they've created.

Still, in a few labs, results are trickling in. Iseman says his colleagues at Jewish Hospital are closing in on a gene that encodes resistance to isoniazid. And Aimee Stanley, a doctoral student at Colorado State University, recently identified two regions of mycobacterium DNA that confer resistance to ethambutol. The region she is focusing on is large, however—about 22.6 kilobases—and it will take a lot of work to fill in the details. "Mycobacterium molecular biology is still in its childhood, if not in its infancy," Stanley says.

Michael Iseman

The lack of good animal models is also hampering TB research. Guinea pigs are used in some studies but are more resistant to the disease than researchers would like. And while mice are reasonably good models for studies of TB immunity, their failure to develop classic lung lesions compromises their value for pathogenicity studies, notes Arthur Dannenberg, who studies TB pathogenesis at Johns Hopkins. TB-susceptible and TB-resistant strains of rabbits have been bred, but the relevance of those models to human tuberculosis remains controversial.

TB researchers also note that for the sake of safety, most laboratory studies have used the "Erdman" strain of *M. tuberculosis*, a drug-sensitive strain that poses little risk to researchers. But increasingly it seems that if scientists are to get the upper hand on the current epidemic, they will have to work with the more dangerous, drug-resistant strains that are causing the problem. Such studies, in which animals inhale aerosolized drug-resistant mycobacterium, require so-called BL-3 laboratories designed to prevent release of highly infectious agents. Now it looks as though the researchers themselves will be facing significant new risks.

Not surprisingly, many of the scientists who have been arguing for years for increased TB funding express some anger that it has come to this. "First the government cuts back its funding for TB research for decades, then it wants us to grow 15 liters of drug-resistant TB and spray a fine mist in a roomful of mice," says Orme of Colorado State, home to one of the few BL-3 tuberculosis labs in the country. "To tell you the truth, we're fairly nervous about doing experiments on aerosolized multiple drug resistant strains." Orme says his lab just received a brand new aerosol machine with a huge, 10-inch rubber gasket that should guarantee no leakage and no accidental exposure. But reassuring as that gasket is, he says, "I think we're going to put lead weights on top" of it.

Expanding on Orme's frustration, Bloom points to the federal government's growing failure to care for the nation's poor and disenfranchised, noting that at this point it will take more than rubber gaskets and lead weights to put a lid on the new TB. "I see this epidemic as a major indictment of the country's health care infrastructure," he says angrily. "Why is it that the United States deals with health problems only when there is a crisis?" ■ RICK WEISS

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Panel Swims Against the Tide in Wetlands Policy

Both ecologically and politically, 1991 was a bad year for the nation's wetlands. Not only did these vital ecological systems continue to lose ground to bulldozers and the effluvia of urban civilization, but President Bush—having once pledged a "no net loss" wetlands management policy—proposed a new federal definition of wetlands that could, in one bureaucratic stroke, reduce areas under federal environmental protection by as much as 50%. In this charged atmosphere, you might expect the National Research Council (NRC) to produce a report decrying hasty action and calling for more study. But the NRC's Committee on Restoration of Aquatic Ecosystems has issued a far more challenging call*—it urges the federal government to begin an expansive new program aimed not merely at preserving existing wetlands but at reclaiming aquatic ecosystems that have already been damaged through pollution or development.

Strictly speaking, the panel's focus extends beyond wetlands to aquatic ecosystems such as streams, rivers, and lakes. As environmental buffers, these systems recycle nutrients, purify water, reduce the risk of floods, and shelter a wide variety of animal and plant species. But the report notes that the United States has lost nearly 117 million acres of wetlands alone since the 1780s.

The consequent degradation of wildlife habitats, higher levels of water pollution, and greater flood hazards demand a "comprehensive and aggressive" restoration effort, the report states. To set priorities, such a program will require a "triage" that focuses attention on systems that will be lost without intervention. Once these are stabilized, restorationists can turn to other degraded systems that require extensive work. Committee chairman John Cairns Jr., an ecotoxicologist at Virginia Polytechnic Institute, says the project should aim for a net increase of 10 million wetlands acres, restoration of 400,000 miles of streams and rivers (or approximately 12% of the total) by 2010, and restoration of 1 million acres of lakes by 2000. The committee did not estimate the cost of this effort, however.

The panel also provided no guidance on how to reach these ambitious goals beyond urging state and federal agencies to develop detailed plans. According to its report, the panel saw its role less as an architect of the restoration effort than as a herald announcing the feasibility of "repairing" damaged ecosystems to a close approximation of their original state. Unfortunately, as the panel acknowledges in several case studies included in the report, such efforts are likely to fall short of full restoration. One such study, for instance, notes that while a $10-billion phosphorus control effort in Lake Michigan succeeded in restoring water quality, it came too late to prevent the loss of 15 million tons of the lake's silica. As a result, the lake's original complement of phytoplankton "cannot be restored."

Committee members seem to have appreciated the irony of then Vice President Bush's 1988 call to environmental activism by reproducing it in their report: "It is not enough merely to halt the damage we've done. Our natural heritage must be recovered and restored." Cairns is in full agreement, adding that delay will merely increase cleanup costs. "Doing it now will be a lot more cost effective than postponing it even a decade or two," he says. "You only have to look at Eastern Europe and Russia to see the horror story of postponing environmental restoration." ■ DAVID P. HAMILTON

*"Restoration of Aquatic Ecosystems: Science, Technology, and Public Policy," Committee on Restoration of Aquatic Ecosystems, National Research Council, November 1991.