300 and 400 nuclear warheads. About 120 missiles are ground-based, a number of which are hidden in caves. Another 250 warheads could be delivered by some 120 antiquated but still quite effective aircraft. China also has two submarines which could launch up to 12 missiles each. Said Fieldhouse: "Only a handful of these are capable of reaching either Moscow or North America, though China has a robust ability to retaliate in Asia." Fieldhouse believes that "survival of Chinese forces under any conceivable attack is assured."

Moves by the United States and the Soviet Union to reduce intermediate-range nuclear forces (INF) in Europe and Asia have been given qualified support by China. "The INF treaty is a breakthrough in a long stalemate," said Zhen-Qiang Pan of the National Defense University in Beijing. Though Pan described the actual reduction in weapons as "insignificant," he did say that the INF treaty plays an "active role in reducing tension." Fieldhouse, however, stressed that the INF treaty is good for China, since it removes 171 Soviet SS-20 Saber missiles deployed east of the Urals. These missiles could reach China as well as Alaska and Japan.

As for the further cuts in nuclear weapons by the United States and the Soviet Union, Hua maintained that even a 50% cut would only provide "short-term psychological benefits." He said that China would not begin reducing its own forces until a 5-to-1 or even a 3-to-1 ratio between the superpower nuclear forces and its own was achieved. Pan added that any quantitative cuts must be accompanied by assurances from both superpowers that they would also stop enhancing the quality of their weapons. "Only by doing that can real arms control be achieved," said Pan.

Both Pan and Hua argued that the Strategic Defense Initiative (SDI) was destabilizing. "Star Wars must not become a reality," said Hua. "China as weakest among the second class nuclear countries should speak strongest against SDI . . . We cannot permit China to become strategically obsolete," he said.

There were also some pointed questions from the audience at the end of the session about China's alleged sale of Silkworm missiles to Iran. While maintaining that China did not directly sell the weapons to Iran, Pan said with some bitterness: "I do not like my country being described as a naughty boy in the process of maturity . . . like somebody who still needs to learn some lessons." Pan said the United States and Soviet Union have been selling weapons to Iran and Iraq for the past 8 years. "Why is China singled out?" ■ **W.B.**

Using Forests to Counter the "Greenhouse Effect"

Virtually nothing is being done at present to protect the earth against an esoteric and possibly catastrophic problem called the "greenhouse effect"—the buildup of heat in the atmosphere caused by an excess of carbon dioxide (CO_2). The chief man-made source of CO_2 is fossil fuel burning. Several speakers at a special session at the AAAS meeting suggested methods of attacking the problem, aside from the obvious one of reducing the use of fossil fuels. Admittedly, their proposals are a bit impractical because they would encounter opposition on economic and political grounds. But they have the virtue of being the only proposals on the table, and if the CO_2 problem becomes bad enough, they may get attention.

One intriguing idea, presented as a quick fix by Gregg Marland of the Oak Ridge National Laboratory, calls for a rapid reforestation of the globe. The aim would be to recapture in trees much of the carbon released into the atmosphere by burning coal and oil. Plants can fix atmospheric carbon by photosynthesis, and trees are able to fix more carbon per hectare (without fertilizer) than any other plant.

Marland first proposed this idea in 1976 along with physicist Freeman Dyson. Since then he has refined his calculations to show that by roughly doubling the volume of forest growth per year, the major fuel burning nations could delay the onset of the greenhouse effect for a decade or two, if they acted decisively. This would allow time for permanent changes in energy use. He judges this to be a difficult, unlikely, and expensive project, but not physically impossible. He also claims that this might be the most acceptable of a group of unpopular remedies to the CO_2 problem.

Marland's emergency scenario includes a number of assumptions that make it appear impractical. For example, as a starting condition, the destruction of existing forests—particularly in the tropics—must be stopped. But at present, the less developed world is tearing down forests at a rapid pace. According to the best estimates, the total inventory of trees has almost been halved since the beginning of agriculture. In the tropics, which comprise more than 30% of the earth's surface, forests are being cleared at the rate of 7 to 20 million hectares per year. If the populations of tropical countries continues to grow at a rate of 2.4% per year, the demand for fuel wood will increase tremendously. To carry out this program, the most populous nations would not only have to invest heavily in tree farms, but, in addition, they would have to refrain from burning the wood.

Yet, the scenario is not entirely fantastic. In the industrialized Northern Hemisphere, commercial lumber plantations have restored once depleted tree stocks. For example, in 1970, the forest area in New England, although smaller than in the precolonial era, had increased by 40% over the amount in 1890. And in the 1950s, a steady decline in forested area in the southeastern United States was reversed and began a slow but steady growth that has persisted ever since.

"The dimensions of the fix are staggering," Marland writes. And he concedes that a huge tree-growing push does not seem economically justifiable. But he concludes that "reforestation could . . . play a significant role as one component among a variety of measures taken to address increasing CO_2." Unfortunately, the other measures suggested at the AAAS meeting—such as rapidly increasing the number of nuclear fission plants or installing costly CO_2 capture equipment at fossil plants—seem no more likely to win acceptance. ■ **E.M.**

A No-Fault Proposal for AIDS High Risks

LeRoy Walters is a soft-spoken and unassuming academic, but that did not stop the Georgetown University ethicist from suggesting that homosexual acts, drug use, and prostitution be decriminalized in an attempt to stem the AIDS epidemic.

