



Food is the burning question in animal society, and the whole structure and activities of the community are dependent upon questions of food supply.

Charles S. Elton, British ecologist
(1900–1991)

MARINE SCIENCE

Bringing New Life to the Dead Zone

The Gulf of Mexico “dead zone” reached a record 7,700 square miles in the summer of 1999. That year, heavier flow in the Mississippi River brought an abundance of nutrients to the Gulf, resulting in hypoxia, or inadequate dissolved oxygen in bottom waters that forces bottom-dwelling animals to either flee or die. With the year 2001 have come legislative efforts to reduce the dead zone—if not kill it outright.

On 18 January 2001, the U.S. Environmental Protection Agency (EPA) proposed a plan to reduce nitrate runoff from farms in the Mississippi River watershed. The 11-item plan focused on improving farming practices, restoring natural habitats (such as wetlands) that are capable of filtering nutrients from water, and promoting flood control projects. The plan also proposed increased monitoring of the hypoxic zone and the waters flowing into it. R. Eugene Turner, a professor of

oceanography and coastal sciences at Louisiana State University in Baton Rouge, says the plan—which would have cut nitrate runoff by 30% by 2015—could possibly have reduced the dead zone’s area by about 50%. Attorney Scott Faber of the group Environmental Defense says many of the proposed practices could also reduce demand for natural gas, help combat climate change, and restore endangered species habitat. No federal legislation has been introduced to enact the EPA proposal, however.

In April 2001, Senator Kit Bond (R–Missouri) introduced the Fishable Waters Act (S. 678). This act would provide \$350 million each year for voluntary, community-led, incentive-based partnerships to reduce runoff of agricultural chemicals. According to Bond, the act is not intended specifically to heal the dead zone in the Gulf but rather to improve the nearly 40% of lakes and rivers now considered unfishable for a variety of reasons related to pollution (including hypoxia). The bill has since been referred to the Senate Committee on Environment and Public Works.

Most scientists attribute the dead zone to nitrates, primarily from fertilizer runoff. But the Fertilizer Institute, a Washington, D.C., trade group, maintains that nitrate runoff is only one factor in hypoxia. Still, says institute spokesperson Kathy Mathers, “[Farmers] ought to have a nutrient management plan, with field maps, soil tests.” Gary Goldberg, CEO of the American Corn Growers Foundation, an offshoot of the 14,000-member American Corn Growers Association, adds that many farmers apply the same amount of nitrogen each year, and that regular soil tests to determine how much fertilizer is actually needed could save money and reduce runoff at the same time.

Because the Mississippi drains 41% of the U.S. land area, scientists believe only a broad effort at reducing nitrate runoff would have a chance at succeeding. And because nitrogen is stored in the soil and continues leaching for many years, any solution must be a long-term effort, says Turner. In Eastern Europe, he points out, nitrates from the Danube River contributed to hypoxia and ecologic havoc in the Black Sea. After the Soviet Union collapsed, the economic decline hit farmers hard; fertilizer use fell by more than 50%, and Black Sea oxygen levels slowly rose.

Hypoxia in the Gulf of Mexico exists in a larger ecological context, says Len Bahr, a marine biologist who is coastal advisor to Louisiana governor Mike Foster. Channelization of the Mississippi River to improve navigation and reduce flooding has starved wetlands of necessary sediment, helping to cause erosion and destruction of the state’s wetlands. Bahr argues that allowing more water to leave the channel levees and enter wetlands would nourish those areas. Once in the wetlands, water would lose some nitrates, ameliorating the dead zone. However, says Turner, “The main issue for removing nitrogen is at the headwaters, not at this end of the pipe.”

—David J. Tenenbaum



Resurrection in the Gulf. A recently announced plan by the U.S. Environmental Protection Agency and newly introduced legislation would curb nitrogen runoff in the Mississippi River basin, a chief cause of the Gulf of Mexico “dead zone.”

