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# Water Current

Millard W. Hall, Director  
Volume 8, Number 6

Karen E. Stork, Editor  
November/December 1976

FROM THE DESK OF THE DIRECTOR . . .

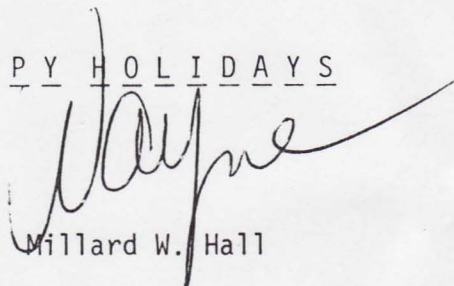
The Holiday Season is a time for remembering friends  
and sending warm wishes . . . .

To all of you who participated in the program of the  
Nebraska Water Resources Center and helped make it a  
rewarding year for me --

Many thanks for your assistance,  
your ideas,  
your inspiration, and  
your kind words.

May your Christmas be Merry and the New Year filled  
with happiness and success in everything you do.

H A P P Y H O L I D A Y S

  
Millard W. Hall



NEBRASKA WATER RESOURCES RESEARCH INSTITUTE



ON THE HOMEFRONT

DEADLINE FOR SUBMITTING ANNUAL ALLOTMENT PROPOSALS

The deadline for filing an annual allotment research proposal for fiscal year 1978 (beginning October 1, 1977) with the Nebraska Water Resources Research Center is February 1, 1977.

Prospective principal investigators are requested to submit a complete rough draft proposal prior to this date for review by the Director. Meetings with researchers will then be scheduled to discuss their proposal ideas.

For further information, please contact the Director's office.

MATCHING GRANTS SUBMITTED TO OWRT

The Nebraska Water Resources Center will submit nine matching grants to the Office of Water Research and Technology for consideration for funding in fiscal year 1978, beginning October 1, 1977. The titles and principal investigators for the grants submitted are as follows:

- Blaine Blad and Norman Rosenberg - "Remotely Sensed Crop Temperature for Water Resources Management"
- Michael T. Steinman - "The Future of Water Resources Policy: The Impact of Congressional Budget Reform and Management by Objective"
- Terry L. Lavy - "Effects of Water on the Fate of Herbicides in Irrigated Soils"
- Khem M. Shahani - "Biocatalytic Analyses and Treatment of Pollutants in Wastewaters"
- James D. Carr - "Ferrate Ion as a Water Treatment Chemical"
- Bruce Johnson - "An Economic Analysis of Water Management Alternatives in Nebraska"
- Ron Gaddis and George Morin - "Water Quality and Erosive Potential of Runoff from Center Pivot Irrigation Systems Operated on Sloping Terrain"
- E. L. Martin - "Biological Regulation of Blue-Green Algae"
- Millard W. Hall - "The Impact of Public Law 92-500 on Regional, State and Local Institutions"



#### FAO FELLOW FROM INDIA

Mr. A. S. Thirunavukkarasu (Arasu) (FAO Fellow from India), has recently been studying at the University of Nebraska under an international training program sponsored by the Food and Agricultural Organization of the United Nations. Mr. Arasu worked for one month under the direction of Dr. J. David Aiken, Water Law specialist with the Department of Agricultural Economics. His visit to Nebraska was sponsored and arranged by the Nebraska Water Resources Center.

During his stay, Mr. Arasu studied water law and water administration; attended a number of conferences and seminars with individuals knowledgeable in the aspects of Nebraska water law, particularly those laws concerned with groundwater; and conducted research into theoretical aspects of water law and administration through reading and visits to various officials in state and local government involved in water law and administration.

Since his departure from Nebraska on December 1, Mr. Arasu has been studying at New Mexico State University in Las Cruces. He will return to India on January 18.

#### STAFF APPOINTEE FROM POLAND

The Nebraska Water Resources Center has recently appointed for one year a Research Assistant from Poland. Mr. Stefan Ignar was an instructor at the Warsaw Agricultural University in Poland and came to the United States on a special exchange program arranged through Goshen College in Indiana. His faculty position in Poland was with a department concerned with irrigation and drainage, river training, hydrology and similar technical problems.

During his stay in Nebraska, Stefan will be working with Center Staff to learn about methods used and research being conducted in the United States in water resources planning and management and mathematical modeling. A major part of his time will be spent in working on the development of mathematical models for quantitative planning related to our contract with the Upper Big Blue NRD.

Stefan will be at the University through October 1977. Anyone desiring further information about his activities should contact Millard W. Hall, Director, Nebraska Water Resources Center, 310 Ag. Hall, University of Nebraska, Lincoln, Nebraska 68583.



