

The government has not been deaf to such arguments. Both a significant increase in funding and a new effort to achieve a coordinated program are expected to be announced this week jointly by Curien and the Minister for Health, Claude Evin, following publication of a report commissioned by the government on the whole AIDS situation in France.

Even Curien admits that it will not necessarily be easy to ensure that the increased funding is used effectively. Two principal hurdles exist. One, a shortage of qualified young researchers in virology and related fields of molecular biology, is shared with other countries in Europe; the second, a rigid funding structure biased against both quick changes in direction and short-term research contracts, is more uniquely French.

Lévy acknowledges both problems. He laments the difficulties caused across the whole of French science by a relative lack of funding and posts for postdoctoral students, and the virtual impossibility of employing technicians on income received from research contracts alone.

"We need more money [for AIDS research]" says Lévy. "But we also need an improvement in the administrative rules for paying people; this is the real problem in France. We certainly need a national program, but it must be a program with very flexible rules."

Montagnier adds his voice to criticism of the rigidity of the current system. "There is a lack of flexibility to respond to the demands of research," he says.

It is no secret that there has been friction between Montagnier and the leadership of the Institut Pasteur over his demands for extra funds and facilities, and it remains an open question whether or not he will be asked to head the new AIDS research institute which the Pasteur is currently building.

Critics sometimes accuse Montagnier of a lack of caution, combined with an excessive desire to remain the center of both scientific and popular attention. He responds by complaining of a "lack of aggressivity, in the American sense," both in the French pharmaceutical industry and in its scientific community.

Given his often bumpy relationship with local funding agencies, Montagnier says that he has "often thought about leaving France and going to work in the United States." Some in Paris would probably be relieved to see him go. But for the moment he says he remains committed to staying around, watching closely to see what the government's next steps are going to be—and, no doubt, the role he will be allowed to play in implementing its plans.

■ DAVID DICKSON

## Planning for Climate Change

Large-scale human intervention will be required in the next century to preserve plant and animal species that are threatened by global climate change, according to a draft report\* to Congress prepared by the Environmental Protection Agency (EPA). The study, which has been sent to the agency's Science Advisory Board for review, concludes that it will be difficult to mitigate the damage to natural systems and society if climate change happens too quickly.

The southeastern states, for example, could experience economic upheaval because agriculture and forestry may be severely affected by higher temperatures, drier soils, and reduced water supplies. In California, where agriculture produces 10% of the nation's farm income, lower water availability in the spring and summer could reduce crop yields.

The amount of land occupied by forests in the United States will shrink and their composition may be altered significantly. Diebacks in forests in the Southeast and upper Midwest could be visible within a few decades. In central Michigan, grasslands conceivably could replace forests of sugar maple and oak trees. Similarly, in northern Minnesota, hardwood forests would replace balsam fir trees.

EPA undertook the study at the request of the Senate Environment and Public Works Committee. The purpose was to provide some broader sense of the magnitude of the effects of greenhouse warming on a regional basis as well on the United States as a whole. A large portion of the document, which is based on about 50 separate research papers, has been subjected to limited peer review and still must be approved by the Science Advisory Board.

The report is built around case studies of how climate change may alter agriculture, forests, water supplies, human health, biological diversity, and demand for electricity. Four regions of the country were looked at—the Great Lakes, the Southeast, California, and the southern Great Plains. The study's editors note that problems posed by greenhouse gases are certain to go beyond the issues examined in the agency's report. Not only may things such as barge traffic on the Mississippi River be affected, but the study notes that beyond the borders of the United States "climate change could have large geopolitical consequences."

Besides outlining the potential impacts for Congress, the report is meant to assist researchers and policy-makers in identifying possible areas of research. In this latest assessment of global warming, EPA used the atmospheric and ocean simulation models of the Goddard Institute of Space Studies, the Geophysical Fluid Dynamics Laboratory, and Oregon State University.

Despite expected rises in temperatures, increased evaporation, and changes in rainfall patterns, the report projects that the United States will be able to produce enough food to feed itself. The country's ability to produce food for export, however, could be adversely affected. In the draft, EPA suggests that the departments of Agriculture, Commerce, and State and the Office of the U.S. Trade Representative should plan for long-term changes in crop production.

The study calls on federal and state policy-makers to institute long-term planning efforts for adapting to climate change. In particular, they suggest that:

- Federal and state wildlife and fishery managers begin to consider climate change effects in siting refuges and to examine setting up migratory corridors to improve the ability of various species to move to new habitat areas.
- Wetland losses could be minimized if people refrained from erecting bulkheads and levees to protect coastline properties from rising sea levels. If all shorelines were to be protected, the report observes, wetland losses could range from 50% to 82%. The cost of protecting these shorelines is estimated to be about \$111 billion.
- The efficiency of water management systems and water use must be improved to cope with changing rainfall patterns, early snow melts, and low water flow.
- New crop varieties will have to be engineered to limit the loss of production.

Just how well the United States will be able to adapt to the environmental and economic changes produced by global warming, says the report, hinges on how slowly this transformation occurs. What is clear, according to the draft document, is that the ultimate effects could last for centuries. ■ MARK CRAWFORD

\**The Potential Effects of Global Climate Change on the United States* (draft), Office of Policy, Planning, and Evaluation, Environmental Protection Agency, October 1988.