Water Commission: No More Free Rides for Water Users

In the last threescore and ten years, at least 20 investigative bodies have been appointed to look into what should be done about the nation's water resources.

Now the National Water Commission, created by President Johnson in 1968, has come out with what some call the last water report. It is the last water report because henceforth water projects and the use of water resources will have to be integrated into comprehensive regional planning. Inland navigation will be part of national transportation policy, irrigation will be part of national agricultural policy, and so forth.

The draft report is very fat and contains hundreds of recommendations. There will be enough water to meet the country's needs for the foreseeable future provided that sensible pricing policies are adopted, says the report. Otherwise, it warns, certain areas, particularly in the Southwest, will be confronted by increasing shortages.

Its basic message is that the policy of using general tax revenue to pay for water resource development has served its purpose. ". . . [T]he West for which this policy was designed," says commission chairman Charles F. Luce, "has been won."

Related to this is the fact that almost all water in this country—agricultural, industrial, navigational, and municipal—is being supplied to users below its real cost. "Water is so important that the country can't afford in the future to give it away or make it available at less than cost," says the commission's executive director Theodore Schad. So, says the report, most government subsidies for water projects and waste treatment should sooner or later be eliminated, and ways should be devised to place the financial burdens as much as possible on the users of the water in question. Also recommended is universal installation of water meters. Many cities already have them but others, like New York City, encourage wastage by charging by the front foot.

The report says the way to promote realistic planning and efficient operation is to bring management as close as possible to operations. This would mean beefing up the capacities of states and localities, as well as the creation of a variety of types of regional compacts and commissions.

This enormous compendium of criticism and recommendations has come out of a commission whose creation was originally spurred by a regional political fight over interbasin transfers of water from the water-rich Northwest to the arid Southwest—specifically a proposal to augment the supply of the Colorado Basin through importing water from the Columbia River. Congress has since banned most studies by federal agencies for such projects.

Reduce Federal Role

The commission's basic philosophy runs counter to the trend of ever deeper federal involvement in the affairs of states and localities, and indeed is compatible in most respects with the thinking of the Nixon Administration. At least four of the commissioners are functional Republicans (one is a Democrat for Nixon) and chairman Luce, head of Consolidated Edison in New York and protégé of Senator Henry M. Jackson (D–Wash.), is a western Democrat. Luce and commissioner Ray K. Linsley, professor of engineering at Stanford University, are Johnson appointees. The other five commissioners were appointed by Nixon: Howell Appling, former Oregon secretary of state; Roger Ernst of Phoenix, a Department of Interior official under Eisenhower; Josiah Wheat of Houston, member of the Texas Water Quality Board; James Reed Ellis, a Seattle lawyer; and James E. Murphy, a Montana lawyer.

Despite the western orientation of commission members, the report has come as an unpleasant shock to westerners long-accustomed to being suckled at the federal breast. For the report says that the three major federal water resource development agencies—the Army Corps of Engineers, the Department of Interior's Bureau of Reclamation, and the Agriculture Department's Soil Conservation Service (SCS)—should call a halt to their free or near-free draining, damming, channelizing, irrigating, and canal building.

These agencies have performed nobly, but now their projects are becoming increasingly marginal, says the report, and they have created an artificial situation that makes it advantageous for states to accept federally subsidized developments even when real costs exceed the benefits.

Furthermore, water projects have been executed at cross-purposes with other federal policies. A major case in point is the fact that farmers are being paid to keep 50 million acres of cropland idle every year, while at the same time the government is paying up to 90 percent of the cost of reclaiming 9 million acres a year.

To cut down on unnecessary projects, the commission has recommended that all projects authorized more than 10 years ago be deauthorized, and that the government subsidize no new irrigation projects before the end of the century on the grounds that the nation has enough productive capacity to meet foreseeable demands through 2000. From now on, says the commission, beneficiaries of irrigation projects should be compelled to repay the costs in full, with interest. To westerners, this idea spells death to agriculture. Said one Idaho newspaper: "To recommend to Idaho that no more irrigation be developed until the year 2000 would be like telling Texas to cease drilling for oil and abandon all new developments."

Stream channelization is another practice that has long gone unquestioned. The SCS has so far straightened out 6,000 miles of streams and 12,000 more are authorized. From now on those who benefit directly should pay for these projects, recommends the report.

The users of inland waterways have not had to pay for their operation or maintenance, enabling them to keep their operating costs low and undercut railway competition. The commission says barge owners should be levied user fees which would be increased gradually until they cover all costs hitherto borne by the federal government. Barge owners have protested that the recommended charge, which would add 14 percent to their operating costs, would kill inland waterways. The commission does not agree.

