

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

---

Water Current Newsletter

Water Center, The

---

11-1980

**Water Current, Volume 12, No. 6, November/December 1980**

Follow this and additional works at: [https://digitalcommons.unl.edu/water\\_currentnews](https://digitalcommons.unl.edu/water_currentnews)



Part of the [Water Resource Management Commons](#)

---

"Water Current, Volume 12, No. 6, November/December 1980" (1980). *Water Current Newsletter*. 131.  
[https://digitalcommons.unl.edu/water\\_currentnews/131](https://digitalcommons.unl.edu/water_currentnews/131)

This Article is brought to you for free and open access by the Water Center, The at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Water Current Newsletter by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

# Water Current

11-12/1980

May the joys of the Christmas season continue  
throughout the New Year . . . . .

SEASONS GREETINGS FROM THE NWRC STAFF!

Karen Stark

Bill Powers

Bob Burns

Mary-Louise Turner

Mary Puckler

Barbara Mitchell

Patty Thorne

Tom Geh

Don Rodchuk

Jessie Ferguson

Ann Miller

Ran Sobashinski

Robin Albert



ON THE HOMEFRONT

PROPOSAL DEADLINE FOR OWRT ANNUAL COOPERATIVE PROGRAM

The deadline for submission of research proposals to the Water Resources Center under the Office of Water Research and Technology (OWRT) Annual Cooperative Program for fiscal year 1982 funding is February 1, 1981. Proposals must be received in the Water Center Director's office by this date for review by the Executive Committee and submission to OWRT by May 1, 1981.

Researchers are asked to contact the Water Center Director by telephone concerning the topic of their proposal; however, preproposals are NOT necessary for this program. Specific information on proposal preparation is also available through the Water Center, and copies of "General Guidelines and Regulations of the Water Resources Center" will be available shortly.

The following is a list of high priority water resources problems in Nebraska developed for the Nebraska Water Resources Center Five-Year Water Resources Research Program. These are the priority areas for research under the Annual Cooperative Program, and proposals will be evaluated for their relevance to Nebraska problems based on this list.

HIGH PRIORITY WATER RESOURCES PROBLEMS IN NEBRASKA

October 1980

A. WATER QUALITY

- (1) Leaching of pesticides and fertilizers into groundwater
- (2) Agricultural runoff into surface water -- chemicals and nutrients
- (3) Maintaining minimum streamflows to sustain water quality
- (4) Eutrophication of lakes and reservoirs
- (5) Reusing irrigation return flows and reusing wastewater

B. WATER QUANTITY

- (1) Effects of ground and surface water declines
- (2) Transbasin diversions to overcome local water deficiencies
- (3) Minimum streamflows for wildlife and aquatic habitat
- (4) Recharge of groundwater aquifers

C. DISTRIBUTION AND REDISTRIBUTION

- (1) Interstate and intrastate transbasin diversions
- (2) Conflicts between ground and surface water users over groundwater depletions
- (3) Temporal distribution of water supplies -- water storage structures of aquifers

D. WATER USE EFFICIENCY, CONSERVATION AND PRODUCTIVITY

- (1) Irrigation scheduling and management
- (2) Studies of evapotranspiration (ET) potential
- (3) Conjunctive use of ground and surface water
- (4) Development of water efficient crops and forage

E. LEGAL-INSTITUTIONAL, ECONOMIC

- (1) Evaluating the economic and social consequences of transbasin diversions
- (2) Clarifying and defining the roles of regional, state and local entities with water resources management capabilities
- (3) Effects of legal recognition of ground and surface water interrelationships and methods for conflict resolution

For additional information or to discuss research proposal ideas, contact the Director's office, Water Resources Center, 310 Ag. Hall, University of Nebraska, Lincoln, Nebraska 68583. Telephone: (402) 472-3305.

NEW STAFF ADDITION

The Water Resources Center is pleased to announce the hiring of Susan Miller, Research Technician III. Susan will be working with Water Center staff members, and other University faculty on various projects including research planning development, publication preparation and background research, educational programs, and other specific research projects.

Susan previously worked for the Water Center while she was attending the University of Nebraska-Lincoln where she received her B.S. degree in Environmental Studies in 1978.

We are pleased to welcome Susan back to the Water Center and are sure that she will be able to provide many valuable services. We urge you to get acquainted with Susan and let us know how she might help you.

