ARIZONA WATER RESOURCES NEWS BULLETIN

NEWS BULLETIN 75-2 MARCH-APRIL 1975

NEW DIRECTOR FOR OWRT

Secretary of the Interior Rogers C.B. Morton announced that Dr. William S. Butcher of Austin, Texas, has been named Director of the Office of Water Research and Technology (OWRT).

Dr. Butcher comes to the post from The University of Texas at Austin, where he was Professor of Civil Engineering. From January 1971 to January 1973 he served as Assistant to the President's Science Advisor in the Office of Science and Technology, Executive Office of the President. He was Associate Director of the Water Resources Research Center of the Desert Research Institute, University of Nevada, Reno, from 1967 to 1969.

"We are fortunate to find such a highly qualified person as Dr. Butcher," Morton said. "He has the scientific background, the executive experience, and the academic stature required to direct OWRT's programs."

The Secretary noted that OWRT's programs include more than a thousand research projects in the 50 states, Puerto Rico, the Virgin Islands, and Guam. The research is designed to assist in meeting rapidly growing demands for water resources, clean streams, and new water supplies. OWRT awards grants and contracts to state research institutes, universities and private firms. The Office also directs the Federal Govemment's projects in desalination of sea, brackish and waste water.

A native of Sydney, Australia, Dr. Butcher attended public schools there and was graduated from the University of Sydney in 1946 with a Bachelor of Engineering degree. He earned a Master of Science degree from the University of California, Berkeley, and a Ph.D. from the University of Southem California, Los Angeles. His major field of study for the doctorate was Civil Engineering, with an emphasis in water resource systems.

NEW STATE HYDROLOGIC MAPS

The U.S. Water Resources Council and the U.S. Geological Survey are jointly publishing new "State Hydrologic Unit Maps." The maps are designed for use in water and land resource planning. They should be of great value to officials involved in water planning, at every level of government. The new maps present information on drainage, culture, hydrography and hydrologic boundaries of Water Resources Regions, Water Resources Subregions, National Water-Data Network Accounting Units, and Cataloging Units of the Geological Survey's "Catalog of Information on Water Data."

The maps, at a scale of 1:500,000 or 1 inch equals nearly 8 miles, show river basins larger than 700 square miles in each state and assign a distinctive computer code to each basin. This gives a consistent geographical basis for data storage and water-resources planning.

Although Arizona is not among the states already having had maps published, it should be one of those completed within the next several months.

Copies of the State Hydrologic Unit Maps for the states now available (Maine, New Hampshire, Vermont, Rhode Island, Massachusetts, Connecticut, Maryland, Delaware, New Jersey, Ohio, Indiana, Pennsylvania, West Virginia, and the District of Columbia) can be purchased by mail (prepaid) from the Distribution Branch, U.S. Geological Survey, 1200 South Eads Street, Arlington, Virginia 22202, for $1.00 per copy.

NEW MAPS GIVE LAND-SLOPE INFORMATION FOR THE PHOENIX-PARADISE VALLEY AND TUCSON AREA

Ten (10) land-slope maps for the Phoenix-Paradise Valley area and two (2) for the Tucson area have been released by the U.S. Geological Survey for public inspection. The slope maps are for the Buckhorn, Calderwood Butte, Currys Corner, El Mirage, Glendale, Higley, McMicken Dam, Paradise Valley, Superstition Mountains SW, Tortolita Mountains NE, Tortolita Mountains NW, and Waddell quadrangles.

The slope maps are printed on mylar, can be reproduced, and show average inclination of the land by patterns superimposed on standard topographic base maps. The slope patterns are for zones of 0-1, 1-2, 2-5, 5-10, 10-15, 15-50, and more than 50 percent slope. A grade of 10 feet in 100 feet of horizontal distance is a 10 percent slope in the land surface. The maps are experimental and are an aid in the location of buildings, roads, streets, and structures.

The maps are available for inspection, or material from which copies can be made at private expense is available from C. Winikka, Arizona Resources Information System, 3500 North Central Avenue, Suite 118, Phoenix, Arizona 85012.

UPCOMING EVENTS

Irrigation and Drainage Specialty Conference

Utah State University will host an Irrigation and Drainage Specialty Conference on August 13-15, 1975. The theme of the conference is "Irrigation and Drainage in An Age of Competition for Resources."

