INVASIVE SPECIES AND THE ENVIRONMENTAL ETHIC

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by
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Adm. Horatio Nelson, the famous British naval commander, once wrote: "But in case signals can neither be seen or perfectly understood, no captain can do very wrong if he places his ship alongside that of the enemy."

Not being a ship's captain, I don't know exactly what that means, but whether in politics or government or business, I have taken this as a metaphor – a piece of good advice to get as close as possible to an enemy, or a problem, or a disagreement and learn about its character and what is driving it as best you can, so that you can try to take it to a satisfactory resolution. The advice seems good, in any case, when it comes to invasive species, some of which are clothed in great beauty and false hope, others of which slip in as hideaways, and a very high percentage of which arrive with the complicity, witting or unwitting, of human beings who did not take the time to get to know what they were dealing with. It is a good idea to take the measure of exotic species, to determine what kinds of problem they are, to determine which may or may not be enemies, and, though they may not be seen and may not be perfectly understood, take the necessary actions to prevent or contain the spread of those that earn the label, invasive.

Here is what I think we know about exotic species in the U.S. in general:

-- Approximately 4,000 species of exotic plants and 500 species of exotic animals have established free-living populations in the U.S. (Alien Plant Working Group, undated) Some were purposeful introductions, brought into their new habitats for economic reasons or for pleasure. Many others were accidental introductions.

-- Of these, nearly 700 are known to cause severe harm to agriculture, and more than 1,000 have been identified as a threat to native flora and fauna as a result of their aggressive characteristics, earning them the label of invasive.

-- This also means that 75% to 85% of exotics are not known to be invasive. Many have cautioned not to paint all exotics with the same brush; many have been incorporated into our gardens, our recreation, and our economy. But those that are invasive have wide-spread, damaging effects: reduced biodiversity, disruption of existing ecosystems, and impacts on the food supplies, recreation, and other resources of human communities.

Beyond these facts, in the interest of getting to know these species, it is useful to ask: is the problem of invasives primarily biological? Or is it primarily economic? And is there an ethical component to the problem—that is, if there were not a direct economic component to the problem, would we care? The answers frame both our public and private responses to invasives: how much we are willing to invest in solving the problem, how much we are willing to regulate ourselves, how much effort we are going to put into education.

BIOLOGICAL

The problem obviously has a biological component, and knowledge of the biology of invasives is central to preventing their arrival, to their eradication if they do arrive, and to their containment if eradication is impossible.

Exotics that are invasive succeed in their invasion for inherent biological reasons. As noted in a recent issue of *Conservation Biology* (Allendorf and Lundquist, 2003), they may be intrinsically better competitors because they evolved in a more competitive environment. They may find themselves relatively free of enemies, parasites and disease, which means that they end up with more resources and

opportunities for growth and reproduction than native species that have co-evolved with a community of species, both cooperators and competitors. And they may gain biological advantage in another way. Native populations may have evolved adaptations for their particular habitats that give them an advantage in extreme events, such as storms, drought, or fire that may come into play every 50 or 100 years. But these same advantages may carry a small price in efficiencies in the short term, which may be constraining when compared to an introduced species that has not been burdened by such adaptations. In these cases, the introduced species will pay in the long run, but may cause havoc in the short run.

If the problem of invasive species were only a biological issue, one could be neutral toward them, even admiring of them. We would battle them, because we, too, are biological beings that compete for space and habitat. But we would know that these species are doing what all species are designed to do – disperse, secure a position in a community that allows them to thrive, and from that position to reproduce and widen its territory as much as possible. Human beings could be particularly admiring, since we excel at these things ourselves. And we would understand that nature has a way of evening things out over the very long term: species come and go; ecological communities are structured and re-structured; and nature lives on.

ECONOMIC

But for anyone who might, in some intellectual way, be admiring of the biological capabilities and achievements of successful invasives, the economic component of the problem dampens our enthusiasm immediately. This is a matter of self-interest, a direct harm or threat of a harm that moves us to action. The costs are documented to be high.

For example, Kevin Boyle, Steve Kahl, Roy Bouchard, and others have documented the importance of great ponds to Maine's economy and tax base; and, in turn, have quantified the impact of water clarity on the value of properties around lakes. For example, the loss of 1 meter of clarity in a great pond such as Thompson Lake or Pushaw Lake can cumulatively depress property values by $6 million to $10 million dollars. (Boyle et. al. 1998) And that does not account for the spin-off impacts on tourism and the outdoor recreation industries that rely on healthy lakes and marine systems.

Nationally each year, invasive plants cause economic losses and expenditures in farming, forestry, and rangelands measured in the billions of dollars. The Office of Technology Assessment estimates that invasive species of weeds cost crop and livestock production more than $5 billion per year, plus the direct and indirect costs of using herbicides to try to control the weeds. The National Park Service and the Fish and Wildlife Service alone spend an estimated $12 million per year to control exotic plants.

And all of this apparently is just a fraction of total costs. When everything is accounted for, from lost production, to environmental costs, to the costs of containment, to the costs of anti-fouling measures in utility lines, writers in the journal *BioScience* in 2000 estimated the total cost of invasive species in the U.S. at an eye-popping $125 billion per year.