### LEGISLATIVE RECORD AVAILABLE

When the 1981 Nebraska Legislature convenes in January, Bob Burns of the Water Resources Center staff will begin collecting appropriate water-related bills which are introduced, along with daily Legislative Journals and other appropriate related publications. In addition, Bob will weekly update the status of each bill. This collection will be kept in three-ring notebooks in the Water Center office and should provide an up-to-date account of water-related legislation in Nebraska. This information will be available to the public for inspection.

### GENERAL GUIDELINES AVAILABLE

The Nebraska Water Resources Center has just completed a publication entitled "General Guidelines and Regulations of the Nebraska Water Resources Center". This publication was developed to acquaint principal investigators with general operating procedures of the Center. Detailed procedures are included which indicate the reporting requirements. Information related to fiscal matters and various other policies is also provided.

Copies will be furnished to all current principal investigators. Anyone desiring a copy should contact the Nebraska Water Resources Center, 310 Ag. Hall, University of Nebraska, Lincoln, Nebraska 68583.

### WATER RESOURCES SEMINAR SERIES

Once again the Nebraska Water Resources Center will sponsor an Interdisciplinary Water Resources Seminar Series during the 1981 spring semester. The intent of these seminars is to bring together upper classmen, graduate students, professional persons, faculty and others interested in water topics. This year the series will focus on "Water Resources Research at the University of Nebraska." The seminars will be held on Tuesday afternoons beginning January 13, 1981 from 3:00 to approximately 5:00 p.m. in the East Campus Union Building.

Students wishing to receive one or two hours credit should register, with their advisor's permission, in their departmental seminar and/or special studies course listings. Attendance and note-taking will satisfy the one-hour requirement; a term paper will be an added requirement for anyone wishing to receive two credit hours.

A schedule of seminar topics follows. For additional information, contact the Water Resources Center at 472-3305.

- |            |  |
|------------|--|
| January 13 | REGISTRATION, INSTRUCTIONS, GENERAL OVERVIEW   |
| January 20 | OVERVIEW OF WATER RESOURCES AND WATER PROBLEMS IN NEBRASKA<br>- Vince Dreeszen, Conservation & Survey Division<br>- Paul Gessaman, Dept. of Agricultural Economics |
| January 27 | NON-POINT SOURCE POLLUTION -- Nitrates<br>- Kenneth Frank, Dept. of Agronomy, South Central Station<br>- Roy Spalding, Conservation & Survey Division              |

- February 3      NON-POINT SOURCE POLLUTION -- Agricultural Runoff & Sedimentation
- Denis Gilbert, Nebr. Water Resources Center
  - James Schepers, Dept. of Agronomy, USDA-SEA-AR
  - Elbert Dickey, Dept. of Agricultural Engineering
- February 10     WATER CONSERVATION
- Howard Wittmuss, Dept. of Agricultural Engineering
  - Charles Fenster, Dept. of Agronomy, Panhandle Station
- February 17     WATER USE EFFICIENCY -- Irrigation Scheduling & Crop Modeling
- Paul Fischbach, Dept. of Agricultural Engineering
  - George Meyer, Dept. of Agricultural Engineering
- February 24     METEOROLOGY AND DROUGHT MANAGEMENT
- Norman Rosenberg, Center for Ag. Meteorology & Climatology
  - Blaine Blad, Center for Ag. Meteorology & Climatology
- March 3         WATER USE EFFICIENCY -- Crop Water Use
- John Norman, Dept. of Agronomy
  - Jerry Eastin, Dept. of Agronomy
- March 10        NEBRASKA WATER CONFERENCE -- NO CLASS
- March 17        GROUND AND SURFACE WATER HYDROLOGY
- Darryll Pederson, Conservation & Survey Division
  - Ralph Marlette, Dept. 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
- April 7         WILDLIFE AND RECREATION
- Edward Peters, Dept. of Forestry, Fisheries & Wildlife
  - Richard Stasiak, Dept. of Biology, UNO
- April 14        HISTORICAL AND SOCIAL CONSIDERATIONS
- M.-L. Quinn, Nebr. Water Resources Center
  - Susan Welch, Dept. of Political Science
- April 21        LEGAL, INSTITUTIONAL AND ECONOMIC ASPECTS
- J. David Aiken, Dept. of Agricultural Economics
  - Raymond Supalla, Dept. of Agricultural Economics
- April 28        WATER RESOURCES PLANNING AND MANAGEMENT
- Bob Burns, Nebr. Water Resources Center
  - Donn Rodekohr, Nebr. Water Resources Center

## WATER RESOURCES IN NEBRASKA

### MRBC LAUNCHES MISSOURI RIVER FLOOD PLAIN STUDY

The Missouri River Basin Commission (MRBC) is beginning a two-year study of the flood plain along the Missouri River from Ponca, Nebraska, to the river mouth above St. Louis, Missouri.

