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## THE SCIENCES

# Costly Interlopers

Introduced species of animals, plants and microbes cost the U.S. \$123 billion a year

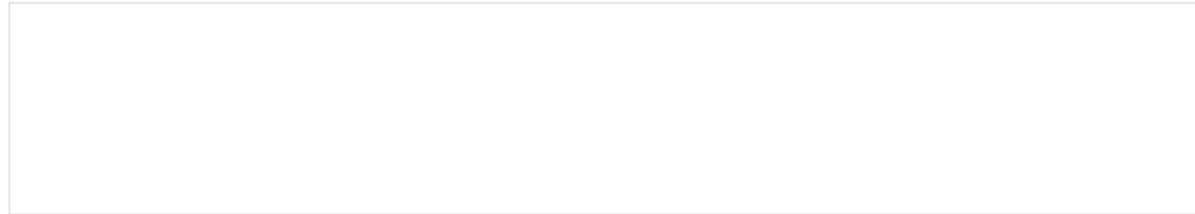
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By Alan Hall on February 15, 1999

Quietly, insidiously--and often by invitation--the U.S. has been invaded. Since Columbus landed on these shores more than 30,000 species of plants, animals and microbes have also taken up home here. Many are valuable crops and others are useful plants that humans have carried with them since the migrations of prehistory. Others are pests that have claimed the habitats of native species, forcing many of them to extinction, causing crop damage and human and animal disease.

The benefits of many imported species are clear. Ninety-eight percent of the U.S. food supply comes from such introduced species as wheat, rice, domestic cattle and poultry, with a value of more than \$500 billion a year. But plants such as purple loosestrife; invertebrates like the zebra mussels and gypsy moths; mammals, including rats, feral cats and pigs; and microbes like the AIDS virus are hardly so benign. A team of researchers from Cornell University, headed by ecologist David Pimentel, estimates that their depredations cost at least \$123 billion a year in economic losses.

"It doesn't take many troublemakers to cause tremendous damage," said Pimentel, when the group presented the findings at the recent annual meeting of the American Association for the Advancement of Science in Anaheim, Calif.

If anything, the estimates made in the damage assessment study, *Environmental and Economic Costs Associated with Non-indigenous Species in the United States*, are conservative. More than 40 percent of species on the U.S. Department of the Interior's endangered or threatened species lists are at risk primarily because of non-indigenous species--and a pricetag cannot be placed on their loss.



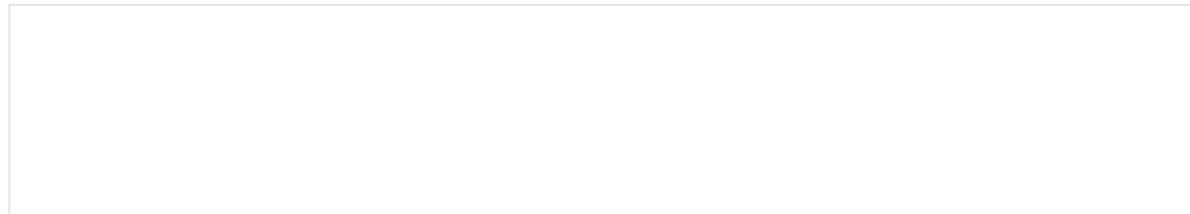
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Precise economic costs associated with some of the most ecologically damaging alien species are not available. The brown tree snake, for example, has been responsible for the extinction of dozens of bird and lizard species on Guam, yet only minimal cost data are known. In other cases, such as the zebra mussel and feral pigs, only control cost data are collected. Some well-known invaders, such as the kudzu vine, have been overlooked for lack of economic information. "If we had been able to assign monetary values to losses in biodiversity, ecosystem services, and aesthetics, the costs of destructive non-indigenous species would undoubtedly be several times higher," the researchers say.

Even so, the rather sketchy results are sobering. The English sparrow was intentionally brought to the U.S. in 1853 to control canker worms. Instead, the hardy little bird became a pest by eating crops, displacing some native birds, and harassing others, carrying 29 diseases that affect humans and domestic animals. Canker worms still bedevil gardeners.

