

BARRIERS TO EXOTIC WEED MANAGEMENT

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In order to increase effective efforts to reduce the impacts of invasive alien plant species on our natural areas, we must overcome numerous barriers. Some of these are technical in nature, *e.g.*, determining the most appropriate control method for a specific species in a particular ecosystem, or devising a better program to exclude new invasive plant species from our country.

To build the infrastructure that will allow us to tackle such scientific problems, however, we have first to enliven the political will to address the very concept of invasive alien plant species damaging our eastern forests. We face numerous complex challenges in this underlying phase, as well.

A campaign of sufficient scope to be effective requires the understanding and support of the American public. To gain that support, we need to attract people's attention. Our first barrier, then, is people's limited attention span. We are competing with all other enticements, ranging from the newest "blockbuster" movie to the state of the economy.

Once we have people's attention, we should ensure that our proposed solutions make sense to them. Here we confront another obstacle. In my view, at least, reducing the impacts of invasive alien plant species will require significant increases in spending and regulatory authority by federal agencies. The prevailing political culture at present is plainly hostile to such measures. To move ahead, we will have to find both voluntary and cooperative steps and arguments to persuade people that the national government has a constructive role to play here.

Finally, people are most concerned about what impacts them directly, and most weeds do not affect most people in the same way as does the threat of toxic substances in their drinking water. Certain ecosystems have been sufficiently damaged by invading exotic plant species to gain some level of public attention. The principal examples are the tropical and subtropical ecosystems of Hawaii and Florida, and grazing lands in the Intermountain West. Unfortunately, these areas are somehow dismissed as irrelevant to most people's concerns. The Hawaiian islands are seen as too far away and too "exotic."

Let's try to climb over these barricades that block effective "weed" control efforts. Where do we begin?

I believe our first hurdle will be overcoming our own and the public's lack of awareness. We need to obtain information ourselves, then find exciting ways to make it available to the public in hopes it will motivate people to act.

Some of the missing information is at a very basic level. As Dr. John Schwegman, just retired from the Illinois Department of Natural Resources, has pointed out, most Americans don't recognize more than a few plant species, and they have no idea which ones are native, which ones exotic. How do we help our neighbors learn to recognize and appreciate our own flora? This education effort would seem especially important in the eastern forest realm, where we have exotic shrubs, trees, and herbaceous flora replacing their counterparts. Invasion in the forests is not as dramatic as the replacement of sawgrass marsh by *Melaleuca* that is occurring in Florida's everglades ecosystem. People need to be given tools to use in order to appreciate the invasion. The exotic vines are more conspicuous, but even they escape notice. Rock Creek Park in Washington, D.C. has wisely included in its recently produced brochure a set of pictures intended to help the visitor distinguish between healthy forest and a curtain of exotic vines.

Our task is probably made more difficult by the fact that people are naturally more interested in animals than plants. Plants seem more "foreignless," like us. They rarely arouse a humanitarian concern. On the other hand, people manifestly love and seek floral beauty.

While our friends in education, psychology, and marketing are tackling the fundamental questions just raised, more traditional players—scientists and resource managers—can be busy filling in our gaps of knowledge in other, more technical areas.

We lack hard data on the extent of exotic plant invasions, both for most (if not all) individual species, and especially for the overall picture. If we cannot tell the American public how big the problem is, how can we persuade them to spend money and accept restrictions on the plants they can have in their yards in order to solve it?

In a very preliminary attempt to provide a nation-wide picture, I have totaled estimates of the areas occupied by a few species—cheat grass *Bromus tectorum*, salt-cedar *Tamarix* spp., floating aquatic weeds, purple loosestrife *Lythrum salicaria*, and *Melaleuca*. Together, these plants displace native plant communities and destroy habitat for wildlife species on more than 169,000 square miles of western grasslands and wetlands. This is an area larger than the state of California; it is 4.6% of the total area of the United States. I have not included here leafy spurge *Euphorbia esula*, yellow starthistle *Centaurea solstitialis*, and other invaders of the western grasslands because I don't know the extent to which they overlap with cheat grass. Surely, however, they infest millions of additional acres, thus further raising the total.

Please note that these data include none of the numerous plants invasive in the eastern forests. The only such plant for which I have been able to find any datum is kudzu *Pueraria montana* (= *P. lobata*; *triloba*; *thunburgiana*). I believe that the vine that ate the South occupies some 10,000 square miles of our forests—an area about the size of Maryland. If we are going to persuade people to help us combat exotic species in the eastern forest, we need better information about the geographic extent of the invasion by the approximately 100 species of alien plant species already well established in this realm.