The study will involve state and local officials from five states--Iowa, South Dakota, Nebraska, Kansas and Missouri. Federal agencies with program or regulatory responsibilities in the flood plain also will be participating. The study will be paid for with \$100,000 in state contributions and \$300,000 in federal funds from the U.S. Water Resources Council.

The study will: (1) collect and organize information about existing resources and land management practices in the flood plain; (2) determine the extent of the potential flood hazards if nothing is done; and (3) recommend a policy or plan to guide and promote interstate, interagency cooperation in developing a flood hazard management strategy for the entire 752-mile length of the flood plain.

### INTERIM STUDY ON IRRIGATED WESTERN FARMLANDS INDICATES MOST ARE SMALL OPERATIONS

A new interim study released by the Water and Power Resources Service reveals that more than 90 percent of the farmers, served by Federal project water and subject to legal acreage limitations thereby, own 160 acres or less. Approximately 97 percent of farm operations in the projects are smaller than 960 acres. Also, 97 percent operating irrigated western farmlands live on that land or within 30 miles of it.

The study reports there are some large exceptions to the general rule. The 435 largest farm operations served by Federal project water - of approximately 1,900 acres or more - control approximately 1.6 million acres in all. The most numerous and largest of these are located in the State of California.

The report, produced by personnel from the Service and from the Department of Agriculture's Economic, Statistics and Cooperative Service, bases findings on data from detailed surveys from 16 case study districts and statistical samplings from 105 random districts selected from the West's 410 water districts.

The report contains three major studies to be used in the preparation of an EIS (environmental impact statement) on proposed rules for acreage limitations for farms receiving Federal irrigation project water in the 17 western states. The draft EIS is scheduled for publication in December 1980. Land tenure, agricultural economics, and costs of Federal irrigation water supplies are covered in the recent report.

Secretary Andrus said the interim report indicates that firm rules of acreage limitation and of residency (within a 50-mile radius) will not impose harsh burdens on the majority of owner-operators. He said, "They're doing it already, most of them, as these figures demonstrate. But there are some large operators who seem to be reaping the economic benefits of the Federal subsidy with large landholdings which were not intended when Congress wrote the existing law."

## CONSERVATION AND SURVEY DIVISION

An investigation is currently underway to develop procedures for using surface electrical resistivity measurements to locate contaminated groundwater plumes. Two principal sites have been studied to date. One involves an industrial plant and the other is a municipal sewage lagoon. Darryll Pederson of the Conservation and Survey Division and Owen Goodenkauf of the Nebraska Public Health Department are the co-investigators on the project.

### FEDERAL HIGHLIGHTS

#### FEDERAL WATER RESOURCES RESEARCH PRIORITIES

The Water Resources Research Review Committee, National Research Council, has prepared a report entitled Water Resources Research Priorities for the F.Y. 1982 Budget. The National Academy Press in Washington, D.C. released the report September 15, 1980.

The Water Resources Research Priorities for the F.Y. 1982 Budget, (herein and after referred to as the NRC Report) was prepared as advice to the Office of Science and Technology Policy and the Office of Management and Budget for preparation of the President's budget for F.Y. 1982. The NRC Report is divided into several sections. A preface included a list of the review committee members and workshop participants along with a short explanation as to why such a set of priorities was developed. Sections one through six are: an introduction; the background for the committee's work; water research goals and objectives, programming of research activities; the research classification system; and the research priorities. The report is about 35 pages in length.

