TECHNOLOGY

The thirsty Capital

As if Washington, D.C., didn't have enough troubles with crime, perpetual political feuds and the prospect of a Bicentennial inundation of tourists, the editors of CIVIL ENGINEERING (June) conclude the nation's capital faces a "critical" water problem. Water quality is "poor and worsening," dams and reservoirs that would provide better water service have been stymied, and expansion of a wastewater treatment plant has suffered a cut in funds.

Fresh water demand of the Washington Metropolitan area (nearly three million people) ran at 381 million gallons a day in 1970 and is expected to rise to 600 mgd by 1980. But during annual dry spells, the Potomac River, which provides almost all the city's water, may flow at a daily rate of only 400 million gallons. Yet, incredibly, there are no reservoirs on the river or its principal tributaries and only one major dam is under construction—too far away to have much effect.

Part of the problem is jurisdictional (Maryland has "owned" the river since the Civil War), but environmentalist opposition to proposed dams and reservoirs has recently become an even more important factor. Meanwhile, pollution has been increasing, with acid waste from strip mines poisoning stretches of the Potomac upstream from Washington, and the metropolitan area's own wastes forming a cesspool of stagnating water downstream where the river meets the Chesapeake Bay.

The Corps of Engineers is designing a demonstration plant to recycle some of the downstream polluted water, but construction will not begin until 1978, and a two-year evaluation study must follow before any long-term similar project could be built to provide a final solution. In the meantime, public officials worry about a repeat of the 1966 drought and the prospect that by the turn of the century, water demand will have increased to nearly four times the present inadequately met rate.

Photographing the deep

While few people outside a very specialized profession took notice, the art of underwater photography has developed some spectacular new techniques, outlined in OCEANUS, the quarterly publication of Woods Hole Oceanographic Institution. Picture taking at great depths is much harder than one might at first think, judging from the plethora of familiar shots taken in relatively shallow waters. Not only is there no useful light from above, but water tends to reflect large amounts of light (backscatter) along the central axis of a conventional camera-floodlamp system.

One of the most successful ways to overcome the phenomenon is the LIBEC system (Light Behind the Camera). Backscatter directly in front of the camera lens is reduced by spreading the illumination more evenly toward the edges of the field of vision. With this system, a camera suspended 25 meters above the ocean floor can produce meaningful images over an area 50 meters in diameter, enough to examine a sunken ship.

Even more sophisticated techniques are on the way. Computer reprocessing of images, performed routinely on satellite photos, offers new resolution. Side-looking sonar produces images good enough for identification purposes during a search mission. And special films may soon be mass produced, following years in which they were too expensive to be practical.

In a separate development, the Naval Research Laboratory recently announced development of pulsed arc xenon lamp that improves by 50 percent the irradiance of earlier LIBEC systems. Principle investigator in development of the pulsed arc system is Ronald G. Hughes. The improvement is expected to significantly ease the task of locating sunken objects.

SPACE SCIENCES

Earth's 'plasma mantle'

The picture of earth's magnetic field has grown still more complex with the discovery by a German research team of what they term a "plasma mantle," flowing toward the "tail" of the field just inside the boundary between the magnetosphere and the solar wind.

Revealed in a study of 1972 data from the European Space Research Organization's HEOS A-2 satellite, the plasma mantle seems to be a persistent phenomenon that extends over the entire "tailward" portion of the magnetosphere on the northern side of the plasma sheet. Its thickness was seen to range up to as much as four earth radii, apparently unrelated to either the position or the *Kp* activity level of the magnetosphere, according to H. Rosenbauer and colleagues at the Max Planck Institute, reporting in the July 1 JOURNAL OF GEOPHYSICAL RESEARCH.

Observed for nearly 11 months, the plasma mantle had a typical flow speed of 100 to 200 kilometers per second, and was always slower than the concurrent flow speed of the nearby magnetosheath (the "wake" formed by the solar wind as it is diverted around the magnetosphere). The most likely cause of the phenomenon, the scientists report, is the merging of terrestrial and interplanetary magnetic field lines on the day side of the earth.

Space applications council urged

A "national space applications council" should be established by Congress to aid potential users of satellite data in such fields as resource exploitation and management, weather forecasting and service-oriented telecommunications, according to the National Research Council.

"There exists at present no institutional mechanism that permits the large body of potential users . . . to express their needs and to have a voice in matters leading to the definition of new systems," says the report of the NRC study, which was funded by the National Aeronautics and Space Administration. The proposed council, which would act as an adviser to Congress and the President, would be an interagency group, also including representatives from state and local governments.

One of the report's specific recommendations is that the space shuttle, which is scheduled to make its first flights in 1979, should be provided with an early capability for putting payloads in either polar or geosynchronous orbits. (The shuttle's ability to put large, heavy payloads into geosynchronous orbits will depend in part on the U.S. Air Force, which is responsible for choosing and developing a secondary booster to ride in the shuttle and carry its payloads above the shuttle's presently envisioned orbital ceiling of about 300 miles.)

The space applications council, as envisioned by the NRC, would direct policies affecting nonmilitary applications, set priorities for meeting user needs, provide for exchanges between users and providers of space technology, and encourage non-Federal investment in the application of space systems.

The report, prepared by the Space Applications Board of the NRC Assembly of Engineering, is based on a July 1974 "summer study" by 110 potential users from Federal agencies, state and local governments, industrial and business communities, and educational institutions.

Still more jobs sought for ATS-6

With the ATS-6 Applications Technology Satellite barely settled in its new orbital position to handle a year of television relays for India, NASA is already soliciting experiments for the following year, when it will be back serving the United States. Proposals are invited in the "societal, communications or technological disciplines," says NASA—"in that order."