Irish garden designer William Robinson (1838–1935) and forward to parts of the current nature garden and native plant movements.

The charge of anti-Semitism against Lange rests on the latter's seeing the Old Testament, which granted humans dominion over other creatures, as a possible inspiration for the formal French and British garden designs that he wished to contrast with his 'nature garden'. A similar indictment of the anthropocentrism of the Old Testament by the historian Lynn White (1967), in his classic paper 'The historical roots of our ecologic crisis', has never, to my knowledge, elicited a charge of anti-Semitism. This fact alone does not exculpate Lange, but it suggests that his perception of the role of the Old Testament need not spring from anti-Semitism. Wolschke-Bulmahn's labeling of

Robinson rests on his description of a scene in a public park in Paris:

In one instance we saw a sparrow or two alight on a man's hand, and pluckily root out crumbs that he held firmly between his finger and thumb. He was an ancient and persevering personage, evidently of the Jewish persuasion; and however much I regret to admit it, as a faithful chronicler I must state that not one sparrow approached within ten inches of the hand of a Gentile. (Robinson 1869, cited by Wolschke-Bulmahn 1992)

The wording of this passage may reflect a pervasive anti-Semitism of the time, but it also appears to me to express a certain amount of affection. There was certainly a nationalistic cast to some of Lange's writings: 'Germany has been chosen to lend its name to this style in the history of gardens and to become once again an "improver of the world"' (Lange 1922, cited by Wohlschke-Bulmahn 1992). However, such nationalism is not equivalent to xenophobia. I have been unable to find specific evidence in the writings of either man that indicates racism. Perhaps Wohlschke-Bulmahn (1992, p. 198) is admitting a lack of evidence when he uses an argument of guilt by association: 'Both Lange and Robinson were members of a conservative bourgeoisie in which attitudes like nationalism, biologism and anti-Semitism were widespread.' It is instructive that both men advocated the use of introduced species in particular circumstances, though both enthusiastically endorsed using native plants.

The historian Anne Helmreich (1997) similarly lambastes Robinson, noting that, even though he at times recommended using introduced plants, these were all from North America, Greece, Spain, Italy, Asia Minor, and the Alps. Robinson himself argued that plants from these areas, with climates similar to that of Britain, would more likely survive than would tropical plants. Helmreich, however, sees the choice of these locations as Robinson's reaffirmation of imperialist notions of English superiority, on the grounds that each had been the home of a great empire or, in the case of North America, a thriving civilization similar to that of Great Britain.

These same historians claim that both Robinson and Lange were influenced in their racist attitudes by illustrious forebears. Wolschke-Bulmahn (1992) notes that Alexander von Humboldt influenced Lange. von Humboldt (1806) firmly believed in innate characters of various peoples, related to their climatic con-

ditions, a prevailing view in his time but one that is highly questionable today. This notion accords well with Lange's idea that native plant gardens are somehow suitable for the temperaments of the native people of a region. Helmreich (1997) documents Robinson's debt to Alfred Russel Wallace, whom she indicts as a nationalist and imperialist, apparently for this passage in a letter to his sister, Fanny Sims, in 1861: 'A hill of gorse, or of heath, a bank of foxgloves & a hedge of wild roses & purple vetches surpass in *beauty* anything I have ever seen in the tropics' (Raby 2001, p. 159). At various times Wallace espoused ideas of European superiority on the one hand and lack of superiority on the other (Raby 2001). However, rather than an aesthetic judgment based on racist thinking, this passage about the relative beauty of English plants might simply have been an expression of homesickness. Wallace had been in the Malay Archipelago over seven years at this point, suffering constant deprivation and occasionally serious illness.

Gröning and Wolschke-Bulmahn (1992, 1994) and Gröning (1997) tar at least some modern native plant enthusiasts with the brush of Nazism. For example, referring to a book on nature gardens by U. Schwarz (1980), Gröning (1997, p. 232), says,

Schwarz had no interest whatsoever in knowing about the history of plant cultivation or earlier nature garden concepts, such as that of Willy Lange, who supported racist and nationalist ideas and worked actively to support National Socialist ideas in gardening.

