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# Water Current

Conservation & Survey  
Division

MAR 24 1981

University of Nebraska

William L. Powers, Director  
Volume 13, Number 1

Karen E. Stork, Editor  
January/February, 1981

FROM THE DESK OF THE DIRECTOR . . . .

ANNUAL REPORT -

NEBRASKA WATER RESOURCES CENTER

The Nebraska Water Resources Center (NWRC) was established by the Water Resources Research Act passed by Congress in 1964. The Center is administered by a Director appointed by the Vice Chancellor for Agriculture and Natural Resources. The permanent staff consists of 15 full-time and part-time members who are involved in activities such as contract and grant research, teaching water courses and providing water information to the public. The primary purpose of the Center is to bring together water researchers, users and funding sources. It functions as a center for integrating University water research and training programs with the needs and efforts of federal, state and local agencies and the public. The Center uses its resources to foster, coordinate and administer cooperative, interdisciplinary water-related activities in Nebraska's post-secondary schools.



NEBRASKA WATER RESOURCES CENTER



## Research

During 1980 the Center developed a Five-Year Water Resources Research Program which identified five areas of high priority water resources problems in Nebraska: (1) water quality; (2) water quantity; (3) distribution and redistribution; (4) water use efficiency, conservation and productivity; and (5) legal-institutional, social and economic. Specific high priority water resources problems were identified in each of these areas (see November/December 1980 issue of WATER CURRENT).

During 1980 the Center sponsored, administered and conducted a research program involving 23 projects totalling approximately \$1.2 million. Four of the research projects administered by the Center during 1980 were directed by Center staff and have produced results of benefit to many state and local agencies for solving critical water problems in Nebraska.

A major thrust of the Center's research program for 1980 involved planning-related research on state water resources policy alternatives. A Water Resources Planner was hired to coordinate the Center's participation in the legislatively mandated State Water Planning and Review Process. During the past year, the Center contributed its involvement in several interagency task forces addressing a variety of water policy issues. The task force on water use efficiency is being led by Center personnel. This multi-year study will examine a wide range of opportunities and problems relating to more efficient use of the state's water resources.

## Training and Education

Training and education activities are an important part of the Center's overall program. Center staff have been involved in many continuing education and training programs in water resources through the year, including courses, conferences, seminars and workshops.

For example, during the 1980 spring semester the Center presented a seminar on "Surface and Groundwater Quality". This seminar provided a forum where water quality issues could be discussed by students, faculty, special interest groups, state and federal agency personnel, and other interested persons. Students may also receive academic credit for participation in these seminars. Eight such seminars on various topics have been sponsored since 1973.



In the spring of 1980, the Center co-hosted the Second Conference on Water Data Programs and Needs as part of its function as a member of the Governor's Water Data Coordination Committee. This was the second meeting on this topic which allowed staff members from various water agencies and industries in Nebraska to discuss their water data collection programs and future data needs.

Water is a frequent topic of discussion and debate in Nebraska's legislature. To assist the state's law-makers in broadening their water knowledge, the Center worked with several University units in presenting a Hydrology Short Course for Nebraska Senators and their staff. During the day-long activity, a wide range of hydrologic information was discussed and explained, giving those in attendance the opportunity to gain a better understanding of Nebraska's water resources.

In addition to these various programs, training of water scientists is also accomplished by active involvement of students and faculty on water research projects. In the past 16 years, several hundred students from 25 departments have received the benefit of training in some aspect of water resources.

#### Information Dissemination

The Water Resources Center has a long-established program of information dissemination through published materials. This includes a bi-monthly newsletter (WATER CURRENT), a directory of University faculty with water expertise, a listing of water-related research and publications in Nebraska, technical completion reports and articles in journals, and staff presentations at scientific meetings.

