conservation groups but opposed by BPR, and even by Interior, which said that such legislation was not needed. It never reached the Senate floor. Metcalf will reintroduce the measure this year, again with the prospect of strong opposition.

Bureau of Public Roads engineers regard themselves as the aggrieved victims of a propaganda campaign by conservation groups skillful at making much out of little. E. H. Swick, director of BPR's office of right-of-way and location, says that, although the bureau is spending $4 billion a year for thousands of miles of highway construction, the number of route-selection decisions producing conservation controversies is small. While this appears true, conservationists are frequently disappointed in the highway builder's sense of values in cases where the protection of a valueable natural area would require either higher road construction costs or a loss of "user-savings" by the motorist.

Interstate 87 is going through Westchester County, the suburban area to the north of New York City where green space is at a premium. There were two possible routes, the shorter —and cheaper (by about 16 percent) —one passing through the "Chestnut Ridge" area dear to local conservationists. The longer route, too, would pass through a sanctuary, and BPR contended that one routing would be no more destructive to wildlife than the other. By insisting on the Chestnut Ridge route, however, the bureau overrode the wishes of Governor Rockefeller, Secretary of the Interior Udall, and many residents of Westchester county (although the county was divided on the issue).

The user-savings argument figures importantly in the Colorado highway department's justification for its plans to have Interstate 70 follow the 16.5-mile "Red Buffalo" route through the Gore Range-Eagles Nest Primitive Area, instead of the 27.1-mile Vail Pass route, where a road now exists and where project costs would be several times less. Computing a motorist's costs at 10 cents a mile, the department says that each trip over the Red Buffalo route will represent a saving of $1.05 over what a trip via Vail Pass would have cost. The value of the wilderness to be violated cannot be so neatly computed.

In some instances controversies over route selections are carried on in the dark, for lack of knowledge of the effects of road construction on natural communities. Interior has assumed that the construction of Interstate 65 through the Wheeler National Wildlife Refuge would lessen the refuge's values as a wintering place for waterfowl. But BPR says it can find nothing to support such a belief. The bureau has agreed to some change in the route alignment and will spend $1 million for additional bridges, but, Swick says, whether this really is needed for proper refuge management is not clear.

"We need more positive information from the conservationists," Swick says. "We are asking, 'what are we doing to you?'" According to BPR officials, the bureau itself will be demanding more studies and documentation from the state highway agencies on the effects of highways on the environment. These agencies will be turning increasingly to the universities for research.

Whether or not major new route-selection policies are adopted, the Rockefeller panel's call for reforms is putting the highway builders on their mettle. Even before the panel's work was well underway, BPR was drafting a memorandum (still to be issued) requiring the state highway agencies to adopt some of the hearing procedures which the panel is now recommending.

Clearly, greater effort at minimizing the damage of highway construction to the environment is needed. A large road-building program seems likely to continue indefinitely. Although the 41,000-mile Interstate System will be completed by the mid-1970's, a major effort will be needed to upgrade other parts of the national highway network. Moreover, there is now talk of a multi-billion-dollar system of "scenic roads." It would be ironic indeed if, in such a program, the bureau should give insufficient attention to conservation values, thereby adding to its list of real and alleged offenses against the environment—LUTHER J. CARTER

Environmental Pollution: West Germany, U.S. Cooperate

Bonn. Both West Germany and the United States have heavy concentrations of industry which create special problems of environmental pollution. And both countries have federal systems of government which pose special problems in dealing with man-made blight. A modest West German-U.S. cooperative program aimed at improving the quality of the environment is, therefore, rooted in real common interest.

In origin the program dates back to a December 1965 meeting between President Johnson and Ludwig Erhard, who was then Chancellor of the Federal Republic. Johnson said that Americans were impressed with German efforts to make cities more livable and that he was sending Interior Secretary Stewart L. Udall at the head of an interdepartmental team of American officials and experts to look at German accomplishments in natural-resource management and also to explore possibilities for a cooperative program between the two countries.

The report of this team last year became the basis for what informally is called the Udall program. Emphasis initially was on exchanges of both people and ideas in several key areas: water management, air pollution, noise abatement, urban planning, solid waste disposal, and coal research. Of those areas, exchanges have already taken place in the fields of water and air pollution, solid waste disposal, and coal research.

This year the program has been expanded to include electric power. A U.S. electric power study team is scheduled to visit Germany for 2 weeks in October and a similar German group is tentatively scheduled to visit major U.S. power facilities several weeks later.

Also scheduled for the fall is a visit to Germany by an American urban planning delegation headed by Housing and Urban Development Secretary

Natural Resources: U.S. and Japan Work Together

The U.S.–German Natural Resources Program is similar to a U.S.–Japanese program that was started in 1964. That program also emphasizes an exchange of information on air and water pollution, although generally the program with Japan is much broader in scope than that with Germany.

