

# The war of the roses: demilitarizing invasion biology

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Biologists need to continuously reflect upon the ethical and rhetorical dimensions of their language when communicating about invasive species. In particular, is current language likely to promote social cohesion and, consequently, effective and appropriate action towards invasive species? To address this question, I focus on prevailing militaristic and combative metaphors within invasion biology. I argue that these metaphors are problematic because (1) they lead to an inaccurate perception of invasive species; (2) they contribute to social misunderstanding, charges of xenophobia, and loss of scientific credibility; and (3) they reinforce militaristic patterns of thought that are counterproductive for conservation. Therefore, while these metaphors may effectively motivate conservation action in the short term, they could be ineffective in the long term. Alternatives to militarism will better promote realistic management and conservation goals in a multicultural context.

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Biologists currently devote considerable resources towards invasive species because of their dramatic spread, economic cost, and effects on ecological systems (Mack *et al.* 2000). Given the magnitude of this phenomenon, the importance of clear and effective communication about invasive species cannot be underestimated (eg Lubchenco 1998). Invasion biologists have discussed extensively the terminology of their field (reviewed by Colautti and MacIsaac 2004), but have focused on its adequacy for scientific research. They have given less consideration to the broader ramifications of language about invasive species. This paper encourages critical reflection on whether metaphors currently used to characterize these species may actually undermine conservation objectives (Figure 1).

Metaphors allow people to understand abstract and perplexing subjects such as invasive species in terms of common referents (Lakoff and Johnson 1999). Militarism is a prevalent mode of conceptualizing political and everyday challenges, so conservationists often relate to invasive species with militaristic and combative metaphors. As an

example, a popular book states, “There is little consolation in the fact that 90% of these *impacts* are ‘*duds*’, and only 1% really *detonate*. The *bombardment* is continual, and so are the *detonations*” (Bright 1998; emphasis added). Baskin (2002) cites further examples such as “beachhead, battle, kill, eradicate, overrun, [and] explode” in discussions of invasive species, thereby characterizing language that appears frequently in popular reports about invasives (Figure 2).

Militaristic language also appears in the scientific literature. Invasion biologists propose that invasive species are successful because of “enemy release” and “novel weapons” (eg Chew and Laubichler 2003; Callaway and Ridenour 2004). Papers in the journal *Biological Invasions* occasionally refer to them as “targets” in a “strategy” of “eradication”. The abstract of the most highly cited paper on “biological invasion” (360 citations according to Web of Science, October 2005) states that “Eradication of an established invader is rare and control efforts vary enormously in their efficacy ... [Control] is most effective when it employs a long-term, ecosystem-wide strategy rather than a tactical approach focused on battling individual invaders” (Mack *et al.* 2000). While these words don’t demand that we “bomb” invasive species, they adopt a militaristic framework for thinking about them.

Here I address the adequacy of combative and militaristic language for discussing invasive species. Invasion biologists and conservation managers presumably (and perhaps unconsciously) rely on the rhetorical power of this language to generate action against these species, which are invisible to most people. Perhaps this approach has been successful, given the tremendous amount of attention this issue has received recently; nonetheless, these metaphors also pose a number of risks that have seldom been discussed in the conservation literature (but see Glotfelty 2000). Every metaphor harbors inaccuracies, yet

## In a nutshell:

- Our language about invasive species reflects how we conceptualize them and has tremendous implications for how we relate to and act towards these species
- Even though militaristic metaphors have drawn attention to invasive species in the short term, they may ultimately be inadequate
- There are alternative ways to conceptualize invasive species and to communicate about them that are more consistent with conservation values

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**Figure 1.** Rambler rose (*Rosa multiflora*) was introduced into eastern North America in the 19th century for horticultural reasons and subsequently used in highway plantings and for erosion control. More recently, it has been recognized as a serious and widespread invasive species. Given its origins and a preference for the disturbed habitats that result from human activity, is it really an “enemy”?

by attending to these we are better able to understand how particular metaphors engender certain ways of conceptualizing a situation, often by blinding us to alternative ways of relating to them and acting (Schön 1993). Militaristic metaphors harbor inaccuracies that contribute to public misunderstanding of invasive species and even to misperception by conservationists themselves. These metaphors also invoke militaristic ways of thinking that are inconsis-

tent with a sustainable relation between humans and the natural world. Together, these factors may impair the efficacy of these metaphors in the long run.

