undo the work of the reclaimers. Severe winter weather or the long dry spells characteristic of the Appalachian autumn may kill seedlings. And there are more sophisticated problems. Soil chemists find that acidity in the spoil banks may release elements, such as aluminum, which are toxic to grasses, plants, and trees.

On the other hand, a good deal has been done to identify species which can survive inhospitable conditions. Among trees, sycamore, cottonwood, European alder, black locust, yellow poplar, and some kinds of pine have proved viable.

The U.S. Forest Services Central States Experiment Station, based at Columbus, Ohio, has worked since 1937 on problems of reforesting strip-mined areas. In 1961 a special strip-mine reclamation project was established at Berea, Kentucky, on the fringe of the Appalachian coal area. Over 30 studies are in progress on five aspects of the problem: revegetation, hydrology, earth movement and placement, spoil-bank chemistry, and coal-haul roads.

Commenting on work done by reclamation associations sponsored by the coal industry, Robert F. May, who heads the Berea station, had this to say: "While we do not have all the answers concerning tree planting, we have enough information to satisfactorily restore forest cover on banks located in moderately rolling topography. Where we are lacking in knowledge is in the stabilizing of banks on steep, forested watersheds of the Appalachian coal fields."

Opponents of strip mining will continue to find grounds for complaint, but the days of unfettered strip mining seem to be numbered. A pattern of stiffer state laws is spreading. The discussion of federal legislation seems likelier to serve as a warning to industry and an encouragement to state legislatures to legislate than as the prelude to a national strip-mine law, which would be very difficult to write. The Appalachia Act, which has helped focus attention on the strip-mine problem, could lead to the establishment of a federal "reclamation fund," however, providing a combination of financial incentives and reclamation requirements designed to persuade the states to act. TVA's decision to add the reclamation clause to its contracts will also have its effect.

The economics of strip mining—particularly the before-and-after value of land—will continue to be a principal factor. A 1963 TVA report, "An Appraisal of Coal Strip Mining," pained many conservationists, who felt its dispassionate tone indicated that strip-mining practices were being condoned. The report noted that, "in a typical west Kentucky mining county, the average annual gross value of agricultural products is $18 per acre of farmland, and only half of the land is in farms. Gross value of coal averages $18,000 an acre." The report says that typical revegetation costs, as determined from TVA demonstration projects, run to about $50 a acre. The facts which the TVA report faces are that the value of land before and after strip mining varies greatly and that the cost of reclamation does too. Some land, particularly orphan banks, probably will never be properly reclaimed. But the point now gaining acceptance is that both damage to the land and the costs of reclamation can be minimized if adequate precautions are taken during mining operations.

The debate on strip mining in Appalachia has often sounded like a shouting match between Cassandra and Pollyanna. The furor has finally attracted the attention the subject deserves. It is reasonable to expect that in the future—as in the case of air and water pollution—social costs will be taken into account and a more deliberate effort will be made to balance economic advantage against total damage to the environment.

—JOHN WALSH

Water Pollution: Federal Role Is Strengthened by Law Authorizing New Agency and Quality Standards

A bill establishing the federal government as a power to be taken seriously in the field of water-pollution control was passed by Congress in mid-September and signed into law by President Johnson last Saturday. The act, known as the Water Quality Act of 1965, has emerged after several years of legislative maneuvering, 4 months of negotiation between House and Senate on conflicting versions of the program, and industrial and other lobbying that, as one Congressman put it, "made things as hot around here as they've been in quite awhile." At more than one point the intervention of the White House was required to keep matters moving. But despite the tortuous route to passage, conservationists in and out of Congress feel, with few exceptions, that the result was worth the fight: they anticipate that the new law will change the strategy underlying this country's water-pollution programs from one of containment to one of prevention, and will give the federal strategists a firm handle as well as a firm hand.

Underpinning the new water-pollution control program is a massive reorganization of the government apparatus that deals with it. The reorganization collects the various research, grant, and enforcement programs now ensconced in the Public Health Service and places them in a newly created Water Pollution Control Administration (WPCA). The new agency is expected to be securely represented at the top levels of the Department of Health, Education, and Welfare through the appointments of a new assistant HEW secretary, who will have jurisdiction over environmental health, and of a WPCA administrator, who will be a high-level civil servant. (Congressional leaders, aware of other programs stunted by unsatisfactory appointments, took care to write into the legislative history of the bill that the appointees should be "individuals of the highest caliber with the finest possible background in the field of water pollution," and they will be watching the selections closely.)