Gröning and Wolschke-Bulmahn (1994) suggest that the entire history of ecology, including concern about introduced species, is infected by Nazism.

That the Nazis opposed introduced species, and that they related this agenda to their campaign to rid Germany (and perhaps the rest of the world) of people they considered foreign and inferior, need not mean that everyone who opposes introduced species does so for xenophobic, racist motives (Dawson 1994; Sorvig 1994a, b), just as every Italian who strives to make the trains run on time need not be a Fascist. Even as the Nazis became enamored of native plants, Dutch landscape architects worried that their movement to use native plants out of concern for the loss of natural areas was being co-opted by the Nazis for nefarious reasons (Woudstra 1997). They were at pains to try, gingerly, to dissociate their ideas from those of their occupiers (Woudstra 1997).

The American writer Michael Pollan (1994) sees a nativist ideology lurking behind increasing concern among gardeners about introduced species. Citing two leading natural gardening authors, Ken Druse (1994) and Sara Stein (1993), he asks 'Am I implying that natural gardening in America is a crypto-Fascist movement? I hope not. I mention the historical precedent partly to suggest that the "new American garden" is neither as new nor as American as its proponents would have us think' (p. 54).

In fact, both Druse (1994) and Stein (1993) explicitly base their advocacy of native species on the threat posed by introduced species to native species and communities. For instance, Stein (1994, p. 37) notes,

In a last exquisite irony, the burgeoning interest in gardening that accompanied the move from city to suburb stimulated the nursery trade to import or to tout Norway maple, alder buckthorn, Japanese barberry, kudzu vine, Japanese honeysuckle, Oriental bittersweet, purple loosestrife, multiflora rose, and other 'easy' ornamentals that are so invasive in damaged habitats as to preclude their natural recovery.

Druse (1994, p. 27) similarly observes, 'a non-native can ... cause extirpation [local extinction] or even extinction of a native plant'. Throughout their writings, both authors consistently emphasize the conservation consequences of introduced species, not the aesthetic ones. Yet Pollan (1994) doubts that there are serious consequences, much less that they are the real motives for the advocacy of native plants in gardens. Referring to Druse (1994), he writes, 'He offers no scientific proof for this contention, leaving the reader to wonder if the darkening specter of alien species in the garden might have less to do with ecology than ideology' (p. 54).

The conservation consequences of introduced species noted above, and their magnitude, vindicate Druse's and Stein's concern. It is also worth noting that neither author opposes the use of introduced species in all circumstances. Stein (1993, p. 202) responds directly to the charge that she is ideologically motivated: 'Restoration purists insist on removing all exotic species whether they are weeds or not. I haven't the personality for ethnic cleansing. Much as I take pride in being botanically patriotic, I stop short of that degree of xenophobia.' Druse (1994) frequently emphasizes that the problem is not with introduced plants *per se* but with their possible impact on natives. For example,

lauding the policies of the Desert Botanical Garden, he observes,

The philosophy of the Phoenix public garden has from the start allowed for certain nonnative plants. But when they are recommended for landscape use outside the living archive, the criteria become much stricter to prevent possible invasion by disruptive aliens. ... Aesthetics aside, ... there is one hard-and-fast rule. You always have to be very careful. (Druse 1994, p. 108)

That grounds for imputing xenophobia to Druse, Stein, and some historical figures are questionable does not mean gardening and landscape architecture are always free of such motives. Jens Jensen provides an example. In his early career, Jensen, a Danish immigrant to the United States and the leading exponent of the Prairie Style of landscape architecture, did not hesitate to use introduced species, including highly invasive ones like Russian olive (*Elaeagnus angustifolia*) and tree-of-heaven (*Ailanthus altissima*), generally on grounds of hardiness (cf. Grese 1992). He later came to oppose introduced plants strenuously, however, and his writings about gardens (Jensen 1990) adduce three reasons for this stance: aesthetic, functional (introduced plants are less likely to thrive), and ecological (when they do thrive, they can harm native species and communities). Wolschke-Bulmahn (1995, 1997a) discounts the latter two and sees the first as simply a reflection of xenophobia and racism. He is convincing insofar as Jensen's own writings about plants so clearly mirror racist political screeds that it is hard not to see attitudes towards humans lurking behind some of his attitudes towards plants:

The gardens that I created myself shall, like any landscape design it does not matter where, be in harmony with their landscape environment and the racial characteristics of its inhabitants. They shall express the spirit of America and therefore have to be free of foreign character as far as possible ... the Latin and the Oriental crept and creeps more and more over our land, coming from the South, which is settled by Latin people, and also from other centers of mixed masses of immigrants. The Germanic character of our race, of our cities and settlements was overgrown by foreign [character]. Latin has spoiled a lot and still spoils things every day. (Jensen 1937, cited in Wolschke-Bulmahn 1995, 1997a)

Similarly, Nellie Doubleday, an early twentieth century American garden writer, believed the natural

garden ‘accords with our racial temperament, therefore it is destined to become the dominant style of gardening here for the same reason that the English language prevails on this continent’ (Doubleday 1908, cited by Clayton 2000). This statement is quite close to a persistent theme in the writings of Jensen (1990) – that different settings ‘look right’ to different people (races) because the environment shapes a certain racial temperament. It is, of course, not politically correct today to subscribe to such a questionable view, though it is probably widely held. This fact need not reduce all individual aesthetic judgments on the suitability of a particular introduced species to a form of racism or xenophobia, however, as I discuss below.

Charging native plant enthusiasts and invasion biologists and managers with xenophobia has practical consequences. Large segments of the horticulture industry have fought more stringent regulation of importation of exotics (see, e.g., Hudson 1998), and it is not surprising that they have cited some of the above critics to impugn the motives of would-be regulators. For example, the on-line catalog of J.L. Hudson, Seedman (1998) cites Gröning and Wolschke-Bulmahn (1992) in calling recent critics of exotics ‘eco-fascists’ and denies that introduced species cause any environmental or conservation problems: ‘To safeguard this free movement [of germplasm] we must begin to educate the public concerning the pseudoscientific foundations of the anti-exotics movement, . . . , their origins in an ideology of race-hatred, and their agenda of total control’ (p. 4).

Immigration policy, nativism, and introduced species

Several authors relate concern with introduced species to the evolution of immigration policy, especially in the United States. The historian Philip Pauly (1996a) sees early activity against introduced species in the United States as part of the nativism that pervaded this nation during the Progressive Era: ‘attitudes towards foreign pests merged with ethnic prejudices: the gypsy moth and the oriental chestnut blight both took on and contributed to characteristics ascribed to their presumed human compatriots’ (p. 54). Similarly, ‘it should be clear that attitudes about foreign and native organisms were intimately linked, through both everyday experience and analogies of policy, to views on “alien” and “native” humans’ (Pauly 1996a, p. 70). He especially indicts scientists for what he characterizes as

Table 1. Regulations and laws relating to human immigration and introduced species in the United States.

Introduced species	Immigration
California state quarantine 1881	Chinese Exclusion Act 1882
California fruit pest law 1883	Beginning of Ellis Island restrictions 1901
Lacey Act 1900	National quotas 1921
Plant Quarantine Act 1912	Immigration Act 1924

stringent regulations governing species introductions since that time. In particular, he charges early American advocates of combating invasions, Theodore Palmer, Charles Marlatt, and Leland Howard, with xenophobic motivations.

Palmer (1899) was one of the first to raise alarms about introduced animals. In 1899 he observed that pigs, goats, rabbits, cats, and especially the small Indian mongoose had repeatedly devastated native biotas in the West Indies and Pacific islands, and he argued that the United States should take responsibility for preventing such devastation in the Hawaiian islands and Puerto Rico. Marlatt (1917) similarly warned about the potential impact of introduced insects and plant pathogens such as chestnut blight and white pine blister rust, calling for stringent quarantine laws on the plants that carried such pests. Howard (1898) wrote about the threat of introduced insects.