For further information, contact Robert W. Hill, College of Engineering, UMC 41, Utah State University, Logan, Utah 84322.

Conference on Nitrogen As a Water Pollutant

A conference on "Nitrogen As a Water Pollutant" will be held at the Technical University of Denmark, Copenhagen, August 18-20, 1975. This Specialty Conference is sponsored by the International Association on Water Pollution Research (IAWPR) and the Danish National Committee to IAWPR. For information about the program or submission of papers, write Conference Secretariat, IAWPR-Nitrogen As a Water Pollutant, c/o DIS CONGRESS, 3 Knabrostraede, KD-120 Copenhagen K, Denmark.

Symposium on Urban Hydrology—Kentucky

The second Symposium on Urban Hydrology and Sediment Control will be held on July 28-31, 1975 at the University of Kentucky, Lexington. Topics for the symposium will cover: (1) quantifying rainfall, runoff, and/or sediment production in urban areas including model studies; (2) economic and legal problems associated with runoff and sediment control; (3) techniques for managing urban runoff and/or sediment; and (4) case studies of innovative systems for controlling urban runoff and sediment.

For additional information on the conference, contact Dr. C.T. Haan, Agricultural Engineering Department, University of Kentucky, Lexington, Kentucky 40506, telephone (606) 258-2986.

Watershed Management Symposium—Logan, Utah

The American Society of Civil Engineers, in cooperation with Utah State University and several allied professional societies, is sponsoring a Symposium on Watershed Management in Logan, Utah, on August 11-13, 1975.

The theme will be "Operational Watershed Management: Research to Application." It is expected to be of interest to environmental specialists, civil and agricultural engineers, land managers and hydrologists. Papers on a variety of subjects are solicited. For information on paper submission, contact Richard H. Hawkins, College of Natural Resources, UMC 52, Utah State University, Logan, Utah 84322.

Earth Resources Symposium Planned

A major Earth Resources Symposium, sponsored by the Lyndon B. Johnson Space Center in Houston, will be held June 8-13, 1975 at Houston's Shamrock Hilton Hotel.

The primary focus of the symposium will be on practical applications of earth resources survey data gathered by satellites and aircraft. Such data are being utilized and evaluated in a variety of applications, including regional planning, environmental impact assessment, energy and mineral resource location, water resources management, and agriculture.

Invitations are being extended to individuals in federal, state and local government, private industry, universities, and to the international scientific community. The symposium is intended to bring together those who have developed the technology for remote sensing of the earth's resources and those who are using or could use this information.

The symposium will include papers on the results of experiments with remote sensing data obtained from LANDSAT (formerly the Earth Resources Technology Satellite—ERTS), from the earth resources experiment package carried aboard the Skylab manned orbiting space laboratory, and from various low and high altitude earth resources survey aircraft programs. Papers discussing the need for new data systems as well as those describing utilization of existing data will be invited.

Additional information on the symposium may be obtained from the Earth Resources Program Office, Code HB; Lyndon B. Johnson Space Center, Houston, Texas 77058, telephone (713) 483-4691.

Graduate Courses in Hydrology

Dr. Mordechai H. Diskin is professor of hydrology at the Israel Institute of Technology (Technion). He will spend a sabbatical year 1975-76 doing teaching and research in the Department of Hydrology and Water Resources, University of Arizona. He will teach the following courses:

Fall Semester

Hydrology 342. Analysis of Hydrologic Systems (3) I
Linear and nonlinear analysis of watersheds, aquifers and soil systems. Hydrologic signal analysis and model building in presence of noise and in context of decision theory.

Spring Semester

Hydrology 343. Stochastic Methods in Hydrology (3) II
Event based and time series analysis of hydrologic phenomena. Use of stochastic process models of streamflow, river networks, aquifers, soil and vegetative patterns, evaporation, reservoirs, precipitation.

Persons desiring to enroll in either of the above courses should have a background in basic surface-water hydrology, calculus, and statistics. Further information may be obtained from Professor E.S. Simpson, Old Psychology Building, University of Arizona, Tucson, Arizona 85721, telephone (602) 884-1855.