Although proposals for the new unit drew continued disapproval from the Public Health Service, the state pollution agencies with whom the PHS deals, and many industries during the years in which the legislation has been under consideration, outside these circles the feeling has been general that, for a variety of reasons, the PHS is ill-equipped to run the pollution program. The PHS has frequently been charged with a predisposition to softness in dealing with states which, in turn, have a predisposition to avoid discouraging industries or alienating municipalities by harsh insistence on expensive anti-pollution installations. It has also been felt that the PHS, with its built-in preoccupation with health, has been insensitive to the conservation and economic values of water resources that also deserve attention. And, finally, it has been felt that, simply by virtue of bureaucratic diffusion, the present arrangements have allowed far too much room for evasion and buck-passing in the delicate situations that are endemic to pollution-control proceedings. The new administration, therefore, is not just a reorganization but a deliberate upgrading.

Standards of Quality

Chief among the functions of the new federal agency will be its jurisdiction over a new program authorizing the Secretary of HEW to set standards of water quality for all interstate waters. As prescribed in the bill that emerged after months of passionate and by no means always amicable controversy, standards are to be set in the following manner. Each state is given 1 year to file with HEW a letter stating its intent to establish criteria for its own waters by 30 June 1967. If, by that time, the state has developed criteria and a plan for enforcing them deemed acceptable in Washington, the state "criteria" become, in effect, the federal "standards," and the matter ends there. If the state fails to produce criteria, however, or if its criteria do not satisfy HEW, the federal government steps in—one toe at a time. The Secretary, after conferring with all interested parties—federal and state agencies, industries, and municipalities—prepares and "publishes" federal standards. The state is then given 6 months to adopt standards of its own consistent with the federal outline. If it doesn't do so, the Secretary moves in and "promulgates" his own standards, making them the official ones. During the 6-month period, and for another 30 days following promulgation, a state governor may request that the standards be revised, and the Secretary must assemble a hearing board which, it is stipulated, is to represent "a proper balance between all affected parties." The hearing board can either approve or modify the Secretary's standards. It has, essentially, the last word on what the standards are to be.

Enforcement of the standards is set about with a similar variety of what are taken to be procedural "safeguards." If a standard is violated, the Secretary of HEW is authorized to bring the violator into court—but no action can begin until 6 months have elapsed in which attempts are made to secure compliance voluntarily. When the alleged polluter does reach the courtroom, the court is authorized to decide not only whether the alleged violation has occurred but whether, in effect, the standards are just. The standards, as well as the violation, will be on trial.

Needless to say, so baroque a system did not spring full-blown from anyone's conception of what constitutes good or efficient government. Its roots, inevitably, are in politics. The Senate bill, formulated chiefly by Edmund S. Muskie (D–Maine), chairman of the special subcommittee on air and water pollution of the Senate Public Works committee, provided, in fairly direct language, that standards would be set by the federal government and that they would be set soon. The House version, managed chiefly by John Blatnik (D–Minn.), chairman of the rivers and harbors subcommittee of the House Public Works committee, essentially eliminated standards altogether, providing only that the states should establish criteria for their own waters.