Pauly’s evidence for these scientists’ nativism rests on the approximate synchrony of anti-immigration regulations on the one hand and introduced species regulations on the other (Table 1). Xenophobia certainly played a major role in nativist rhetoric surrounding the increasingly restrictive immigration policies (Kraut 1994; Tomes 1998). There is, however, no direct evidence that the motivations of the pioneers of United States introduced species policy were other than what they stated them to be: concern for the damage caused by introduced species to native species and communities, and to agricultural and silvicultural ecosystems. Pauly (1996b, p. 677) admits as much with his implication that all individuals living at a particular time are tainted by the popular attitudes of that period: ‘Scholars of the Progressive Era are well aware of the pervasiveness of prejudicial attitudes at all levels of American society during this period. Genteel scientists, however, seldom displayed their prejudices in print.’

It is noteworthy that each piece of legislation in Table 1 confronting introduced species responded to specific damage. The California quarantine was imposed after pressure from growers devastated by a

wave of introduced pest insect species that destroyed crops. Results of this early effort were ambiguous, leading to tighter restrictions in the state fruit pest law of 1883 (which Palmer (1899) credited with having kept the small Indian mongoose (*Herpestes javanicus*) out of California). The federal Plant Quarantine Act of 1912, which Pauly (1996a) interprets as further hindering plant introduction, is more traditionally seen (e.g., Segarra and Rawson 1999) quite differently, as a way for the federal government to pre-empt an increasing number of state statutes. The main state interest was generally the need to protect natural resources, while the main federal interest was to protect interstate and international commerce, particularly of agricultural products, by superseding state statutes that might impede commerce. The Lacey Act of 1900 was primarily aimed at enlisting federal aid in implementing state game laws, by prohibiting interstate transportation of wildlife that violated state statutes. It was originally inspired by the decline of many game bird species. Regulation of introductions was added at the behest of Agriculture Secretary, James Wilson (Pauly 1996a), who noted the problems already caused by introduced species such as the mongoose in Hawaii and the West Indies. Although Pauly (1996a) sees the Lacey Act as draconian, it was and remains a very weak law in this regard (Kurdila 1988; Peoples et al. 1992; U.S. Congress 1993), as the only species forbidden entry are the few on a 'blacklist', and those few are those that have already been problematic elsewhere. In addition, it has proved difficult to add species to the list. Any other species can be imported, subject to quarantine regulations so that diseases are not inadvertently introduced. This entire approach has largely failed to control introductions.

Several critics (Peretti 1998; Sagoff 1999; Heller and Matza 2000; Subramaniam 2001) see the same dark motives of xenophobia, nativism, and racism at work today in current enhanced activity against introduced species in the United States and elsewhere. Gröning and Wolschke-Bulmahn (1992) depict the current mania for native plants as part of a nativism driving a recent wave of xenophobia in Germany. The most comprehensive critic in this vein is an American biologist and feminist student of science, Banu Subramaniam (2001), who perceives a 'panic' about introduced species as a reflection of a xenophobic surge triggered by unease about changing racial, economic, and gender norms:

The parallels in the rhetoric surrounding foreign plants and those of foreign peoples are striking. . . .

alien plants are accused of 'crowd(ing) out native plants and animals, spread(ing) disease, damag(ing) crops, and threaten(ing) drinking water supplies' (Verrengia 1999a). The xenophobic rhetoric that surrounds immigrants is extended to plants and animals. (p. 29)

Subramaniam wrote just before 9/11, and, in her view, the main motor of nativist anxiety then was globalization; whatever the merits of her perception of a wave of xenophobia, the attacks of 9/11 have surely increased public concern about foreign immigrants and visitors to the United States. And this concern has spread to the issue of introduced species. For example, the potential link of introduced species to ecoterrorism and bioterrorism was recognized before 9/11 and quickly received new emphasis (e.g., Knobler et al. 2002; National Research Council 2002). However, it is important to note that the very statements Subramaniam ascribes to xenophobia are, in fact, true – as noted above, introduced species have crowded out native species, they have brought and spread new diseases, they have damaged crops, and they do threaten drinking water supplies. This fact does not, of course, demonstrate the motives of persons raising these issues, any more than does the similarity in language to that used in historic and recent waves of nativism. It does, however, suggest the possibility of no nefarious subtext to such concerns. Subramaniam (2001) does not deny that introduced species have many harmful impacts, but she views nativism rather than the impacts as the key motivation of people concerned with them:

. . . we are living in a cultural moment where the anxieties of globalization are feeding nationalisms through xenophobia. The battle against exotic and alien plants is a symptom of a campaign that misplaces and displaces anxieties about economic, social, political, and cultural changes onto outsiders and foreigners. (p. 34)

Jonah Peretti (1998), an American social and scientific critic, also detects a recent wave of xenophobia (e.g., California's proposition 187 of 1994). He does not assail all the increasing concern with introduced species in the United States as necessarily wholly motivated by xenophobia and nativism, but he posits a link. He suggests that the South African response to introduced species is utterly compromised by racism,

and because of the heavy South African influence on international programs, the latter are also tainted:

A more recent and subtle example of this can be found in South Africa in the 1980s. This is where the initial proposal for the Scientific Committee on Problems of the Environment's (SCOPE) invasive species project was proposed . . . South African scientists have had a great deal of influence over the SCOPE project. They have been over-represented at international SCOPE conferences on biological invasion and have published a disproportionate number of articles on the subject . . . Why are scientists from South Africa especially concerned with biological invasions? The answer may be similar to the Nazi proclivity for the nature garden. Like Nazism, apartheid thinking is concerned with separating the pure from the impure . . . It is not surprising that SCOPE's hard-line biological nativism has roots in South Africa. (p. 188)

It is true that South African scientists have been heavily represented both in SCOPE introduced species projects and in the literature on introduced species generally. This was true during apartheid and remains true today. In fact, the South African Working for Water Programme, a post-apartheid initiative, is one of the most comprehensive responses to problems generated by introduced species.

It is important to consider, however, that negative impacts of introduced species are disproportionately high in South Africa, for two main reasons, one biological and the other human. Biologically, the key problem is that South Africa has a large number of endemic species, many of them characteristic of the 'fynbos' plant association that covers 77,000 km² (Macdonald and Richardson 1986). The species in this remarkably diverse community evolved in dry conditions and adapted to occasional high-intensity fires. The dominant native plants are shrubs, not trees. South Africa also has one of the most pronounced introduced plant invasions in the world. About 10 million ha (8.28% of the nation) are invaded. When trees and large shrubs were introduced (especially species of *Pinus*, *Eucalyptus*, *Acacia*, and *Hakea*), some proved to be fire-adapted and highly invasive, spreading to produce large, impenetrable stands in many places, at the expense of the native biota, particularly in the previously treeless fynbos. This tree invasion has greatly increased erosion, modified sand movements, and changed fire regimes and geochemical cycling; all these

impacts have harmed the native community. However, probably the biggest impact is on the hydrology of a dry nation. The plant invaders use 6.7% more of the mean annual runoff nationwide than the natives did, with the analogous figure for parts of the fynbos rising to 17% (Le Maitre et al. 2000); the impact on native biota of a dry region of such massive water withdrawals is severe. Consequences for groundwater have not yet been quantified.

This water loss is also of great consequence to human endeavors – agriculture and silviculture – as well as to ecosystem services such as flood control and supplying basic human needs. It amounts to over 200 liter per person daily when the basic minimum allowance is 25 liter daily (McQueen et al. 2000). This is why the Mandela government initiated the Working for Water Programme.

Marc Sagoff (1999), an American philosopher, is another critic who analogizes the current concern with introduced species with xenophobia, pointing explicitly to nativists who attempted to impede human immigration. He argues, as do Tsing (1995), Heller and Matza (2000), and Subramaniam (2001), that the same traits (such as sexual robustness, uncontrolled fecundity, aggressiveness, lackadaisical parental care) with which nativists stigmatize human immigrants are ascribed to introduced species. The crux of his argument is that there is nothing generically wrong with introduced species – after all, he notes, some native species are invasive, aggressive, and cause economic damage. Further, he argues that the economic costs attributed to introduced species, as a class, do not outweigh the benefits of introduced species (such as food plants), as a class, and that any aesthetic judgment about their suitability can only be subjective. Thus, any generic plea against introduced species must be xenophobic. I agree in part with this point, and I will discuss it in closing.

