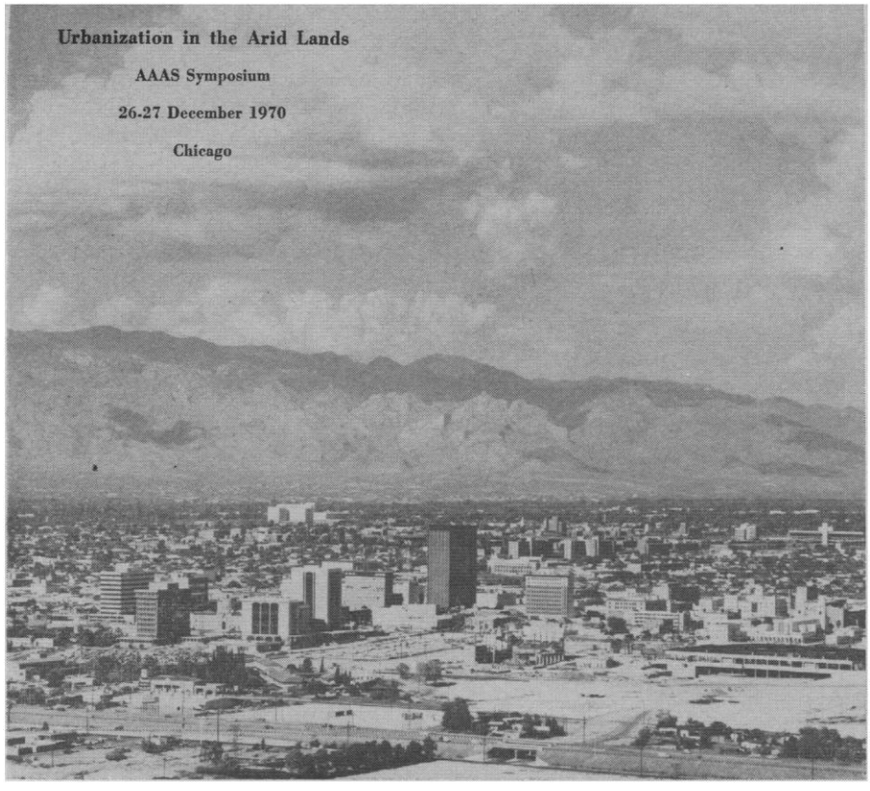

Researchers of the U.S. Geological Survey determined not long ago that vast quantities of water could be recovered if moisture-wasteful brush were stripped from the flood plain of the Gila River in Arizona. According to their calculations, up to 3400 acre-feet (1.1 billion gallons) a year could be salvaged; no mean accomplishment in a state with so precarious a water budget. However, when the U.S. Army Corps of Engineers proceeded earlier this year to channelize the stream, the project was legally enjoined by an uncomfortable alliance of hunters and preservationists. The antagonists challenged the Survey estimates, as well as arguing that an important habitat for wildlife would be erased. Such conflicts and incongruities reinforce an old truism—that sociological factors are as elemental to the development of arid-area resources as technology, if not more so. These problems are by no means peculiar to open spaces, though. Urbanization presents a special paradox.

In the deserts and semideserts, the spread of human habitation tends to diminish the uniqueness that attracted much of the populace to the fragile biome in the first place. The very meteorological parameters responsible for the aridity, for example, the dry, descending air from mid-latitude highs, also render the atmosphere especially susceptible to pollution. Thus, man's engines and other accessories blur the once limpid air. It is ironic that Phoenix, Arizona, in what boosters like to call "the Valley of the Sun," has become beset by air pollution. The trappings of civilization also mask the immense vistas, decimate native flora and fauna, and cause the same kind of overcrowding that some settlers had sought to escape.

Water, never abundant, is more elusive—and ultimately more expensive. Its scarcity and variability multiply the difficulties of waste disposal, and municipalities must divert surface supplies from ever greater distances. Without the longest aqueduct in the world to draw water from the Owens Valley, across the state in east-central California, Los Angeles never would have mushroomed into so classic a monument to urban sprawl. And now southern California is reaching still farther, into northern California, to abate its gargantuan thirst. In northern California, as was the case with the Owens Valley, the local citizenry is less than enthusiastic about the removal of its water. Also, in other places, still deeper wells must be drilled. As aquifers are emptied, the earth's surface itself sometimes subsides.

Oddly, in view of the short supply, city dwellers in the West use more water proportionately than do those in the East. The per capita use from municipal systems in Nevada is almost twice that in New York State. Geographer Gilbert F. White, reflecting upon this "undervaluation" of a crucial commodity, has pointed out that the residents of rainy Chicago, next to Lake Michigan, pay no more for water than those of relatively dry Boulder, Colorado, whose nearest water source is a glacier 20 miles distant.

Domestic and industrial waste waters could be recycled, and the capture of the considerable urban runoff is feasible. Albeit, so long as Westerners are able to obtain cheap water simply by turning a tap, they are unlikely to be concerned with water thriftiness.

There are historical explanations for this diffidence. The first Europeans to penetrate the American Southwest were Spaniards, accustomed to a paucity of precipitation. But large-scale occupation came from the humid eastern United States, and the immigrants were inclined, as they still are, to take with them the values and attitudes acquired in a region with adequate rainfall. They planted lawns and built houses more suited to the Connecticut coast.