NEW UNIVERSITY OF ARIZONA WATER RESEARCH PROJECTS

I. "Surface Mining and Water Resources in the Southwest" is a new project being investigated by John L. Thames, Tika R. Verma, and Martin M. Fogel, School of Renewable Natural Resources, University of Arizona. The two-year project began May 1, 1975 and is being funded by The U.S. Bureau of Mines. The principal objectives of the project are to use and/or refine existing models to develop optimal surface configurations and/or surface treatments for reclaimed areas which will maximize the water available for on-site use by vegetation and minimize surface runoff, and to predict the probable effect of mining and subsequent reclamation practices on the hydrologic regime of the surrounding area.

II. "Rehabilitation of Arizona Watersheds Degraded by Past Mining Activities" by David B. Thorud, John L. Thames, and Tika R. Verma, School of Renewable Natural Resources, University of Arizona, is a five-year project which began June 1, 1974 and is being funded by The U.S. Forest Service. The overall objective of the project is to improve Lynx Lake Watershed by bringing sites previously disturbed by mining activities to a state of ecological equilibrium with the natural environment.

For further information on either of these projects, one may contact Tika R. Verma, School of Renewable Natural Resources, University of Arizona, Tucson, Arizona 85721.

III. The National Science Foundation has just awarded a $124,000 research grant to a multidisciplinary group of research scientists at the University of Arizona to investigate "Sensitivity of Decisions in Resources Engineering to Assumptions of Multivariate Models." Investigators in this proposal and their respective departments are: Lucien Duckstein (Systems & Industrial Engineering and Hydrology & Water Resources), Jean Weber (Management), Sid Yakowitz (Systems & Industrial Engineering), Martin Fogel (Watershed Management), and Don Davis (Hydrology & Water Resources and Systems & Industrial Engineering).

This research is applicable in many areas, since many important policies are defined on the basis of information or forecasts generated by multivariate models; specifically, decisions concerning energy and water resources allocation are considered in this research. The assumptions of these models generally are determined by statistical convenience, rather than by consideration of conditions likely to prevail in the real world. In many cases, the effects of the discrepancy between the assumptions of a model and the circumstances under which it is applied on the quality of the generated information are not known. As a result, nonoptimal policy decisions may be made.

The purpose of the research is to investigate the effects of violations of model assumptions on the quality of the information generated by multivariate models and to provide guidelines for using this information in decision making. The models studied will include multivariate regression, discriminant functions, canonical correlation, principal components, factor analysis and cluster analysis. For each of these models, various violations of each assumption and simultaneous violation of several assumptions will be considered. The effects of these violations of assumptions on model estimates and predictions will be investigated, particularly with respect to their use in resources decision making. The research will consider examples involving energy forecasting models and water resources systems.

PUBLICATIONS RELEVANT TO ARIZONA AVAILABLE

Annual Report on Ground Water Released

Nearly 4.8 million acre-feet of ground water was withdrawn from the ground-water reservoirs in Arizona in 1973 according to a report prepared by the U.S. Geological Survey in cooperation with the Arizona Water Commission and released March 28, 1975. Nearly 149 million acre-feet of ground water has been withdrawn since the beginning of record, and the large withdrawal has resulted in water-level declines in many areas in the State.

The report contains maps showing potential well production by areas, depth to water in selected wells in spring 1974, and change in water levels in selected wells from 1969 to 1974. The report also contains maps showing detailed hydrologic conditions in three highly developed areas in the State—Gila Bend Basin, McMullen Valley, and the southeast part of the Harquahala Plains.

The report "Annual report on ground water in Arizona—with emphasis on Gila Bend Basin, McMullen Valley, and the southeast part of the Harquahala Plains—spring 1973 to spring 1974," was prepared under the direction of H.M. Babcock, district chief of the U.S. Geological Survey in Arizona. Copies are available for distribution at the Arizona Water Commission, 222 N. Central Avenue, Suite 800, Phoenix, and may be inspected at U.S. Geological Survey offices in Room 5-A Federal Building, 301 West Congress Street, Tucson; 5017 Federal Building, 230 N. First Avenue, Phoenix; 2304½ Building A, Fourth Street, Flagstaff; 1940 South Third Avenue, Yuma; and Room 5312 National Center, 12201 Sunrise Valley Drive, Reston, Virginia.