The section on the background for committee's work is a review of the various documents that have been published on water research activities since 1963. These include the document prepared by the Office of Water Research and Technology on April 1979 and revision on May 1, 1979. Section three on Water Research Goals and Objectives is an analysis of some of the water problems in the nation. In Section four, Programming of Research Activities, the NRC Report discusses the relationship of research, development and technology transfer. The broad subject of programming research is discussed including a section on anticipated trends. This section also presents the basis for setting the priorities along with a definition of the three priority classes of critical, urgent, and important. Section five establishes a research classification system of five separate categories, and it mentions that the subject of technology transfer is not covered in this report. In Section six the Council discusses the critical, urgent, and important research priorities under each of the five categories. In this section there is a table that lists the Water Resources Research areas by priority. This table is presented below for your information. Finally, there are discussions of research of lower priority and of the need for continuing coordination and review.



TABLE 1: WATER RESOURCES RESEARCH AREAS BY PRIORITY

CRITICAL PRIORITY

Atmospheric, Hydrologic, and Hydraulic Processes

Hydrologic characteristics of the vadose zone  
Atmospheric transport and precipitation of contaminants

Ecological-Environmental Relationships in Water Resources

Effects of contaminants on ecosystems and species  
Significance of trace contaminants to human health  
Effects of pollutants in marshes, estuaries, and oceans

Water Quality Processes, Prediction, and Protection

Options for water re-use  
Control of contaminants resulting from energy development

Water Resources Management

Water problems of food and fiber production in stressed environments

Institutional, Political, Legal, Behavioral, and Economic Analysis

Institutional arrangements for reallocation of water  
Institutional arrangements for ground-water management (quality and quantity)

URGENT PRIORITY

Atmospheric, Hydrologic, and Hydraulic Processes

Flood frequency determination  
Hydrological inputs to water quality monitoring  
Climate variability and trends  
Erosion, sedimentation, and nutrient transport

Ecological-Environmental Relationships in Water Resources

Resource degradation as a result of water project operation  
Physical use or modification of wetlands and estuaries

Water Quality Processes, Prediction, and Protection

Transport and fate of contaminants resulting from land disposal of wastes

Water Resources Management

Conjunctive anagement of ground and surface water to meet competing needs  
Water conservation in municipal, industrial, energy, and agricultural uses  
Control of pollution from non-point sources  
Methodologies for water resources planning

Institutional, Political, Legal, Behavioral, and Economic Analysis

Reallocation of responsibility for water and related resource management among federal, state, and local levels of government  
Institutional arrangements for water conservation  
Improved programs for flood and drought hazard mitigation  
Management and resolution of conflicts over alternative courses of action  
Institutional arrangements for achieving erosion and sediment control

IMPORTANT PRIORITY

Atmospheric, Hydrologic, and Hydraulic Processes

Weather and hydrologic forecasting

Water Quality Processes, Prediction, and Protection

Monitoring of waste treatment effects

Water Resources Management

Management of resources under flood and drought hazard

Institutional, Political, Legal, Behavioral, and Economic Analysis

Impacts of water management policies and programs  
Institutional arrangements for water resources research

In addition to the preparation of the NRC Report, the NRC Water Resources Research Review Committee has been requested to prepare a report to be completed in the Spring of 1981, after a committee review of the 5-Year Research Programs that are now in the final stages of completion by all federal agencies that undertake and/or finance water research, including OWRT and the associated state water resources research institutes.

The Water Resources Research Review Committee welcomes comments anyone in the water research community would care to make on the NRC Report discussed above in order to assist the Committee prepare the report due in Spring 1981. Differences of opinions on research priorities and reasons for such differences are especially welcomed. Comments should be addressed to:

Theodore Shad, Deputy Director  
Commission on Natural Resources  
National Research Council  
2101 Constitution Avenue  
Washington, D.C. 20418

## CONFERENCES

### AWRA UNIFIED RIVER BASIN MANAGEMENT SYMPOSIUM CANCELLED

In the September/October edition of WATER CURRENT, it was announced that a Unified River Basin Management Symposium-II would be held in Seattle, Washington, in June 1981. We have recently learned that this symposium has been cancelled. Plans for future rescheduling of the symposium are now being considered.

For additional information, contact the American Water Resources Association, St. Anthony Falls Hydraulic Laboratory, Mississippi River at 3rd Avenue, S. E., Minneapolis, Minnesota 55414. Telephone: (612) 376-5050.

### WATER QUALITY MODELING SHORT COURSE

A short course on Water Quality Modeling will be held January 12-16, 1981 in Las Vegas, Nevada, sponsored by the Desert Research Institute, University of Nevada.

