

US “ghost fleet” sails into controversy

Kathryn Senior

This autumn, the issue of toxic waste export came to the world’s attention when the US began sending barely seaworthy naval vessels across the Atlantic to a UK-based shipbreaking yard. The ships contain residual fuel oil, some of which is probably contaminated with massive quantities of solid PCBs, mercury, asbestos, and other toxic substances. According to US law, the export of PCBs is illegal, but in this case, the US Environmental Protection Agency (EPA) used its discretion not to enforce the law. Up to 13 US naval ships may now travel from Virginia to Able UK in Teeside, in the north of England. A legal challenge mounted by environmental groups the Basel Action Network (Seattle, WA), the Sierra Club (San Francisco, CA), and Earthjustice (Oakland, CA) led to a restraining order on some of the ships, but four have now set out.

“The legal challenge is by no means over”, says Earthjustice lawyer Martin Wagner. “One of our fundamental legal arguments is that the EPA has overstepped the limits of the discretion allowed by the legislature.” Although one Virginia senator recently spoke in favor of the export because of the need to prevent local pollution, many groups want the ships to be broken up in US-based facilities. “It is curious that, although local companies offered to do the job at a lower price, the contract still went to Able UK”, says Wagner, who believes that the deal to dismantle the ships was part of a larger one allowing the US to sell two of its unwanted new Navy oilers (fuel supply ships) to the UK for decommissioning and reuse. “This will require substantial investment”, he notes, “but these ships will then be enormously valuable”.



Migrant workers break down imported computers in Guiyu, China.

Marietta Harjano, coordinator of Greenpeace’s International Shipbreaking Campaign (Amsterdam, The Netherlands), supports the challenge. Greenpeace and other environmental groups are concerned that the move not only poses an environmental threat if any of the ships sink, but also sets a dangerous legal precedent. The 13 vessels are only a fraction of the total US “ghost fleet”, which may have as many as 162 ships. Many of them could join old ships from other countries in primitive shipbreaking yards in India, Bangladesh, and China. “It is ironic that US ships are being transported to the UK for ‘proper’ dismantling while in 2003, at least ten UK ships have been exported to Asia”, she says. Harjano points out that ships from throughout the developed world are sold to scrapyards in Asia for millions of dollars. “The ship owners then pay workers a dollar or two per hour to work in appalling conditions with no protective clothing, and sell the ‘scrap’ steel that is recovered to Asian industry as raw materials for huge profits”, she continues. Plastics are burned in the open air, and the asbestos, PCBs, and other toxic wastes are left to pollute the beaches and shores around the shipbreaking areas.

Asia is also bearing much of the brunt of the need for the disposal of “e-waste”. Last year, Greenpeace ran a

lengthy investigation into the trade in obsolete computer hardware and peripherals. Rich in toxic ingredients such as lead, beryllium, mercury, cadmium, and brominated flame retardants, old computer equipment is shipped to developing countries for “recycling” by migrant workers, many of them children. As in shipbreaking, the conditions are very dangerous; massive quantities of carcinogenic toner powder is released into the air, and workers with no protective clothing use acid baths to recover gold from circuit boards. All European nations have now banned e-waste export to developing countries. Although several companies, including Dell and Hewlett-Packard, have instituted better recycling programs over the past 18 months, most other electronics manufacturers still lag behind. As yet, the US government has failed to respond, observes Wagner. “The current administration has taken major steps backward in environmental protection.”

It’s not just rich and powerful countries that are adopting the “out of sight, out of mind” strategy for toxic waste disposal. In early October, Suzanne Holshouser, a Member of Parliament with the opposition United Bermuda Party (UBP), drew attention to her country’s asbestos waste problem by walking into a supposedly secure storage facility with several reporters. The gate to the site was open and there were open containers of friable asbestos lying around. Although the government plans to export thousands of metric tons of asbestos to Cuba, UBP leader Grant Gibbons has stressed that the plan raises diplomatic, ethical, and commercial issues as well as environmental concerns. A key problem will be potential liability if anything goes wrong with the disposal operations in Cuba. Safety and liability may not be a concern for the current government in Cuba, but as Gibbons says, “if the government were to change in the future, there could well be an accusation that Bermuda took advantage of the Cuban people, knowing there was a totalitarian government in place”. ■

Hidden casualties of global warming

Martina Habeck

Countries that are primarily responsible for global warming should be responsible for the care and protection of people forced to abandon their homes due to climate change, according to a report published in September by the London, UK-based think tank New Economics Foundation (NEF). According to the report, drought, soil erosion, desertification, and other environmental problems are already driving more people from their homelands than war and political or religious persecution.