An important activity of the Center during 1980 was the development of a slide-tape presentation about the Water Resources Center--who we are, what we do and how we operate. This presentation discusses many aspects of the Center's programs and may be borrowed by interested groups. It is available in two forms--either as a 7-minute slide-tape combination, or in a 15-minute version with a Center staff member presenting the slides. The presentation has been given several times to various groups and has been well received.

Publications during 1980 included: (1) General Guidelines and Regulations of the Nebraska Water Resources Center; (2) University of Nebraska Faculty with Competence in Water Resources; (3) Artificial Groundwater Recharge in Nebraska; and (4) a final version of the popular publication, "Summary Report on Water-Facts Computer Game".



ON THE HOMEFRONT

WATER RESOURCES SEMINARS

The February and March schedule for the Water Resources Seminar series on "Water Resources Research at the University of Nebraska" follows. These seminars are held from 3:00 to 5:00 p.m. on Tuesday afternoon in the East Campus Union.

February 10 - WATER CONSERVATION

- Howard Wittmuss  
Department of Ag. Engineering
- Charles Fenster  
Department of Agronomy  
Panhandle Station

February 17 - WATER USE EFFICIENCY - Crop Modeling

- Blaine Blad  
Center for Ag. Meteorology and  
Climatology
- George Meyer  
Department of Ag. Engineering

February 24 - METEOROLOGY/DROUGHT MANAGEMENT AND  
IRRIGATION SCHEDULING

- Norman Rosenberg  
Center for Ag. Meteorology and  
Climatology
- Paul Fischbach  
Department of Ag. Engineering

March 3 - WATER USE EFFICIENCY - Crop Water  
Use and Crop Modeling

- John Norman  
Department of Agronomy
- Jerry Eastin  
Department of Agronomy

March 10 - NEBRASKA WATER CONFERENCE

March 17 - GROUND AND SURFACE WATER HYDROLOGY

- Darryll Pederson  
Conservation and Survey Division
- Ralph Marlette  
Department of Civil Engineering

March 24 - SPRING BREAK - NO CLASS



March 31 - EUTROPHICATION AND ITS CONTROL

- Eugene Martin  
School of Life Sciences
- James Rosowski  
School of Life Sciences

GROUNDWATER HYDROLOGIST POSITION

The Nebraska Water Resources Center announces a job opening for a Groundwater Hydrologist. This is a tenure-leading position and will be 75 percent research and 25 percent teaching. Duties will include the development of a strong research program in groundwater hydrology as related to irrigation, as well as responsibility for developing and teaching two groundwater hydrology courses and a beginning level hydrology course. Appointment could be at the rank of assistant professor or above depending upon qualifications and experience.

The person holding this position will be a member of a small professional Water Resources Center staff. The Water Center functions primarily as a coordinative unit responsible for providing leadership in several phases of the University's water resources research, training and information dissemination programs. This position is part of a special program to develop excellence in Water Resources Planning and Management. The person hired would be expected to work closely with members of the Water Center staff, the Water Resources Planning and Management Area of Excellence program and others at the University with similar interests.

Qualified candidates must possess a Ph.D. degree in a field related to job responsibilities. This person should be a well-trained individual with a strong background in mathematics, flow in porous media, computer science, groundwater hydrology, optimization and irrigation. Salary will be commensurate with qualifications, but nationally competitive. Closing date for the position is April 1, 1981, or until a suitable candidate is found.

Interested candidates should submit a resume, along with the names of three references, to: Dr. William L. Powers, Director, Nebraska Water Resources Center, 310 Agricultural Hall, University of Nebraska, Lincoln, Nebraska 68583. Telephone: (402) 472-3305.

The University of Nebraska is an Equal Opportunity/Affirmative Action Employer.