FOOD SAFETY

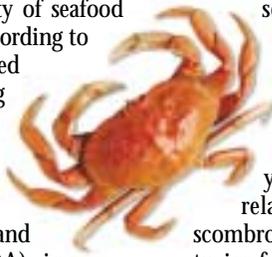
HACCP Hassles

There are serious deficiencies in a program intended to ensure the safety of seafood sold in the United States, according to a January 2001 report issued by the General Accounting Office (GAO). *Food Safety: Federal Oversight of Seafood Does Not Sufficiently Protect Consumers* criticizes the effectiveness of the U.S. Food and Drug Administration (FDA) in overseeing the Hazard Analysis and Critical Control Point (HACCP, pronounced “has-sip”) system for seafood. HACCP programs aim to prevent food safety problems in several different categories rather than find them after they occur. But according to FDA statistics, by 1999 only 44% of seafood firms had a complete HACCP plan.

Under HACCP, processors develop individualized plans detailing “critical control points” and document their monitoring of these critical areas. Critical control points are steps or procedures in production where food safety hazards are especially likely to occur if precautions aren't taken. For example, a critical control point in the handling of tuna involves keeping the fish cold enough to prevent the formation of the histamines that cause scombroid poisoning. Although seafood processors and distributors are responsible for developing their own HACCP plans, a process that can be costly and time-consuming, the FDA must ultimately ensure compliance.

According to the *National Seafood Industry HACCP Implementation Report*, issued by New York Sea Grant in April 2000, HACCP plans are proportionately more expensive for small companies than for large ones. Companies with sales of under \$500,000 a year spend about 3% of their income on HACCP programs, compared to about 0.5% by companies with average annual sales of over \$3 million.

“HACCP is a great concept but has been very poorly implemented,” says Tony Corbo, a lobbyist for Public Citizen, a Washington, D.C.-based consumer rights group. “To do their job properly, [the FDA is] going to need a huge increase in staff,” says Corbo. The official FDA response to the report agrees that the seafood HACCP program has deficiencies, and the agency has requested additional funds from Congress to improve safety inspections, including user fees to be charged to seafood import-export companies.



No data are available on how HACCP has affected the incidence of seafood-related illness; the most recent estimates from the Centers for Disease Control and Prevention date from 1997, the year the seafood HACCP program was established. By those estimates, contaminated finfish and crustaceans cause about 15% of the 76 million foodborne illnesses reported in the United States each year. More than 80% of the seafood-related outbreaks were caused by scombrototoxin or ciguatera, heat-resistant toxins found in warmwater species of fish.

The report criticized the FDA for implementing the seafood HACCP program before establishing baseline levels of seafood contamination (in contrast, the U.S. Department of Agriculture established baseline contamination levels before implementing meat and poultry HACCP programs). The GAO further questioned the lack of HACCP standards for fishing vessels. To this charge, the FDA counters that most processing on vessels is minimal—heading and gutting—and that these steps can actually enhance seafood quality by allowing fish to cool faster and removing blood and bacteria-harboring internal organs, which can contribute to spoilage. The GAO report also expressed concern that, although the FDA has issued warnings about methylmercury contamination in seafood, exposure to this highly toxic substance “is not identified or covered in FDA's seafood guide as a hazard reasonably likely to occur.”

The GAO does recognize the seafood HACCP program's successes. FDA inspections of HACCP plans are now scheduled to occur yearly instead of once every four years. In addition, many seafood firms report improving safety procedures, primarily in sanitation and temperature control, as a result of the HACCP program, according to the New York Sea Grant report.

However, processors are frustrated because they don't know if improvements in procedures have resulted in safer seafood reaching consumers, says Richard Gutting, Jr., president of the National Fisheries Institute, an Arlington, Virginia-based trade association. Gutting says processors want to see a scientific basis for FDA activities. “What neither the GAO nor the FDA have done is complete a scientific analysis of the relationship between frequency of inspection and levels of compliance,” says Gutting. The FDA is currently working on such a study, according to Philip C. Spiller, director of the FDA Office of Seafood. —Kris Freeman

Smoke in the Womb Means Asthma Later

Maternal smoking during pregnancy increases the rate of asthma in children, according to a University of Southern California study that looked at lifetime tobacco smoke exposure histories of 5,762 fourth-, seventh-, and tenth-grade students in Southern California.

The report, published in the February 2001 issue of the *American Journal of Respiratory and Critical Care Medicine*, states that the probability of physician-diagnosed asthma for children exposed to tobacco smoke *in utero* via maternal smoking was 1.8-fold higher than for children with no exposure. The investigators remark that elimination of fetal exposure to maternal smoking could prevent an estimated 5–15% of childhood asthma cases.