The objectives of the course are to define the need and justification for water quality criteria, to establish the constraints imposed by current regulations, to present the fundamentals of modeling techniques, and to demonstrate their applicability to the rational solution of water quality management. The course is designed to aid managers, technicians, regulatory personnel and others who are intimately involved in the decision making process concerning water quality control.

For additional information, contact: Peter A. Krenkel, Executive Director, Water Resources Center, Desert Research Institute, P.O. Box 60220, Reno, Nevada 89506. Telephone: (702) 673-7365.

### WATER QUALITY CONFERENCE

A national conference on Agricultural Management and Water Quality will be held May 26-29, 1981 at Iowa State University, Ames, Iowa.

The program consists of 24 papers covering the following areas: (1) overview and issues of non-point source pollution; (2) agricultural non-point sources and pollutant processes; (3) predicting loads and water quality impacts; (4) agricultural best management practices (BMP's)--evaluation, selection and implementation; and (5) policy issues, trends and summary.

Conference sponsors include the Agricultural Engineering Department, Iowa State University and the Environmental Protection Agency, Environmental Research Laboratory, Athens, Georgia.

To obtain a copy of the program and a pre-registration packet, contact: Frank W. Schaller, Coordinator, Agricultural Engineering Department, Iowa State University, Ames, Iowa 50011.

## PUBLICATIONS

### UPPER MISSOURI WATER AND ENERGY REPORT PUBLISHED

The Water Resources Council has published a summary report of water resources implications of coal conversion in the Upper Missouri region. The report was published in the October 29 Federal Register to solicit comments due by January 27, 1981. It examines the water required for coal gasification and liquefaction and the water availability for such conversion in a 156,000 square mile area of Wyoming, Montana, North Dakota and South Dakota.

The 1974 Federal Nonnuclear Energy Research and Development Act requires Council assessment of water requirements and supply availability for emerging energy technologies. The Upper Missouri study is the first regional study completed; eight other regional studies and four site specific studies are underway.

Under agreement with the Council, the Missouri River Basin Commission conducted the regional assessment of water implications for coal conversion. Representatives of the States of Montana, Wyoming, North Dakota and South Dakota participated in the assessment.

Some of the report's findings indicate that synfuels development of 1.1 million barrels per day oil equivalent by the year 2000 would consume about 250,000 acre-feet of water yearly. Development at a level of 1.7 million barrels per day oil equivalent would consume 350,000 acre-feet annually. Of this, 50,000 and 75,000 respectively would be used for supporting activities--such as coal mining, land reclamation, thermal electric power generation for plant operations and municipal water supply associated with population growth attributed to synfuel development--rather than the conversion process itself.

Development at 1.7 million barrels equivalent per day by 2000 was assumed as the basis of the availability analysis. The study concludes that surface water is generally available in the Upper Missouri River Basin to support coal conversion development, but existing water supply systems would require major modification and expansion to enable the use of available supplies. Possible considerations to provide water at desired plant locations include new storage, transfers, changes in use and groundwater development.

Under the 1974 Federal Nonnuclear Energy Research and Development Act, site specific commercial or demonstration plants involving Federal assistance require detailed Council assessments.

Copies of the preliminary summary report published in the Federal Register on October 29 are available from the Council on request. Comments are due by January 27, 1981. Following receipt of the comments, the Council staff will analyze the comments and revise the report as appropriate. The comments, Council analysis and final report will then be sent to the Secretary of Energy, as required by the 1974 Federal Nonnuclear Research and Development Act.

POSITIONS AVAILABLE

DIRECTOR SOUGHT FOR IDAHO WATER AND ENERGY RESOURCES RESEARCH INSTITUTE

The University of Idaho is accepting applications for the position of Director of the Idaho Water and Energy Resources Research Institute. The Director is responsible for the administration of the Institute. This includes responsibility for activities supported with funding from the Water Resources Research Act of 1964 and subsequent water research legislation and other funding and programs delegated to the Institute. The Director will report to the Director of the University Office of Research.

Specific responsibilities include: (1) promoting, organizing and coordinating water and energy resources research efforts both within the University and cooperatively with other state and regional institutions of higher education; (2) promoting and coordinating Institute activities with users groups and state and federal agencies; (3) generating support for water and energy resources research; (4) evaluating the goals and objectives of the institute as they relate to local, state and national water and energy problems and research needs; (5) coordinating the preparation and dissemination of reports and other publications dealing with activities supported by the Institute; and (6) helping to strengthen and coordinate educational and training programs in water-related areas.