Enigmas of this sort are not new, for civilization's first cities were in the desert. For example, Eridu and Kish thrived five millennia ago in the irrigated valleys of Mesopotamia. Eventually, though, the canals that were their lifelines filled with silt. There was drought, and the cities were abandoned. Modern technology has made arid zones more habitable and less remote. (Barbed-wire and the six-gun may have tamed the West, but air-conditioning certainly made it more livable.) In the United States, indeed, the region of greatest growth during the past generation has been the arid and semiarid West. California's population increased by 25 percent in the past 10 years, and although central cities generally declined in inhabitants between 1960 and 1970, those in California and Arizona grew considerably.

In many locations the exploitation of natural resources, the oil of the Middle East and the diamondiferous gravels of South West Africa, as examples, has created cities. But in the western United States, the salubrious climate has been perhaps the major reason for migration.

Studies have shown that urbanization, with light industry, utilizes the sparse water of the West more profitably than does agriculture. Farming provides slightly less than a tenth of the total basic employment in the Tucson basin and yet it consumes almost half of the water, all of it from wells.

(Above) Such arid-area cities as Tucson have grown enormously since World War II. [Ray Manley, Tucson]

Nonetheless, such fundamental questions as whether (or how) we should adapt our development to the arid environment rather than seek to modify or reshape the environment have never been resolved. These matters will become increasingly significant as the burgeoning world population leads, as surely it must, to accelerated settlement of the vast land bank that is the dry fifth of the earth.

In that context, then, a symposium to be held on 26 and 27 December during the Chicago Meeting of the AAAS will examine the natural and cultural constraints upon such settlement. The program on Urbanization in the Arid Lands, arranged by the AAAS's Committee on Arid Lands, will consider past failures and successes in inhabiting the deserts and semideserts and, finally, assess means by which this urbanization might evolve more logically.

The papers will focus on such subjects as water management, the economics and design of new cities, population-growth trends and the cultural factors that affect them, and ancient and present-day towns in the arid Old World. One author will describe the experience of southern California.

Co-sponsoring the three sessions are the AAAS Section on Geology and Geography, the Association for the Study of Man-Environment Relations, and the Human Ecological Society.

CARLE O. HODGE
Environmental Research Laboratory, University of Arizona, Tucson 85721

Topics and Speakers

Arranged by Carle O. Hodge and Carl N. Hodges (Environmental Research Laboratory, University of Arizona, Tucson).

26 December

Chairman: William E. Benson (Secretary, AAAS Section on Geology and Geography).

Urbanization in the Arid Lands: A Preliminary Survey of Possibilities and Problems, Marion Clawson (Director, Land Use and Management Program, Resources for the Future, Inc., Washington, D.C.).

Water Utilization by Roman Period Cities of the Negev, E. Y. Kedar (Professor of Geography, State University of New York, Binghamton).

Hydrological and Environmental Controls on Water Management in an Arid Urban Area, Sol D. Rednick and Kenneth J. DeCook (Associate Director, Water Resources Research Center, University of Arizona, Tucson, and Associate Hydrologist, Water Resources Research Center, University of Arizona, Tucson).

Reclaiming Municipal Waste Water by Ground-Water Recharge, Herman Bouwer and J. C. Lance (Chief Hydraulic Engineer, U.S. Department of Agriculture, U.S. Water Conservation Laboratory, Phoenix, Arizona, and Soil Chemist, U.S. Water Conservation Laboratory).

Geological Aspects of Urbanization in Las Vegas, Nevada, George B. Maxey and Gilbert F. Cochran (Professor of Hydrology and Geology, and Director, Center for Water Resources Research, Desert Research Institute, University of Nevada, Reno, and Research Associate in Hydrology, Desert Research Institute).

Pollution Problems in Cities in Arid Areas, Heinz H. Lettau (Chairman, Department of Meteorology, University of Wisconsin, Madison).

27 December (morning)

Chairman: Aristide H. Esser (President, Association for the Study of Man-Environment Relations).

Transfer of Cultural Values: Problems for Arid Areas, Courtland L. Smith (Assistant Professor, Department of Anthropology, Oregon State University, Corvallis).

Trends in Urban Population Growth and Manufacturing Employment in the Arid Lands, Andrew W. Wilson (Professor, Department of Geography and Area Development, University of Arizona, Tucson).

Arizona's Rural Subdivisions and Landscape Pollution, Charles E. Campbell (Instructor, Department of Geography, Northern Illinois University, DeKalb).

Climate and Other Amenities as Factors in the Growth of Arid-Area Populations, Lay James Gibson (Assistant Professor, Department of Geography and Area Development, University of Arizona, Tucson).

Urbanization in the Namib Desert, South West Africa, Richard F. Logan (Professor, Department of Geography, University of California at Los Angeles).

Urbanization in the Northern Sudan: Trends, Problems, and Lessons, Gerry A. Hale (Assistant Professor, Department of Geography, University of California at Los Angeles).

27 December (afternoon)

Chairman: George B. Happ (President, Human Ecological Society).

Social Aspects of Urbanization in the Arid West, Wade H. Andrews (Professor of Sociology and Chairman, Institute for Social Research on Natural Resources, Utah State University, Logan).

Historic Interplay of Aridity with Urbanization Waves in New Mexico, William Weismantel (Associate Professor, Department of Architecture, University of New Mexico, Albuquerque).

Urbanization in Arid Lands: The Southern California Experience, Howard J. Nelson (Chairman, Department of Geography, University of California at Los Angeles).

The Economics of New Cities, Byron L. Johnson (Professor, Department of Economics, and Director, Center for Urban Affairs, University of Colorado, Denver).

Inner and Outer in Arid Lands: The Arcological Congruence, Paolo Soleri (Architect, Scottsdale, Arizona).

Summary and Commentary, Gilbert F. White (Director, Institute of Behavioral Science, University of Colorado, Boulder).