■ **Assessing the war on invasive species**

There are two fundamental problems with using militaristic metaphors to describe our interaction with invasive species. First, a war requires two opposing sides, but it is misleading to believe that we can pit ourselves against invasive species. We are inextricably entangled with these species since their invasions originate from our consumptive activities and global movement patterns (Bright 1999). For example, Rodman (1993) argued that tamarisk invasion along river systems in the American southwest was generated by human alterations to the hydrologic regime, which created favorable conditions for tamarisk establishment (Figure 3). Similarly, Buhs (2002) asserted that fire ant removal will be ineffective without considering the role of the “bulldozer revolution” in creating new habitats for them. We have set invasive species on their course, and this paradox will not be resolved more easily by invoking a war, especially when it misdirects us towards biological solutions for what is largely a social issue.



Courtesy, B Billings/USFWS

**Figure 2.** A Virginia Department of Game and Inland Fisheries research team survey for northern snakehead (*Channa argus*), a highly adaptable, mobile, and carnivorous fish introduced from its native Asia to freshwater environments of the mid-Atlantic US. When reporting on the initial discoveries of northern snakeheads in the US and possible control strategies, media outlets routinely resorted to provocative language and metaphors (Chew and Laubichler 2003).

Second, wars are staged on the assumption that good will triumph over evil, but we will never win this war and return ecosystems to a pristine state. As many conservation biologists have pointed out, we will have to accept that native and non-native species will intermingle in recombinant systems of the future (Soulé 1990). In many cases, even the distinction between native and non-native species is ambiguous (Woods and Moriarty 2001). While we will have small successes with some invasive species, it will be practically and economically infeasible to prevent or contain many of them. For example, bio-control agents sometimes become as problematic as the initial pest (Civeyrel and Simberloff 1996). Elsewhere, crossbreeding between native and non-native species has created hybrid populations, thereby preventing removal of one constituent species. Even when an invasive species can be removed it is often replaced by other problem species, or its removal negatively affects a native species (Figure 4). While this may seem a pessimistic view of

invasion biology, we don't need to give up. Instead, a reassessment of our approach to these species – as well as the metaphors used to describe it – is required.

These two misperceptions may contribute to social misinterpretation of invasion biology, thereby interfering with conservation activities. In particular, militaristic language contributes to the belief that invasive species are a generalized “enemy” or a reified class of “equally bad” species (Slobodkin 2001), rather than a problem to be tackled on a case-by-case basis. If we use this language in cases where it isn't warranted, or where we are unlikely to be successful in eradicating a particular species, we may hinder its efficacy (“crying wolf”). For example, critics increasingly wonder whether invasive species are really such a significant issue after all, and whether they are perhaps as much a consequence of large-scale environmental changes as a cause of them (eg Gurevitch and Padilla 2004; Burdick 2005).

Militaristic language could also prove ineffective because of the “boomerang effect”, whereby “extremely intense language or images used for purposes of persuasion can have an opposite effect on the receiver” (Mio 1997). This may be especially true given that the language of invasion biology has a xenophobic “resonance” for many people (Simberloff 2003). For example, San Francisco City Supervisor Leland Yee downplayed concerns about invasive species when he asked, “How many of us are ‘invasive exotics’ who have taken root in the San Francisco soil, have thrived and flourished here, and now contribute to the wonderful mix that constitutes present-day San Francisco?” (quoted in Todd 2002). There are also numerous stories about indigenous peoples who take offense at the way language about invasive species shifts attention from the invasive people who have brought about the greatest ecological impacts on their lands. Finally, the removal of invasive species in at least some restoration programs tends to benefit upper-middle class rather than poor people, so that actions against these species may be perceived as class- and race-based (eg Foster and Sandberg 2004). In these contexts, people may be unresponsive to militaristic language or even angered by it. While we can neither foresee nor ameliorate all possible interpretations of our language, we can seek alternatives that more effectively communicate the concepts to diverse peoples.

Current metaphors may contribute to a potentially greater problem for invasion biology, namely a loss of scientific credibility. By using loaded language, invasion biologists may erode public trust in their objectivity. A recent analysis of the preferred role of field ecologists in natural resource management in the Pacific Northwest found that the “attentive pub-



**Figure 3.** *Tamarisk* (*Tamarix* sp) along the Colorado River in Utah. *Tamarisk* is a prevalent and costly invasive species along rivers in the southwest US. Given its dominance, however, it has become part of a recombinant ecological system that we may now have to accept (Rodman 1993).

lic” – individuals who are actively involved in resource management decisions – preferred that ecologists help to integrate their knowledge into management rather than to advocate for particular decisions (Lach *et al.* 2003). Even though the benefits of conservation advocacy are heavily disputed, the language of war, even if implicit, reveals a



**Figure 4.** Himalayan blackberry (*Rubus discolor*) patches, in the foreground and background here, provide important nesting habitat for the tricolored blackbird, a rapidly declining species endemic to the Central Valley of California (Cook and Toft 2005).