Africanized bees, racism, and the sexual connection

A heralded invasion that epitomizes the contrasting interpretations of concern about introduced species is that of *Apis mellifera scutellata*, the Africanized honeybee (National Invasive Species Council 2003a). In 1957, 26 queens of this African subspecies escaped from captivity in Brazil, and hybrids of this subspecies and the European subspecies (previously introduced)

have spread north at ca. 500 km/year. Despite a massive attempt to forestall their arrival with a bee-free 'Magenot Line' in Mexico, they reached the United States (Texas) in 1990 and subsequently became established in California (1995) and other southwestern states. The subject of many stories in the popular media, they have been termed 'killer bees' because they are far more aggressive than the European subspecies – they react to disturbance much more quickly, chase victims for greater distances, and mass and sting in much greater numbers.

Though they cause far fewer deaths than dog or snake bites (Johnston and Schmidt 2001), the bees do merit the 'killer' sobriquet. They have killed over 1000 people since escaping captivity (Smithsonian Institution 2003), including 175 in Mexico between 1988 and 1995 alone, and 10 in the United States through 1998. In addition, vastly more stung individuals have required medical attention. Because many of the deaths entail hundreds of stings, they are believed to be excruciating. Africanized bees also sting livestock, but there is no tally of damage to date. Other concerns include whether they will interfere with crop pollination services and/or depress the apiary trade. Brazilian honey production plummeted in the wake of the invasion but recovered as beekeepers acquired experience dealing with these more aggressive bees.

Anna Tsing (1995, p. 127), an American anthropologist, sees a different motive for the great publicity and alarm: 'In order to make sense of this new alien hazard, however, it seems important to think about the long-term significance of race and nation in U.S. bee culture.' In her view, the fear has a racist origin, resonating with racial fear. Describing the arrival of the Africanized bees in California, she notes that they penetrated 'managed apiaries properly reserved for "European" bees. The newspapers went wild This time, briefly, the mulattos would be removed and destroyed for a Europeans-only California' (Tsing 1995, p. 113). The racism in 'bee-panic' she attributes to particular aspects of human racism:

North American beekeeping derives from a long European tradition in which bees have been, if anything, emblematic of domesticity. Honeybees are devoted to their home in a hive; busy, they work hard; helpful, they cooperate within a natural division of labor; loyal, they protect their home altruistically; parental, they provision their brood; frugal, they save up a full larder. (Tsing 1995, p. 116)

In short, these European bees are the quintessential family organisms, just as WASPs presumably form the quintessential human family. The Africanized bees, which are far less domesticated towards humans, are also far less domestic: they tend to abscond at higher rates than European bees. Worse, from the standpoint of family sanctity, Africanized bees hybridize with Europeans: 'From the perspective of those whose knowledge begins with the unmarked European-origin honeybee, . . . African bees are potential rapists' (Tsing 1995, p. 128).

The American filmmaker Michael Moore has recently taken up Tsing's themes as a central metaphor in his scathing indictment of the violence of United States culture, 'Bowling for Columbine' (2002). He interweaves news clips and educational films about Africanized bees (including one extended sequence with a leading authority on this topic, Justin O. Schmidt) with many short clips of young African-American men being arrested and restrained by police. The constant juxtaposition and the context of the film imply that the fear of both Africanized bees and African-American men is generated by racism rather than by their activities. Even Tsing's point that the ultimate fear is sexual is clear to viewers: 'With tricky cutting, Moore even makes a convincing argument that media frenzy over Killer Bees was a piece of inferential racism, paranoia that the more aggressive "Africanized" bees might mate with our meek and respectable "European" bees' (Fienberg 2002).