## MATCHING FUND PROPOSALS SUBMITTED TO OWRT

Seven research proposals have been submitted to the Water Resources Center and were recently sent to the Office of Water Research and Technology for fiscal year 1982 funding under the Matching Fund Program. Principal investigators and proposal titles are as follows:

James R. Gilley, Raymond J. Supalla and  
Darrell G. Watts, "Water Conservation Through  
Improved Irrigation Scheduling Procedures"

Gary W. Hergert, et. al., "Maximizing  
Water Use Efficiency of Limited Irrigation  
Plus Natural Precipitation Using Conservation  
Cropping Systems"

Donald L. Johnson, "Test Procedures and  
Analysis for Accelerated Leaching and  
Corrosion of Containment Systems and  
Structures into Groundwater"

Paul S. T. Lee (UNO), "A Study of Legal,  
Institutional, Social and Economic  
Barriers to Wastewater Reuse for Irrigation"

James L. Van Etten and Russel Meints,  
"Properties of a Virus That Multiplies  
in a Eukaryotic Green Alga"

Norman Thorson, "Model Legislation to  
Eliminate Legal and Institutional Barriers  
to Conjunctive Management of Water"

Howard Wittmuss, George Meyer and Joseph  
Skopp, "Improved Water Management Practices  
Through Selected Tillage Practices"

## WATER RESOURCES IN NEBRASKA

### NEBRASKA WATER CONFERENCE

The 1981 Nebraska Water Conference will be held March 10-11, 1981, at the Nebraska Center for Continuing Education, University of Nebraska. The theme for this year's conference is "The Role of Water in Nebraska's Economy".

Three concurrent sessions on "Water Activity Update Reports" will be held the first morning. Other session topics will include: (1) surface water reservoir storage; (2) irrigation, transportation and social impacts; (3) legislative



updates; (4) the role of water in energy production and use; and (5) projections relating to water and irrigation.

Registration fee for the conference is \$40 for pre-registration or \$46 on the day of the conference. For additional information, contact: Dr. Leslie Sheffield, 223 Filley Hall, University of Nebraska, Lincoln, Nebraska 68583. Telephone: (402) 472-1773.

#### FISCHBACH RECEIVES AWARD

Professor Paul E. Fischbach, Department of Agricultural Engineering at the University of Nebraska-Lincoln, recently received an Energy Conservation Award in Agriculture from former President Jimmy Carter.

Paul came to the University of Nebraska in 1952 and is widely known for his work in irrigation scheduling. He is currently team leader for Nebraska's extension irrigation water management program which includes demonstrations, meetings, and media materials to inform Nebraska farmers about water and energy savings possible with irrigation scheduling. He is also head of the Pump Unit Management Program, a demonstration program showing farmers how to improve energy efficiency of their irrigation pumping plants. Paul was instrumental in designing an irrigation scheduling program for the AGNET computer system which can be run from remote terminals. He is the author of numerous articles and has received many other awards for his work in irrigation.

Congratulations, Paul, for this well-deserved award.

#### DIRECTOR OF DWR RESIGNS

John W. Neugerger, Director of the Nebraska Department of Water Resources (DWR) for the past 3 1/4 years, submitted his resignation to Governor Charles Thone effective January 31. On February 1, he assumed a position with the Omaha-based Northern Plains Natural Gas Company as Manager of Government Relations.

Neuberger told Governor Thone that he decided to accept a new position in the private sector because he was "challenged by the need and importance of the Company's 1,131 mile Northern Border Pipeline Project to meet the immediate energy needs of the nation. Being part of the management team responsible for moving the 'eastern leg' of the Alaska Natural Gas Transportation System from the planning stages to reality will be another key step in my professional growth and career in natural resources. A change of venue from water regulation



back to energy resources will compliment my past experience as Manager of Interior's 1971-72 Southwest Energy Study".

Governor Thone has designated Deputy Director J. Michael Jess to serve as Acting Director until a successor is named.

The Department of Water Resources has been given broad responsibilities by the Legislature to administer and enforce state water laws, carry out agreements on interstate streams, survey and compile data on the flow and quality of Nebraska streams, approve plans for dams and reservoirs, inspect dams for safety, issue flood plains permits, register ground water wells, and issue permits for new wells in designated Ground Water Control Areas. The Director also serves on the Governor's Interagency Coordinating Committee (IWCC) and chairs the Nebraska Water Data Coordination Committee.