Probably, even more important, and certainly more difficult, will be obtaining information on the ecological damage caused by invading alien plant species—especially those in the East. It is a matter of priorities. If the invasion has little ecological impact, should not the public—and we—devote our energies elsewhere? But this decision should not be based on ignorance; a lack of data is not, in my view, satisfactory “proof” that the ecological impact is minor.

Some studies, such as that by Thomas of the National Park Service, have demonstrated that English ivy *Hedera helix* and Japanese honeysuckle *Lonicera japonica* can suppress tree regeneration.¹ Ann Rhoads of the Morris Arboretum has suggested that the replacement of ephemeral spring herbs by biannual or annual herbs such as garlic mustard *Alliaria petiolata* (*A. officinalis*) may interfere with the recycling of nutrients normally captured in the early spring by the ephemerals, then released to other plants as the early bloomers retreat into dormancy. Scientists need to explore and explain to the public these and other forms of ecosystem damage.

We will be much better off if we can enlist the help of economic interests. Looking at the “weed” problem from the broad perspective, we should be able to do this. The most recent data, to be incorporated in the government’s “weed fact book,” puts agricultural losses due to weeds at \$20 billion per year. But we need much better data to solidify our case.

For some regions and some species, the economic arguments are well advanced—and control efforts have followed. Leafy spurge, spotted knapweed *Centaurea maculosa*, Medusahead wildrye *Taeniatherum caput-medusae*, and other scourges of the West receive considerable attention—relatively speaking—because they harm the livestock industry. Please note, however, the contrasting low level of attention given to the most widespread of the invasive alien plant species, cheat grass. Cheat has invaded one-third of the grasslands of the Intermountain West—158,000 square miles.² Cheat is a true “ecosystem changer.” It triggers “drastic” ecosystem changes³ by fueling hotter, larger, and more frequent fires. The fires virtually eliminate native shrubs within a few years. The shrubs matter because they provide key food or shelter to native wildlife including

¹reported in Macdonald, IAW, Loope, LL, Usher, MB, Hamann, O. (1989) Wildlife Conservation and the Invasion of Nature Reserves by Introduced Species: a Global Perspective. In: Drake, JA, Mooney, HA, diCatri, F, Groves, RH, Kruger, FJ, Rejmanek, M, Williamson, M. (1989) Biological Invasions: A Global Perspective. SCOPE 37 (Scientific Committee on Problems of the Environment). John Wiley & Sons. New York and Toronto. pp. 215 - 256.

²R. Mack, cited in Rosenstreter, R. (1994) Displacement of Rare Plants by Exotic Grasses. In: Monsen, SB, Kitchen, SG. (1994) Proceedings—Ecology and Management of Annual Rangelands. USDA Forest Service. Intermountain Research Station. General Technical Report INT-GTR-313. Ogden, Utah. September 1994. pp. 170 - 175.

³Billings, WD. (1994) Ecological Impacts of Cheatgrass and Resultant Fire on Ecosystems in the Western Great Basin. In: Monsen, SB, Kitchen, SG. (1994) Proceedings—Ecology and Management of Annual Rangelands. USDA Forest Service. Intermountain Research Station. General Technical Report INT-GTR-313. Ogden, Utah. September 1994. pp. 22 -30.

antelope, song birds, and the small mammals that are the prey for the large number of raptors found in the region. Despite its ecological importance, cheat is not even included in the Bureau of Land Management's data on invading exotic plant species. I believe this results from the fact that cattle willingly feed on cheat in the spring.

In the east, purple loosestrife, hydrilla *Hydrilla verticillata*, and Eurasian watermil-foil *Myriophyllum spicatum* are the objects of research and control efforts because they interfere with activities by hunters, boaters, and owners of waterfront property—e.g., powerful political constituencies. Unfortunately, most of the vines, shrubs, trees, and herbs that harm natural environments in our forests do not pose significant problems to agriculture or homeowners. It will be challenging to generate the same level of concern about invaders of the eastern forests as long as those plants are not perceived as going an economically or politically important ox.

The situation is further complicated because a surprisingly high proportion of invasive exotic plants are still sold for use in ornamental horticulture, landscaping, wildlife “enhancement,” or soil conservation. Overall, 64 percent of the approximately 340 species identified by my sources as seriously invasive in ecosystems of the continental United States are in the commercial trade. For plants invading the eastern forest, the proportion is even higher, perhaps 80 percent. Looking to future weed problems, I believe that the driving force behind most plant introductions today are these markets. As I will argue below, some proportion of the as-yet-to-be introduced species will also prove invasive. Consequently, the proportion of troublesome species that are in the trade is likely to increase in coming years.

Clearly, building an effective program to contain and suppress plant invasions will require the active cooperation of the trade. People who earn their living by selling plants, and who feel competitive pressures to find “new and improved” varieties to offer, will be asked to consider the greater good and to forego sales of certain species. What's more, increasingly the decisions will be based on a *prediction* that a species may be invasive, rather than observed facts. We are asking much from the industry. I believe the cause of restoring our ecosystems' biological integrity merits the sacrifices sought—but we need to be aware of the magnitude of our request.