Courtesy of S Hillebrand, USFWS

**Figure 5.** Sitka black-tailed deer (*Odocoileus hemionus sitkensis*) were introduced to Haida Gwaii (also known as the Queen Charlotte Islands, located off of the coast of central British Columbia) early in the 20th century, with subsequent devastating impact on native vegetation. Given such dramatic evidence of the effect of this invasive species, many people wish to eradicate them from the islands. Others oppose such action on ethical and pragmatic grounds, especially since the deer have become an important food source for many of the Haida people.

zealous commitment to a particular plan of action. It may cause those most committed to conservation to have doubts about the invasion biologists' intentions.

Militaristic metaphors may also affect perceptions of scientific objectivity because of their resonance within the contemporary political setting. Just as Davis *et al.* (2001) suggested that Elton's views on invasive species were influenced by fears of German invasion of the United Kingdom, similar influences may be operating today. First, the political climate after the September 11th terrorist attacks on New York and Washington could be generating unnecessary fears. Meyerson and Reaser (2003), for example, state that "A terrorist attack on the environment [with invasive species] would have economic consequences ...but the greater impact might be on the national psyche, if, for example, a national park and/or highly charismatic wildlife species were targeted". While not impossible, this is at least very unlikely given our current inability to predict the success of introduced species. Such fears could drain limited

conservation funds. Also, the metaphors of invasion biology are too easily associated with nationalistic policies. US President Bush recently merged part of the Animal and Plant Health Inspection Service – which is responsible for invasive species – into the new Department of Homeland Security. The Union of Concerned Scientists (2002) criticized this move, observing that "It's hard to imagine that a department rightfully focused on preventing terrorist activity will pay much attention to the movement of pests and weeds". To the extent that invasion biologists invoked a "war against invasive species", however, they may have contributed to this association between their actions and broader political machinations.

Militaristic language also contributes to "literal" war against invasive species. The language of war derives from a strong moral commitment that tends to polarize not only villain and victim but also those who oppose the war and those who support it. In October of 1997, for example, the California Department of Fish and Game announced its plan to apply pesticides to a water reservoir to exterminate invasive pike. Because the reservoir supplied fish and water to the nearby town of Portola, local people were outraged, feeling that this was a war – not against the fish but against them (Little 1997). As another example, consider the National Parks Service project to eradicate rats from Anacapa Island, one of the California Channel Islands. While the decision to act was undoubtedly a difficult one, the method chosen to control the rats – precision dropping of poison pellets along GPS gridlines with helicopters (at a cost of \$1 million) – can be interpreted as both a symbolic and a technological act of war. This may have contributed to extensive conflict with a local animal rights group. In both cases, it is worth asking whether the rhetoric of bioinvasion contributed to human conflict, in that the agencies involved were so committed to their actions against invasive species that these were transformed into what was perceived as an affront to a particular group of people. Given that diverse value systems underlie perception of these species (Woods and Moriarty 2001), militaristic language may reinforce recurring conflict between invasion biologists and those with alternative views (Figure 5). This may inhibit our capacity to tackle important conservation and restoration activities.

Even if militaristic language inspires action against invasive species, it may have broader ramifications that counterbalance this effect. In particular, linguistic war can contribute to real ones, which have tremendous socioecological costs. When we evoke a militaristic framework, we implicitly endorse the militaristic worldview of those who promote the circulation of this framework rather than questioning that worldview. We have recently waged wars against drugs, terror, and other non-political entities (Glover 2002), for example, and in each case have promoted the habit of directing the frame of war in directions other than actual war. More and more we are using militaristic metaphors to describe non-war, yet simultaneously diminishing actual war by describing it

in other ways (Underhill 2003). Furthermore, wars against invasive species indirectly contribute to veritable ones; for instance, Russell (1996) has shown how killing humans in war and killing insects with insecticides became metaphorically and literally interwoven in the mid-20th century. In short, by using militaristic metaphors, biologists create an artificial similarity that contributes to a semantic field of war. Given the impact of wars around the globe, we need to be cautious with language that contributes to polarized, militaristic ways of conceptualizing difficult situations. Instead, we need to reflect upon alternatives that are more consistent with a vision of sustainable socioecological systems.

