**Ocean Litter Gives Alien Species an Easy Ride**

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for National Geographic News

April 29, 2002

Alien species are using trash in the ocean to raft their way to new territory, where they can colonize and possibly overwhelm local marine ecosystems, reports a British marine biologist.

This kind of dispersal is not a new phenomenon. Aquatic animals have long used wood, pumice from volcanic eruptions, coconut shells, and the like as mobile homes for transport. But the huge increase in the availability of human debris is providing many more opportunities for invaders to colonize.

"The debris is their commercial jetliner, paralleling the 30-year explosion of travel among people. The opportunity being provided by the sheer amount of debris is unparalleled in geological time," said David Barnes, a marine biologist with the British Antarctic Survey.

Barnes found that **the amount of garbage, particularly plastic, floating in the ocean has enabled travel by marine species to roughly double in the subtropics** and more than triple at high latitudes. The findings of the ten-year study are published in the April 25th issue of the journal Nature.

**Alien species** introduced into new habitats—intentionally or unintentionally—pose a **major threat to global biodiversity.**

The newly adopted habitats of non-native plants and animals often lack the natural enemies of these species, allowing them to multiply and spread quickly.

Alien species can devastate ecosystems by eating the native species, competing with them for food or habitat, introducing fatal diseases, or decreasing genetic diversity by mating with the native species.

**Rafting the Oceans on Plastic**

The small marine animals that hitch rides across the ocean are typically non-mobile. They spend most of their lives attached to rocks, plants, shells, and other surfaces. **The alien invaders include bryozoans, barnacles, polychaete worms, hydroids, crabs, and mollusks—"the range of organisms is enormous," said Barnes.**

Besides a big increase in the amount of debris floating in the oceans, **the kind of debris has changed too.** Plastic is much more durable and longer lasting. "Organisms like colonizing on plastic—it's a good surface to attach to," said Barnes. "It's not slippery like glass, it doesn't rot like wood, and it travels slower than a ship's hull."

**And plastic acts like a floating hotel, transporting the organisms to areas they would never be able to reach on their own.**

"Say you're standing in Miami and you chuck or accidentally drop a bottle of lemonade into the ocean," said Barnes. "The larvae in the water settle on the plastic, and the bottle has so much buoyancy it can really hold an enormous number of these creatures.

"The bottle travels with the trade winds and prevailing ocean currents, and winds up on the west coast of Scotland or Ireland," he said. "Now you've got lots of adult colonists, and they're spawning all the time. The new larvae might not survive because the conditions are too different from their native habitat, or they could just settle in the new environment and not make much difference at all."

What his paper warns about, Barnes said, "are the ones that settle and could eat the native species, or outcompete them for space."

Allen Collins, a marine biologist at the University of California at San Diego, said the study raises a lot of questions.

"Are the organisms traveling on [man-made] debris different from those that use natural floats? It makes sense that the rate of invasion can go up with an increase in opportunity," he said. "But if the organisms wind up in a very different environment, it's very unlikely they could survive. So it's unclear how much of an impact in terms of species invasion there might be. "

**Travel to New Places**

According to Barnes, the rubbish is carrying the marine organisms to new places.

Thousands of species of marine organisms move around the world on ship bottoms; the Ecological Society of America estimates that **more than 10,000 marine species each day may hitch rides around the globe** in the ballast water of cargo ships.

"But the ships have been plying these trade routes for a long time," said Barnes. "Traveling the same routes, you could imagine much of the damage has already been done."

**The Southern Ocean may be particularly vulnerable.** The amount of debris found in parts of Antarctica increased 100-fold during the early 1990s, said Barnes. Because of its isolation, the fauna is highly endemic and therefore may be more subject to being pushed out by invaders.

At the same time, global warming may reduce the natural protection that freezing temperatures provide by inhibiting colonization by many alien species.

The increase in debris poses other problems besides the threat of colonization by alien species.

"Even in the remotest parts of the planet, we see garbage, plastic bottles, cigarette lighters," said Iain Kerr, a member of the Odyssey team, a five-year research effort to collect data on whales in the world's oceans. "Albatrosses are feeding their chicks cigarette lighters because they resemble the pumice they eat to help digestion. So you have chicks dying from over-consumption of cigarette lighters. The plastic is everywhere."

Anyone interested in contributing data to the ongoing study by conducting simple surveys of shore debris should contact David Barnes at: dkab@bas.ac.uk. He is particularly interested in data from the following islands: Andamans, Ille Amsterdam, Bermuda, Chagos, Clipperton, Cocos/Christmas, Gilbert, Midway, Society, Socotra, Trinidade (an island off the coast of Brazil), and Wake.

# Alien species colonise on plastic rafts

* 19:00 24 April 2002 by [**Fred Pearce**](http://www.newscientist.com/search?rbauthors=Fred+Pearce)

Plastic bottles floating across the oceans may carry more than a message - they could be carrying the seeds of ecological chaos for wherever they end up.

In a survey of the beaches of 30 remote islands, David Barnes of the British Antarctic Survey in Cambridge, UK, has found that a rising tide of plastic debris has now replaced wood as the major shoreline debris. And riding on the back of the rubbish are alien stowaways such as worms, barnacles and various larvae.

According to Jeff McNeely, chief scientist at the World Conservation Union "after clearance of native vegetation, alien invasions are the second most important cause of diversity loss". Barnes has shown that that human rubbish is now more important than natural debris in transporting alien species invading new territories. "It more than doubles the rafting opportunities for invading species," he says.

### Slow boat

He believes it could well be more important than the contents of ships and aircraft, previously regarded as humankind's prime means of spreading species round the globe.

"Compared to boats, man-made debris is longer-lasting, more pervasive and travels more slowly - all factors that could favour survival of colonists," says Barnes.

His study covered islands from Spitzbergen in the Arctic to Signy in the Antarctic, and from Galapagos in the Pacific to Ascension in the Atlantic. "The highest proportion of man-made rubbish is in the Southern Ocean", says Barnes. He says the amount of debris in the Southern Ocean may have risen a hundred-fold in the last decade.

And in these water, warmer temperatures caused by global warming are encouraging greater survival among tropical invaders floating south. Antarctica, he points out, has seen few invaders in the last 25 million years, and is largely populated by endemic species.

Journal reference: *Nature* (vol 416, p 808)