"Bioinformatics experts want fast access" so they can run follow-up experiments, says John Norvell, who heads the structural genomics program at the National Institute of General Medical Sciences in Bethesda, Maryland. But "experimentalists want time to check the data."

The issue boils down to how protein structures are gleaned and checked before release, says Wayne Hendrickson, a structural biologist at Columbia University. Computer programs, fed data from x-ray crystallography and NMR experiments, generate the likeliest set of three-dimensional coordinates for all of a protein's atoms. Bioinformatics experts initially wanted guidelines that mandate the release of those computer predictions the instant they are produced. Such a policy would be similar to the way sequence data from the publicly funded human genome project are posted daily on the Web.

"That did not fly," says Tom Terwilliger, an x-ray crystallographer at Los Alamos National Laboratory in New Mexico. Experimentalists maintain that protein structure analysis is more complex than spitting out raw genome sequence data. Each modeling prediction must be vetted, Hendrickson says. Several participants, he says, felt there's "no need to abandon the current standards of investigators making the decision" on when data are ripe for release.

But although structural biologists will still make the call on when data are solid, they won't be allowed to withhold a structure for the sake of determining its function. That means changing the status quo. When a protein structure is submitted to a journal today, Hendrickson says, it's almost always accompanied by findings—from experiments that alter key amino acids in the protein, for instance—that allow scientists to make educated guesses about how the protein works. But with a high-speed approach to solving protein structures, says Norvell, "publishing will have to be done in a different way."

NIH and other agencies that plan to pour money into the structural genomics centers don't want to freeze out biologists not associated with the centers. According to Hendrickson, "everyone agreed that the concept should not give those groups a privileged status."

As a compromise, researchers will be asked to publish their results—most likely in electronic format or as a brief summary in a specialist journal—within 2 to 4 weeks of finishing a structure, says Stephen Burley, a structural biologist at The Rockefeller University in New York City. "The moment the paper is posted on the Web," he says, "the coordinates would be placed in the Protein Data Bank," which is freely available to all researchers. The burden will be primarily on funders to enforce the timelines. They're accustomed to that, Burley says: Agencies regularly use their leverage over purse strings to ensure that structural biologists submit coordinates to the Protein Data Bank as soon as findings are published.

As an additional prod, structural biologists plan to add a little peer pressure. Hendrickson and others say the new guidelines call on each structural genomics center to keep a log on the Web of which structures they are attempting to solve. They would chart milestones such as cloning, isolating, and purifying a protein, and coaxing it to form a crystal. This will not only help to prevent several groups from working on the same projects, says Hendrickson, but "it will put internal pressure on the groups that they wouldn't be able to hold something forever."

–ROBERT F. SERVICE

With reporting by Michael Hagmann in Cambridge, U.K.

GLOBAL WARMING

Some Coral Bouncing Back From El Niño

Coral reefs in the Indian and Pacific oceans seem to be recovering more quickly than expected from a recent devastating "bleaching" caused by high ocean temperatures. New research suggests that the nascent recoveries may be partly due to the unexpected survival of juvenile coral that somehow avoided the brunt of the environmental assault. "It may indicate that reefs are more resilient than we had thought," says Terry Done, a senior research scientist at the Australian Institute of Marine Science in Cape Ferguson who studies reefs in the Indian Ocean. However, the coral would not be able to mature and recover from the repeated bleaching forecast to accompany projected global warming, he adds.

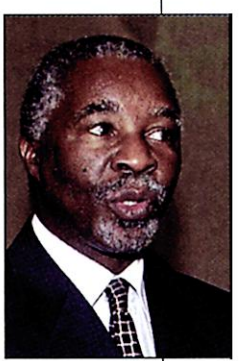
Resilient reefs. There may be hope for some areas hard hit by extensive coral bleaching after 1997–98 El Niño event.