Desired qualifications include extensive training and experience in some specialized field of water and/or energy resources; administrative experience in budget and fiscal matters, policy formulation and personnel management; university teaching experience; research experience including experience in obtaining and administering grants and contracts; ability to work effectively with faculty, University administrators, agency personnel and the public and private sector; an ability to communicate effectively both orally and in writing; and an earned doctorate.

Search and selection procedures will close when a sufficient number of completed applications are identified, but, in any event, no sooner than January 20, 1981. Applicants should submit a complete resume and have three letters of recommendation sent to: Dr. D. W. Fitzsimmons, Chairman, IWERRI Director Screening Committee, Department of Agricultural Engineering, University of Idaho, Moscow, Idaho 83843.

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

FACULTY POSITION OPEN

The Department of Geography and Environmental Engineering at 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. 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.

#### EXECUTIVE DIRECTOR OF AMERICAN WATER RESOURCES ASSOCIATION

The American Water Resources Association solicits applications for the position of EXECUTIVE DIRECTOR. With headquarters in Minneapolis, AWRA is a multidisciplinary professional organization dedicated to the advancement of water resources research, planning development, management, and education. Its bimonthly publication, the Water Resources Bulletin, is recognized as a leading technical journal in the field and provides an outlet for papers in all aspects of water resources.

Applicants should have administrative or managerial abilities and experience. Training and background in a water related field is desirable. Salary is commensurate with qualifications and experience.

Interested applicants should send resume and names of three references, NO LATER THAN JANUARY 15, 1981, to William R. Boggess, General Secretary AWRA, Laboratory of Tree-Ring Research, University of Arizona, Tucson, Arizona 85721.

#### SABBATICAL OPENING IN HYDROLOGY

The Hydrology Laboratory in Beltsville, Maryland, has opportunities for University personnel to spend their sabbatical leaves doing full time research in hydrology and remote sensing applications to hydrology. The research program at the Hydrology Laboratory relates to the Agricultural Research nationwide program on watershed hydrology directed toward evaluating the impact of watershed and river basin management systems on water quantity and quality. The research encompasses all phases of hydrology such as precipitation, snow-melt, evapotranspiration, infiltration, subsurface flow, overland flow and channel flow; however, the emphasis of this assignment is onflow in porous media and the specific problems associated with adapting basic principles to large complex watersheds.

Payment of per diem to cover living costs, or part of one's salary, is possible under this program.

Interested individuals should contact the following for more information, and procedures to apply: Edwin T. Engman, Hydrology Laboratory, PPHI, Room 139, Bldg. 007, BARC - West, Beltsville, Maryland 20705, phone (301) 344-3490.

#### GROUNDWATER HYDROLOGIST

The Idaho Department of Water Resources is seeking applicants for the position of groundwater hydrologist. Training in engineering, geology, or closely related field is required. Some experience preferred but consideration will also be given to applicants completing a master's degree in one of these fields. For further information, contact A. C. Roertson, Idaho Department of Water Resources, Statehouse, Boise, Idaho 83720, phone (208) 334-4485.

The Idaho Department of Water Resources is also seeking applicants for a position whose major emphasis will be in groundwater hydrology. Training in engineering, geology or closely related field is required; however, some knowledge of groundwater chemistry, especially radiochemistry, would also be desirable.

The position entails a variety of field and lab work at a professional level, and requires good ability to communicate, both orally and in writing. For further information, please contact Paul M. Castelin, Idaho Department of Water Resources, Statehouse, Boise, Idaho 83720. Telephone: (208) 344-4291.

#### LECTURE POSITION

The California State University of Sacramento invites applications to fill a one-year lecturer position (possibility of tenure track position) in Civil Engineering with emphasis in Water Resources Engineering.

Duties include teaching undergraduate courses and instructionally related duties, including student advising, academic committee work and curriculum development.

Interested applicants should contact Dr. Vishnu L. Agaskar, Department of Civil Engineering, 6000 J Street, Sacramento, California 95819. Closing date for applications and nominations is January 30, 1981.

California State University, Sacramento is an Equal Employment Opportunity (M/F) Affirmative Action Employer.