By publishing *Environmental refugees: the case for recognition*, NEF is taking the debate over the plight of people affected by global warming into the public arena. Although many in academic circles agree that such people should receive refugee status,

the United Nations High Commission for Refugees and other humanitarian agencies stress that their budgets are already overstrained.

Oxford ecologist Norman Myers estimates that in 1995, there were 25 million “environmental refugees” (*Phil Trans R Soc Lond B* 356: 16.1–16.5). By comparison in 1999, there were an estimated 22 million “traditional” refugees. Like other environmentalists and conflict specialists, Myers believes that global warming will cause a huge upsurge in the number of people forced to migrate. “Global warming, through drought, rising sea levels, hurricanes, etc, could result in as many as 200 million environmental refugees”, he warns. Myers estimates that the flooding of coastal-zone communities may leave 26 million people homeless in Bangladesh, 12 million in Egypt, and 73 million in China.

The report was welcomed by environmentalists, but others are con-

cerned that it could play into the hands of the political far right, which tends to politicize refugee and immigration issues. “The probable public and government reaction to reports like this is to clamp down on migration still further, rather than taking the necessary practical steps to deal with environmental problems”, says migration expert Richard Black (University of Sussex, Brighton, UK).

But for Andrew Simms, Policy Director of the NEF and coauthor of the report, avoiding the debate is not an option. A direct link exists between the fossil fuel-intensive life styles of people in the North and the creation of environmental refugees in the South. Denying them status will leave environmental refugees unprotected and push the cost of their care unfairly onto poor countries” he says. “If we just leave the debate, that is an abstention of responsibility.” ■

Surveying Panama's treetops

Jane Bradbury

A Panamanian rainforest recently became home to 30 entomologists, who are cataloguing the vertical stratification of arthropods “on a scale that has never been done before”, according to principal investigator Yves Basset (Smithsonian Tropical Research Institute, City, Panama). He predicts that the results of the IBISCA (Investigating the Biodiversity of Soil and Canopy Arthropods) project “will have far-ranging implications for the conservation of biodiversity in tropical rainforests”.

IBISCA is using state-of-the-art sampling techniques to examine the vertical stratification of up to 40 taxa of insects at nine sites in the San Lorenzo Forest, a wet evergreen forest on Panama's Caribbean coast. Between September 22 and October 31, researchers used a static canopy crane with a 54 meter boom to sample three 400 m² sites. Over the same period, a canopy raft – a 400 m² platform of PVC pontoons – was lowered onto



Researcher working on the Sherman canopy crane.

three different sites. Scientists also used a canopy bubble (a seat harness suspended from a helium balloon) and a fixed tree house in their studies. The crane will also be used to gather sea-

sonal replications of insect diversity.

“This study is the first to map insect diversity from the soil to the treetops in a single rainforest study area”, says Vojtech Novotny (Institute of Entomology, České Budejovice, Czech Republic). Fewer than 2 million of the 4–6 million estimated global insect species, most of which probably live in rainforests, have been described. The inability of the scientific community to document tropical species diversity means that it is impossible to show how insect diversity is decreasing with the destruction of tropical rainforests, explains Novotny. He suggests that this damages the credibility of the conservation movement, since it is difficult to concern the public over an unknown species going extinct.

IBISCA should identify some of these mystery at-risk insects. More importantly, says Basset, by knowing more about insect localization within the rainforest, “we will be able to assess how many species will be lost when the canopy habitat is removed, or whether any of them will be able to relocate from the canopy to another habitat.” ■

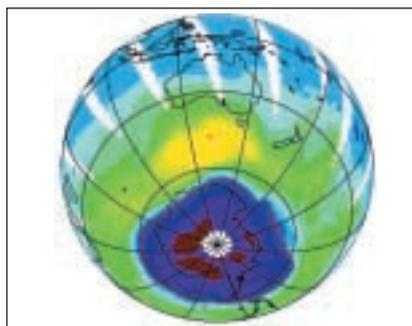
Ozone hole not shrinking

Claire Miller

The hole in the ozone layer over Antarctica this southern spring is shaping up to be one of the largest on record, and scientists are predicting that it will not begin to shrink for at least another 5 years, despite the decline in emissions of ozone-depleting chemicals. Ozone blocks ultra-violet (UV) radiation which, in excess, can damage biological and chemical processes in plants and animals.