This, certainly, is what brings all of you here. According to an examination of the role of great ponds in Maine's economy, conducted for the Great Ponds Task Force in 1997, the economic activity associated with lakes and ponds leads to $1.2 billion in annual income for Maine residents and 50,000 jobs. (Boyle et. al., 1997). The economic consequences of milfoil and other invasives in Maine's lakes and ponds are too great to ignore.

ETHICAL

But is there also an ethical component? If so, our reaction takes on a different dimension. By definition, an ethical component requires us to act *contrary* to economic self-interest – to take action, or to refuse an opportunity, out of concern about something bigger than we, or out of obligation to a community or a generation that is not ours.

The ethical component of invasives has at least two parts to it. The first is only partly ethical; arguably it is really another aspect of the economic problem, because it has to do with who pays. The question is whether those who cause the problem appropriately bear the cost of solving it. We know that, while species invasions are a natural biological event, the rate of their occurrence and the distances traversed by species now exceed by orders of magnitude the invasions of a few hundred years ago. They are directly the result of human movement and trade. Some, like carp and European starlings, have been introduced on purpose. But far more often, they are introduced accidentally—such as Eurasian water milfoil by recreational boaters and anglers and zebra mussels via ballast water. Did you know that it is estimated that between 3,000 and 10,000 species of protists, animals, and plants are in motion around the world on any given day, in the ballast of ocean-going ships? The Japanese shore crab, now colonizing Atlantic North America, is one of them.

This is a question of fair distribution of costs and benefits, and that is why it is at least partly an ethical question. Those who have been responsible for inadvertently introducing species into new habitats may not have been willing to make the investment to prevent such accidents from occurring. They may not have realized the dangers, and in any case the dangers would be unlikely to have much economic impact on their own welfare. Rather, the costs of such accidents are borne by people other than those who have catalyzed the accidents. As Jeffrey McNeely, Chief Scientist of The World Conservation Union, has pointed out, the costs are in this way externalized. (Undated)

There is also a more purely ethical component to the invasives problem. The raw, ethical question is this: would we care about invasives if it were not for the direct economic harm to property values, to livelihoods, and to the enjoyment of resources we regard as placed on earth for our use? For that matter, *should* we care?

The non-economic problem associated with invasives is the homogenization of nature: taking a complex, resilient ecosystem that has evolved over thousands of years and simplifying and homogenizing and weakening it. As species invasions have accelerated in numbers and space well beyond background levels, ecosystems are less and less able to absorb their impacts. As a result, they are another manifestation of homogenization that comes with human colonization of local, regional, and global ecosystems. A recent article in the respected journal *Conservation Biology* asserts that the impact of invasive events on biodiversity is widespread – that invasive species are at least partially responsible for the extinction or imperiled status of 49% of the extinct or imperiled species in the United States. (Lodge & Shrader-Frechette, 2003)

If there were no economic consequences to this, I wonder if we would care. A little more than 30 years ago the U.S. passed the first federal statute, the Endangered Species Act, to grant de facto existence rights to species of plants and animals. In concept, at least, the Act recognizes existence rights of other species apart from their potential value as instrumentalities of human beings.

Yet, there is a great deal of evidence that our ethical values—that is, our willingness to act contrary to economic self-interest for a purpose greater than ourselves—do not extend to the homogenization of nature. The best evidence arises from the way in which we have chosen to spread ourselves across the landscape over the last half-century. Sprawl, as this pattern of settlement has become known, is one of the great homogenizers of nature. Even at low densities of one unit per 5 to 10 acres, sprawl reduces or eliminates the interior habitats required for biodiversity. The diversity of life quickly halves, and halves again, as large blocks of open space are reduced to 1,000-acres, 500-acres, and 50-acres, or are punctuated with house lots on 2, 5, or 10 acres. Yet, this is precisely what most suburban zoning ordinances now require.

Suburban sprawl, so far, has been impervious to ethical arguments dealing with pollution of the commons, reduction of wildlife habitat, and the homogenization of nature. Economic arguments simply trump ethical arguments. As a result, those of us who are trying to slow down or reverse sprawl must

resort to economic arguments of our own. There are plenty – including tax burdens, loss of the competitive advantage that is our quality of life, inordinate transportation costs, and so forth. And right now, the statewide organization GrowSmart Maine, led by its president Alan Caron, is launching a major analysis of the relationship between sprawl and Maine's economy—an analysis that we believe will definitively link the need to defuse sprawl to the future economic well-being of the state.

But the point is that, when it comes to common resources, like wildlife, the air, the great ponds, and so forth, we must rely on economic rather than ethical considerations if we are to protect them.

This is not exactly what Aldo Leopold had in mind, when he wrote in *A Sand County Almanac*: "Examine each question in terms of what is ethically and aesthetically right, as well as economically expedient. A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise."

Fortunately or unfortunately, we need not rely on the ethical component to stir interest in invasives. The economic imperatives are strong enough to engage public policy, and, thanks to your efforts, public awareness of the problem is growing. The volunteer efforts and the public service mounted by the people in this room, and many others, around the control of milfoil and other lake invasives are remarkable. And, economically driven or not, it is a testament to Mainers' feelings for nature.

Let me conclude by saying that when I hear or read about invasives, a little poem by Ogden Nash comes to mind. It is about one of the most prolific introduced species in North America, the Rock Dove (now officially known as the common pigeon):

> "Toward a better world I contribute my modest smidgin;
> I eat the squab, lest it become a pigeon." – Ogden Nash

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