#### FEDERAL HIGHLIGHTS

##### EPA ANNOUNCES GROUNDWATER PROTECTION PLAN

The Environmental Protection Agency (EPA) recently released its proposed Groundwater Protection Strategy. Public hearings and workshops in five cities were held during January. Closing date for public comments on the proposed strategy is February 18, 1981.

The EPA strategy proposes a three-tiered classification system. Level I would provide for protection of those aquifers that are important sources of drinking water, with stringent limits on hazardous waste facilities, septic tank systems, industry, energy development, and other activities that post a threat to groundwater. Level II would protect aquifers that could supply drinking water and would probably include most fresh groundwater. Level III would allow limited degradation in "those areas which provide the best opportunity for mitigating adverse effects" associated with such activities as energy production, agriculture, industrial uses, or waste disposal. Adoption of the classification system would mean that groundwater of drinking water quality will be considered a drinking water source and will be assured of protection.

To submit public comments or for further information, write Ms. Marian Mlay, Associate Deputy Assistant Administrator for Drinking Water, WH-550, Environmental Protection Agency, 401 "M" Street, S.W., Washington, D.C. 20460. Requests for copies of the full strategy may be telephoned to (800) 424-9159.



## FIVE-YEAR WATER RESEARCH GOALS AND OBJECTIVES

P.L. 95-467 (the Water Research and Development Act of 1978) states that "The Secretary (of Interior) shall develop a five-year water resources research program in cooperation with the institutes and appropriate water entities, indicating goals, objectives, priorities and funding requirements". In October 1980, the State Water Institutes completed individual Five-Year Water Resources Research Programs for their states. Reports of the individual states within each of the eight Office of Water Research and Technology (OWRT) regions were then combined into regional reports. Highlights from these eight regional reports provided material for OWRT's five-year program of water research goals and objectives. OWRT's program will then be combined with other pertinent federal agency reports into a Federal Five-Year Water Resources Research Program. This document is scheduled for completion during the summer of 1981, and will be reviewed by the National Research Council of the National Academy of Sciences for validity, breadth and appropriateness of the recommended five-year program.

## CONFERENCES

### VEGETATION MANAGEMENT FOR MUNICIPAL WASTEWATER LAND APPLICATION SYSTEMS

The Michigan State University Institute of Water Research in cooperation with the U.S. Environmental Protection Agency will sponsor a conference on "Vegetation Management for Municipal Wastewater Land Application Systems: Great Lakes Region of the United States" on February 23-24, 1981, at the Michigan State University Kellogg Conference Center.

The conference is designed to review, discuss, and recommend vegetation management strategies and cultivars which can be used most effectively in slow rate and overland flow municipal land treatment systems in the north central region of the United States. The speakers will devote special emphasis to the identification of future research needs leading to the development of new vegetation management strategies.

Registration fee is \$10 with meal costs extra. For further information, contact: Howard Bernson, Conference Consultant, Lifelong Education Programs, Michigan State University, East Lansing, Michigan 48824. Telephone: (517) 355-4557.



#### ACID PRECIPITATION CONFERENCE

A conference on "The Effects of Acid Precipitation on Ecological Systems in the Great Lakes Region of the United States" will be held at Michigan State University's Kellogg Conference Center on April 1-3, 1981. In a multidisciplinary forum, twenty-five scientists will exchange information on the ecological impact of acid rain. Sessions will focus on sources, monitoring, and the resultant effects on aquatic and terrestrial ecosystems, particularly in the Great Lakes Region. The participants will also identify future research needs and suggest priorities among them.

