CAWS Oration
Plant the white flag or raise the battle standard? Controversies over non-native weeds

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KEYNOTE ADDRESS

With few exceptions, biologists who noted non-native species in the late 18th century through the 19th century were concerned with biogeographic patterns – simply which species were found where – rather than with ecological impacts. Occasional spats arose beginning in the mid-19th century among landscape architects and gardeners not about impacts but about whether non-native plants are inherently aesthetically discordant or somehow not aligned with the temperaments of human populations, which have come by either evolution or simply familiarity to appreciate the characteristic native vegetation.

In the 1990s, a series of authors in the fields of landscape and garden architecture, philosophy, history, and sociology argued that antipathy towards non-native species is often in fact displaced xenophobia, and that the claimed aesthetic basis for the antipathy was nothing more than masquerading xenophobia. These critics, mostly from the social sciences and humanities, largely ignore the ecological impact of invasive non-natives. This past decade has seen a continuation of such charges of xenophobia, but several ecologists have also become high-profile critics of invasion biology and management. They have usually not assailed the field on grounds of xenophobia, but rather on three other bases.

First, they argue that the great majority of non-native species are ecologically and economically harmless, so battling them makes little sense and wastes resources. Rather, in this view, attention should be focused only on the few invaders that are actually harmful. This argument is often buttressed with one or both of two other claims: some native species are also harmful or invasive; and some non-native species are beneficial, including for conservation. In sum, the focus on non-native species as a class is irrational. If it is irrational, this line of reasoning goes, it must be driven by something other than valid ecological or economic concerns, and these critics occasionally hint that that other motive is xenophobia.

A second recently adduced argument is that, in some locales, introduced species actually increase biodiversity. They cause few if any extinctions, and, even when they cause some species to disappear, the number of established immigrants is so great that species richness increases. The data used to support this line of reasoning are usually drawn from islands, where native species richness is often low.

A third and increasingly prominent contention is that, even if effects of biological invasions are very substantial, we cannot do much about the phenomenon in the face of globalisation, so we should not waste our resources trying. This argument has become one of the two bases (the other is global climate change) for the proclamation by some restoration ecologists that traditional ecological restoration, with its native reference ecosystems, is passé, and that the proper feasible goal of restoration is now the recognition and maintenance of 'novel ecosystems,' with a strong component of introduced plants, that provide ecosystem services for humans.

The claim that xenophobia drives invasion management agendas is flawed, as are the more recent arguments advanced against fighting biological invasions. It is true that some late 19th century and early 20th century advocates of using exclusively native plants in landscaping and gardens were xenophobes and quite probable that their attitudes towards foreign people and foreign plants were related. However, the earliest authors warning of ecological and economic damage by introduced species at this time were motivated by empirical observations of impact, and these were the forebears of modern invasion biology and management. Those who persist in seeing xenophobia infecting the field are engaging in a social construction of science based on facile analogies and their own ideologies, rather than on the facts of nature.

The argument that the threat posed by non-native invaders is overblown is belied by the increasing evidence of sometimes subtle but often pervasive impacts of many kinds caused by many invasions. The great majority of introduced species have not been studied, especially in their non-native ranges, so we cannot say that the majority of non-natives are harmless. Furthermore, the frequent occurrence of a

lag between a species' introduction and its subsequent spread and impact means that the frequency of impacts would continue to grow even if no new species were introduced – this effect is known as the 'invasion debt'. It is true that some native species also become 'invasive', but such a status is far more frequent for non-native species, perhaps in the range of 40 times more frequent. It is also true that some non-native species are beneficial, but these, including food plants, are not targets for management, and claims that some species aid conservation rarely look at the net impact of the claimed benefactors.

Of course it is true that the number of species in some locations is increased by the establishment of non-natives, but the latter are often widespread, and it is far from clear that this biotic homogenisation is desirable. A certain number of native species do disappear locally, and these are often uncommon to begin with. Ultimately some species become globally extinct, and global biodiversity thus decreases, but such extinction often takes a long time, as populations dwindle and finally disappear.

Despite increasing economic globalisation, the battle against invasions is far from hopeless. Many potentially devastating invaders have been stopped by border inspections, and others have been prevented by various import-export protocols. The biggest hindrance to even more effective prevention is multi-lateral trade treaties such as those of the World Trade Organization, which reflexively argues against measures that would impede invasions and hinders the adoption of more stringent actions by individual signatory nations. Successful eradication efforts are mounted against increasingly widespread invaders in increasingly complex settings. Even when eradication is not possible with current resources and technology, many successful maintenance management programs have limited the density and impact of introduced species, including formerly intractable weeds. Some of these successes have derived from incremental improvements in traditional technologies, especially mechanical, chemical, and biological control. Others entail bright new ideas, and there is every reason to believe that future bright new ideas will aid the battle against invasions.

Critics of invasion management, though a small minority, have easy access to the lay media because they are telling a man-bites-dog sort of story amidst the many reports of damage by introduced species. The resulting plethora of sound-bites in newspapers, radio, and television does not yet seem to have led to a retrenchment in government, NGO, and citizen efforts to fight invasions. However, government agencies are always looking for reasons to curtail expenses, particularly in times of economic exigency such as today, so it is a legitimate concern that these minority viewpoints might be used as an excuse to cut back on invasion management.