Rep. John A. Blatnik

On its face, the argument which kept the bills in conference for 4 months was thus an argument about who should set the standards, it being tacitly understood that a program run by states would tend to be less effective than one directed from Washington. (The House of Representatives, throughout its consideration of the bill, was in fact besieged by state and industry lobbyists pleading the case for state jurisdiction in a way so emphatic that it sometimes appeared that the votes even of dedicated conservationists would be in jeopardy.) In fact, however, the political situation was far more subtle. Blatnik, who is noted as one of the most far-seeing and committed conservationists in the House, was not opposed to federal standards; he had put them into an earlier version of his bill, only to have them taken out by his Public Works committee colleagues. But he believed that the provision in the Senate bill for immediate setting of federal standards was futile because HEW lacked the technical personnel and knowledge required for their immediate development and implementation on such a large scale. Blatnik also believed that the House bill was stronger than the Senate bill in that it moved all water pollution programs from the PHS to the new administration (the Senate bill left some programs in the PHS) and provided greater financial aid to states in building waste-treatment plants. All in all, Blatnik felt an open fight for standards in the House was not worth the risk, and he believed, correctly as it turned out, that the House-Senate conference would produce an alternative better than either of its elements. This strategy called for walking a thin line between the conservationists (who, early in the game, accused their long-term ally of "selling out" to the "interests") and the congressmen, who generally regard their designated conferee as bound to support the bill as enacted in their chamber. But the result, the complex fusion of state and federal authority which was endorsed unanimously by both House and Senate, was a genuine political compromise which leaves both sides feeling not only victorious but statesman-like.

Criticism of Standards

For his tactics on the standards question, Blatnik was criticized, ironically, by some of the people who have the greatest doubts about the usefulness of standards, yet accept commitment to the idea as an emblem of conservationist zeal. The arguments against the standards are complex, and further complicated the fact that, since we don't have any yet, no one is sure exactly how they will work. The most frequently voiced fear is that formal standards will tend to "lock in" streams at presently high levels of pollution. Despite the fact that the act requires the government to take into account the "use and value [of bodies of water] for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other legitimate uses," skeptics feel that there may be a tendency to classify waters too low. One government aide involved with enforcement programs pointed out that it has been such a long time since it was safe to swim in many of the major rivers and harbors of the country that people no longer think of recreation as a legitimate water use. The conservationists'

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slogan is, more or less, "a trout in every river," but the industries and municipalities which pay the bills for treatment plants tend to see water use as an either-or proposition—"pickerels or payrolls is their dogma," one observer remarked last week.

Critics also fear that the competition among states for industry would give commercial advantage to the states with the lowest standards, and that the Secretary of HEW will be hard put to resist political pressures arising from cries of lost jobs or bankruptcy if industries move elsewhere. It has been argued that shifting the burden for the first formulation of standards to the states will give them a chance to define the terms of discussion in a way that will be detrimental to conservation interests. "When we call an enforcement conference now," one HEW official said last week, "we go in on the basis of a technical report which names names, tells the facts, and makes recommendations. If the states define the standards, the basis for discussion will be much weaker—and it's going to be hard to revise it upward." In this view, the reason for HEW's poor record in water pollution is not absence of authority to intervene but absence of inclination—which presumably will be remedied by the new administration.

Fears have also been expressed that the legislation will prove difficult to administer. For the most part neither the designers of the bill nor the officials who will administer it are yet able to answer questions concerning, for example, how a new industry entering a river system will be integrated into the system without lowering the standards. A redistribution of pollution allowances among all users of the stream would be one alternative—but one which might prove costly by encouraging piecemeal expenditures. An absolute prohibition on pollution for the newcomer is another—but one which would plainly discourage industrial expansion. Political dispensations—and the collapse of standards—is a third. Vagueness about such key questions is one reason for apprehension not only among the conservationists but also among industrial lobbyists.

Most such complaints are dismissed by supporters of the standards as intellectual fantasies. "What this bill says to polluters," one leading congressional conservationist said last week, "is that

you have two more years of hanky-panky and after that we'll really be in business." The basis for this view is that, whereas now enforcement begins at the conference table and follows a lengthy route to hearings and court action, the new and elaborate standards-setting procedure itself encompasses those delays. Once the standards are set, the government can presumably move right on to enforcement action against violators. As for the seeming interlocking of federal and state authority, another veteran congressional conservationist advises, "don't be fooled. Federal enforcement officials have had a lot of experience structuring conferences and they'll be able to handle this to suit them." Congressman Blatnik also believes that, despite the emphasis on cooperation with states, "there is no doubt that in the last analysis real authority rests with the federal government." Political pressures on government officials these lobby-hardened politicians take as a matter of course. Details of administration, they believe, will work themselves out. And they feel, above all, that, by extending the basis for federal intervention to situations where there is no pretense that the immediate public health or welfare is threatened, they have constructed a system in which broader values are recognized and in which the upgrading of long-polluted rivers can begin.