To control the rapid spread of the human immunodeficiency virus (HIV) among intravenous (IV) drug abusers, Walters would like to see users provided with carefully limited access to injectable drugs accompanied by a simultaneous decriminalization of IV drug use. Walters believes that this would bring addiction and its social context above ground. "Every Administration declares a war on drugs, but thus far it doesn't seem as if drug addiction has been greatly ameliorated," said Walters, who spoke at a AAAS symposium entitled "AIDS: An Overview." Walters stressed that approaches towards controlling AIDS should be pragmatic and experimental, not dogmatic and moralistic. Earlier in the symposium, James Curran, head of the AIDS program at the federal Centers for Disease Control in Atlanta, remarked, "If we really want to do something about IV drug use we have to do something big." Walters' suggestion was certainly big.

On to prostitution. Walters advocated an approach similar to that taken by some European countries and several counties in Nevada, where prostitution is legalized and

prostitutes are regularly screened for infectious disease. Legal prohibition of prostitution has not succeeded in preventing large numbers of prostitutes from becoming infected. In a recent paper (*Science*, 5 February, p. 597), Walters repeats some seroprevalence data. In Newark, for example, 52% of the prostitutes tested positive for HIV. Among incarcerated prostitutes in Miami, seroprevalence was 19%, while seroprevalence of monitored prostitutes in Nevada is extremely low.

Finally, Walters argued that statutes outlawing private homosexual acts between consenting adults be revoked and that laws prohibiting discrimination against homosexuals be enacted. "This would have great symbolic significance," said Walters. At the same time such a move would encourage homosexuals and bisexuals to provide accurate information about risk-taking behaviors which would help researchers define more precisely the parameters and direction of the epidemic. ■ **W.B.**

Bad Bees Buzz North; USDA Builds Barrier

Africanized honeybees continue their trek from Brazil to the United States. They are expected to arrive en masse in Texas between 1989 and 1990, much to the glee of tabloid newspapers but to the dread of the honeybee industry.

The northern edge of the Africanized honeybee front has already reached the southern Mexican states of Quintana Roo, Chiapas, and Oaxaca. To slow down the aggressive but commercially unproductive insects, the U.S. Department of Agriculture (USDA) is busy erecting a genetic "bee barrier" in Mexico. Plans call for destruction of feral colonies of advancing Africanized honeybees as well as the introduction of large numbers of freshly mated European honeybee queens. "The idea is not to stop the Africanized bees but to get them to cross with the European honeybees," said Robert Danka of the USDA's Agricultural Research Service in Baton Rouge, Louisiana, in a telephone interview with *Science*.

So far, the bees have not mellowed much. According to David Roubik of the Smithsonian Tropical Research Institute in Balboa, Panama, the Africanized honeybees in Central America are nearly identical to bees from Central Africa. Roubik was speaking at a AAAS symposium on the biology and impact of Africanized honeybees.

Africanized honeybees are hybrids created by crossing African and European subspecies of *Apis mellifera*. Introduced in 1956 in an attempt to create a more hearty race for the tropics, the Africanized honeybees defend their hives more aggressively, sting more readily, swarm more prolifically, and, worst of all from a commercial standpoint, produce less honey.

In a paper prepared for presentation at the symposium, Sarah Locke of the University of California at Davis reported that the Africanized bees pose "a serious threat" to commercial beekeeping and to agriculture dependent on pollination by bees. Commercially managed European honeybees, particularly the race of yellow Italians which is the bee of choice in the United States, are the primary pollinators of crops worth approximately $5 billion annually, Locke noted.

Will the Africanized bees be able to survive the winters in America? Al Dietz, a professor of entomology at the University of Georgia in Athens, believes that they will. "There is essentially no difference in ability to survive between Africanized and European honeybees," said Dietz in a telephone interview. Dietz placed a hive of Africanized honeybees at 2700 meters in the snow-covered Andes in Argentina. Dietz said: "The question is: Did they make it? The answer is: They did." ■ **W.B.**

Will Receding Budget Strand Science?

"A high tide lifts all boats," said Peter Likins, president of Lehigh University, speaking about government support for research at the AAAS meeting on 14 February in Boston. "But," he asked, "What does a low tide do? It beaches whales."

A receding federal budget, Likins suggested, may leave some projects like the new science and technology centers of the National Science Foundation (NSF) high on the sand. Although the centers were created by presidential directive and were singled out for attention in Ronald Reagan's State of the Union Address a year ago, they were not funded in the 1988 budget.

It was evident from these and other comments in a session on federal science policy that managers of research are worried not only about the centers but about the effect that an ebb tide of funding would have on scientists not connected with a center or a big institutional project.

Peter Likins: *"economic justification is now the only game in town."*

The President made wonderful promises last year, Likins said, but "reality has intruded" in 1988, and it is becoming harder all the time to justify spending public funds on basic science. Because the problems created by the trade deficit and sluggish industrial growth are widely recognized, there is a tendency to describe all new federal projects as helping solve them.

The resulting policy trend, Likins said, is a "shift toward more clearly targeted research." Because NSF is the chief financer of untargeted research, "the policy shift has been most dramatic in that agency," visible recently in the emphasis on science and technology centers. But it is "dangerous" to put too much emphasis on the economic value of science, according to Likins. "The credibility of the scientific establishment has been very high in America, and we can put this achievement of several decades in jeopardy by stretching too far the protective cloak that we call 'strengthening industrial competitiveness in the global economy.' Better justification than this can be found for the superconducting supercollider and the space station, to cite two quite different examples of megaprojects often defended with economic arguments of dubious merit." It is important to keep in mind that scientific research has an inherent value.

Given that "economic justification is now the only game in town," Likins asked, "How should we play it?" Specifically, in the case of the science and technology centers, what should the science community seek from the government? Arguing that "the best defense is a good offense," Likins urged his listeners to marshal evidence for the case that isolated, untargeted research contributes at least as much as group projects to innovation (for example, the discovery of low-temperature superconductors). He said that the new research centers should probably be regarded as experimental, and that they should remain "comparatively few in number" until they have proved their worth. ■ **E.M.**