## RURAL WATER CONFERENCE

On November 4-5, 1976 the Nebraska Water Resources Center sponsored a conference on "Water Problems in the Rural Environment." There were approximately 130 attendees from 18 states representing federal and state agencies, universities, Nebraska Natural Resources Districts, Missouri River Basin Commission, various rural water districts, Nebraska 208 Planning Policy Advisory Committees and private organizations.

The conference was widely publicized in cooperation with the Department of Ag. Communications. There were a number of radio and newspaper reporters in attendance, and two articles were published in the Lincoln Journal and Star along with a television interview. The participants agreed that this was a very timely conference and felt that a great deal of valuable information had been obtained. Suggestions were made that a conference on rural problems should perhaps be an annual or biennial event.

Proceedings of the conference will be published within the next two months. Anyone who did not attend the conference and would like a copy of the proceedings should contact: Millard W. Hall, Director, Nebraska Water Resources Center, 310 Ag. Hall, University of Nebraska, Lincoln, Nebraska 68583.

## WATER RESEARCH IN NEBRASKA

### CONSERVATION AND SURVEY DIVISION

A full-color map showing the locations of 8,517 center-pivot irrigation systems in Nebraska has just been published by the Conservation and Survey Division, Institute of Agriculture and Natural Resources, The University of Nebraska-Lincoln. The new map shows by color distinction the center-pivot systems existing prior to and through 1972 (blue), those added in 1973 (gold), those added in 1974 (green), and those added in 1975 (red). A table at the bottom of the map gives, county by county, annual totals of center-pivot systems from 1972 through 1975.

The spiraling growth of center-pivot irrigation systems in Nebraska can be seen in the annual increase, in percent, over the 1972 total. The 1975 cumulative total represents a 320 percent increase.

Another means of charting the rapid increase in center-pivot systems in Nebraska is by noting the following increase in acres irrigated by such systems: 354,000 acres in 1972; 503,000 acres in 1973; 800,000 acres in 1974; and 1,133,000 acres in 1975.

Satellite imagery from NASA's Landsat-1 and Landsat-2 provided the basic information for the map. Conservation and Survey Division's Remote Sensing Center assembled the data and provided photogrammetric interpretation. Project directors Richard O. Hoffman and Donald M. Edwards, of UNL's College of Engineering and Technology, supervised the computer techniques for storing, retrieving, and generating the data in map form.

Copies of the new map are available at 50 cents each plus sales tax from the Conservation and Survey Division, The University of Nebraska, 113 Nebraska Hall, Lincoln, Nebraska 68588.



## FEDERAL HIGHLIGHTS

### OGALLALA STUDY APPROVED

The President recently signed the Water Resources Development Act of 1976, which authorized \$6 million to study the declining water resources of the Ogallala aquifer and to develop plans to increase water supplies in the area.

The Ogallala aquifer underlies portions of Colorado, Kansas, New Mexico, Oklahoma, Texas and Nebraska. Working with the Corps of Engineers will be the Department of Commerce and other appropriate federal, state, and local agencies and the private sector in developing its recommendations.

MRBC Chairman John W. Neuberger has asked the Commerce Secretary Elliott Richardson to appoint a representative from the Missouri River Basin Commission to the High Plains Study advisory group.

The report of the High Plains Study is to be completed in 1980.

### INTERIOR SIGNS WATER MARKETING AGREEMENT WITH MONTANA

Assistant Secretary of the Interior Jack Horton has signed a contract with Montana that permits the state to market up to 300,000 acre-feet annually from the federally-constructed Fort Peck Reservoir in Montana.

The Interior Department offered the Missouri River Basin states the first opportunity to process any application for industrial water from Upper Missouri Basin federal projects. In the offer was included the opportunity for the state government to contract for substantial blocks of water behind these reservoirs.

### DISCOUNT RATE SET AT 6 3/8%

The interest rate used by federal agencies to formulate and evaluate plans for water and related land resources projects has been raised to 6 3/8 percent for the period October 1, 1976 to September 1, 1977.

The interest rate formula is used to discount future benefits and costs as a part of the process involved in formulating and evaluating comprehensive regional or river basin plans and federal water and related land resources projects. The formula, originally established in September 1973 in "Standards for Planning Water and Related Land Resources" was amended by Section 80 of the Water Resources Development Act of 1974 (P.L. 93-251).

The formula set forth states that the interest rate is based upon "the average yield during the preceding fiscal year on interest-bearing marketable securities of the United States which, at the time the computation is made, have terms of 15 years or more remaining to maturity..." The formula also provides, however, that the rate may not be raised or lowered by more than one-quarter of one percent for any year.