The Cost of Silence

At its February 2001 Governing Council meeting in Nairobi, Kenya, UNEP released a report on the threats to indigenous cultures from globalization. “Enshrined in their cultures and customs are secrets of how to manage habitats and the land in environmentally friendly, sustainable ways,” said UNEP executive director Klaus Töpfer.

The report illustrates how the encroachment of Western culture and farming practices threatens to overtake indigenous methods, such as the 3,000-year-old *waru-waru* system of native Andean farmers, which yields up to 10 times the regional average of potatoes. The report highlights the fact that up to 90% of the world's 5,000–7,000 spoken languages could die out over the next century, and with them a valuable storehouse of information about the natural world.



Looking beyond the Label

On 16 February 2001 the attorneys general of Alaska, Connecticut, Massachusetts, and New York filed a lawsuit charging that the U.S. EPA has delayed by three years action requiring pesticide manufacturers to list all ingredients on product labels. Manufacturers are only required to state the ingredients that actually kill the target organism, but inert ingredients make up as much as 99% of pesticides sold at retail. Many of the 2,300 inert ingredients registered with the EPA are known to pose serious risks to human health. Massachusetts attorney general Tom Reilly said that most people would equate the term “inert” with “harmless,” and that allowing pesticide manufacturers to label risky chemicals in this way is “dangerously misleading.”

WASTE DISPOSAL

Portable Potty Keeps Outdoors Great

Human waste on the battlefield is a perennial problem for the U.S. military, and the environmental health hazards it can create—diphtheria, cholera, and other diseases—have often caused more deaths than actual combat.

Traditional handling methods such as burning or burying all have shortcomings. For example, buried waste may leak pathogens into the groundwater. Alan P. Schlie, a force documentation analyst for the U.S. Army Engineering School at Fort Leonard Wood, Missouri, believes the solution may lie in the PETT™ (short for Phillips Environmental Toilet), a portable toilet his unit recently field-tested. “The way the PETT is designed makes it easy to transfer and dispose of waste,” Schlie explains. “I believe the PETT will eliminate the waste disposal problem in the military.”

The PETT is the only portable toilet on the market to use disposal bags that degrade along with the waste, unlike the usual plastic waste bags. The bags are labeled a Group II (nonhazardous) waste product—the same as regular garbage—in the 47 states that classify them. The used bags can thus be put in a regular solid waste landfill.

Each waste bag kit uses dual degradable bags that can be used about 5–10 times. They contain an absorbent powder that neutralizes odors, gels waste, and initiates the decay process. The PETT is the size of a standard toilet, but weighs only seven pounds and can function in temperatures ranging from -40°F to 140°F. “We believe our product is eco-friendly as well as sanitary, because it’s designed to prevent spilling and splashing,” says Bill Phillips, CEO of Phillips Environmental Products, the Bozeman, Montana, company that developed the toilet.

The PETT is being considered for use in protected areas under the Bureau of Land Management (BLM) and the National Forest Service. “Many people like to create a Lewis and Clark-type expedition in these areas,” says Pat Crowley, solid waste regulatory program manager with the Montana Department of Environmental Quality. “They dig their pit toilets at the campsites . . . and in no time you have dozens of smelly holes in the ground. The sites become littered with human waste



Not just bears. A new portable toilet makes for cleaner waste disposal in the woods and elsewhere.

and strewn toilet paper. It’s unsanitary and looks real ugly.”

In a 15 May 2001 letter to Phillips, senior specialist Gary Marsh wrote that the BLM does not object to the use of the PETT along with other acceptable human waste disposal systems currently in use. Marsh stressed, however, that “great emphasis must be placed on educating the user and monitoring [the bags’] disposal,” and that if PETT bags are found to be improperly disposed of in protected areas such as federal or state campgrounds, the BLM would “have to re-evaluate their usefulness.”

Phillips Environmental Products is now looking for ways to sell the PETT in the consumer market. Wal-Mart is taking a serious look at the toilet, and the company has been in negotiations with potential partners in Japan and Canada. Says Phillips, “My marketing experience told me that there is a tremendous need for something like the PETT.” —Ron Chepesiuk

Then it gets into lakes and rivers, and you end up with high levels of mercury in the fish, which people then catch and eat.” Nriagu believes COMESA nations should enact uniform environmental policies and emissions standards, labeling requirements, and public education campaigns to counter the influx of environmentally unhealthy products.

