yield" has become a frayed concept, stretched out of shape by pressures from industry. It seeks to ensure that maximum yield (and hence the amount of timber that should be cut) is calculated from the biological data and is not influenced by steadily rising timber demand. The Randolph bill, therefore, requires that multidisciplinary teams draw up a multiple use–maximum sustainable yield plan for each national forest. Sustainable yield would have to be calculated within areas of no more than 500,000 acres, rather than entire forests; this would result in "even flow," of timber, another cardinal principle of the bill, according to James Moorman of the Sierra Club Legal Defense Fund, who helped draft it. Instead of allowing an area to be cleared out and then leaving it for 50 years, he says, the bill would compel the Forest Service to arrange sales that produced smaller and more consistent cuts.

The timber industry has no use whatsoever for this bill. Representatives call it "forestry by prescription" that puts a "straitjacket" on the professionals. Many foresters and wildlife managers don't like it either, even though its intent, according to Moorman, is to put more power into the hands of Forest Service experts and insulate their judgments from pressures exerted by high-level bureaucrats and industry interests.

Supporters of the bill believe legislation is necessary to prevent large parts of the forests from being turned into short-rotation tree farms where huge stands of young even-age trees are harvested, like wheat, for pulp. The kind of forest the bill envisages is a "long rotation, high quality timber forest filled with large trees," where the concept of "multiple use" would be a reality and not degenerate into a meaningless euphemism (much as the call for a "balanced transportation system" became the rallying cry for highway builders).

To the industry and the Forest Service, however, the bill is a prescription for an inefficiently managed forest that is both unproductive and uncongenial to wildlife. They say it would inhibit the removal of old, static growth to make way for new, fast-growing stands, and they reject the bill's definition of physiological maturity, claiming it means a tree would actually have to be in a state of decline before it could be cut. They also predict the new restrictions would cause the annual amount of timber cut from National Forests to be reduced by up to 50 percent, and result in higher prices and increased unemployment. The National Forest Products Association went so far as to issue a press release warning residents of Los Angeles that they might have to lower their toilet paper consumption by 25 percent.

Tom Barlow says everyone has been over-reacting to this bill. He says, disingenuously in the minds of some, that the studies mandated in the bill might well cause allowable cuts to be increased. And if they do not, he believes the law would have the beneficial effect of causing timber companies to turn to privately owned land, thereby putting money in the farmers' pockets. As for the wood shortage that is projected if harvests are reduced, he observes that elimination of waste and cutting back on exports of logs from the Northwest to Japan ought to be looked into before anyone talks about shortages.

The term clear-cutting is often used as a shorthand for a variety of practices environmentalists don't like, such as inflated allowable cuts, short rotations, excessive use of pesticides, failure to regenerate cut areas, failure to remove slash (leftovers), and practices that lead to erosion and stream pollution. It is not the strident national issue it was 5 years ago, when rampant clear-cutting, particularly in Montana's Bitterroot National Forest, came under intensive scrutiny by a committee headed by Senator Frank Church (D–Idaho). The hearings resulted in the formulation of congressional guidelines that have stemmed many of the worst practices. Many foresters feel the Church guidelines are quite sufficient to protect the national forests from further abuse. But sustaining "multiple use" is becoming ever more of a challenge as these uses increasingly conflict and overlap. By the year 2020 demands for rangeland are expected to increase by 80 percent, recreational demand is expected to double; the Forest Service wants to double wilderness areas, and the timber companies want to haul out twice as many board feet. Pressures from commercial interests are bound to mount, and it may well be that guidelines and policies, however well-considered, will be no substitute for a little more inflexibility, in the form of a law.

—CONSTANCE HOLDEN

Biological Warfare: Suspicions of Soviet Activity

Has the Soviet Union taken a new interest in biological warfare? Two recent articles, quoting unidentified intelligence sources, suggest that the Russians are flouting the Biological Weapons Convention. Though evidence for an outright violation seems doubtful, there would be cause for concern even in a renewal of activity by the Soviet Union in an issue that had seemed to be well laid to rest.

The Biological Weapons Convention, which came into force a year ago, prohibits the development and production of offensive biological agents and requires existing stocks to be destroyed. Like certain other arms control treaties, the Convention is to some extent a cosmetic agreement to refrain from what neither side intended to do in any case. Biological agents simply make poor weapons. Nevertheless, the Convention appears somewhat more useful now than it did when first conceived, because it closes off the avenues opened up by the recently developed recombinant DNA technique.

The charges of violations by the Soviet Union appeared in articles in the Boston *Globe* of 28 September and in a Jack Anderson column of 27 December. The *Globe* piece was written by William Beecher, a former *New York Times* correspondent who became second-in-command of the Pentagon's public affairs office. According to Beecher, Administration officials "are in a quandary over what they can do about strong indications that the Soviet Union may be violating the ban on biological weapons by building new facilities for their manufacture and storage." The story quoted unnamed sources as saying that "there is evidence that within recent months the Soviet Union has been constructing or expanding facilities which appear to be

biological arms production plants, having very high incinerator stacks and large cold storage bunkers that could be used for stockpiling the weapons."

The facilities are said to be at the Russian towns of Zagorsk, Omutninsk, and Sverdlovsk. The Beecher story indicates that some officials believe it is hard to be absolutely certain from photographic evidence about the purpose of the installations, and that certain analysts "regard the evidence as sufficiently ambiguous to call for nothing more than continued close surveillance of the suspected facilities."

