fellowships and grants.

There are reasons why the biology community sees the need for such a collection of institutes. The manpower situation is grim, Hubbell testified at the hearing: "There are 24 times as many health-related researchers as environmental scientists." Biology departments are being co-opted by molecular biologists, while whole organism biology, ecology, and systematics have fallen on hard times. "Ecology nationwide is dying for lack of money," said Hubbell. "We're not training anyone to do the job. The Princeton molecular biology department brings in more money for health-related research than is spent by the National Science Foundation on ecology nationwide."

Witnesses explained that the federal funding scene is riddled with gaps and that no single agency sponsors the kind of research that is needed. The EPA's research is too short term, NSF is too basic, and the National Oceanic and Atmospheric Administration is not into biology.

The NIE concept is by far the most ambitious of several proposals now circulating around Washington designed to address the growing need for policy-relevant research on the environment. The EPA is looking into recommendations made by a task force in 1988, which include the establishment of an Environmental Research Institute and a doubling of its current R&D budget of $56 million. Representative James Saxton (R–NJ) has introduced a bill that would set up a commission to study a national institute of environmental research. The House science committee is currently drafting a bill proposing some sort of environmental institute.

At Scheuer's hearing, officials from EPA, NOAA, and the Council on Environmental Quality expressed strong reservations about the institute proposals, saying they were "duplicative" and that, while there are gaps in research, more thought is needed before big changes are made. Scheuer dismissed these reservations as "meaningless pap."

Definitive action on the environmental institute proposals is not likely until after EPA has been elevated into a Cabinet-level Department of the Environment. Both houses have passed measures calling for that change, and managers of the legislation have said they want to get final action by Earth Day, which will celebrate its 20th anniversary on 22 April. Scheuer's hearing has already produced one development: he, Saxton, and committee chairman Robert Roe (D–NJ) are proposing an amendment to the House bill that would call on the National Academy of Sciences to study the feasibility of a national environmental research institute.

■ CONSTANCE HOLDEN

Bacteria Effective in Alaska Cleanup

A year after the *Exxon Valdez* dumped its cargo into Prince William Sound, oil-soaked beaches that were treated with an experimental cleanup technique are beginning to return to normal. Indeed, the technique has turned out to be so effective that even some of the scientists who helped develop it are expressing surprise.

Last summer, in a $10-million experiment, Exxon researchers sprayed some 70 miles of beaches around Prince William Sound with a fertilizer called Inipol that was developed in the early 1980s by the French petroleum company Elf Aquitaine. The goal: to stimulate the growth of naturally occurring bacteria known to have an appetite for hydrocarbons. It was the biggest test ever conducted of the use of bacteria to clean up an oil spill (*Science*, 18 August 1989, p. 704).

Though nobody is touting the technique as a cure for every oil-fouled beach, preliminary surveys conducted last summer by the Environmental Protection Agency (EPA), which is participating in the test, indicated that the sprayed beaches showed dramatic improvement compared to untreated areas—usually within 15 days. Now laboratory tests performed this winter have provided detailed support for these observations.

For example, scientists found two orders of magnitude greater microbial counts on beaches soon after they were treated than existed in untreated areas. And the effect lasted, with elevated levels of oil-degrading bacteria persisting 5 months after spraying, according to Russell R. Chianelli, senior research associate at Exxon Research and Engineering Company. Best of all, the bacteria turned out to have a much greater appetite for oil than anyone had imagined, says Chianelli. In fact, EPA's and Exxon's data collection efforts were initially hampered because the organisms even attacked some compounds in the crude oil that researchers were hoping to use as long-term markers for statistical analyses.

Still to be determined is how effective the technique is in digesting oil that has penetrated porous stone or migrated below the surface of pebble beaches. EPA and Exxon researchers say the fertilizer seems to be stimulating increased degradation to depths of about 1 foot, but biological activity there may occur at a slower rate. Chianelli reports, however, that preliminary tests indicate that oil beneath surface rocks was consumed by microorganisms in about 40 to 50 days.

As for toxic effects, so far no significant impact has been seen in mussel larvae and oyster larvae, says Hap H. Pritchard, a microbial ecologist with EPA. Nor did the chemicals simply dissolve oil on the beaches and cause it to run off into the sound, as some researchers had feared, says Pritchard.

All this makes one of the originators of the technique—Ronald M. Atlas, a professor of biology at the University of Louisville, who first experimented with fertilizer formulations similar to Inipol in the late 1960s—ecstatic. Currently working as a consultant for Exxon on the cleanup, Atlas says "There were more dramatic surface results than anyone had predicted."

But while these results are encouraging, EPA officials are quick to point out that the method is not a magic, cheap solution nor a cure-all for oil spills. Every beach that was treated first had to be hosed down to disperse the oil across the surface of the beach before the fertilizer was applied. The technique also is not likely to be useful on rocky portions of the 1089 miles of Alaska shoreline contaminated by oil because the fertilizer solution will not cling to vertical surfaces. This could also limit the usefulness of the technique on steeply sloping beaches, EPA officials say. Furthermore, the level of biological activity declines with cold weather—by some 75% just as biologists expected. Quantifying the effects of biological degradation particularly in winter is difficult because of increased physical washing that results from wave action.

Nevertheless, the treatment strategy has worked well enough for Exxon to continue to experiment. This summer the company is expected to expand the use of fertilizers into additional parts of Prince William Sound. It also has spurred the American Petroleum Institute to step up research on bacterial scouring. Moreover, Atlas predicts that the results will trigger a wave of new research by oil companies, EPA, and universities to better understand how shoreline microorganisms break down oil. It could also stimulate interest in developing more advanced bioremediation methods for dealing with oil spills on land as well as along coastlines. ■ MARK CRAWFORD