Water Policy Reports

The following publications are available from The Institute of Government Research, University of Arizona, Tucson, Arizona 85721.

1) *Institutional Fragmentation and Policy Innovation: The Case of Federal Water Pollution Control* by Helen Ingram, Director; Scott J. Ullery, Research Assistant; and Bruce A. Wright, Research Assistant (OWRT Project No. B-034-ARIZ) January 20, 1975, 316 pages.
2) "Policy Innovation and Institutional Fragmentation," by Helen M. Ingram and Scott J. Ullery, 38 pages. This paper was presented at the 1975 National Conference on Public Administration, Chicago, Ill., April 1-4, 1975.

Hydrology and Water Resources in Arizona and the Southwest – Vol. 5

The Arizona Section of the American Water Resources Association announces a forthcoming publication: Volume 5 of *Hydrology and Water Resources in Arizona and the Southwest,* compiled by Don Chery Jr.

Volume 5 consists of papers read at the Section's annual meeting held jointly with the Hydrology Section of the Arizona Academy of Sciences, April 1975, in Tempe, Arizona. The topics covered by these papers include soil and water relationships, remote sensing and aerial photography, groundwater, modeling, the Central Arizona Project, direct osmosis for reclamation of saline water, the laser rain gage, antitranspirants on saltcedars, water quality, and erosion processes.

Orders for Volume 5 may be placed now in order to receive the Proceedings immediately upon publication in August 1975. Copies of Volumes 1 through 4 are also available, and can be sent immediately upon receipt of the order.

Prices for these volumes are as follows:

Vol. 1, 1971 meeting, 29 papers	$ 5
Vol. 2, 1972 meeting, 28 papers	$ 8
Vol. 3, 1973 meeting, 28 papers	$ 8
Vol. 4, 1974 meeting, 28 papers	$10
Vol. 5, 1975 meeting, 26 papers	$10

Orders for any of these publications can be sent to Linda White, Secretary-Treasurer of the Arizona Section, AWRA, c/o School of Renewable Natural Resources, College of Agriculture, University of Arizona, Tucson, Arizona 85721. A purchase order, check, or money order (payable to Arizona Section–AWRA) may be sent with the order or you may ask to be billed.

REMOTE SENSING OF SOIL MOISTURE

During the week of 17-23 March, Ray Jackson, Sherwood Idso, Bob Reginato, Bruce Kimball, and Francis Nakayama of the U.S. Water Conservation Laboratory, and Jim Vedder and Bob Goettelman of NASA-Ames, gathered extensive ground truth data for an experiment to assess the potentials of remote detection of soil water content from aircraft and satellites. Data acquired during the periods 0430 to 0630 and 1300 to 1500 each day included soil water contents from rough and smooth plots of bare soil in wet, drying, and dry conditions, along with infrared thermometer derived surface temperatures. During these periods a NASA aircraft passed over the fields and obtained radiometric data in a variety of wavebands in the visible and thermal regions of the electromagnetic spectrum. Meteorological and soil temperature data were also recorded at the site every 20 minutes during the experiment. The lab team has completed its analysis of the ground-based data, which looks good; and they are now waiting for the aircraft data to be processed.

The basic approach of this group has been to correlate soil moisture in the first few centimeters of the ground with albedo (rates of reflected to incoming solar radiation) and surface soil temperature. Some results of their initial findings are published in the September–October 1974 *Soil Science Society of America Proceedings* and the February 1975 *Journal of Applied Meteorology.* Another basic article will shortly appear in the *Journal of Geophysical Research;* and the September-October issue of *American Scientist* will carry a general review article about the benefits to be reaped from progress in these areas.

Please address your news items or comments on the News Bulletin to any of the four editors:

Phil Briggs, Arizona Water Commission, Suite 800, 222 North Central Avenue, Phoenix, Arizona 85004.

Jim DeCook, Water Resources Research Center, University of Arizona, Tucson, Arizona 85721.

Ken Foster, Office of Arid Lands Studies, University of Arizona, Tucson, Arizona 85719.

Rich Herbert, Water Resources Research Center, University of Arizona, Tucson, Arizona 85721.

Water Information Section
Water Resources Research Center
University of Arizona
Tucson, Arizona 85721