David Ugolor, president of the Nigerian organization African Network for Environmental and Economic Justice (ANEJ), believes a larger, unified regional market may attract industry that will exploit the area’s natural resources. Competing agricultural products could exacerbate poverty, he says. Deforestation is already a problem, and in many areas water is a fragile resource. “The weak regulatory mechanism in the region will not secure the environmental quality of eastern and southern African countries,” Ugolor says. “There are a few safeguards in the COMESA countries, but they are not strong enough to play the watchdog role.”

Ugolor contends that the answer may lie in the efforts of groups such as ANEEJ and African nongovernmental organizations in the United Nations to maintain pressure to keep polluting technologies and trade out of the region. He adds, “Whatever happens to the African environment also has implications for the United States and the international community as a whole. Whatever happens to the African environment should be of concern to the international community.”

To paint African countries as uniformly negligent when it comes to the environment is incorrect, says Graeme Donovan, a World Bank economist. COMESA members Kenya, Tanzania, and Uganda are launching a World Bank-financed strategy to manage toxic waste in neighboring Lake Victoria. The bank has also required African nations receiving loans to develop national environmental action plans since the mid-1990s. While these plans do not have “teeth” in every country, says Donovan, they have led in some cases to strong environmental regulatory frameworks. “There are the beginnings of safeguards in place for most [COMESA] countries,” he says. “They are thinking about those kinds of things separately from the trade agreement.” —Richard Dahl

TRADE/COMMERCE

African Trade Agreement—Not Entirely Free?

The launch of Africa’s first multination free-trade area in October 2000 by the Common Market for Eastern and Southern Africa (COMESA) has raised hopes for an improved economy that will spur trade, promote peace, and attract foreign investors to this impoverished and often embattled region of Africa. On 30 April 2001, COMESA reported that interest in trading in the region has indeed increased. But environmentalists are wary of the effects the zone may have on the region’s air and water quality and the health of its citizens. If, as COMESA itself says, industrialization is the “driving force in the development process,” to what extent are COMESA member nations willing—or able—to respond with effective environmental regulation?

COMESA is a group of 20 nations that has committed itself to removing trade barriers among its members. Nine member nations have been trading with other COMESA countries at zero tariff, with the other 11 countries operating with reciprocal reduced tariffs. COMESA also intends to establish a common external tariff by 2004.

“I don’t see [COMESA] as doing the environment a lot of good,” says Jerome O. Nriagu, a professor of environmental health sciences at the University of Michigan in Ann Arbor who compiled a report on hazardous waste and its impact on the citizens of member nation Zambia. “They’re trying to go down a path where they’ll pollute the environment and then clean it up . . . [but] they probably will never have the kind of money to do the remediation and the cleanup.”

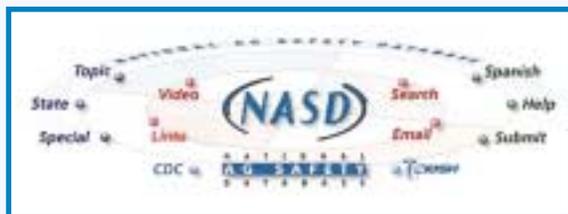
Nriagu says he was “quite horrified at how careless people are with some of the most toxic stuff,” such as mercury-containing soaps, which are banned in other parts of the world but widely used among Zambian women to lighten their skin. “Nobody told [consumers] the soap was not good for them,” says Nriagu. “Ultimately, it goes into the sewer.



National Ag Safety Database

During the 1990s, the rural population of the United States grew faster than the urban population, resulting in 20% of the population—over 54 million people—living in rural areas. Many urbanites move to the country seeking a more relaxed lifestyle, but living in the country, especially on a farm, is not as carefree and idyllic as city dwellers might think. In the United States, farming is considered to be the second most dangerous occupation after mining. The latest National Safety Council statistics state that farm-related accidents and health problems account for as many as 1,400 deaths and 140,000 injuries each year, most of them preventable. To help reverse this trend, the National Ag Safety Database (NASD), located at <http://www.cdc.gov/niosh/nasd/nasdhome.html>, provides educational materials for farmers, extension agents, and the general public to promote safety in agriculture. The information, gathered from 34 states, 4 federal agencies, and 5 national organizations, includes over 2,650 publications.