Subramaniam (2001) believes that antipathy towards introduced species is also part of a generalized fear of the fertility of oversexed immigrant women:

One of the classic metaphors surrounding immigrants is the over-sexualized female. Foreign women are typically associated with superfertility – reproduction gone amuck. (p. 31)

This rhetoric of uncontrollable fertility and reproduction is another hallmark of human immigrants. Repeatedly, alien plants are characterized as aggressive, uncontrollable, prolific, invasive and expanding. (p. 30)

The particular introduced species Subramaniam chooses to exemplify this fear – the 'Canada' thistle (*Cirsium arvense*), a native of Europe – would seem to undercut her case somewhat, as I do not believe that Canadian women are stereotyped as oversexed or notably fertile. However, the key point is that at least

one reason this plant is abhorred in North America could simply be the stated reason: it is major agricultural pest (on the U.S. Federal Noxious Weed List) because of millions of dollars of damage annually, and it also threatens the local existence of species in a number of natural plant communities of prairies, savannas, meadows, barrens, glades, and sand dunes (United States Department of Agriculture 2003).

Are introduced species ugly or unnatural?

As noted above, the early landscape architecture and garden literature is rife with assertions that native species are aesthetically pleasing and introduced species are somehow aesthetically discordant, while much of the modern nature garden literature stresses threats to native species and communities, as do invasion biologists and policymakers. I contend that concern with a real threat to the very existence of native species and communities need have no connection to nativism, racism, and xenophobia, nor do attempts to prevent economic costs to various human endeavors, such as agriculture and silviculture. However, an aspect of this contention bears further discussion.

The facts that early activists in the campaign to limit species introductions, such as Palmer and Marlatt, cited only ecological, agricultural, and silvicultural threats, that their descriptions and predictions were validated, and that they nowhere used racist or xenophobic terms, does not eliminate the possibility that, either consciously or subconsciously, they were motivated at least partly by racism or xenophobia. After all, Pauly (1996b) argues that such attitudes were completely pervasive in the United States at that time, but that educated scientists were careful not to display their prejudices, particularly in print. The assumption that it is difficult to disentangle individual motivation from larger cultural and institutional currents underpins much of modern historiography (cf. Tosh 1991, p. 114; Appleby et al. 1994, p. 306). I would only say, however, that I feel the burden of proof should be on the accuser when claims of racism and xenophobia are advanced (cf. Marinelli 1995).

A second difficult issue is whether an aesthetic preference for native species, particularly native plants, can truly be uninfected by nativism and xenophobia. Some of those who based their concern on aesthetics (e.g., Humboldt, Doubleday, Jensen) explicitly appealed to a sense of psychological well-being associated with native vegetation, thus to the notion that

the environment, including the biotic environment, has shaped the psychology of different national groups differently, at least to the extent of molding aesthetic preferences. Though now highly politically charged, this was and perhaps still is a widely held idea. A thorough treatment is beyond the scope of this paper; suffice it to say that at least some who criticized introduced species on these grounds (e.g., Jensen) adopted terminology so similar to that of contemporary nativists and xenophobes that it is difficult to believe the two sentiments were unlinked in their minds. Most appeals to aesthetics as an argument against introduced species do not relate aesthetic preferences to group psychology, nor do they use the terminology of racism or xenophobia. However, they are unconvincing exactly because aesthetic appeal is so frankly a matter of taste. Perhaps this point is most strikingly made by noting that advocates of introduced species (e.g., Cronon 1991; Pollan 1994; Pauly 1996a) also appeal to aesthetics, seeing great beauty in mixtures of introduced and native species. Further, as indicated by Sagoff (1999), many people have grown up surrounded by species that were introduced before they were born, and, for them, whatever aesthetic is associated with a sense of place may attach to those species as well. In short, aesthetics is obviously too subjective a basis for policy on introduced species.

