

By Carolyn Raffensperger

Exotic Species Come With Trade Increase

Literary critics have said that there are only two stories: “the journey” and “the stranger came to town.” This story is about both. In this case the stranger is cholera that traveled to the Chesapeake Bay in the ballast water of cargo ships. Cholera was discovered in the course of research by the Smithsonian Environmental Research Center that was mandated under the National Invasive Species Act of 1996.

The presence of cholera in our own country calls attention to the larger problem of controlling invasive species. Ballast water is probably the single most important vector for marine species movement. The rate of invasions is increasing as global trade increases, and current laws are severely challenged to keep up with them. Some species, such as purple loosestrife or leafy spurge, invade ecosystems and then dominate the landscape. Others make humans sick. Recent outbreaks of disease like West Nile Virus demonstrate the threats to human health of homogenizing the planet.

Cholera is a bacterial disease that can cause diarrhea, severe dehydration, and often death. There are fewer than five cases a year in the United States, although in Latin America, Asia, and Africa cholera has been widespread for 40 years. The disease is associated with fecal contamination of water or food and is highly correlated with poverty and inadequate sewage treatment. A quarter to a half of cholera cases are fatal if not treated.

One of the most famous events in the history of the public health movement occurred because of a cholera epidemic in 1854 in London. John Snow, a physician, did not know the cause of the epidemic but surmised that it was related to a contaminated water supply and so took off the handle to the water pump in central London. The epidemic died out.

Historians note that there have been six cholera pandemics (widespread epidemics covering a population or the world) since the 1800s. The most recent pandemic in the Americas began in 1991 in Peru. Later that year, the Peruvian strain of cholera appeared in shellfish beds in Mobile Bay, Alabama. Investigations showed that the bacteria were present in the ballast and bilge water of three cargo vessels that had last been in Latin America.

Perhaps the most striking example of unwanted species to show up in the ballast water of ships is the zebra mussel, which was introduced into the Great Lakes and has infested riverine and aquatic systems. Rivers from the Hudson to the Mississippi and Arkansas now suffer the devastation of the zebra mussel, which colonizes water pipes and boat hulls.

Although the problem does not get much attention as such, the problem of invasive species is one of the greatest environmental threats that we face. David Pimentel of Cornell University has calculated the economic loss to the United States from invasive species as exceeding \$138 billion a year. Forty-three percent of the species on the threatened or endangered lists are at risk because of invaders. In the Chesapeake Bay alone, 202 species have been listed as nonindigenous.

Because the increased entry of foreign ballast water due to increased trade plays such an important role in this invasion, Congress passed the aforementioned National Invasive Species Act, which reauthorized and amended the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990. The major provision of this law is that all vessels entering U.S. waters from outside the Exclusive Economic Zone (200 miles

from shore) follow voluntary guidelines for open-ocean exchange of water in ballast tanks before they are discharged into U.S. waters. That is, they must change the water in their tanks while they are out in the ocean before emptying the tanks in a U.S. seaport or Great Lakes harbor. If compliance with the voluntary open-ocean exchange guidelines is low, mandatory guidelines may be established.

Ships are also required to report their ballast exchange practices. Exceptions to the reporting and exchange rules are military vessels, crude oil tankers that do coastwise trade, and passenger ships equipped with ballast treatment systems.

According to the National Ballast Water Information Clearinghouse (established through NISA), two problems are associated with controlling invasive species through voluntary ballast water exchange. First, ocean and weather conditions do not always permit replacing ballast water. This means that water is then exchanged closer to shore. Second, even if water is replaced at sea, residual organisms remain in the ballast tanks. The tanks are not sterilized during the exchange process. This means that some nonnative organisms will always tag along in ballast water.

These problems were demonstrated in a recent study by the Smithsonian’s Gregory Ruiz. Ruiz examined the ballast water from 15 ships from Europe and the Mediterranean moored in Chesapeake Bay and found that most of the samples contained cholera. Interestingly, these were not ships that had last been in a port known for a cholera epidemic.

Perhaps we need to rethink our immigration policy. Human migration is the least of our problems. Bacteria, viruses, and larger invasive species pose threats that only a few years ago were unimaginable. Finding cholera in ballast waters in the Chesapeake Bay should serve as a wake-up call.

Carolyn Raffensperger is Executive Director of the Science and Environmental Health Network in Windsor, North Dakota. She can be reached at craffensperger@compuserve.com.