Coral stressed by heat or disease expel zooxanthellae, the symbiotic algae that give the white

CREDITS: (TOP TO BOTTOM) MICHEL EULER/AP; PROVIDED BY GREOGOR HODGSON

ScienceScope

Unconventional Committee South African President Thabo Mbeki's controversial AIDS advisory panel found little common ground this week and ended up establishing a four-person committee to devise tests of fringe ideas about what causes the disease. Mbeki outraged many mainstream AIDS researchers last month when he questioned whether HIV causes AIDS and named leading skeptic Peter Duesberg of the University of California, Berkeley, to a deeply divided 33-member panel that will recommend ways South Africa should fight the disease (*Science*, 28 April, p. 590).



The panel, which met on 6 and 7 May in Pretoria, appointed two researchers from each camp to work on formulating experiments that could test theories about HIV's role in AIDS, which threatens more than 10% of South Africa's 42 million people. The four—Duesberg, William Makgoba of South Africa's Medical Research Council, Helene Gayle of the Centers for Disease Control and Prevention in the United States, and Harvey Baily, a Mexico-based AIDS researcher—plan to confer by Internet over the next 6 weeks. They will return to South Africa to present their ideas before the 7 July opening of the 13th World Conference on AIDS.

Critics call the exercise a waste of time and money. But Mbeki told the panel he is keeping an open mind: "You can't respond to a catastrophe merely by saying 'I will do what is routine.' "

Eyes on the Finnish Searching for new ways to battle type I diabetes, the Juvenile Diabetes Foundation (JDF) is turning to the country with the world's highest incidence of the disease. Last week, JDF signed off on two 5-year contracts, together worth over $4 million, to support Finnish researchers.

A joint venture with the Academy of Finland and the Sigrid Juselius Foundation will focus on new treatments, such as using stem cells to replace lost pancreas cells. The other program, run by Turku University since 1995, aims to test 20% of Finnish newborns for genetic susceptibility, then follow at-risk children in a bid to pinpoint what triggers the disease. Says JDF chief science officer Bob Goldstein: "It's a fabulous chance to do long-term epidemiology."

coral its color, through an imperfectly understood mechanism. But severe bleaching, a result of an excessive loss of zooxanthellae, can kill the coral. Record-high sea surface temperatures in tropical regions during the 1997–98 El Niño–Southern Oscillation led to the most extensive coral bleaching event ever seen. And because coral reefs host a disproportionate share of marine life, their loss represents a serious blow to the ecosystem.

Done studies a reef outside one of the Lakshadweep Islands off India's west coast that, like many Indian Ocean reefs, looked "like a graveyard" after the 1998 bleaching. But in a March survey of the reef, Done found a surprising amount of new coral, of a size that indicates it must have settled and begun growing at just about the time of the bleaching. Their presence poses a mystery. "If they drifted in after the bleaching, it isn't clear where they would have come from," Done says, as several species of adult coral were virtually wiped out in the bleaching. But if they arrived before the bleaching, as he suspects, "how did they survive?"

One bleaching hypothesis holds that the high water temperatures disrupt enzymes in the zooxanthellae, which then create toxic byproducts during photosynthesis. Done speculates that the new coral had minimal zooxanthellae in their tissue, which would have spared them these toxic effects. And by lodging in cracks and fissures, the coral were shielded from the sun's normal ultraviolet radiation that would have accelerated production of the toxins.

Other scientists are seeing similar recoveries, although they say the recovery mechanism is not clear. William Allison, a marine biologist with Sea Explorers Association in the Maldives, also reports seeing "survival of corals that must have settled during or shortly before or after the bleaching event." And Robert Richmond, a marine biologist at the University of Guam in Mangilao, says that recent surveys of reefs near Palau have turned up "some very nice [coral] recruits in areas that had been hit by the bleaching events." Although these corals likely have arrived since the bleaching, he says that any recovery is "good news."

However, not all reports are so upbeat. In a February survey of reefs near Belize in the Caribbean that virtually collapsed during the El Niño bleaching, Richard Ransom of Dauphin Island Sea Lab in Alabama found "no signs of recovery." Even the recovery events in the Pacific and Indian oceans, he notes, are patchy and seem to depend on the absence of other stress factors.