### ■ Conclusion: alternative metaphors for invasion biology

Rather than using a militaristic framework for invasive species, we need to consider alternatives that recognize our relationship with them, while still promoting conservation action. We might emphasize metaphors that are relevant to their origins rather than just to the species themselves, directing us more towards prevention and acceptance rather than opposition. Invasive species are often conceptualized as a disease (Baskin 2002), for example, and by analogy they weaken ecosystem health just as pathogens weaken bodily health. The major benefit of this analogy is that people intuitively understand the notion of health, which allows effective communication about the consequences of invasive species on a landscape, regardless of any debate about its scientific shortcomings (Lackey 2001). It also reminds us that our health and the health of ecosystems are interwoven. Unfortunately, our response to disease is often militaristic too, but we can draw upon alternative medical models. Traditional Chinese medicine conceptualizes disease with metaphors of balance, energy, and weather – sometimes even emphasizing “kindness to tumors”, whereas conventional Western medicine draws upon militaristic imagery and the metaphor that “curing illness is a fight” (Stibbe 1996). The latter metaphor is particularly misleading for terminal illnesses, and to the extent that invasive species are a “terminal” disease we may need to adopt language that focuses on improving “quality of life”.

We could also conceptualize these species as human symbionts – in the original Greek sense of species “living together” – rather than as invaders. They often depend on our activities and are simply very good at accompanying us around the planet, thriving in the habitats (particularly the disturbed ones) that we create. This metaphor more directly implicates us in their creation; we must therefore take appropriate responsibility. Just as human disease results to some extent from individual action, invasive species originate with individual and social behaviors. By conceptualizing these species as co-conspirators with us in our urge to consume, to progress, to spread and to travel, we would raise uncomfortable questions, but perhaps ones

that more directly confront the complexity of how we are changing the planet. Rather than maintaining our illusory separateness from a natural world “out there”, we would be acknowledging our role in changing it.

Finally, we can look to alternative cultural models of restoration. Long *et al.* (2003) demonstrate how the health and stability metaphors underlying ecological restoration on the White Mountain Apache Reservation contrast with those from scientific ecology. In particular, ecological metaphors imply “that humans dominate a mechanistic process, while the tribal metaphor portrays nature as an organic process, with humans in a subsidiary role”. Mechanistic ecological thought – and militaristic metaphors – also encourage quick, linear solutions rather than more patient, cyclical ones. In attending to the latter, the Apache emphasize the mindset of the restorationist. Perhaps this is the crucial lesson for our “war on invasive species”, one that underscores the need to reflect on the interconnections between individual, social, and ecosystem health.

These alternatives point us in the direction of acceptance, a difficult compromise given the biological effects and economic harmfulness of many of these species. We preclude acceptance with caricatures of a general struggle between ourselves and invasive species. Such species are part of a system that includes humans, and we will only “solve” the invasive species problem with reference to this greater context. While the changes wrought by invasive species are painful for biologists familiar with the former state of ecosystems, we will neither sensitize others to this issue nor bring back the past by rhetorical might and martial action alone. When we discuss invasive species and even when we remove them, we can perhaps do so with greater appreciation for how they are an expression of ourselves.

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### ■ References

- Baskin Y. 2002. A plague of rats and rubbervines: the growing threat of species invasions. Washington, DC: Island Press.
- Bright C. 1998. Life out of bounds: bioinvasion in a borderless world. New York, NY: WW Norton.
- Bright C. 1999. Invasive species: pathogens of globalization. *Foreign Policy* 116: 50–64.
- Buhs JB. 2002. The fire ant wars: nature and science in the pesticide controversies of the late twentieth century. *Isis* 93: 377–400.
- Burdick A. 2005. Are invasive species really so bad? *Discover* 26: 34–41.
- Callaway RM and Ridenour WM. 2004. Novel weapons: invasive success and the evolution of increased competitive ability. *Front Ecol Environ* 2: 436–43.