I have outlined a suggestion for the content of the needed educational campaign. Now we need to move ahead with it. Scientists and resource managers are only now beginning to get out the message. We need to learn from the advertising industry that is so successful in our country—our message should be repeated *ad nauseam*, like an advertisement for toothpaste.

We can tell people that half of our National parks—194 out of 370—have identified exotic plants as serious threats. Through various documents—e.g., the *National Strategy, Pulling Together*, the “weed fact book,” etc.—the federal government is increasing its educational efforts.

Similarly, stewards of 60 percent of preserves managed by The Nature Conservancy report plant invasions to be significant threats. TNC has launched an aggressive educational campaign in Hawaii and on the continent, issued a report on *America's Least Wanted*.

I believe we all wish to involve the other major environmental organizations in this campaign. This may be difficult because the “weed” issue scrambles traditional alliances. Environmentalists are

being asked to join forces with chemical companies and livestock ranchers; and to support active management of what they have thought of as “pristine” areas. Furthermore, we want them to abandon their own past advice regarding plantings to “enhance” wildlife habitat. In the case of animal invaders, we are asking fishermen to stop stocking introduced fish into new lakes and streams, and people concerned about humane treatment of animals to accept the killing of various mammals and birds.

A fundamental problem remains: the threat from invasive alien species is often seen as somehow fundamentally different in kind and scope from other environmental threats. It is portrayed as requiring a completely new type of response. I would argue that invasive aliens are not fundamentally different. That is why I welcome use of the term “biological pollution.”

No matter whether the threat to our biodiversity stems from chemical pollutants, overharvesting, suburban sprawl, draining of wetlands, or biological pollutants, we cannot put the environment “back the way it was.” We *can* reverse the damage or restore some areas and minimize what will occur in the future. I think our message should emphasize the similarities with other environmental threats, even as we acknowledge the need for actions aimed at this specific manifestation.

Finally, we tend to become so focused on the burgeoning problem under our feet that we can’t find time to look at the very scary longer term picture:

Unless we act decisively, exotic plants will do more and more damage in future years.

Those species already introduced into the country continue to spread. On federal lands in the west, exotic plants are spreading at a rate of at least 4,600 acres per day. At this rate, weeds cover a new area the size of Delaware every year.

An estimated 4,000 exotic plant species have been reported as outside cultivation in the United States. In both Florida and California, more than 1,000 exotic species have escaped cultivation; in Hawaii, more than 800. Because a plant species’ invasiveness is often recognized only decades after it first became established in the wild, some proportion of these few thousand species now “escaped” but not yet considered “invasive” probably will become troublesome.

Thousands of other plants have been introduced for our gardens or other purposes—more than 8,000 species in Hawaii. Perhaps 10 percent will probably escape when conditions are right.

Finally, new plant species are imported every year. If one extrapolates from current data and concludes that about 10 percent of all vascular plants are “weedy,” there could be as many as 26,000 species capable of becoming invasive once they are introduced into new environments.⁴

⁴Rapoport, E.H. 1991. Tropical versus temperate weeds: A glance into the present and future. In: Ramakrishnan, P.S. 1991. *Ecology of Biological Invasion in the Tropics*. National Institute of Ecology, New Delhi

The current system intended to protect our ecosystems from this onslaught is inadequate. We currently have no requirement that plants of foreign origin be screened for invasiveness prior to their introduction. Conversations have begun with the nursery industry to develop such a program, but many technical and political hurdles will have to be cleared before it is in place.

Meanwhile, international negotiations under the auspices of the World Trade Organization and the International Plant Protection Convention are on the verge of setting the "rules of game" for determining which "plant pests" the United States can exclude from entry. Are these negotiators adequately attuned to the damage caused by invading alien species in natural ecosystems and the impossibility of predicting in advance with anything approaching certainty which pests will cause great threats? How many scientists even knew of the existence of the fungus *Cryphonectria* (= *Endothia*) *parasitica* before chestnut blight began sweeping through our forests?

The Exotic Pest Plant Councils, Weed Science Society of America, and the USDA Animal and Plant Health Inspection Service agree that the Service's present authority under the Federal Noxious Weed Act is inadequate to address the problem. While the federal agencies have greatly increased their efforts and are coordinating their programs more effectively, naturally major gaps in both concept and implementation remain. We will just have to expand our own efforts and invite others to join us in moving ahead on all fronts. Our battered but still magnificent forests will reward us for the effort.

Thank you for the opportunity to exchange views with you today. I look forward to many future collaborations.