According to the London, UK-based Environmental Investigation Agency (EIA), the September 2003 hole was the largest ever, covering some 27 million km². The EIA also warns that a global black market in chlorofluorocarbons and other ozone-harming substances is undermining progress in reducing the production and use of harmful chemicals, made under the 1987 Montreal Protocol.

Developed countries have already banned ozone-depleting chemicals in appliances such as air conditioners and refrigerators, but developing countries



Southern hemisphere ozone hole in September 2003.

Image by P Krummel, courtesy of CSIRO/NASA

are still in the process of phasing them out. Unfortunately, the substitutes are expensive, creating an illegal trade in the banned substances.

Paul Fraser, of the Australian Commonwealth Scientific and Industrial Research Organisation's Atmospheric Research Division (Melbourne, Australia), says this year's hole is now 28 million km², second in size only to the one in 2000 (29 million km²). It may be the largest ever, he adds, depending on how long it lasts and how deep it is.

The good news is that the size of the holes, which develop each southern

spring, has probably peaked. Fraser says the rate of ozone thinning is slowing down, and predicts that holes will begin shrinking after about 2010. The bad news is that worsening global warming over the coming decades will delay recovery.

"We will lose the simple relationship between the amount of ozone-depleting chemicals and the size of the ozone hole as the Montreal Protocol takes effect", says Fraser, "but there is more than one variable at work. Global warming is a factor because of its effect on the stratosphere; as surface temperatures rise, the stratosphere gets colder, and a colder stratosphere is more likely to deplete ozone." This is why ozone thinning over the northern polar regions is not as severe as over Antarctica, he explains – the Antarctic stratosphere is colder.

A World Bank report released on September 16, International Ozone Day, estimated that ozone depletion would be ten times worse without the Montreal Protocol, causing up to 20 million more cases of skin cancer and 130 million more cases of cataracts. ■

India a hotspot for mercury pollution

Dinesh C Sharma

Loopholes in environment regulation and industry reluctance to shift to safer technologies are leading India to become a hotspot for mercury pollution in Asia, according to a new report titled *Mercury in India: toxic pathways*, published by Toxics Link, a New Delhi-based NGO. Continuing mercury emissions into the air and contamination of groundwater due to mercury waste are cause for serious concern.

India imports over 250 metric tons (mt) of mercury annually and releases more than 220 mt into the environment from known sources. The report suggests that if all sources of mercury leaks were accounted for, the amount might even exceed how much is imported.

An outdated chlor-alkali process, based on the use of mercury cells, results in the leakage of up to 150 mt of mercury every year, causing widespread mercury pollution. The phasing out of the process – used to produce sodium hydroxide and chlorine from brine – has been very slow, and even government-controlled units continue to use it. Although the government banned new units using this technology in 1991, there has been no attempt to reduce the use of mercury in existing units.

Government-owned thermal power plants release an estimated 60 mt of mercury per year, the report says. "It is surprising that the government has set standards for all major industries which emit mercury, except coal-based thermal power plants", points out Kishore Wankhade, the report's lead author (New Delhi, India).

Seven areas with clusters of industrial units around them have been identified as "mercury hotspots" in India. Surface and groundwater sources in these locations were found to contain mercury far in excess of permitted limits. High mercury concentrations were also found in fish and the blood of humans tested in earlier studies.

Toxics Link fears India could become a dumping ground for mercury waste from Western countries, where chlor-alkali units are being phased out. It is also emerging as a favored destination for manufacturing mercury-based products for international markets.

In 2001, a Hindustan Lever unit in Kodaikanal (Tamil Nadu, India), which exported millions of thermometers to the US, was found to have dumped many tons of mercury waste in surrounding areas, and was ordered to shut down. ■

European cities try car-free day

Adrian Burton

From Iceland to Russia, over a thousand cities participated in the European “In Town Without My Car” initiative on September 22. In fact, the project spilled beyond Europe’s borders to Argentina, Brazil, Canada, Indonesia, Mexico, and Taiwan. Early results speak of millions of gallons of gasoline saved and large reductions in noise and CO₂ pollution. But is a day without cars a day without cares?