- Chew MK and Laubichler MD. 2003. Natural enemies – metaphor or misconception? *Science* **301**: 52–53.
- Civeyrel L and Simberloff D. 1996. A tale of two snails: is the cure worse than the disease? *Biodiv Conserv* **5**: 1231–52.
- Colautti RI and MacIsaac HJ. 2004. A neutral terminology to define “invasive” species. *Divers Distrib* **10**: 135–41.
- Cook LF and Toft CA. 2005. Dynamics of extinction: population decline in the colonially nesting tricolored blackbird *Agelaius tricolor*. *Bird Conserv Int* **15**: 73–88.
- Davis MA, Thompson K, and Grime JP. 2001. Charles S Elton and the dissociation of invasion ecology from the rest of ecology. *Divers Distrib* **7**: 97–102.
- Foster J and Sandberg LA. 2004. Friends or foe? Invasive species and public green space in Toronto. *Geog Rev* **94**: 178–98.
- Glotfelty C. 2000. Cold war, silent spring: The trope of war in modern environmentalism. In: Waddell C (Ed). *And no birds sing: rhetorical analyses of Rachel Carson’s Silent Spring*. Carbondale, IL: Southern Illinois University Press.
- Glover R. 2002. The war on \_\_\_\_\_. In: Collins J and Glover R (Eds). *Collateral language: a user’s guide to America’s new war*. New York, NY: New York University Press.
- Gurevitch J and Padilla DK. 2004. Are invasive species a major cause of extinctions? *Trends Ecol Evol* **19**: 470–74.
- Lach D, List P, Steel B, et al. 2003. Advocacy and credibility of ecological scientists in resource decisionmaking: a regional study. *Bioscience* **53**: 170–78.
- Lackey RT. 2001. Values, policy, and ecosystem health. *Bioscience* **51**: 437–43.
- Lakoff G and Johnson M. 1999. *Philosophy in the flesh: the embodied mind and its challenge to Western thought*. New York, NY: Basic Books.
- Little JB. 1997. What to do about a nasty fish? *High Country News* [www.hcn.org/servlets/hcn.Article?article\\_id=3468](http://www.hcn.org/servlets/hcn.Article?article_id=3468). Viewed 19 June 2005.
- Long J, Teale A, and Burnette B. 2003. Cultural foundations for ecological restoration on the White Mountain Apache Reservation. *Conserv Ecol* **8**: 4. [www.consecol.org/vol8/iss1/art4](http://www.consecol.org/vol8/iss1/art4). Viewed 22 September 2005.
- Lubchenco J. 1998. Entering the century of the environment: a new social contract for science. *Science* **279**: 491–97.
- Mack RN, Simberloff D, Lonsdale WM, et al. 2000. Biotic invasions: causes, epidemiology, global consequences, and control. *Ecol Appl* **10**: 689–710.
- Meyerson LA and Reaser JK. 2003. Bioinvasions, bioterrorism, and biosecurity. *Front Ecol Env* **1**: 307–14.
- Mio JS. 1997. Metaphor and politics. *Metaphor and Symbol* **12**: 113–33.
- Rodman J. 1993. Restoring nature: natives and exotics. In: Bennett J and Chaloupka W (Eds). *In the nature of things: language, politics, and the environment*. Minneapolis, MN: University of Minnesota Press.
- Russell EP. 1996. “Speaking of annihilation”: mobilizing for war against human and insect enemies, 1914–1945. *J Amer Hist* **82**: 1505–29.
- Schön DA. 1993. Generative metaphor: a perspective on problem-setting in social policy. In: Ortony A (Ed). *Metaphor and thought*. 2nd edn. Cambridge, UK: Cambridge University Press.
- Simberloff D. 2003. Confronting invasive species: a form of xenophobia? *Biol Invasions* **5**: 179–92.
- Slobodkin LB. 2001. The good, the bad and the reified. *Evol Ecol Res* **3**: 1–13.
- Soulé ME. 1990. The onslaught of alien species, and other challenges in the coming decades. *Cons Biol* **4**: 233–39.
- Stibbe A. 1996. The metaphorical construction of illness in Chinese culture. *J Asian Pacific Commun* **7**: 177–88.
- Todd K. 2002. Botanically correct: a new language is needed to win the day for native species. [www.gristmagazine.com/soapbox/todd110602.asp](http://www.gristmagazine.com/soapbox/todd110602.asp). Viewed 19 June 2005.
- UCS 2002. Homeland security department could open floodgates to biological invaders. [www.ucsusa.org/news/press\\_release.cfm?newsID=269](http://www.ucsusa.org/news/press_release.cfm?newsID=269). Viewed 19 June 2005.
- Underhill JW. 2003. The switch: metaphorical representation of the war in Iraq from September 2002–May 2003. <http://metaphorik.de/05/underhill.htm>. Viewed 22 September 2005.
- Woods M and Moriarty PV. 2001. Strangers in a strange land: the problem of exotic species. *Environ Values* **10**: 163–91.