The conference is sponsored by the Michigan State University Institute of Water Research in cooperation with the U.S. Department of the Interior's Office of Water Research and Technology, U.S. Park Service, U.S. Fish and Wildlife Service, and the U.S. Environmental Protection Agency's Acid Precipitation program. For more information, contact: Howard Bernson, Conference Coordinator, University Conference and Institutes, 49 Kellogg Center, Michigan State University, East Lansing, Michigan 48824. Telephone: (517) 355-4557.

#### NATIONAL WATER CONSERVATION CONFERENCE

A National Water Conservation Conference -- Publicly Supplied Potable Water will be held April 14-15, 1981, at the Denver Hilton Hotel in Denver, Colorado. The conference is sponsored by the Office of Water Research and Technology, U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, U.S. Department of Housing and Urban Development, U.S. Water Resources Council, and National Bureau of Standards.

The conference will examine the interaction between local and state water management with federal programs that provide assistance and incentives for water conservation. Day-to-day experiences, east vs. west, and conservation of supply vs. demand management will be highlighted. Attendees will have the option of selecting two of eight workshop sessions based on subject areas of professional and personal interest: economics, technology, education, planning, water law and allocation, and manuals and handbooks.

There is no fee for conference registration. However, attendance will be limited and early registration is encouraged. An optional luncheon/coffee fee of \$45.00 will cover all luncheons and coffee breaks.



For additional information or to obtain a registration form, contact: Gail Cioban or Sheri Marshall, National Water Conservation Conference, c/o Enviro Control, Inc., P.O. Box 827, Rockville, Maryland 20851. Telephone: (301) 468-2500.

#### SHORT COURSE ON ADVANCED WASTEWATER TREATMENT PROCESSES

A short course on "How to Use and Design Advanced Wastewater Treatment Processes" will be held at Lake Tahoe, Nevada, April 13-17, 1981.

The objectives of this course are to present the current state-of-the-art of advanced wastewater treatment, to elucidate design criteria and procedures, and to demonstrate experience with existing facilities. The course is designed to aid managers who must make decisions concerning advanced waste treatment, engineers who must design and cost the facilities, and regulatory personnel who must implement adequate water quality standards.

For additional information, contact: P. A. Krenkel, Executive Director, Water Resources Center, Desert Research Institute, P.O. Box 60220, Reno, Nevada 89506. Telephone: (702) 673-7361.

#### SHORT COURSE ON HIERARCHICAL-MULTIOBJECTIVE APPROACH IN WATER RESOURCES PLANNING AND MANAGEMENT

The 10th Annual Short Course on Hierarchical-Multiobjective Approach in Water Resources Planning and Management will be presented May 18-22, 1981, at Case Western Reserve University. Co-sponsored by the International Water Resources Association, the 1981 theme is "Risk-Benefit Analysis in the Revised Water Resources Council's Principles, Standards and Procedures".

The purpose of the short course is to present the state-of-the-art in the field of large-scale systems engineering as applied to the planning and management of water and related land resources systems. In particular, to discuss the applications of decomposition and hierarchical coordination of large-scale systems to water resource problems, which are often characterized by multiple noncommensurable objectives. Risk, benefits and costs will be discussed within the hierarchical multiobjective framework. The course is designed for engineers, hydrologists and public officials concerned with the planning, operation and management of water and related land resources systems.



The course fee is \$380 which includes complete course notes, three books and use of a laboratory. To insure enrollment, individual names must be received by May 1, 1981. For additional information or registration forms, contact: M. A. Pelot, Center for Large-Scale Systems and Policy Analysis, Room 612C Crawford Building, Case Western Reserve University, Cleveland, Ohio 44106. Telephone: (216) 368-4492.

#### AGRICULTURAL MANAGEMENT AND WATER QUALITY

A national conference on "Agricultural Management and Water Quality" will be held May 26-29, 1981, at Iowa State University, Ames, Iowa. The conference is sponsored by the Department of Agricultural Engineering, Iowa State University and the US EPA, Environmental Research Laboratory, Athens, Georgia.