The U.S.–Japan Natural Resources Program (UJNR) grew out of a suggestion by the U.S.–Japan Joint Committee on Trade and Economic Affairs for government-to-government information and personnel exchanges in the field of natural resources.

Information is exchanged by panels made up of government personnel. In all, 100 persons are involved with the program in the two countries. To date, UJNR exchanges have consisted mostly of exchange of published information, although several panels have also visited their counterparts.

The current panels deal with the following: desalinization of seawater and use of its by-products; air and water pollution; alternatives to established sources of energy; production of forage crop seed; toxic microorganisms; national park management; mycoplasmosis; design of structural systems to resist wind and seismic shock; protein resources; and undersea technology. A panel on supression of water evaporation was discontinued this year.

Cooperative research under UJNR has been somewhat limited. What has been done has consisted mostly of an exchange of information by scientists working on similar projects in the two countries. However, plans are under way to bring at least one Japanese scientist to the U.S. to work on mycoplasmosis with W. P. Switzer of the Veterinary Research Institute, Iowa State University. Joint conferences in Japan on water pollution and energy are also scheduled for this fall.

As is the case with the U.S.–German program, the Department of the Interior is the principal coordinator for the U.S. In Japan the Science and Technology Agency coordinates the program.—K.S.

Robert C. Weaver. Noise abatement is the sole program area with no exchange visits yet planned.

For the United States, the Interior Department serves as coodinator, while on the German side it is the Health Ministry. In the early stages, at least, the program will provide for exchanges of teams of experts drawn not only from government but from industry and the universities as well. The plan is to follow up team visits with joint research. Each country will bear the cost of research done there, and data will be exchanged.

Technology will not be the sole subject of interest. Problems of control and regulation are regarded as equally important, and meetings are planned between legislators and staff from the two countries and from different levels of government.

Another dimension of the program is the intention to make widely available the results of cooperative studies, particularly to nations now in the process of becoming industrial societies.

In West Germany, with a population density ten times that of the United States, circumstances have forced decisive action on environmental pollution earlier than in other industrialized countries. A 1964 national law in Germany which forbade the sale of hard detergents, for example, certainly had a strong indirect influence in making American detergent manufacturers shift to the production of biodegradable detergents.

Examples of German ingenuity are to be found in such advanced facilities as the Nord power station near Munich, which burns refuse combined with powdered coal and effectively controls the resulting smoke with electrostatic precipitators.

The West Germans can also claim high marks for restoration of land in strip-mined areas. For example, a comprehensive, law-based plan provides for the efficient mining of the rich deposits of brown coal in the area between Cologne and Aachen and the return of the land to almost its original condition. Topsoil is carefully stockpiled and replaced, and villages are even rebuilt. It is doubtful, however, that the Germans can provide a direct model for American emulation because the land strip-mined in West Germany is relatively valuable, while in the United States no straight economic argument for reclamation can be made for much of the land in strip-mining country.

Where Americans can profit from the German experience is in the area of the water-management projects, particularly in the highly industrialized and heavily populated Ruhr. In this region, eight water-resources associations known as *Genossenschaften* have husbanded the water of the Ruhr River and several other small tributaries of the Rhine so that these waters serve not only heavy industrial and domestic water demands but also recreational uses.

The first *Genossenschaft* was created in 1904 at a time when the dumping of industrial wastes in the river Emscher and other local streams threatened supplies of high-grade water. As Allen V. Kneese points out in a chapter on the Ruhr system in his book *The Economics of Regional Water Quality Management*, the *Genossenschaften* in the Ruhr system were established to meet different specific needs, such as flood control and drainage in areas of land subsidence, but all have almost complete control over water quantity and quality.

The *Genossenschaften* are essentially water-users associations which have the power to promulgate regulations. Control measures are discussed by the members and, when accepted, have the force of law. Members of the associations are the municipal and rural administrative agencies and the industries involved. The supervising authority is the state of North-Rhine Westphalia, but the state government's role is primarily one of seeing that the associations adhere to their constitutions.

Basically, water users are required to insure that water is as pure when it is dumped back into the system as it was when it was taken out. Most industrial effluent is treated. But the strength of the *Genossenschaft* is in its being a regional system. Its control, for instance, extends to farmers spraying crops with pesticides which may ultimately pollute the rivers. "Specialization" has also been possible. The bed of the Emscher has been lined with concrete along most of its course and

is essentially a carefully engineered drain.

In view of the fact that the average natural low flow of the Ruhr is less than the volume of effluent discharged into the river, the *Genossenschaften* have done much in the cause of waste disposal and water supply in a very difficult situation. The associations have not, however, worked miracles. Water in some parts is not fit for drinking. Authorities have the power to shut down factories if their waste discharges rise above a certain level, but observers say that officials are hesitant to act when jobs and profits are at stake. During low-water periods it is necessary to pump water out of the Rhine into the Ruhr system. And while the inflow from the Rhine tributaries in the Ruhr does not, on balance, appreciably add to the already formidable pollution of the Rhine, the Emscher still poses such a serious problem that a biological treatment plant for the stream is planned.