The 6th annual car-free day was the climax of European Mobility Week, an EC-backed project designed to improve the quality of life in cities by raising awareness about the environmental damage caused by cars and promoting sustainable urban transport options such as public transport, walking, and cycling. On this day,

areas of participating cities – usually the centers – are closed to traffic and open only to cyclists and pedestrians.

“This year had the difficulty that car-free day fell on a work day”, explains Karen Vancluysen (ACCESS-EUROCITIES for a New Mobility Culture, Brussels, Belgium), who helps coordinate and promote European Mobility Week. “This is much more challenging than organizing a car-free day on a Sunday, as was the case last year, so the number of participating cities was slightly lower”, she adds. “But overall we are very pleased with the number of cities that participated – 1484.”

Although most countries have yet to hand in their statistics, the Spanish Ministry of the Environment has published initial results for Spain, which had the greatest number participating towns (237). Austria came next with 126, and France was third with 80.

Traffic in Spanish towns was reduced by 15%, the use of public transport increased by 11%, noise levels dropped by 3–4 decibels, 9.25 million liters (2.44 million gallons) of gasoline were saved, and city air was spared some 26 million kg of CO₂. Surveys show that 84% of citizens felt positive about the exercise.

Still, traffic returned to normal the next day, raising the question of whether the inconvenience was worthwhile. “Without proper funding and the political will to radically improve public transport systems, cutting back on cars for one day is just a cosmetic exercise”, argues researcher Mercedes Arauzo (Environmental Sciences Research Center, Madrid, Spain). “The pollution prevented is minimal. And does cutting the city center out for the day really improve quality of life, or does the resulting traffic chaos actually make it worse?” ■

New Zealand possums not just pests?

Dorothy Bonn

Possums are generally seen as New Zealand’s number one pest, as 70 million of them chomp their way through the tender new growth of native trees, devastating vast tracts of bush. But possums – introduced from Australia in 1858 to establish a fur trade – may actually contribute to the regeneration of native forest by dispersing seeds. However, balancing their possible positive and undisputed negative contributions to the dynamics of forested ecosystems has proved controversial.

Last year, Roger Dungan and colleagues at Canterbury University (Christchurch, New Zealand) claimed that in many areas, because of severe population depletion among large-gaped native birds, the brushtailed possum (*Trichosurus vulpecula*) might be the only dispersal agent for large-seeded native tree species (*New Zeal J Ecol* 2002; 26: 121–28). Possums prefer to eat fruit and seeds when available. These comprised 70% of the animals’ diet in Dungan’s study area of



Brushtailed possum, friend or foe?

forest and scrub, and possums contributed 17% of the dispersed seed rain during the study period.

Peter Williams (Landcare Research, Nelson, New Zealand) argues, however, that “there is little evidence that possums excrete viable seeds greater than 10 mm in diameter”, and that there are still plenty of birds, coexisting with possums, that disperse seeds up to this size (*New Zeal J Ecol* 2003;

27: 221–23). Dungan (*New Zeal J Ecol* 2003; 27: 225–26) and Williams finally agree that possums “may be of particular importance to native species with *large-seeded* fruits”.

Graham Nugent of Landcare Research (Lincoln, New Zealand) suggests that Dungan’s study “demonstrates the complex multifaceted interactions between introduced species and their new environments and the pitfalls of trying to classify these interactions as good or bad”. His colleague Phil Cowan adds: “You also have to tease apart the interactions between the various introduced species. For example, possum control may result in increased rodent numbers – would that be better or worse for seed dispersal and/or predation?”

“Any positive effects of seed dispersal by possums”, says Dungan, “are likely to be greatest in areas not currently managed for their biodiversity conservation values, such as those retired from active agricultural production”. Land managers will always want to reduce possum numbers, he adds, because they are vectors of bovine tuberculosis. ■

Amazon monitoring system completed

Claudia Orellana

The world's largest environmental monitoring system, the Surveillance System for the Amazon (SIVAM), becomes fully operational in November 2003. It will provide a continuous real-time picture of changing conditions in the Brazilian Amazon. Data from remote sensor satellites, radar stations, environmental monitoring sites, and five high-tech reconnaissance planes will be sent via satellite to three surveillance centers in Manaus, Porto Velho, and Belém. A network of solar-powered computers, located in jungle communities, will chart the progress of epidemics, pollutants, and flooding.