The conference is designed to gather and disseminate information on the state-of-the-art relative to agricultural nonpoint source pollution problems and their management. The papers presented will cover work from various institutions, including universities, government agencies, and practicing engineering groups. A proceedings will be published in hard-cover book.

The registration fee is \$35.00, payable in advance. The fee covers refreshment breaks, materials and one copy of the proceedings. Meals are not included but may be requested on the registration form. Pre-registration is requested by May 8, 1981. Questions about registration should be directed to Marilyn Scott, Office of Continuing Education, 102 Scheman Building, Iowa State University, Ames, Iowa 50011. Telephone: (515) 294-1400.

For additional program information, contact: Conference Coordinator, Department of Agricultural Engineering, Iowa State University, Ames, Iowa 50011. Telephone: (515) 294-2871.

#### SHORT COURSE ON UNSTEADY FLOW IN PIPELINES

A short course on fluid transients in piping systems will be presented at The University of Michigan July 6-10, 1981. The course is intended for practicing engineers who desire an understanding of transient flow in fluid systems and who wish to acquire a capability in problem solutions with the digital computer. Emphasis will be placed on the solution of practical problems in a variety of fields such as fluid transportation systems, cooling water condensor systems in power plants, and complex piping systems that include various boundary conditions.



Topics will include concepts of transient flow; derivation of basic equations for liquids and transformation by method of characteristics; series, branching, and looped systems; boundary conditions such as turbomachines, valves, air chambers, surge devices, condensers, etc.; vapor column separation; natural gas unsteady flow in pipeline systems, transients in liquified natural gas systems.

For further information, contact: Professor E. Benjamin Wylie, Department of Civil Engineering, University of Michigan, Ann Arbor, Michigan 48109.

#### POSITIONS AVAILABLE

##### DIRECTOR, WATER RESOURCES RESEARCH CENTER

The University of Massachusetts, Amherst, is seeking a Director for the Water Resources Research Center. Starting date will be September 1, 1981.

The Director's specific responsibilities include: (1) identify jointly with the state water resources agencies, the major water resources problems in Massachusetts; (2) encourage University faculty representing many disciplines to prepare proposals for research, including interdisciplinary research responsive to state and regional problems; (3) initiate the preparation of research proposals by the Water Resources Research Center, and conduct funded research; (4) manage the research program including: assist University faculty in preparing research proposals; evaluate proposals for scientific merit and relevancy to need; collaborate and consult with water resources officials of the state; arrange for timely preparation of progress, annual, special and project completion reports; (5) work jointly with University departments in establishing new, important educational programs in water resources and related multidisciplinary fields; (6) improve and administer an information dissemination service designed to respond to the needs of various categories of users of information; and (7) assume responsibility for managing all funds received by the University for support related to the Water Resources Research Center's operations, within the rules and procedures of the University of Massachusetts and of fund granting agencies including the Office of Water Research and Technology.

Departmental affiliation and salary will be commensurate with experience. Interested candidates should submit applications and resumes by March 20, 1981, to: Search



Committee for the Water Resources Research Center Director, A217 Graduate Research Center, University of Massachusetts, Amherst, Massachusetts 01003.

The University of Massachusetts is an Equal Opportunity/Affirmative Action Employer.

#### ENVIRONMENTAL ENGINEERING FACULTY POSITION

The Department of Environmental Sciences and Engineering of the University of North Carolina at Chapel Hill is soliciting applications for a tenure track position at the Assistant or Associate Professor level in the field of water resources engineering. Responsibilities include teaching and research at the graduate level.

Applicants must have a Ph.D. in engineering with a speciality in planning or design of water resources systems. Experience with water resources management in developing countries is desirable but not mandatory.

Interested applicants should send resumes and names of references to: Donald T. Lauria, Department of Environmental Sciences and Engineering, School of Public Health, University of North Carolina, Chapel Hill, North Carolina 27514. Telephone: (919) 966-1023.

The University of North Carolina is an Equal Opportunity/Affirmative Action Employer.