There is little question, however, that the *Genossenschaften* prevent a bad situation from getting worse, and also that their operations are pertinent for Americans facing similar problems in maintaining supplies of usable water. Two aspects of the *Genossenschaften* activities seem particularly worthy of study. One is the coordination with land-use planning authorities and the other is the experience gained by the associations in allocating costs.

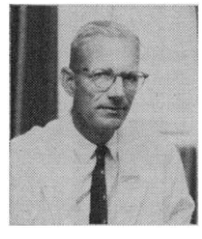
Methods differ among associations, but the general principle on effluent charges, as Kneese says, is that the discharging unit will be assessed on the basis of the quantity and quality of the effluent discharged into the system. One association determines the degree of pollution by the damage to a particular species of fish.

Virtually from the beginning, the associations have assessed costs for drainage operations necessitated by land subsidence caused by underground coal mining. The costs are divided between the beneficiaries of the drainage operations and the mines causing the subsidence.

In some respects the cost-assessment procedures are not highly refined or, in the case of pollution measurement, very sensitive to varying conditions in the rivers. But a good deal of experience has been gained in assigning monetary costs to damage to the environment, and fairly wide acceptance has been gained for the principle that the polluter should pay. Americans could learn from this German experience.

At the federal level in West Germany and the United States, officials are convinced that new and more effective measures are needed to correct abuses of the environment, abuses which may cause irreversible damage. In the United States, the Water Quality Act, the Clean Air Act, and the Solid Waste Disposal Act are evidence of governmental concern and, incidentally, of the broader aspirations of the Great Society program. But under the federal system in both countries the central governments are limited largely to a role of setting standards, giving advice and information, training personnel, and providing financial assistance for closely defined purposes. It is at the state and local level that essential laws must be enacted and administered, that costs must be paid, and that the political crunch ultimately comes. So a high-level agreement affecting federal governments, such as the one between West Germany and the United States, is, in a sense, another instrument of information and persuasion.—JOHN WALSH

APPOINTMENTS



J. Frederick Eagle, assistant dean of the College of Physicians and Surgeons, Columbia University, to dean and executive vice president of New York Medical College. . . . **Fred C. Davison**, vice chancellor of the university system of Georgia, to president of the University of Georgia, Athens. . . . **John R. Coleman**, program officer in charge of social development, Ford Foundation, to president of Haverford College, Pennsylvania. . . . **Samuel E. Braden**, vice president of the undergraduate college, University of Indiana, to president of Illinois State University. . . . **Theodore Cooper**, on leave as professor of surgery, University of New Mexico School of Medicine, to associate director of the National Heart Institute and chief of the Artificial Heart-Myocardial Infarction Program. . . . **Samuel B. Weiss**, professor of biochemistry at the University of Chicago and the Argonne Cancer Research Hospital, to associate director of the hospital. . . . **Shannon McCune,** former president of the University of Vermont, to director of the American Geographical Society. . . . **Frederic M. Philips**, special assistant to the secretary, Department of Commerce, to director of the Office of Public Affairs, Smithsonian Institution. He succeeds **Richard Berg**, who has become vice president of Lindenwood College, St. Charles, Missouri. . . . **James J. Gallagher**, associate director of the Institute for Research on Exceptional Children, University of Illinois, to associate commissioner for the education of the handicapped and head of the Bureau of Education for the Handicapped, U.S. Office of Education. . . . **Gordon P. Hagberg**, director of the Institute of International Education's office in Nairobi, Kenya, to director of the Washington office. . . . **John H. Rust**, professor of pharmacology, University of Chicago, to director of the university's A. J. Carlson Animal Research Facility. . . . **David B. Truman,** dean of Columbia College, to vice president and provost of Columbia University; **Herbert A. Dean**, vice dean of Graduate Faculties, to acting dean of Graduate Faculties at the university; **Henry S. Coleman**, director of Columbia College Admissions, to acting dean of Columbia College; **John Wellington**, associate director of Columbia College Admissions, to director of Columbia College Admissions. . . . **Warren G. Bennis,** professor of organizational psychology and management and chairman of the organizational studies group at Massachusetts Institute of Technology, to provost of the Social Sciences and Administration, State University of New York at Buffalo. . . . **John N. Hobstetter**, professor of metallurgical engineering and director of the University of Pennsylvania's Laboratory for Research on the Structure of Matter, to the newly established post of vice-provost for research at the university. . . . **Aksel A. Bothner-By,** staff fellow, Mellon Institute, to head of the department of chemistry, Carnegie-Mellon University. . . . **Walter Lowen**, on leave from chairman of the department of mechanical engineering, Union College, to director of the newly established School of Advanced Technology, State University of New York at Binghamton. . . . **Earl W. Sutherland, Jr.**, professor of physiology, Vanderbilt University School of Medicine, to career investigator, American Heart Association.