SIVAM should improve the accuracy of estimates on how much of the Amazon has been deforested. The new planes, which can "see" through the forest canopy, have already detected illegal timber roads. "In each aerial monitoring center we have people whose specific task is to check for illegal activities", says Augusto Queiroz, Director of the Manaus surveillance center.

Although the Brazilian government has been publicizing SIVAM's environmental benefits, it was originally conceived to protect the country's borders. "Most of the flights and apparatus are concentrated in frontier areas, but much of the destruction is taking place elsewhere", says Philip Fearnside, of the National Institute for Research in the Amazon (INPA), Manaus. "In such places as 'Terra do Meio' (Middle Land), between the Iriiri and Xingu rivers, there is a lot of deforestation that was not detected by SIVAM. This technology can detect many details that are difficult to see on a satellite picture, but most of this is expectations for the future."

To fully realize this potential, comments Eduardo Brondizio (Anthropology Department, Indiana University, Bloomington, IN), SIVAM needs to integrate and not duplicate the existing knowledge and data held by Brazilian institutions such

as the National Space Research Institute and INPA. "The other challenge is to create mechanisms to distribute and democratize the information among the diverse sectors in the Amazon", he adds. "That means interacting with farmers, rural communities, researchers, indigenous people, and NGOs. SIVAM is not going to solve the problems alone."

Enforcement is a particular dilemma. Following the discovery of 10 000 ha of cleared forest in the state of

Rondônia, 17 people were arrested in September – five were local officials from the Brazilian Institute for Natural Resources, who are accused of granting logging permits illegally. Brondizio concludes that as SIVAM cannot prosper in isolation, it is necessary to strengthen the other institutions working on the ground. "If the infrastructure necessary to verify infringements and enforce environmental law is not in place, all this information will be limited to documentation." ■

Giant squid wash up in Spain

Adrian Burton

Three giant squid (*Architeuthis* sp), one 11 m long, washed up on the beaches of Asturias in northern Spain between September 13 and 17. One of the stranded animals was a sexually mature female – a very rare find. A fourth squid, apparently near death, was sighted off the coast.

Giant squid, which live at depths of 300–2000 m and can grow to over 20 m long, are rarely seen alive. However, the waters of Asturias, especially the Carrandi fishing grounds, seem to be a hotspot. "Sightings are only made with any frequency in New Zealand and off the Asturian coast", explains Angel Guerra (Marine Research Institute, Vigo, Spain), who researches the squid. "There are three canyons close to the coast that might provide the habitat these animals need."

Although five giant squid washed up in the same area in early autumn of 2001, "these are the only years in which several squid have been found in a period of one week", explains Guerra's coworker Francisco Rocha. "It might be premature to say there is a trend."

During both these periods, however, geological survey ships were in the area, using air guns to produce acoustic pulses for probing the ocean floor. "These pulses might affect the animals' statocysts –

their balance organs – causing them to become disorientated and lose their locomotor capacity", says Guerra. "Any giant squid floating up from cold, deep waters to temperate, surface waters would suffocate; at higher temperatures, squid hemocyanin [a protein analogous to hemoglobin] is not able to carry enough oxygen to keep them alive." This is only a hypothesis, however. "We hope our tests will tell us something more about why these animals died", he adds.

"The oil industry has been using the air gun technique for 30 years with no problems", comments José Díaz, Deputy Director of the Spanish Research Council's Marine Technology Unit (Barcelona). "Even the Scientific Committee for Antarctic Research approves its use for experimental purposes. The bubbles the guns generate to produce the acoustic pulses are made at a depth of just 8 or 9 m; I'd be very surprised if they could hurt these animals 700 m below." ■



Photo by Christina Lozano (Copernica)

An 11 m giant squid washes up on Spanish beach.