One variant of this aesthetic argument is subtler – the contention that introduced species are somehow ‘unnatural’, so their presence is an offense against nature. For instance, this thread runs through garden/landscape architecture writings from Sargent through Stein, even when a different point, such as environmental suitability or protection of native species, is stressed. The view that introduced species are unnatural is easily assailed (e.g., Pauly 1996a; Gould 1998; Peretti 1998), usually by appeal to the works of the historian William Cronon (1983, 1996a), who has depicted the enormous imprint of native Americans before the arrival of Europeans. Cronon thus questions whether any part of North America qualifies as ‘natural’ or ‘wilderness’ if these terms are meant to mean ‘unaffected by humans.’ The argument then goes that, if we cannot say that humans had not already ‘tampered’ with nature before Europeans got to North America, how can we assail introduced species, even those brought by humans, on the grounds that they are somehow unnatural?

Cronon’s views on wilderness and nature are extremely controversial and have been both adopted as support by opponents of environmentalism

(e.g., Budiansky 1995) and castigated as anti-environmentalist (see Cronon 1996b). Without addressing the cogency of Cronon's rebuttal (1996b), which asserts that his profound questioning about the relationship of humans to nature and wilderness was meant to strengthen the environmental movement, I believe his arguments do impugn appeals against introduced species based on the argument that they are unnatural. He marshals strong supporting evidence for his contention that the concept of nature is a human construct. If this is so, views of what is natural are personal judgments just as aesthetic tastes are.

Conclusion

In sum, I believe the strongest ethical bases, and possibly the only ethical bases, for concern about introduced species are that they can threaten the existence of native species and communities and that they can cause staggering damage, reflected in economic terms, to human endeavors. This said, I must address what I believe is a red herring introduced by a philosopher (Sagoff 1999) and two ecologists (Slobodkin 2001; Rosenzweig 2001). This is the notion that current concern with introduced species is focussed on all introduced species and founded on the notion that introduced species are generically 'bad' and native species 'good'. Although some extreme adherents of an aesthetic stance favoring native species doubtless hold such a view, invasion biologists do not, and the many recent government and international activities on introduced species explicitly recognize the enormous benefits of some introduced species. The 1992 Rio Convention on Biological Diversity (article 8h) called for dealing not with all introduced species, but 'with those alien species which threaten ecosystems, habitats, or species'. President Clinton's Executive Order 13112 aimed not to forbid introduction of all species, but 'to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause' (National Invasive Species Council 2003b). By 'invasive', the Executive Order means 'an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health' (National Invasive Species Council 2003b). Similarly, reviews of the issue (e.g., Simberloff 2000; Huber et al. 2002) rarely fail to note the great benefits conferred by some introduced species.

Thus, none of the substantial efforts for more effective control of introduced species aim to prevent all introductions or to remove all established introduced species. They target introduced species that are likely to cause ecological, economic, or public health problems. A good analogy is to synthetic chemicals. Though we know full well that carcinogens that occur naturally in foods are more abundant in human diets than synthetic carcinogens (National Research Council 1996), we in the United States are surely glad to have the Toxic Substances Control Act of 1976, under which the Environmental Protection Agency tracks and tests thousands of new chemicals synthesized each year to find the ones that cause cancer.

Unfortunately, attempts to predict which species, among a suite of potential introductions, are likely to be problematic have had very mixed success (Mack et al. 2000). Because the stakes are so high, and it is far more difficult (often impossible) to remove introduced species once they are established than to keep them out in the first place, the 'innocent until proven guilty' philosophy that has guided national and international policy until now (see, e.g., National Research Council 2000) is inadequate and should be replaced with a philosophy of 'guilty until proven innocent' (Panetta et al. 1994; Mack et al. 2000). In practice, of course, this approach could not require proof, but rather rigorous expert assessment of all proposed introductions; currently, in most nations, such assessment is not rigorous and is, in any event, restricted only to species for which there is already some suspicion of a threat, often an agricultural one. The New Zealand Biosecurity Act of 1993 (Parliamentary Commissioner for the Environment 2001) included the first national law that does not presuppose innocence.

Acknowledgements

I thank Louise E. Robbins for continuing dialogue on this topic, Todd Campbell, William Cronon, and Mary Tebo for discussion on certain points, and Nathan Sanders, Justin Schmidt, Evan Sugden, and Michael Turelli for helpful information.

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