environment

Ecological succession

Scientists have long been interested in how life forms establish themselves in an area where there had previously been no life. Studies of the reemergence of life in Hawaiian areas ravaged by volcanoes, for instance, revealed that a single tree species provided organic materials that enabled a large range of organisms to be reestablished (SN: 4/27/70, p. 411).

Daniel Simberloff, a Florida State University ecologist, reports that his work on seven islands in Florida Bay indicates that animal life very quickly reestablishes itself in areas denuded of such life—but that sometimes the new species distribution is different from the old.

Simberloff selected seven small islands of varying distance from the Florida coast and took a careful census of all animal species. Then he fumigated each island, thus eliminating all animal life but leaving mangroves and other plants alive. Within a year and a half, all the islands were repopulated with animals. The island nearest the shore was repopulated within 100 days.

First animals to arrive were spiders and plant-eating insects. Then other insects arrived to feed on the early arrivals. "Most of them were blown out by wind," said Simberloff, "and others floated out."

The work throws light on why larger islands have greater species diversity than smaller ones. As Darwin pointed out long ago, larger islands simply have more varieties of habitats. But Simberloff says an additional factor revealed by his work is that the rate of species extinction on smaller islands is greater than on larger ones. Simberloff notes that his work involved no permanent ecological damage.

Ancient carbon monoxide

Scientists have been becoming more certain lately that there is little worldwide carbon monoxide pollution from manmade sources and that manmade CO pollution is essentially a local problem in urban areas. A new study shows that CO levels as long ago as 500 B.C. were about as high as now exist in remote areas.

Robert C. Robbins of Stanford Research Institute reported at an Aug. 15 joint meeting of the American Geophysical Union and the American Meteorological Society at St. Petersburg Beach, Fla., that CO levels from ice samples taken in Greenland and Antarctica varied little from sample to sample, despite a large difference in the age of the samples. Greenland ice cores were 115, 150 and 185 years old and Antarctic ones were 700, 1,200 and 2,500 years old. The logical conclusion of the work, says Robbins, is that no large increases in CO worldwide have occurred due to the industrial revolution.

He adds the caveat, however, that natural sources of CO—largely plant decay—are so large that if there is an increase due to man's activities the increase is proportionately so small that it would be very difficult to measure.

Limits to 'Limits'

Limits to Growth, the study derived from a world computer model constructed by Dennis Meadows and his associates at the Massachusetts Institute of Technology, predicts worldwide catastrophe unless mankind controls more wisely its interconnected activities in five prime areas: population growth, capital investment, resource depletion, pollution and agricultural investment (SN: 3/25/72, p. 202).

Three researchers at Koninklijke Shell-Laboratorium, Amsterdam, argue in the Aug. 4 NATURE that the MIT model is flawed in several important ways:

- The high level of aggregation of predicted effects of pollution on human morbidity and mortality precludes an empirical base.
- The MIT scientists lacked the "theory, evidence or experience" to predict changing relationships of variables that affect demographic and economic systems; these relationships in the MIT model are thus based on unproven assumptions. Also, simulations by the Amsterdam researchers reportedly show the MIT team failed to take into account the high sensitivity of its model to small changes in certain inputs.
- The MIT model does not sufficiently take into account "social feedback" which could cause mankind to intervene in positive ways when "the world system develops in an undesirable direction." The three researchers are T. W. Oerlemans, M. M. J. Tellings and H. De Vries.

Antidote for metal poisoning

Researchers from McGill University in Montreal and the U.S. Environmental Protection Agency report that macromolecular compounds called polyuronates can serve as an antidote for poisoning from environmental lead and cadmium. The two metals are common pollutants. Polyuronates occur naturally in certain seaweeds and citrus fruits.

When taken by mouth, polyuronates combine with excess metals in the digestive tract; the compounds thus formed cannot be assimilated and are excreted in the feces, report Yukio Tanaka, McGill chemist, and Jerry F. Stara, EPA toxicologist. The metals are captured by the compounds through ion exchange.

Even metals that reach organs by inhalation can be removed by oral dosage with the polyuronates; movement of materials through intestinal walls brings the metals into the intestines where they can be captured. The researchers believe the research may have particular application to workers in factories exposed to dangerous levels of several metals.

Retorting feedlot wastes

Organic solid wastes create serious pollution problems. If they enter waterways, they cause high biological oxygen demand; if they are incinerated, they cause air pollution. A particularly serious problem is feedlot wastes. Each steer produces approximately 16 times the organic waste produced by a human being.

Researchers at Texas Tech University in Lubbock report they have developed a retort system which dries feedlot waste, then pyrolyzes it. The product is "char," carbon and inert ash which can be used for water clarification, as fuel or as a soil conditioner. The process produces sufficient gas to fuel the operation.

The two researchers, Harry W. Parker and J. Richard Massie Jr., claim their pilot retort, if scaled up to commercial size and automated, would require only one or two men to operate.