#### RESEARCH POSITION

Applications are invited for the position of Assistant Professor or Associate Professor (tenure or research track), starting July 1, 1981, at Utah State University. Applicants should have a Ph.D. in Civil Engineering or related sciences and demonstrated research ability in the mathematical modeling of water quality and quantity systems (deterministic and stochastic methods to hydroquality modeling and groundwater analysis) with interest in salinity control applications.

Responsibilities include preparing proposals, directing research, teaching, and conducting short courses. Salary ranges from \$23,000 to \$32,000 (12-month basis) commensurate with qualifications and experience. Application deadline is April 1, 1981.



Interested applicants should send resume and names and addresses of three references to L. Douglas James, Director, Utah Water Research Laboratory, UMC 82, Utah State University, Logan, Utah 84322.

Utah State University is an Affirmative Action/Equal Opportunity Employer.

#### ENDOWED CHAIR IN NATURAL RESOURCES ENGINEERING

Applications are invited for the Charles Carter Newman Endowed Chair of Natural Resources Engineering at Clemson University. Applicants should have an earned doctorate in engineering and a proven teaching and research record in areas closely associated with natural resources. Applicants should possess sincere interest in the conservation and development of natural resources with concurrent environmental protection. This twelve-month position carries the title of Professor of Agricultural Engineering. Starting salary is open.

Interested candidates should send application and resume to Dr. B. K. Webb, Head, Department of Agricultural Engineering, Clemson University, Clemson, South Carolina 29631 before May 1, 1981.

Clemson University is an Affirmative Action/Equal Opportunity Employer.

#### FACULTY POSITION

The Department of Geography and Environmental Engineering at The Johns Hopkins University invites applications at the Assistant Professor level for a tenure track position in the area of flow in permeable media. Potential areas of interest include behavior of soil moisture and groundwater, and related aspects of environmental engineering involving hydrology and surficial earth processes.

Candidates' background should include familiarity with modeling techniques as well as appropriate natural sciences. The individual and his interests rather than field of specialization are of primary importance. The Department is an interdisciplinary one including environmental engineering, earth sciences, and the social sciences related to resource management. It is anticipated that this opening will be filled by July 1, 1981.



Applications and names of three references should be sent to Dr. M. Gordon Wolman, Chairman, Department of Geography and Environmental Engineering, The Johns Hopkins University, Baltimore, Maryland 21218. Telephone: (301) 338-7090.

The Johns Hopkins University is an Equal Opportunity/Affirmative Action Employer.

#### FACULTY POSITION

A faculty position is available in Hydromechanics and Water Resources in the Department of Civil and Mineral Engineering, University of Minnesota. Candidates must have a strong interest in teaching and research in one of the following areas: Fluid Mechanics, Coastal Engineering, Energy Systems, Turbulence, and Water Resources.

Required qualifications include teaching ability or potential and ability to attract research support. Rank and salary are negotiable.

Applications should include at last three professional references and a statement on how the candidate would contribute to the current research program and the academic requirements of both undergraduate and graduate programs in the Department. Send resumes to: Dr. Roger E. A. Arndt, Director, St. Anthony Falls Hydraulic Laboratory, Mississippi River at Third Avenue S.E., Minneapolis, Minnesota 55414.

The University of Minnesota is an Equal Opportunity Educator and Employer and specifically invites and encourages applications from women and minorities.

#### SCIENTIFIC ADVISOR SOUGHT

The Office of the Assistant Secretary of the Army (Civil Works) is seeking applications for the position of Scientific Advisor for the academic year beginning September 1981. This staff position has normally been filled each year by a university faculty member who, by virtue of academic training and research, brings specialized knowledge and analytical skills to bear on policy issues of concern to the Army Secretariat.