Other Features

Besides the provision for a new agency and water standards, the new legislation contains several other measures designed to put water-pollution control on a stronger footing. One of the most important, though little noticed, features of the bill gives the new agency power to bring enforcement action if it finds that substantial economic injury results from the inability to market shellfish or shellfish products because of pollution in interstate or navigable waters. The inclusion of "navigable" waters gives the agency access to the large number of coastal bays and harbors which have no interstate boundaries and which therefore will be omitted from classification under the standards provision. The bill also authorizes a 4-year, $20 million program of grants to states, municipalities, and other agencies for research and development on ways of improving the combined storm and sewage systems which are extremely common throughout the country and which fre-

quently feed huge overflows of untreated waste into the waterways during periods of heavy rainfall. Finally, the new bill begins to make some inroads on the admittedly inadequate levels of federal financial support for state and local pollution abatement activities. The annual appropriation ceiling has been raised from $100 million to $150 million. Some of the inequitable provisions that limited effective use of the $100 million have also been modified for the additional $50 million, which is to be allotted on a straight population basis. (The formula still governing the first $100 million stipulates that half of the funds must go to communities with a population of 125,000 or less—a system which has actually discriminated against the populous urban areas where pollution problems are most serious.) The new bill also doubles present limitations on grants for the construction of waste treatment works from $600,000 to $1.2 million for a single project and from $2.4 million to $4.8 million for a project serving more than one municipality —figures still only a fraction of what cities must spend for effective abatement systems.

Widespread satisfaction with the new legislation is balanced by an equally widespread conviction that much more remains to be done. The pollution problem is not the work of a malevolent few but of an ingrained national habit of treating the waterways as sewers. A recent HEW study of pollution on the Hudson River, for example, reports that 43 percent of the waste dumped into the river is discharged without any treatment whatever. In some of the heavily industrialized areas of New England, the proportion may be even higher. The result is a threat not only to the rising conservationist values of a well-heeled and recreation-minded public but to the water supply itself. "When all is said and done," a congressional aide remarked last week, "our best friend on the water pollution bill was the northeast drought. If anything gives a guy courage to thumb his nose at a lobbyist, it's 400 housewives screaming about watering their lawns." Sentiment is growing, even among some industrial polluters, that a change in philosophy is in order and veterans of this year's congressional battle are already casting about for new ways of embodying it in progressive legislation. One thing they are sure about is that in the field of water pollution there will be plenty to do for an encore.

—ELINOR LANGER

Arches of Science Award to Weaver

The Pacific Science Center Foundation this week named Warren Weaver to receive its first Arches of Science Award on 25 October in Seattle. The award, created earlier in the year to recognize outstanding contributions by people in all professions to better public understanding of science, carries a $25,000 prize and a gold medal.

Although Weaver retired last year as vice president of the Alfred P. Sloan Foundation in New York, he has continued as a special consultant and a trustee of the foundation. He is also chairman of the board of the Salk Institute for Biological Studies in San Diego. A fellow of AAAS since 1928, he was the 1954 president of the AAAS. Next week, in Paris, he will receive the Kalinga prize, awarded annually by UNESCO for distinguished contributions to public understanding of science.

Wheeler Receives Einstein Award

John Wheeler, professor of physics at Princeton, is the recipient of this year's Einstein Award. The award, which provides $5000, a gold medal, and a citation, is presented by the Lewis and Rosa Strauss Memorial Foundation.

Established in 1950, the award is made in recognition of significant additions to human knowledge in the natural sciences.

During World War II Wheeler was a consultant and senior physicist on atomic energy projects, first at Princeton, later at Chicago, Richland, and Los Alamos. He was a vice president of the Battelle Memorial Institute in Columbus, Ohio, where he is now a trustee. He is a member of the advisory committee at Oak Ridge National Laboratory.

Announcements

NASA last week stopped telemetry operations of the **Mariner IV** spacecraft. The craft had operated since November 1964, transmitting scientific and engineering measurements on the environment of interplanetary space. In July it recorded the first close-up pictures of Mars. Project officials at Caltech's Jet Propulsion Laboratory said that the craft will continue in its present orbit around the sun; tracking it will be possible only with a new 210-foot antenna, which will begin