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Water Current

Millard W. Hall, Director
Volume 7, Number 6

Karen E. Stork, Editor
July/August 1975

FROM THE DESK OF THE DIRECTOR . . .

It's a pleasure, but a surprise, to be sharing the good life with you in Nebraska. Three and one-half short months ago I was in the rarest of positions--exceedingly happy with my work. I was so pleased with my job as Director of the University of Maine at Orono's Environmental Studies Center that I looked forward to getting to work each day. I was convinced that I had stumbled into the best of all possible worlds. Then . . . wham! Off to Nebraska.

Professionally, I was surprised and delighted to be asked to direct the Nebraska Institute, for I have long shared, with others in my profession, a deep respect for this Institute as one of the best in the nation. I am looking forward to the career challenges that this position offers. Personally speaking, although my family and I enjoyed our years in Maine immensely, we are expecting to enjoy Nebraska just as much.

Bud Viessman is a hard act to follow. With your help over the past several years, he developed the Nebraska Water Resources Research Institute into a unit of national prominence. When he came here in 1969, the Institute was managing 8 projects with a total annual budget of \$100,000. This year, owing largely to his energy, the total budget for 22 projects is almost \$900,000. Water resources professionals have come to regard his conferences, seminars and short-course programs with high esteem. In addition, the Institute office staff is the envy of other water center directors throughout the nation.

The University of Nebraska also has recognized the stature that the Institute has attained, and recently approved expansion of these efforts through the Area of Excellence program in Water Resources Management. So, I have inherited a strong, well-recognized program of activities, resources with which to increase these activities and a talented staff. The challenges are great, and I will need your strong support if I am to meet them successfully, which I mean to do.

My hopes for the future can be simply stated: to make this Institute the very best in terms of water resources research, training and public education activities. My chances for realizing these hopes are greatly enhanced by the tremendous talent in water resources I see around me in Nebraska. If we can all put our heads together and optimize the use of this talent, there is no question but what the Institute's future will be as bright as has been its recent past.

ON THE HOMEFRONT

NEW ADDRESS FOR NWRRI

The Nebraska Water Resources Research Institute has moved its main offices to 310 Ag. Hall on East Campus. Part of the research staff will be located in the old offices at 212 Ag. Engineering, but all mail to the Director and other administrative staff should be directed to the new address.

NEWSLETTER PUBLICATION CHANGE

As you will note, beginning with this edition of Water Current, a new time-table is being adopted. The newsletter will now be published every two months with approximate dates as follows:

January/February	-	February 1
March/April	-	April 1
May/June	-	June 1
July/August	-	August 1
September/October	-	October 1
November/December	-	December 1

NWRRI PUBLICATIONS LIST

The Water Resources Research Institute is adopting a new policy of announcing the receipt of new publications on a bi-weekly basis. The first in such a series has just been mailed to our regular newsletter mailing list. Previously, new publications were listed as part of the Water Current.

If you did not receive a copy of the first Publications List, please contact the Director's Office.

DEADLINE FOR RESEARCH PROPOSALS

Deadlines for filing research proposals for fiscal year 1977 with the Water Resources Research Institute have been established. Matching grant proposals must be received not later than September 15, 1975 and annual allotment proposals not later than December 15, 1975.

Prospective principal investigators should make an appointment to discuss their proposals with the Institute Director before they begin writing.

NWRRI FISCAL YEAR 1976 RESEARCH PROGRAM

The Nebraska Water Resources Research Institute (NWRRI) announces a grant of \$110,000 from the Office of Water Research and Technology (OWRT) for its 1976 annual allotment program. The following 11 projects are included in this grant:

<u>Project No.</u>	<u>Project Title</u>	<u>Principal Investigator</u>
A-032-NEB	Seasonal Water Use of Irrigated Pasture Grasses Under Permanent-Set Irrigation as Related to Climatic Factors	James Nichols North Platte
A-033-NEB	Biological Control of Blue-Green Algae	E. L. Martin School of Life Sciences
A-035-NEB	Investigation of Laser Raman Spectroscopy for Analysis of Water Quality	Frank G. Ullman Electrical Engr.
A-037-NEB	Detection of a Potential Health Hazard in Recreational and Other Surface Waters	William O'Dell Dept. of Biology UNO
A-038-NEB	Computer Modeling to Maximize Water Use Efficiency and Reduce Energy in Irrigation	James R. Gilley Ag. Engineering
A-039-NEB	Mapping Model for Determining Land Suitable for Irrigation	Richard O. Hoffman Ind. & Gen. Engr.
A-040-NEB	Application of Enzyme Methods to the Determination of Pollutants in Water	Khem M. Shahani Food Science & Tech.
A-041-NEB	Wastewater Treatment and Reuse by the Soil-Plant System	James R. Gilley Ag. Engineering
A-042-NEB	Groundwater Recharge Model and Field Project Implementations	Deane Manbeck Ag. Engineering
A-043-NEB	Production of Mucilage by Diatoms in McConaughy, Pawnee and Yankee Hill Lakes and the Role of this Material in the Aquatic Environment	J. R. Rosowski School of Life Sciences
A-044-NEB	Physiological Aspects of Plant Water Use Efficiency	Charles Sullivan Dept. of Agronomy

Matching grant projects funded under Section 101 of the Water Resources Research Act of 1964 for fiscal year 1976 were also recently announced by OWRT. Nebraska received one such grant to Dr. James R. Steadman, Assistant Professor of Plant Pathology. The title of his research project is "Pollution of Irrigation Reuse Water by Plant Pathogens" and is a continuation of previous studies completed with funding by OWRT.