The Department of Treasury notified the Water Resources Council on October 15 that the rate would be seven percent based upon the average yield of the marketable securities during the last fiscal year. Since the rate for fiscal year 1976 was 6 1/8 percent, the rate for fiscal year 1977 is 6 3/8 percent.

## CONFERENCES

### SECOND MISSOURI RIVER BASIN GOVERNORS' CONFERENCE

Omaha will be the site for the second Missouri River Basin governors' conference and will be held on May 4, 1977. At this time, a theme has not been decided upon. The meeting will be held in conjunction with the 20th quarterly meeting of the Missouri River Basin Commission (MRBC). The timing of the May Missouri River Basin governors' conference is such that it precedes the 1977 National Conference on Water to be held in St. Louis, May 23-25.

### 1977 NATIONAL CONFERENCE ON WATER

The National Conference on Water will be held in St. Louis, Missouri, from May 23-25, 1977.

Assistant Secretary of Interior, Jack O. Horton, will lead the Conference planning and will welcome views and suggestions as plans for the Conference are formulated. Those should be sent to: 1977 National Conference on Water, Water Resources Council, 2120 L Street, N.W., Suite 800, Washington, D. C. 20037.

While the supply is limited, copies of the Executive Summary of the 1975 National Conference on Water are still available from the Council on request.

### CONFERENCE ON PREDICTION OF URBAN RUNOFF QUALITY

"Prediction of Urban Storm Runoff Quality" is to be the subject of a special symposium to be held in Washington, D. C., from May 30-June 3, 1977. It is being sponsored by the Water Quality Committee of the Hydrology Section of the American Geophysical Union (AGU).

Recent concern over the effects of urbanization on water quality has resulted in a considerable effort directed toward the evaluation of urban storm runoff quality.

Emphasis will be on the technical aspects and modeling of urban storm-water quality prediction including statistical or stochastic aspects, and data aspects. Of particular interest are the methods (analytical and/or statistical) of pollution loading estimation and the determination of the so-called "critical" or design conditions.

Those planning on contributing should submit abstracts of their papers before January 30, 1977, to: Marshall E. Jennings, Gulf Coast Hydroscience Center, U.S. Geological Survey, Bay St. Louis, Mississippi 39520, or, Shaw L. Yu, Department of Civil and Environmental Engineering, Rutgers University, New Brunswick, N. J. 08903.



## SYMPOSIUM ON QUALITY OF PRECIPITATION

The Committee on Precipitation and the Committee on Water Quality, both of AGU's Section of Hydrology, will be sponsoring a Symposium on Quality of Precipitation which will be held in Washington, D. C. on May 30-June 3, 1977.

The Symposium will bring together outstanding specialists to discuss the effects of acid precipitation and other types of precipitation on forests, fish and wildlife, and the quality of surface and ground waters.

Anyone wishing to offer a paper should submit by February 15, an abstract of up to 300 words to either of the symposium co-chairman: Dr. Eugene L. Peck, Hydrologic Research Laboratory, NOAA-National Weather Service, Silver Spring, Maryland 20910, or Dr. Timothy D. Steele, U.S. Geological Survey, WRD, Colorado District, MS 415, Federal Center, Box 25046, Lakewood, Colorado 80225.

## THIRTEENTH AMERICAN WATER RESOURCES CONFERENCE

"Assessment, Management, and Politics of Water," is the title of the AWRA Conference to be held in Tucson, Arizona, October 31-November 3, 1977. Anyone wishing to submit a paper can choose a subject related to any aspect of water resources research, planning, development, management, education, and information systems. The following tentative session topics have been selected:

- |                              |                                       |
|------------------------------|---------------------------------------|
| -- National water assessment | -- Irrigation practices               |
| -- Water law                 | -- Hydrologic modeling                |
| -- Water and energy          | -- Flood plain management             |
| -- Water and industry        | -- Education and manpower             |
| -- Water-based recreation    | -- Decision making                    |
| -- Water quality control     | -- Climatic change                    |
| -- Water conservation        | -- World hunger and water development |
| -- Water reuse               | -- Politics of water                  |
| -- Water planning            | -- Limnology                          |
| -- Desalination              |                                       |

Papers must be submitted no later than March 31, 1977. Abstracts must not exceed 200 words in length and must include title, author's name and affiliation. Typing should be single spaced with a left-hand margin of one inch and other margins not less than half an inch. Paragraphs are to be indented five spaces and should be separated by one blank line. Five copies of the abstract should be sent, one of which is the original. Authors must also enclose on a separate page, the full mailing address for all authors of the paper (including position, firm or institution, department and telephone number).

