



By Thad Box

Invasive Species, Gondwana, Columbus, and Land-Care Professionals

A Eurasian collared dove sits in a Norway maple outside my window. Improved Kentucky bluegrass greens my lawn. Dry cheatgrass covers the mountain a mile away. Rainbow and brown trout breed in a stream that flows from the mountain. Flattened raccoons lie rotting on our roads.

None of these species were here when white men first entered our valley. Maples, improved bluegrass, and trout were brought here for people's enjoyment. They were "improved" by breeding programs that selected characteristics that gave us pleasure. Cheatgrass hitched a ride here decades ago. The first raccoon wandered from the south in 1980. Eurasian doves showed up 8 years ago. All are now residents. They are exotics, and by definition, invasive species.

We view immigrants through culture-biased eyes. Opinion often supplants science in evaluating a new species. When the value of a species exists in the eye of the beholder, science plays second fiddle. If we like it, it's good. If we don't, it's a weed.

I grew up thinking weeds were bad plants. In college, my botany professor told me plant species were neither good nor bad, but a group of organisms with unique features that taxonomists used to classify them. In agronomy, I was told a weed was a plant out of place. A morning glory provides esthetic beauty. Planted as a crop, its seed become medicine or harmful drugs. In a field of chiles, its gorgeous flowers mean green enchiladas will rarely grace our plate.

Most definitions of invasive species describe them as something exotic, not native. They suggest exotics might harm other species already established or those species desired by humans. If exotic means something undesirable coming from somewhere else, let's take a quick look at history of species movement.

The southern supercontinent of Gondwana existed around 500 million years ago (MYA). By about 180 MYA the continent began to split. South America began to drift slowly westward around 130 MYA. Terrestrial biological interchange between South America and the other land masses probably stopped with the rift between Tierra del Fuego and Antarctica around 41 MYA. The Isthmus of Panama formed about 3 MYA, connecting South America to North America. That made possible the Great American Exchange of terrestrial plant and animal species between the two continents.

Migration of terrestrial species between the Americas and the rest of the world was limited by glaciers formed during the current Ice Age (about 2.6 MYA to the present). Anatomically modern humans evolved from archaic *Homo sapiens* about 200,000 years ago. Indicators of what we consider human—culture, language, and specialized technology—probably developed around 50,000 years ago. It is thought that humans arrived in the Americas about 30,000 years ago.

Prior to 1492, most new terrestrial species arrived in the Americas blown by wind or floated by water. An occasional human or other animal may have wandered into the Americas from time to time. Their impact was small because long, slow journeys made bringing other species with them difficult.

When Columbus “discovered” America, he triggered an influx of humans from Europe and Africa with microbial species in their bodies and more complex species on their ships. Few of the first Europeans remained, and many of those who did died. But viruses, bacteria, insects, and a few species of advanced plants and animals spread from those first landings.

Millions of Native Americans died from invasive species before they ever saw a European or African. Disease-causing microbial populations spread rapidly into vacant niches in human bodies and their communities. Conquering armies arrived to find large vacant cities and farms with corn uneaten in the granary. Invasive species invisible to the human eye, not great armies, reduced the populations of Native American humans. Gradually exotic *Homo sapiens* varieties replaced native human varieties that were not able to adjust to invasive species.

The dramatic change in biology of the Americas during the past 500 years can be attributed to at least three kinds of invasive organisms: 1) Invasive species, many of them small and unseen, that found niches they could exploit. Most of these were accidental introductions, but others like the English sparrow were brought for the pleasure of humans. 2) Plants and animals that had been domesticated and genetically changed through breeding programs. Horses and swine are examples of this category. 3) Invasive varieties of the same species as a native organism that could out-compete the native in the new environment. *Homo sapiens* is the prime example.

The extent to which species spread, and the effect on human populations are topics of best-selling, popular science books by social scientists and environmental historians. Alfred Crosby coined the term Columbian Exchange for the widespread exchange of diseases, animals, plants, culture, and ideas following Columbus’s first voyage. Charles Mann, with his two books *1491* and *1493*, describes the world prior to and after Columbus’ arrival. Jared Diamond’s books *Guns, Germs, and Steel* and *Collapse* contain examples of how human beings changed their environment and the consequences we as a species suffer.

There are an estimated 30 million species on the earth today. New species become established wherever a vacant niche exists. The earth’s two hemispheres, evolving separately from a common source, developed many opportunities for invasive species to succeed. Biologists and chemists can now decipher the DNA of any species. Physicists and mathematicians give us tools to analyze and model the complex structure of any organism. Given enough time and funding, no species can keep its secrets hidden.

But understanding everything that can be known about a single species is not sufficient to understand and control species invasion. Successful invasion does not come from the characteristics of the individual, but from the makeup and function of the community. And the structure and function of the earth’s communities are controlled by an invasive variety of *Homo sapiens*. Fortunately, humans are thinking, altruistic beings.

Here in North America we humans went through several stages. From the time the first white man arrived until the late 1880s, we went through an era of exploitation. To conquer the wilderness was honorable and good. As forests were cut and rangelands overgrazed a few visionaries forced us to rethink our future. National parks and forest preserves were established. Science turned its attention to rebuilding what had been exploited.

This era of conservation lasted from about 1880 to 1960. From then until now, we are in an era of environmental awareness. As the human population rises near (some would argue we have already passed) the earth’s carrying capacity for our species, we search for ways to continue our lifestyles and our very lives. It is in this environment we land-use professionals are challenged to think about invasive species.

The problem is best approached, not from the species level, but from community health and composition. Over the years, land-care professionals have been frustrated by emphasis on species rather than on the land itself. One of the problems in the early days of range management was to get ranchers to change from being beef producers or wool growers to land stewards. Now we are challenged to get seven billion to take responsibility for the environment in which they exist. I doubt that can be done with a new app on a smartphone. But an app might be more useful than an herbicide for killing an invasive species.

Suggested Reading

- CRONON, W. 1983. *Changes in the land*. New York, NY, USA: Hill and Wang. 257 p.
- CROSBY, A. W. 1973. *The Columbian exchange: biological and cultural consequences of 1492*. Westport, CT, USA: Praeger.
- DIAMOND, J. 1999. *Guns, germs and steel: the fates of human societies*. New York, NY, USA: W. W. Norton.
- DIAMOND, J. 2005. *Collapse: how societies choose to fail or succeed*. New York, NY, USA: Penguin Books.
- MANN, C. C. 2005. *1491: new revelations of the Americas before Columbus*. New York, NY, USA: Alfred A. Knopf.
- MANN, C. C. 2011. *1493: uncovering the New World Columbus created*. New York, NY, USA: Alfred A. Knopf. 535 p.

Thad Box, thadbox@comcast.net.