#### RESEARCH FACULTY MEMBER

The University of Guam Water Resources Research Center has an opening for a Research Faculty Member. This position would be at the Assistant Professor level for the 1981-82 academic year, with a renewable two-year contract. Duties would involve 2/3 to 3/4 time research and 1/4 to 1/3 time teaching in undergraduate physical science.

Qualifications include a Ph.D. degree in sanitary engineering, environmental engineering or related area.

Salary would range from \$16,570 to \$25,300 for the academic year from local funds depending upon qualifications. Additional vacation salary is readily available from contracts and grants. Round trip air fare and shipment of household goods is provided.

Applications or inquiries should be directed to Dr. Stephen J. Winter, Director, Water Resources Research Center, University of Guam, UGO Station, Mangilao, Guam 96913.

RESEARCH REVIEW

PROJECT TITLE: Remotely Sensed Crop Temperature for Water Resources Management

PRINCIPAL INVESTIGATORS: Blaine L. Blad, Associate Professor  
Norman J. Rosenberg, Professor and Director  
Center for Agricultural Meteorology and Climatology  
University of Nebraska-Lincoln

The overall goal of this project was to evaluate the use of crop temperature data as a tool in the management of water resources. The specific objectives of the studies were: (1) to determine the crop temperature response of some major agronomic crops to various levels of water stress; (2) to test methods based on crop temperature or other remotely sensed data to estimate crop water stress conditions and to evaluate the utility of these methods for their ability to estimate crop yields, severity of water stress and crop phenological development; and (3) to determine the feasibility of using crop temperature as a guide for irrigation scheduling.

Crop temperatures were measured with an infrared thermometer, with attached leaf thermocouples and with airborne multispectral scanners. Corn and sorghum were the principal crops studied. Some data were also obtained for soybeans and alfalfa. Studies were conducted at the University of Nebraska Sandhills Agricultural Laboratory and at the University of Nebraska Mead Field Laboratory.

Primary research findings are summarized as follows:

(1) After about 75% plant cover was achieved, the temperature of well-watered crops measured with an infrared thermometer ( $T_{iR}$ ) agreed to within about 1 C of the temperature measured with attached leaf thermocouples (TTC). For crops under water stress the agreement was found to be within about 2.5 C.

(2) Different species of crops growing under similar climatic conditions and water regimes may have different canopy temperatures. This difference in canopy temperature relates to the crop water use for, in general, the cooler the crop the greater the transpiration and, hence, the water use rate.

(3) Under fully irrigated conditions  $T_{iR}$  values were not affected by plant population but under water stress conditions  $T_{iR}$  was consistently 1-2 C warmer in plots with high plant populations than in plots with low plant populations.

(4) Crop temperatures obtained at mid-day with an IR thermometer when the observed faced north and viewed leaves on the south sides of plants were similar to those obtained when the observed faced south under well-watered conditions. Under water stress conditions crop temperatures obtained when facing north were about 1-2 C warmer than those obtained when facing south.

(5) Crop temperature at mid-day was found to be a function of the level of water stress. Water-stressed plants were often 5 to 7 C warmer than non-stressed plants and differences as great as 12.8 C were observed. At night differences in crop temperature of stressed and non-stressed vegetation were negligible.



(6) The optimum time to measure the maximum temperature difference between water stressed and non-stressed crops was found, generally, to be about 1400 solar time. A good time to make crop temperature measurements is about 1400 hrs.

(7) Summation of the mid-day crop temperature differences (TSD) between water stressed and non-stressed corn during the pollination and grain filling periods was directly related to decreases in final grain yield. In sorghum

Results of the studies summarized above suggest that crop temperature data can be used to assess crop water status. As such, crop temperature data can be used for scheduling irrigation; for detecting and monitoring effects of limited availability of water to crops, conditions which occur during drought and in semi-arid and arid regions; for evaluating the effectiveness of various irrigation scheduling techniques; for examining the uniformity of water application by various irrigation systems; for detecting soil areas with low water holding capacities; and as a means to select plant types which are most effective in tolerating or avoiding shortages of water. Additional research is needed to further evaluate and quantify relationships between crop temperature and crop water status and to answer some of the questions raised in the conduct of our studies thus far.

#### 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 Agricultural Hall, University of Nebraska, Lincoln, Nebraska 68583. Telephone: (402) 472-3305.