Abstracts should be sent to: Dr. Daniel D. Evans, Dr. Stanley N. Davis, or Dr. David B. Thorud, Department of Hydrology and Water Resources, University of Arizona, Tucson, Arizona 85721.



#### FOURTH JOINT CONFERENCE ON SENSING OF ENVIRONMENTAL POLLUTANTS

The Fourth Joint Conference on Sensing of Environmental Pollutants will be held November 6-11, 1977 at the New Orleans Hilton, New Orleans, Louisiana. The conference is sponsored by ACS, AMS, AIAA, IEEE, ISA, DOT, EPA, NASA, NOAA, and USGS.

For further information contact: V. E. Derr, Environmental Research Laboratories, NOAA, Boulder, Colorado 80302.

#### PUBLICATIONS

##### PROCEEDINGS AVAILABLE FOR INTERNATIONAL SYMPOSIUM ON POLLUTION

Twenty technical papers on soil and ground water pollution are presented in a proceedings volume released recently by the International Association of Hydrological Sciences. Engineers and scientists from eight countries discuss pollution--of the soil in the unsaturated zone as well as of the ground water in aquifers--resulting from solid waste deposits, waste fluids, petroleum products, surface stock-piling, and spraying of sewage effluent.

The 240-page volume, entitled "Groundwater Pollutants", is available from the Treasurer, International Association of Hydrological Sciences, 1909 K St. Lower Level, Washington, D. C. 20006, U.S.A. It is the IAHS Publication No. 103 and the cost is \$25.

##### "STATUS OF GROUND WATER MODELING IN THE U.S. GEOLOGICAL SURVEY"

This brief report summarizes the history of ground water modeling and the methods of modeling presently in use or under development by the USGS for ground water studies. It examines the standard tools of the hydrologist which are mathematical equations and electronics which are used to simulate and predict the behavior of the Nation's vast underground water resources.

The report classifies modeling methods into four main types, representing increased stages of capability for handling complex ground water problems and ranging from those still in early developmental stages to those fully operational and in general use.

The authors are Charles A. Appel and John D. Brdethoeft.

Copies are available free of charge from the Branch of Distribution, USGS, 1200 South Eads Street, Arlington, Virginia 22202.



POSITIONS AVAILABLE

FACULTY POSITION IN FLUID MECHANICS AND WATER RESOURCES ENGINEERING

The Department of Civil Engineering at the University of New Hampshire is seeking a faculty member in the area of fluid mechanics and water resources engineering. Applicants should have a background in fluid mechanics, hydraulics and mathematical modeling for water quality management. A background in ocean or coastal engineering is desirable but is not required. This position will be filled at the Assistant Professor level.

Interested persons should submit resumes and names of three professional references before February 28, 1977 to: Dr. Paul L. Bishop, Department of Civil Engineering, University of New Hampshire, Durham, New Hampshire 03824.

POSITION AVAILABLE IN SOIL MECHANICS

The University of New Hampshire Department of Civil Engineering is seeking a faculty member in the area of geotechnical engineering/soil mechanics. A background in ocean engineering as related to soils is desirable, but not essential. The position will be filled at the Assistant Professor level.

Interested persons should submit resumes and names of three professional references before February 28, 1977 to: Dr. Paul L. Bishop, Department of Civil Engineering, University of New Hampshire, Durham, New Hampshire 03824.

FACULTY POSITION IN ENVIRONMENTAL ENGINEERING

The Department of Civil Engineering at the University of New Hampshire is seeking a faculty member at the Assistant Professor level in the area of environmental engineering. The applicant should have expertise in one or more of the following areas: biological waste treatment, physico-chemical treatment, solid waste management or environmental systems. A background in ocean or coastal engineering as related to environmental engineering is desirable but not essential.

This position will require participation in graduate and undergraduate teaching, research and related academic activities. A Ph.D. is required and the applicant should have a civil engineering background.

Interested persons should submit resumes and names of three professional references before February 28, 1977 to: Dr. Paul L. Bishop, Department of Civil Engineering, University of New Hampshire, Durham, New Hampshire 03824.

FACULTY OPENING IN HYDROLOGY

The Department of Geology and Geophysics at the University of Utah, invites applications for a faculty position of junior rank in the area of groundwater hydrology. The position will be open as of July 2, 1977.



Applicants should have a strong background in quantitative aspects of hydrology. Opportunities exist for interaction with research programs in structural geology, geochemistry, isotope geology, exploration geophysics, geothermics and field research in groundwater.