Similarly, the mongoose was introduced into Puerto Rico and Hawaii in the late 1800s to kill rats in sugarcane plantations. The islands still have rats, but the mongooses are preying on native ground-nesting birds and on amphibians and reptiles that could be beneficial for pest control. The extinction of at least 12 species of reptiles and amphibians in Puerto Rico and other islands of the West Indies is blamed on mongooses, which also carry the pathogenic organisms for rabies and leptospirosis.

Meanwhile, rats, which probably arrived in the continental U.S. as stowaways on ships, now have an estimated population in the billions. On farms each rat is estimated to destroy grain and other goods worth \$15 a year. In urban and suburban areas there is roughly one rat for every human. These rats cause fires by gnawing on electric wires, polluting foodstuffs and carrying diseases such as salmonellosis and leptospirosis.



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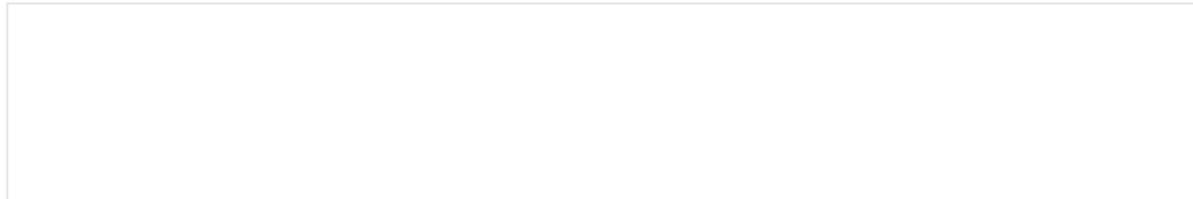
Our domesticated predators--dogs and cats--also have a share in the mayhem. America's 63 million domestic cats and 30 million feral cats are believed to kill some 200 million birds a year. Wild dogs running in packs in Florida, Texas and other states cause an estimated \$10 million a year in livestock losses, rivaling or exceeding the damage from wolves and other indigenous canines.

Many plants that once delighted gardeners have also run amuck when they escaped into the wild. Purple loosestrife--a European native popular as an ornamental plant in the early 1800s-- has invaded wetlands in 48 states at an estimated cost of \$45 million a year for control and loss of forage crops. It is crowding out 44 native plants and endangering the wildlife that depend on them.

Topping off the list are the tiny creatures that nobody invited --microbes, insects, worms-- that often sneak in with their traditional hosts but soon found more bountiful prey to occupy themselves. "It's too late to send these organisms back," says Pimentel.

But it is not too late to tighten safeguards against accidental introductions. Because of the ease of travel and increased agricultural commerce, it is easier than ever before for species to establish beachheads in distant lands. Most of the alien organisms in the U.S. arrived in the past 70 years.

"The true challenge lies in preventing further damage to natural and managed ecosystems," Pimentel told the AAAS meeting. "We have a long way to go before the resources devoted to the problem are in proportion to the risks. We hope that this assessment will advance the argument that resources spent on preventing the introduction of potentially harmful species will be returned many times over in safeguarding our environment." hosts but soon found more bountiful prey to occupy themselves. "It's too late to send these organisms back," says Pimentel.

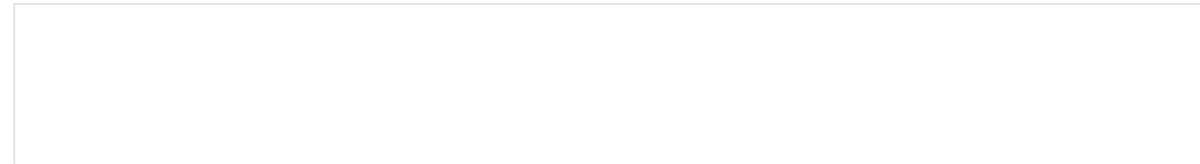


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