That connection puts the fate of the coral reefs in the hands of any future global warming trend. Coral have a good chance to recover from a one-time, short-term disturbance like bleaching if water and substrata quality are sufficiently high and there is a viable adult population within a reasonable distance, says Richmond. "But if you then kick it and stomp on it, there is a limit to the stress it can take," he adds.

Done notes that it may become harder for coral reefs to enjoy the decade or more of undisturbed growth needed for a full recovery if global warming triggers more episodes of severe bleaching. Under such a scenario, he says, "this recovery won't do the reefs much good. They'll no sooner get 1 or 2 years old before they'll be wiped out again."

–DENNIS NORMILE

CLIMATE CHANGE

Panel Estimates Possible Carbon 'Sinks'

The December 1997 Kyoto Protocol was a major milestone on the road to addressing human-induced climate change, but it left unanswered many questions that have stalled the treaty's ratification. One of the most vexing: Just how much carbon can a forest or farmland hold, and how easy is it to measure? The reason it's an issue is that the protocol allows developed countries to meet tough carbon emissions targets—5% below 1990 levels, between 2008 and 2012—both by reducing emissions from fossil fuels and, in a controversial option, by "sequestering" carbon in forests or other types of land. A new report* attempts to answer the question scientifically, but it is unlikely to make the option more palatable politically.

Some European countries and environmental groups object to allowing developed countries to get too much credit for carbon sinks because they think it will let energy-guzzling countries such as the United States off the hook. Storing carbon in forests and fields won't stave off the need to find renewable energy sources, and it's too difficult to accurately track how much carbon they hold, say such groups as the World Wildlife Fund. Leery that countries won't cut emissions and that sequestration won't work, these critics want to limit how much of a country's emissions can be reduced this way.

Leaving the political issues aside, the new report—written by a scientific panel of the United Nations–sponsored Intergovernmental Panel on Climate Change (IPCC) and approved by delegates from over 100 countries this week at a meeting in Montreal—adds long-awaited numbers and a how-to manual to what has, until now, been a murky academic debate. "There was a lot of mystery for the delegates. Now the scientists have really aired it out, and there's a good source of information," says Mike Coda, a climate change analyst with The Nature Conservancy in Arlington, Virginia.

The 460-page report runs through a dozen types of land uses, such as regenerating forests or converting cropland to grassland, spelling out just how much carbon might be socked away in each. The answer is, a lot. The report, informally known as the "sinks" report, suggests that, at first glance, the 41 developed countries could meet their Kyoto goals of cutting 200 megatons of carbon emissions per year entirely through land use changes rather than by reducing emissions from fossil fuels (see table). But following this route could be tricky, cautions the report, which offers a plethora of caveats concerning the difficulty of measuring how much these lands store.

For forests, however, the tally is mandatory: Countries will get credit for the forests they have grown or be docked for the trees they have lost since 1990. With so much at stake, just defining what a forest is has been controversial. For example, define a forest as 70% canopy cover, and countries with savanna forests, which have sparse canopies, might feel free to mow them down. Also crucial, the report notes, is whether forests that are harvested commercially and replanted should be counted.

But answering those questions is far simpler than estimating how much carbon might be stored by changing the use of other types of land, such as farmland. The protocol

HOW MUCH CARBON COULD THEY HOLD? (Megatons C/year)

Newly planted and regrowing forests*	197 to 584
Deforestation	−1788
Better management of:	
Croplands (no-till, erosion control, etc.)	125
Grazing land	240
Forests (fertilization, species choices, etc.)	170
Changes in land use:	
Agroforestry (grow crop trees, such as orange or apple, on unproductive grassland and cropland)	390
Cropland to grassland	38
Other	42

* At rate of current activities using IPCC definitions.

SOURCE: IPCC

* IPCC Special Report: Land Use, Land-Use Change, and Forestry. Available in June; contact: ipcc-sec@gateway.umo.ch