Applications must be sent in by February 1, 1977 to: Stanley H. Ward, Chairman, Department of Geology and Geophysics, University of Utah, Salt Lake City, Utah 84112.

The University of Utah is an equal opportunity employer.

#### ENVIRONMENTAL ENGINEER

A regional planning agency in Washington, D. C. is seeking recent or upcoming graduates of the MS program to assist with the utilization of computerized watershed models for 208 basin studies and a regional flood control program.

The position requires MS in Civil Engineering or Environmental Engineering with concentrations in computer simulation techniques, hydrology, and sanitary engineering, plus the equivalent of one year's experience.

Interested persons should contact: Mr. Austan S. Librach, Northern Virginia Planning District Commission, Suite 300, 7309 Arlington Blvd., Falls Church, Virginia 22042. (An equal opportunity employer).

#### ASSOCIATE PROFESSOR AND ASSISTANT DIRECTOR

Rutgers University Water Resources Research Institute is seeking an associate professor and an assistant director as of July 1, 1977.

Responsibilities will include becoming familiar with all phases of the institute's operation and administration, carrying out responsibilities as assigned, and participating as investigator or co-investigator as appropriate in water resources research appropriate to his or her discipline.

Candidate must have Ph.D. with major involvement in studies related to some aspect of water resources. Also must be able to establish expertise in some discipline related to water resources. Expertise may be in either hard science, planning or social sciences. It is essential that the candidate have a strong character and personality and have the ability to understand quickly and to express himself or herself fluently in a wide range of studies.

For further information, contact: William Whipple, Jr., Director, Water Resources Research Institute, Rutgers University, Box 231, New Brunswick, New Jersey 08903.

Rutgers University is an affirmative action equal opportunity employer.



## RESEARCH REVIEW

Title: Irrigation Management -- A Mechanism for Saving Energy and Water

Principal Investigator: Paul E. Fischbach, Professor  
Dept. of Agricultural Engineering  
University of Nebraska-Lincoln

The objectives of this project are: (1) to develop criteria for the design and selection of irrigation systems which minimize energy and water requirements; specific objectives relate to improved irrigation practices and efficient water and energy use; (2) to plan and execute programs for technology transfer and implementation of research results on an intensive state-wide basis.

Four automated surface irrigation systems have been installed at four locations in Nebraska: the University of Nebraska Field Laboratory at Mead; on a farm near Imperial; the Panhandle Station at Scottsbluff; and the South Central Station. These locations represent four different soils, ranging from a silty clay to a sandy loam. The problem with surface irrigation is applying too much water each irrigation, thereby wasting energy and water. Reuse systems were also installed with the automated irrigation system.

The first experiment involved scheduling irrigations on corn to evaluate the effect of different methods of scheduling irrigations on yield and amount of water required. It appears there are several methods of timing irrigations that can be used successfully. However, there is a problem in physically applying the two or three inches of water. It appears that some method of smoothing or compacting the furrows before the first irrigation could result in applying only two inches the first irrigation. Then, irrigating before the soil becomes too dry on the second irrigation could result in less total water being applied over the season.

The second experiment concerning irrigation management to save water and energy involved applying two inches or less water each irrigation and distributing it efficiently and uniformly with an automated gated pipe system. Experiments were conducted at the Mead Field Laboratory and Imperial, Nebraska using four treatments and four replications at Mead and one treatment and seven replications at Imperial. Results indicated that use of the conventional ditcher plus smoothing and packing had the highest uniformity coefficient.

The technology transfer phase of the project will be conducted in three parts: (1) a general education program in this region, dealing with the necessity and feasibility of preserving the unique qualities of the Sandhills while providing for agricultural development; (2) an intensive campaign utilizing radio, TV, newspapers, agricultural publications, public meetings and short courses to disseminate technical information to farmers, land developers, equipment dealers, system designers and other actively involved in irrigation work; and (3) the development of closer contact and lines of communication with the agricultural technical services companies which are expanding in the area. They will serve as a channel of rapid implementation of research results.



## QUESTIONS AND INQUIRIES

Newsletter items and inquiries should be sent to: Editor, Nebraska Water Resources Research Institute, 310 Ag. Hall, East Campus, University of Nebraska, Lincoln, Nebraska, 68583, or phone (402) 472-3307.

## NEWSLETTER ITEMS SOLICITED

The Water Current Newsletter will publish without charge, announcement programs for up-coming conferences, employment opportunities or other newsworth items on hydrology, water resources or related topics.

THE UNIVERSITY OF NEBRASKA-LINCOLN  
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Water Resources Research Center  
310 Agriculture Hall  
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