Flood control is another kind of activity that has gained its own momentum. Dam building and diversion to

enable floodplains to be developed is a popular Corps activity that is paid for by federal taxpayers. However, as was proved dramatically in South Dakota and the Northeast last year, dams may reduce floods but they can't prevent them. Indeed, despite extensive dam building, annual damage from floods has gone up to $1 billion a year —this because buck-happy developers move into "safe" floodplains and then sell out, leaving valuable flood-prone commercial and residential developments. The commission recommends that there be increased regulation of floodplain development, and that hitherto nonexistent coordination between flood control and land-use planning begin.

The commission's rule of thumb on federal subsidies is that "subsidies are only justified if they serve some compelling social purpose." It says that the federal role should be to get out of the engineering and hardware end of water development and to concentrate instead on planning, licensing, and regulation. Federal activities should be limited to those that cannot be as efficiently performed by states, localities, or regional commissions.

The extent of future federal involvement in water projects may be related to the discount rate, which is also an item of contention. The discount rate is a vague tool used to compute the worthwhileness of a project by measuring future costs and benefits in present terms, with the dollar being used as unit of measurement. A high rate has the effect of discouraging large, long-term projects. The commission wants the rate raised to about 5.5 percent (present rates are as low as 3.5 percent). Environmentalists want the discount rate raised to 10 percent, the opportunity cost of private capital. Most important, they want a higher rate to be applied retroactively to projects authorized but not funded. This would force a reassessment of these projects and wipe many of them out.

For the most part, environmentalists find the report to be an encouraging attempt to curb heedless exploitation of resources and to integrate environmental considerations into all aspects of water planning. But they have some complaints—about the section on power plants, for example. The commission believes that much time can be saved if issues of power plant siting can be decided by a single certification proceeding, and recommends that licensing and permit requirements be consolidated, with a single agency to pass on the project and an independent board to balance the environmental and developmental values. Environmentalists argue there is no way to ensure that the board will give proper weight to environmental considerations. Worst of all, they say, the commission wants to put final resolution of any dispute in the hands of the relevant congressional committee, thus robbing the citizenry of recourse to judicial review (a recourse provided for in the National Environmental Policy Act).

One of the most controversial chapters in the report is that dealing with pollution. The commission chose to defy congressional intent as expressed in the 1972 amendments to the Water Pollution Control Act, which call for gradual reduction in discharges of pollutants, with 1985 as the target date for "zero discharge." The commission thinks this goal is ridiculous and that standards should be set so that "water is polluted when its quality has been altered . . . [so] that reasonable present and prospective uses as designated by public authorities are impaired." The report explains that less progress will be made under the present act than if more realistic standards are set. The cost of cleaning up that last 1 percent—in air, land, mineral, energy, and capital resources—will far exceed environmental benefits, it says.

Urban Sewage

Although antipollution forces abhor the commission's dismissal of the zero discharge goal, they are happier with the commission's ideas on federal grants to municipalities for the construction of waste treatment plants. In line with its cost-sharing approach, the report says the program should be phased out by 1982. However, in view of the "backlog caused by generations of neglect," the commissioners believe that the grant program should be stepped up to help all cities that need it. The cutoff date is intended as a spur to get the whole job done within the next decade.

From then on, they're on their own. "Municipal waste treatment, with its captive customers, is an ideal enterprise to put on a self-sustaining basis" through the use of sewer charges. The commissioners argue that this would not put an undue burden on the poor if the poor are "assisted by adequate income maintenance programs rather than by burdening the pollution abatement programs with welfare objectives."

The report dwells at length on the equities involved in multistate water transfers. ". . . [T]he topic of interbasin transfers generates passion. . . ," it says in one of its more colorful passages. It is recommended that present laws hindering these transactions be lifted and that the final decision be made by Congress in the interests of national economic development (a single state would not have the power to block such a project). Congress would also fix the amount of compensation to the area of origin. Environmentalists generally oppose interbasin transfers on ecological grounds and because transfers could stimulate growth in areas with inadequate carrying capacity.

The commission also struggles with the matter of water rights, an area which is exceedingly tangled and entrenched in tradition established even before the Constitution was written. Legal and institutional impediments should be lifted so that water resources can be put to their "highest and best use," says the commission. Indian water rights pose a special problem, and no solution has been recommended that is satisfactory to Indians who want to quantify and claim ancient water rights while denying reimbursement to long-time non-Indian users.

To facilitate future natural water policy development, the commission suggests the creation of a new high-level Office of Water Technology, and the consolidation of the National Oceanic and Atmospheric Administration with the U.S. Geological Survey in the Department of the Interior.

Further, Congress is advised to establish an independent board of review to evaluate proposed federal projects. It would be structured as an independent agency within the executive branch, chaired by the head of the Water Resources Council and manned by people appointed to set terms by the President.

The commission is expected to come out with its final report in a couple of months, after which the Senate Interior committee plans to hold hearings with commission members and the Water Resources Council. Public hearings will be held in the fall.