For the academic year beginning September 1981, an economist with the rank of at least associate professor (or equivalent) is being sought for this position. An assignment agreement setting forth specific conditions of employment would be negotiated between the successful candidate's



university and the Department of the Army pursuant to the provisions of the Intergovernmental Personnel Act of 1970. Salary for this position varies depending upon the candidate's qualifications; however, compensation normally has been at the GS-15, Step 1, level, which currently is \$44,547.

Economists interested in this position should have specialized training in micro-economic theory and/or econometrics and have research interests related to natural resources management or transportation. Examples of policy issues of concern to the Army Secretariat currently include evaluation of environmental assessment methodologies; improved benefit-cost estimating techniques, particularly in the areas of navigation and hydroelectric power; conservation-based water pricing plans; and the Corps of Engineers Regulatory Program. Research and publications in these or related areas will be weighted heavily in the evaluation of candidates.

Interested applicants should submit a complete Standard Form 171 (Personal Qualifications Statement) to: The Assistant Secretary of the Army (Civil Works), Room 2E570, The Pentagon, Washington, D.C. 20310. Applications must be received by March 1, 1981, in order to receive consideration for appointment for the year beginning September 1981.

The Department of the Army is an Equal Opportunity Employer and invites applications from all individuals who believe they are eligible for the Scientific Advisor position.

#### GRADUATE TRAINING OPPORTUNITY

Opportunities for graduate training and research in water resources and sanitary engineering are available in the College of Engineering of the University of Colorado. A strong departmental program has been developed by the Department of Civil, Environmental, and Architectural Engineering to provide in-depth training in water quality control and management and broad based studies in water management and engineering. Administered through the Center for Urban Engineering Studies in cooperation with the department, several forms of financial assistance are available to participating students with backgrounds in engineering, chemistry, biology, or related sciences. These include research assistantships, departmental teaching assistantships and fellowships and scholarships.

Applicants interested in graduate programs in (1) water resources engineering or (2) the chemical and biological aspects of water quality may apply to: Dr. G. G. Goble, Chairman, Department of Civil, Environmental, and Architectural Engineering, Engineering Center, OT 4-34, Box 428, University of Colorado, Boulder, Colorado 80309.



## RESEARCH REVIEW

PROJECT TITLE: Estimation of Ground Water Recharge  
Benefits for Irrigation Use

PRINCIPAL INVESTIGATOR: Raymond J. Supalla  
Associate Professor  
Department of Agricultural  
Economics  
University of Nebraska-Lincoln

One of the management alternatives being considered in regions experiencing groundwater mining is artificial recharge. The purpose of this project was to analyze the economic feasibility of recharge for irrigation use. A procedure for estimating recharge benefits was developed, and the benefit estimating procedure was applied to a proposed Nebraska case. Literature regarding recharge program costs was reviewed and costs for recharge projects were estimated.

The benefit estimating procedure considers two types of benefits: those due to reduced pumping lifts and those due to extended aquifer life. Since decision makers frequently have minimum hydrologic data available, procedures for estimating recharge impacts under limited data availability were developed.

Recharge benefits were estimated under different assumptions regarding lift effects, energy prices, farm commodity prices and discount rates. It was found that recharge benefits in irrigation use areas could range from less than \$2 to nearly \$20 an acre foot, with the most likely value being in the \$5 to \$10 range.

When estimated benefits were compared to available published data on recharge costs, it was found that single-purpose recharge projects to augment water supplies for irrigation would be economically infeasible in most cases. If artificial recharge is to be a viable option it must be pursued as part a multi-purpose water development project.



# NEWSLETTER ITEMS SOLICITED

The WATER CURRENT Newsletter will publish, without charge, announcements, programs for upcoming conferences, employment opportunities or other newsworthy items on hydrology, water resources or related topics.

## QUESTIONS AND INQUIRIES

Newsletter items and inquiries should be sent to:  
Editor, Nebraska Water Resources Center, 310 Ag. Hall - East  
Campus, University of Nebraska, Lincoln, Nebraska 68583; or  
phone (402) 472-3305.

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