The Jack Anderson column repeats the same allegations more strongly. "In violation of a United Nations agreement, the Soviet Union is continuing its secret research into germ warfare," Anderson declared. Citing Russian reaction to the discovery last September that the CIA had defied a presidential order to destroy stocks of biological agents, Anderson observed that, "From intelligence sources, however, we have established that the Soviets stepped up their own efforts to produce lethal germs at the same time that they were denouncing the United States."

The second part of the Anderson story concerned the chief medical attaché at the Soviet embassy in Washington, Dr. Vyacheslav Stepanov. Stepanov, Anderson related, had "tried to weasel suspicious information" from at least three government scientists who had attended the conference on recombinant DNA held at Asilomar, California, a year ago. "His efforts to elicit information that could help the Soviets advance their germ warfare research were obvious. Some of the Americans, therefore, spoke to the security office at the National Institutes of Health. The FBI was notified." Anderson added that Stepanov, a suspected KGB agent, was trying to persuade some American scientist to defect or pass information to the Soviet embassy.

Science has been trying for several weeks to check out these allegations, though without a great deal of success. One difficulty is that officials likely to be the source of such statements are harder to reach than those likely for institutional reasons to be skeptical of them. Thus the balance of information obtained may not represent the exact situation.

The Stepanov affair is most easily dealt with. The NIH security officer, Otis Watts, declined to identify the scientist who had reported the conversation with Stepanov but told *Science* that it took place at a dinner party and that "they were general science kinds of questions—there was nothing from my standpoint of an intelligence value." An Administration official says that Stepanov's approach was a perfectly legitimate overture for a diplomat to make, with no unusual questions asked. Another Administration official suggests that, since only government scientists were involved, perhaps Stepanov was trying to establish if the American biological warfare program had indeed ceased, rather than seeking information useful to a Soviet program.

Stepanov himself, asked about the Anderson article, says that someone had put Anderson up to it. He proposes the CIA, "maybe because it had been caught out by Congress on the toxins it had stored." Stepanov says he was "just asking ordinary questions." He adds, with some chutzpah, "Anderson can say what he likes—this is a free country."

Satellite Photos Suggestive

A central point in the *Globe* and Anderson articles is that the Soviet Union is or may be building facilities for the production of biological weapons. Contrary to the *Globe*'s statement, the building of facilities is not in itself a violation of the Convention, which prohibits only the production of biological agents. Nor, as Anderson states, is research on biological weapons necessarily a violation of the Convention, which only forbids development. Anderson doesn't say what type of information his source's conclusions are based on, but the *Globe* article mentions satellite photos. A high intelligence official told *Science* that some suggestive photos exist but that it is hard to draw firm conclusions one way or the other. It is presumably difficult to distinguish a factory designed to produce biological warfare agents from a vaccine or serums plant.

Other Administration officials take the following general view about the Soviet position on biological weapons. Before the renunciation of biological warfare by the United States in 1969, they say, the Soviets conducted extensive research on biological agents and protective techniques. The Soviets probably have facilities that could be used to produce and store biological agents. In this vein, it is almost certain that the Soviets are continuing a program for defense against biological warfare, as the Convention permits. These efforts may involve protection for crops and animals as well as people.

The Soviets, these officials continue, might be motivated to develop a standby capability for producing biological weapons as a hedge against cheating by the United States. (They have the same difficulty as do American analysts in distinguishing between civilian and military plants.) Possession of inactive facilities is not forbidden by the Convention. On the other hand, to maintain facilities on a standby status would require a major investment to preserve what would be a limited option. The Soviets are surely aware that use of biological weapons, either openly or in a covert manner, would certainly risk provoking a U.S. nuclear response. Therefore, these officials conclude, for reasons that span the military, technical, economic, and political spectra, it seems unlikely that the Soviets would derive any significant benefit in circumventing the terms of the Convention, and there is no convincing evidence that contradicts the Soviet public statement that they have been in full compliance with the Convention.

As to the specific issue of recombinant DNA, the technique's enormous manipulative power gives it an obvious application for biological warfare, for example by inserting the genes for deadly or incapacitating products into highly infective host bacteria. U.S. Army scientists are said to have been looking for just such a technique in 1968 before biological weapons were renounced. On the other hand, some scientists believe the technique would only render easier or cheaper manipulations that were possible by conventional means.

The Soviet Union has recently launched a program to catch up in recombinant DNA, as well as in several other areas of modern biology. A group of 25 American biologists recently visited the Soviet Union as part of an exchange program sponsored by the National Academy of Sciences. One member of the group says that the Russians are "desperately interested in acquiring Western techniques" but that they are abiding by the same moratorium as is being observed in Western countries; "I don't think they have the current technology to break the guidelines," he adds. Another member says he saw nothing on his visit to suggest that the Soviets are interested in the biological warfare implications of the technique.

Proving a negative is never easy, but it seems that there is little evidence to suppose the Soviet Union is in legal violation of the Biological Weapons Convention, and only ambiguous indications that it is even increasing its activity in the area. If this is so, the reports to the contrary are either untrue or may represent the sincere opinion of some, but not all, government analysts.

—NICHOLAS WADE