So far, it is difficult to gauge public or congressional reaction to the report, aside from a few specific issues that have been latched onto by environmentalists, irrigators, and Indians.

Industry as a whole is not complaining, since the commission's recommended definition of pollution would take a great deal of strain off their

antipollution budgets. But many business organizations concerned with water resources are appalled by what they see as a virtual stoppage of development if all projects must be self-supporting.

Furthermore, many observers have heavy reservations about returning so much authority for planning and execution of water projects to states and regions. They point out that many states have little competency in water matters, and the dangers of domination by special interests are great.

It will be some time before the thrust of future water legislation becomes clear. Right now, Congress is waiting to see what, if any, new legislative proposals are submitted by President Nixon along with the final report.—CONSTANCE HOLDEN

Restoring Immunity: Marrow and Thymus Transplants May Do It

This is the second of two articles exploring the basis for growing federal support of immunological research. The first (Science, *6 April*) *discussed current understanding of the nature of the immune system. This article looks at recent attempts to use the immune system as a therapeutic tool.*

A few months ago at University Hospital in Copenhagen, Bo Dupont transplanted bone marrow into a young boy who was born without an immune system. Dupont took the marrow from the child's uncle, even though he knew that the man and his nephew did not share any of the four genes that presumably matter when it comes to determining whether two individuals have genetically compatible tissues. Dupont went ahead with the marrow transplant anyway because the man and boy were matched with respect to what is being called the third gene locus of tissue compatibility.

Early indications are that Dupont's gamble paid off. The boy has accepted his uncle's bone marrow cells, and they are now making the immunologically competent lymphocytes that he needs to survive the everyday assaults of pathogens in his environment, but which he could not make for himself.

The premise that a transplant will take only if the tissues of the donor and recipient are genetically compatible has consistently been the guiding principle of organ transplantation—from bone marrow to kidneys and hearts—and nothing has happened to challenge that premise. But the tentatively held assumptions about what tissue compatibility really is at the cellular level and about how to identify it are being modified. The ground rules for deciding whether two people are genetically matched may be rewritten.

As far as is known, the Copenhagen case is the first one in which bone marrow was transplanted between individuals who are so thoroughly mismatched as far as the genes of the HL-A (human leukocyte—antigen) system are concerned. This is the genetically controlled system that researchers have closely associated with tissue compatibility for the last several years. A surgeon, looking for an ideal organ donor, asks an immunologist to find one whose tissues are "HL-A identical" with those of his patient.

Each individual inherits four genes—two from each parent—which control the HL-A system. Each of these genes produces a distinctive protein, or antigen, that sits on the surface of cells. Those four antigens together give tissues the special characteristics that a healthy immune system identifies as self or nonself. When lymphocytes come in contact with nonself, they react and graft rejection occurs. To date, at least 31 different HL-A antigens are known; tissue-typing techniques reveal whether two people share any of them and, if so, which ones. The chances of finding a four-antigen match are highest with identical twins. Siblings rank next; other relatives are third in order, but, by then, chances have dropped significantly. The chances of finding two people in the general population who are HL-A identical are even lower, but it can be done.

Dupont's deliberate experiment in HL-A mismatching lends support to the hypothesis that tissue compatibility is not under the sole control of the HL-A system, at least not as it is presently understood. Fritz Bach, of the University of Wisconsin, says it is possible that the HL-A system is not the main determinant of tissue compatibility after all. "It may be," he speculates with confidence, "that the HL-A antigens are simply markers for a histocompatibility gene that we have yet to find." Evidence that a third gene system is at work is circumstantial, but it has been accumulating at a fairly consistent rate since Bach and Bernard Amos of Duke University proposed the idea a few years ago.

(Nomenclature in this field, in which genes and their antigens are often identified by number, is confusing. The postulated "third gene locus" is so named because there are two gene loci on the chromosome where the four genes of the HL-A system are found, two genes at each locus. The number of genes that may be involved in this third locus is unknown.)

The possibility that it is this third gene that counts in tissue compatibility has opened the door to happy speculation that the pool of ideal donors may be expanded to include relatives other than just sisters and brothers. Thus, the impact of its discovery on the use of organ transplantation to treat disease could be substantial.

Dupont and Bach talked about their latest work at the Second International Workshop on the Primary Immunodeficiency Diseases in Man, held recently in St. Petersburg, Florida, under the sponsorship of the National Foundation–March of Dimes. Immunologist Robert A. Good, new director of the Sloan-Kettering Institute for Cancer Research in New York, organized the meeting, to which about 80 investigators were invited. Good also organized the first such workshop, which was held in 1967 on Sanibel Island off the west coast of Florida.

Immunology is going through a period of rapid growth that is both exciting and confusing. Investigators are