

## GENERAL SCIENCE

# Need Policy on Water

To properly solve the extremely complex problem of water usage between states, cities and the Federal Government, management at a national level is needed.

► WATER will be an unsolved problem as long as Americans worry about who owns it, a California authority said.

Ownership conflicts flare between states, between cities, between the Federal and state governments, between various agencies of the Federal Government, and among Congressional committees. The problems involved in such conflicts were reported by Harvey Banks, former director of Water Resources for California and now president of Leeds, Hill and Jewett, Inc., consulting engineers.

Mr. Banks told the scientists at the American Association for the Advancement of Science meeting that water is not an engineering problem. He said all the technological aspects of diverting, transporting and delivering water have been solved by the Government, although legal aspects are lagging far behind.

A major cause of this competition for water is the lack of management on a national level. There is little national law or policy on water. Consequently each agency interested in water, including the U.S. Department of Agriculture, Interior and many others, is out to obtain its own water and support its own projects, Mr. Banks charged.

Since each of these groups requires water for different purposes, the solution is a new Federal policy.

The Government's role should be to coordinate demands of various state, local and city agencies for water and to manage the allocation. States could then act as intermediaries between the Federal Government and local areas.

Mr. Banks pointed out that there is no question about who owns water in this country. The Supreme Court has in effect held that "for all practical purposes, the U.S. Government has the right to take and utilize all the water it sees fit."

The U.S. must face the fact that water is becoming more and more expensive, a second expert said at a symposium on "Evolving Water Law: The Growing Conflict Between Federal and State Governments."

Dr. Harold T. Nelson, regional director of the United States Bureau of Reclamation in Boise, Idaho, said the old cliché of "spending money like water" may soon become "spending water like money."

However, despite all the billions that new water projects will cost in the next 25 years, this country will still be spending proportionately little for good water compared to a country like Israel, which is using 85 to 90% of its available water right now. The United States is utilizing only five percent.

After Government, the next major problem concerns biologists, said Dr. Nelson.

Every time a small diversion in a stream is made, important biological changes for animals or fish take place.

Raising the temperature of river water by only one degree has a major effect on the vitality of fish down stream, he said.

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## Tiny Cracks Form Caves

► THE WORLD'S GREAT limestone caverns may have been formed by water flowing from wall cracks smaller than a human hair.

Geologists have long puzzled over the formation of vast limestone caves, carved from solid underground rocks by flowing water. Since the hairline cracks along which many caves have been formed appear to be almost waterproof as the limestone itself, geologists could not determine how the water flowed into the cave, Dr. Stanley N. Davis of Stanford University told the Association for the Advancement of Science meeting.

New precision portable instruments, carried into Wool Hollow Cave in the Sierra Nevada range, detected infinitely small shifts and grindings of rock surrounding the crack.

In constant movement due to earth tides, temperature changes and other stresses, the sides of the rock work against each other and fractures open sufficiently to allow water to flow. Slowly, through eons of time, this water dissolves the limestone and carries it away, thus forming the great underground caverns.

Land movements less than one-tenth the diameter of a human hair can be detected by the portable instruments. Comparable sensitivity has been achieved only by permanent installation too large to be carried "on location."

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## SPACE

# Pioneer Explores Space

► A SYSTEMATIC EXPLORATION of interplanetary space has begun with the launch of Pioneer A, now called Pioneer VI, first in a new series of probes to learn more about the solar system environment.

The heavily instrumented spacecraft was launched from Cape Kennedy, Fla., by the National Aeronautics and Space Administration.

Pioneer VI and others in the series may be the only United States probes returning to earth information on conditions in interplanetary space during the next several years. The Pioneers will orbit the sun in a strip of space about 40 million miles wide in the plane of the earth's orbit.

Some will circle the sun between earth and sun, others will be beyond earth's orbit.

Pioneer VI was launched in toward the sun. Its elliptical orbit should carry it to within about 77 million miles of earth's life-giving star after six months. Its "year," or the time Pioneer VI will take to circle the sun once, is expected to be about 310 days.

The new Pioneer series bears the name

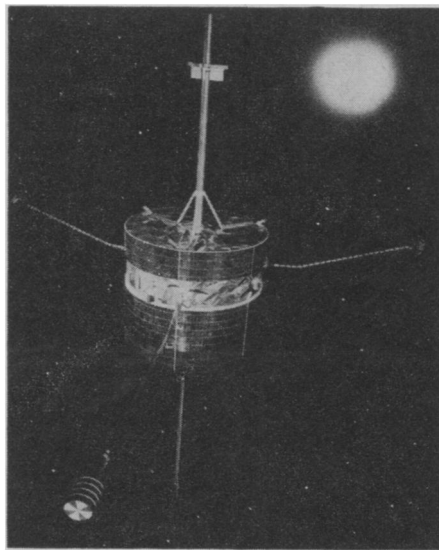
of an earlier group of deep space probes, the last one being Pioneer V, which returned data from 22.5 million miles from earth in 1960.

The Pioneer is the most magnetically "clean" spacecraft yet built by the U.S., in order to allow experiments to detect interplanetary magnetic fields without interference from the spacecraft. It will be the first spacecraft to attempt a radio propagation experiment in interplanetary space.

The six scientific experiments aboard Pioneer VI are designed to improve knowledge of the turbulent solar atmosphere of solar wind stream of charged particles, the magnetic fields of the sun, the boundary region between the solar atmosphere and interstellar space, the physics of the sun itself, and the basic interactions of high-energy charged particles and magnetic fields.

Pioneer VI is a cylinder 35 inches long and 37 inches in diameter. It weighs 140 pounds and carries 35 pounds of scientific experiments, the highest ratio of instruments to overall weight of any U.S. interplanetary probe to date.

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NASA

**OFF TO THE SUN**—The spacecraft, Pioneer VI, launched from Cape Kennedy into solar orbit, is expected to reach within about 77 million miles of the sun after six months of flight.