The site, produced by the National Institute for Occupational Safety and Health, groups its information in three different categories. The State link leads to articles produced by state agencies that are relevant to each state. (A Federal & National Materials subheading leads to more general publications by groups such as the U.S.



Environmental Protection Agency and the American Society of Agricultural Engineers.) The Special link lists materials by source, including conference proceedings, federal materials, journals, and news releases.

The Topic link groups information in a directory of over 25 farm safety subjects, including personal protective equipment, chemicals/pesticides, and manure pits/farm ponds/wells. Each topic page provides an extensive list of links to related articles, reviews of data sources and research, training materials, and videos that can be purchased from the site.

For example, the Personal Protective Equipment topic page offers farmers guides to the airborne risks they can face, the respiratory ailments they could contract, and the protective equipment they can use to reduce exposures. Respiratory problems are a special environmental concern for farmers, who can be exposed to grain dust, molds, pollen, animal dander, soil dust, and diesel exhausts in the span of a single day. Exposure to these particles can cause or exacerbate acute infections or toxic pneumonitis, hypersensitivity pneumonitis (farmer's lung), chronic asthma, bronchitis, silicosis, and organic dust toxic syndrome. Farmers can also be exposed to toxic airborne gases and pesticides.

Chemicals and pesticides not only can compound respiratory problems for agricultural workers, they also present a separate set of health concerns. Farmers often work with anhydrous ammonia, widely used as fertilizer. In addition to lung problems, exposure to this chemical can also cause blindness and burns. Information accessed through the Chemicals/Pesticides topic page provides an overview of the chemical and its uses, preventive measures to avoid injury during its use, and first aid procedures in case an accident does occur. Also available through the Chemicals/Pesticides page is an Environmental Concerns page, which lists links to federal worker safety and water regulations, steps for protecting groundwater from chemical contamination, and guidelines for pesticide purchasing, storage, handling, and disposal.

A third topic page, Manure Pits/Farm Ponds/Wells, lists articles on the dangers of working in or near these facilities as well as steps for making such facilities safer. A National Institute for Occupational Safety and Health program found that many farm workers are unaware of the potential risks involved in working around manure pits. The gases generated from decaying animal waste in these pits can build up to create oxygen-deficient, toxic, or explosive atmospheres. Between 1980 and 1985, 16 deaths resulted from asphyxiation of workers in animal waste storage pits or tanks. —Erin E. Dooley

Clay Nation?

Researchers from the USDA Agricultural Research Service and Engelhard Corporation of Iselin, New Jersey, have developed crop protectants that could reduce the amount of pesticides used by farmers by 50% or more. The protectants use specially processed kaolin, a white clay, and are applied to the surface of plants to form a film barrier



against more than a dozen species of insects and mites, including pear psyllas and glassy-winged sharpshooters. The products also serve as a reflective coating, reducing plant sunburn and heat stress.

According to coinventor Gary Puterka, the products have the potential to work against almost any insect under the proper conditions. Entomologists are working to adjust application parameters to avoid disrupting beneficial insects that are helpful in biological control. The products' ingredients have few mammalian toxicity effects, pose minimal environmental risks, and are exempt from EPA residue tolerance requirements.

Breath of Fresh Air in Asia

In February 2001 leaders from a dozen Asian cities met with representatives from international donor agencies and the private sector in Bangkok, Thailand, for the launch of the World

Bank-sponsored Clean Air Initiative for Asian Cities. The initiative is intended to strengthen the ability of national and municipal governments to effectively manage urban air quality and protect public health.

Industrial growth in the region has been accompanied by increased factory and vehicular emissions. According to the World Bank, air pollution causes \$500 million in health-related damages each year in Bangkok alone.

Municipal environmental officials outlined what their cities have done and are currently doing to combat declining air quality. The initiative is cosponsored by the Bangkok Metropolitan Administration, Ford Motor Company, the Asian Development Bank, and the governments of Japan and the Netherlands.