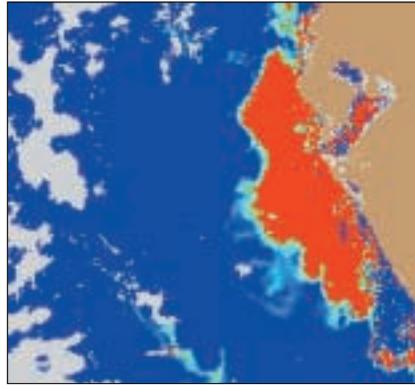
Turning the red tide

Virginia Gewin

The US National Oceanic and Atmospheric Agency (NOAA) is turning to high-tech approaches to better detect harmful algal blooms (HAB), also known as red tides. NOAA scientists are developing satellite-based remote sensing detection methods and using on-site technology to catalog the effects on marine fish and mammals.

Algal species can produce toxins that disrupt marine food webs and kill fish and mammals, including humans. Blooms hit coastal communities hard, and around \$46 million is spent annually on human health effects, fisheries closures, tourism, and monitoring. Today, virtually every coastal state is subject to one of several recurrent HABs.

To better predict blooms, NOAA oceanographer Richard Stumpf (Silver Spring, MD), uses commercial satellite imagery called SeaWiFs to monitor ocean conditions such as chlorophyll content and turbidity. He then develops algorithms to detect the



SeaWiFs data showing a potential HAB near Tampa, FL.

Courtesy of Richard Stumpf, NOAA

spectral and spatial patterns associated with HABs. Combining satellite and wind data with water samples, his team can forecast the blooms' extent and movement – potentially increasing the detection time by up to a week.

Researchers have also modified blood collection cards, first developed to test infants for diseases, to assess toxin levels in sea life. Although the toxins are often stored in fatty tissue, blood concentrations are better measures of their impact on living animals. The cards provide an easy way to

produce a baseline of toxin accumulation in mammals, and the results can be archived indefinitely. Future management options will also include predictive markers to determine when blooms are in a strong phase and when they will end, explains John Ramsdell, Chief of NOAA's Coastal Research Branch (Charleston, SC).

Vera Trainer, Program Manager of NOAA's Northwest Marine Biotoxin group (Seattle, WA), points out that although these measures will help early detection, "considerable tweaking will need to take place in every region where blooms occur". For example, the Washington coast does not typically experience the high density, chlorophyll-laden HABs found in Florida. Temperature changes associated with upwelling may be a more important indicator in the northwest.

Regardless of regional differences, advance notice will better protect public health, local economies, and fisheries. "Two years ago, we successfully forecast the first bloom before any effects were noticed", says Stumpf, adding that managers were better able to focus resources as a result. ■

Pew Institute opens

Johanna Polsenberg

On October 1, the Pew Institute for Ocean Sciences, a new center for marine conservation, opened at the Rosenstiel School of Marine and Atmospheric Science (RSMAS) at the University of Miami, FL. RSMAS, located near the Florida Keys National Marine Sanctuary, already works closely with two laboratories of the US National Oceanic and Atmospheric Administration. The addition of the Pew Institute is seen as important for the coordination of organizations working to further marine conservation and fisheries science.

The independent Pew Oceans Commission report and preliminary reports from the US Commission on Ocean Policy both highlight the need for integrated, ecosystem-

based ocean management. "The oceans are understudied, and this lack of information has been an impediment to conservation", says Ellen Pikitch, a fisheries scientist and director of the Pew Institute. "We are committed to bringing ocean issues to the forefront and supporting collaborative work that will make a difference."

The Pew Charitable Trusts foundation, long associated with supporting environmental policy research, is funding the \$3 million institute. Otis Brown, Dean of RSMAS, admits that he was initially concerned that by associating with Pew, the Rosenstiel School might be perceived as advocating a particular agenda. "However", he says, "I am convinced that this partnership will enhance both Pew's and Rosenstiel's ability to produce the new and rigorous science needed by policy makers

to help stop the precipitous decline in living marine resources".

Dr Pikitch will continue research on the assessment and management of fish stocks, especially overfished species whose populations are plummeting and unlikely to bounce back, such as large coastal sharks and beluga sturgeon. She says that in the first year, the Institute plans to distribute an ecosystem-based fishery management report and an analysis of US recreational fisheries. Long-term missions include the development of science-based solutions to threats facing marine fish and ecosystems and overseeing the Pew Fellows Program in Marine Conservation. "Additionally", says Dean Brown, "we will emphasize the output of information that is accessible to the public and policy makers, and stress informal public education". ■