

Ballast-water

Floating vendors of disease

The ballast-water found on modern tankers is a veritable source of disease vectors

A modern oil tanker carries, on average, 50,000 tonnes of ballast, rising to 200,000 tonnes for the biggest ones. These tankers are aquariums on keels, carrying viruses, bacteria, jellyfish, molluscs, shellfish, crabs and fish from port to port. The enormous ballast-water tanks of ships are a medium for the introduction of alien species into the waters. The damage they wreak on ecosystems and human health is devastating, as the following examples reveal:

The American comb-jelly has ruined the traditionally rich fisheries of the Black Sea. It was introduced from America via ballast water. In a few years it had exploded in numbers. Although it is a tiny creature of just a few grams each, the stock by the end of the 1980s had reached a total weight of 900 million tonnes—ten times the world's yearly fish catch. It has now moved through the Bosphorus into the Mediterranean.

The European zebra mussel has invaded the Great Lakes of the US and Canada. Introduced via ballast-water, it is now covering large areas of the seabed and is spreading to other American river systems. It clogs up water pipes and displaces natural organisms. The municipalities and industries affected expend approximately \$360,000 per year on zebra mussel control; small municipalities spend, on average, \$20,000. Nuclear power plants average an additional \$825,009 of additional costs per year for zebra mussel control.

As the zebra mussel spreads to inland lakes and rivers across North America, such as the Mississippi River Basin and Lake Champlain, so do the costs to water users. Other invading species of fish (such as the sea lamprey, ruffe and round

goby) can harm native fish. Reductions in native fish populations (such as lake trout, walleye, yellow perch and catfish) threaten a sport and commercial fishing industry that is valued at almost \$4.5 billion annually and supports 81,000 jobs.

The re-introduction of cholera to South America in the 1990s is thought to have resulted from a freighter discharging ballast-water from China into Peruvian coastal waters. The water carried the *Vibrio cholerae* which flourished in algal blooms enriched with nitrogen and phosphorous from sewage and fertilizers. Algae are filtered and eaten by molluscs, crustaceans and fish that are, in turn, eaten by people.

Once it entered Latin America, the infection spread rapidly, encouraged by rapid urbanization and IMF- and World Bank-imposed cutbacks in sanitation and public health programmes. By December 1994, millions of Latin Americans had become ill, and about 11,000 had died. Reported cases are thought to be only a fraction of those infected.

Common to all the above-mentioned cases is the combination of the introduction of a species and a favourable situation for colonization. A 'healthy' ecosystem has a stronger immunity to alien species than a distorted one.

Against monoculture

When excess nutrients, overfishing and pollution are reducing the natural biological diversity, the ecosystem is going from a 'mature' system with high diversity to a pseudo-primary system which is less diverse and more open for newcomers. Nature 'hates' monoculture. It does everything to tear down what it regards as an immature situation. The introduction of a new species will thus be

more likely to succeed (from nature's point of view) in a monoculture—i.e. in a big city or in a polluted or overfished environment.

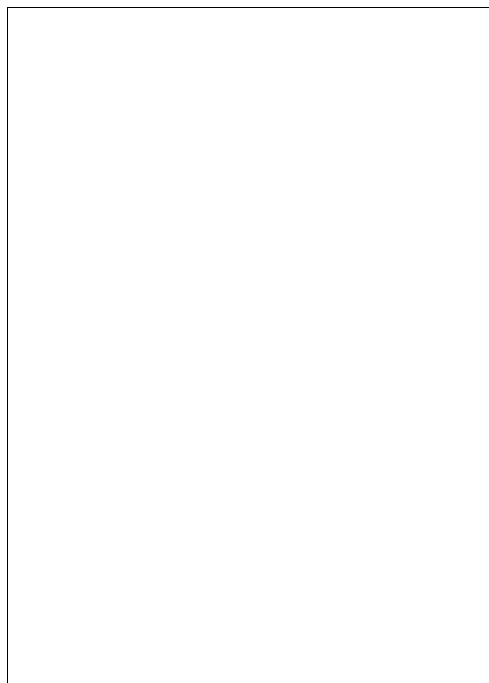
The introduction of organisms from one area to another is nothing new. But there are two factors which make today's situation different from earlier times. Firstly, most ballast-water comes from, and ends up in, areas with a high population density and concentration of industry. It ends up in waters which have been under pressure from human activity for a long period of time.

The second factor is time and scale. Today's ships are bigger, and the bigger the body of water, the greater is the chance that an organism will survive the travel. The newer ships are also faster than the older ones. It took, for example, 30 years of traffic, from the time of Columbus' arrival, for smallpox to be introduced to the Americas, simply because most of the carriers of the disease died during the crossing of the sea and were thrown overboard.

In the old days, concrete materials like stones, lead, iron, sand and soil were used as ballast in ships. The difference today is that water—the primary medium of life—is being transported between the continents.

The issue of ballast-water and alien species has been discussed at several international forums, among them the International Maritime Organization of the UN. Common to these discussions is that they are of a technical nature. Proposals range from mid-water exchange (changing of ballast-water in the high seas) to treating the water with poison, hydrogen peroxide, ozone or UV-radiation.

Common to all these proposals is the fact that they are expensive. Some of them pose a threat to safety at sea (midwater exchange), to the ship (hydrogen peroxide which causes corrosion) or to the environment (poisonous chemicals). Virtually absent from the debate is any attempt to understand the phenomenon of economic globalization and how issues of trade, pollution and poverty go together to form a complex ecological problem.



This piece is by Gunnar Album of the Norwegian Society for the Conservation of Nature, Leines, Norway