This new project will provide a data base from which specific control measures will be formulated and subsequently tested for efficacy. With respect to the particular organisms to be studied, this project will lead to irrigation system designs which will make the reuse of runoff water from crop lands feasible for crop irrigation. Project objectives include: (1) to measure and evaluate organismal contamination of irrigation reuse water in Nebraska with respect to phytopathogenic bacteria and fungi; (2) to produce a sufficient data base for development of biological assays for testing efficiency of procedures for reduction of phytopathogenic organismal contamination of water; and (3) to test the effectiveness of specific methods to minimize pollution and to determine if effective methods can be incorporated into the design of irrigation reuse systems.

GROUNDWATER RECHARGE STUDY

The University of Nebraska Board of Regents has accepted a two-year \$250,000 contract from the Old West Regional Commission to develop experimental projects in underground water supply recharge. The project will be administered by the Water Resources Research Institute.

The primary site for the project will be in the upper Big Blue River Basin near York and Grand Island as well as the Upper Republican River Basin. The project will: (1) document and evaluate existing recharge systems; (2) determine the amount of water movement from the soil surface to the aquifer through methods of impounded water, recharge wells and flowing water in canals; (3) determine changes in the recharge amounts after initial conditions have been modified; (4) project the measured data to other areas in Nebraska and the region for the most effective recharge; (5) develop selection criteria, including economic evaluation, and procedures for field experimental recharge projects to obtain significant model verification data; (6) determine the areas of Nebraska and the region that are physically suitable for recharge to groundwater supplies for purposes of irrigation withdrawal and other beneficial uses; and (7) demonstrate the practicality of recharge in selected areas.

The project is being undertaken in connection with the Natural Resources Commission and the State Office of Planning and Programming.

IRRIGATION RESEARCH EXPLAINED AT SAL FIELD DAY

"There are two keys to avoid high leaching losses of nitrogen when growing crops in sandy soils--careful irrigation water control and applying only the amount of nitrogen the crop needs."

That was the way Dr. Darrell Watts, irrigation engineer at the University of Nebraska North Platte Station, summed up 1974 research results on water and nitrogen loss on irrigated corn being conducted at the NU Sandhills Agricultural Laboratory (SAL). The study was explained to 350 people attending the third annual SAL field day on August 8.

It was reported that 1974 tests showed that when excess water is applied, the preplant nitrogen tends to move through the soil as a "wave." The "wave", from 200 pounds of nitrogen applied last year as preplant broadcast in early May, moved over five feet in mid July. At the end of three more weeks, the nitrogen wave was down to ten feet since it was a time of heavy irrigation.

Watts said the total nitrogen loss was about 150 pounds per acre for that test. For normal fertilizer application, nitrogen losses run from 8 to 16 pounds for each excess inch of water applied.

Other tour stops and discussions during the SAL field day included: methods of planting corn on sandy soils; rate and frequency of irrigation; fertilizer trials on corn, alfalfa and brome grass; commercial corn variety plots; insect control; and health programs for beef herds. Taking part in the research explanations were staff members from the University of Nebraska-Lincoln and the North Platte Station.

CONFERENCES

NEBRASKA WATER LAW SEMINAR PLANNED FOR NOVEMBER

Members of the legislature's Public Works Committee voted unanimously to hold a two-day water law seminar in November. Dates for the seminar, to be held in Lincoln, were left open. Leading water law attorneys from Nebraska and other states and a representative of the state attorney general's office would be invited.

The committee's counsel said that differences between the committee and Attorney General Paul Douglas apparently have been narrowed on the subject of water rights. Douglas' office had earlier issued an opinion saying, in effect, that the "first in time, first in right" principle applying to surface water also applied to underground water. It was the committee counsel's understanding that a review of that opinion by Douglas and his staff had resolved some of the conflict which the opinion had created. The recent legislature approved a law which allows some restrictions on use of underground water in Nebraska regions that are determined to be water short.

ENVIRONMENTAL IMPACT OF WATER CHLORINATION CONFERENCE

A two-day conference on "Environmental Impact of Water Chlorination" is planned for October 22-24, 1975 at Holifield (formerly Oak Ridge) National

Laboratory in Tennessee. The objective of the program will be to present and discuss the best available data concerning the formation and effects of chlorinated organic compounds associated with the use of chlorine as a biocide or in process treatment.

Three major technical sessions are planned covering: aqueous chemistry of chlorine, biomedical effects of chloro-organic compounds, and environmental transport and effects. Formal papers and discussions will seek to develop and evaluate new ideas concerning the chemical and environmental effects of chlorination as well as to identify needed research.

Conference reservations and inquiries should be addressed to: Robert Jolley, Holifield National Laboratory, P. O. Box X, Oak Ridge, Tennessee 37830. Attendance will be limited to approximately 200 persons. A \$30 registration fee will include a copy of the published proceedings of the conference.

RESEARCH REVIEW

Project Title: Computer Modeling to Maximize Water Use Efficiency and Reduce Energy in Irrigation

Principal Investigator: James R. Gilley, Associate Professor
Department of Agricultural Engineering
University of Nebraska - Lincoln

Irrigation scheduling could, if applied on a large scale, greatly increase the overall efficiency of irrigation systems. This increased efficiency will lessen the energy demand per acre and will also allow an increase in irrigated acreage without the need for additional water resources, thus greatly saving the energy expended in pumping water for irrigation.

As this project has just gotten started, I can only report our goals and expected outcomes. The primary objective is to develop refinements in irrigation scheduling procedures which reduce the energy requirements for irrigation without reducing agricultural production.

Many irrigation techniques and procedures have been suggested and studied, and the term "irrigation schedule" has many different meanings. I prefer to define irrigation scheduling as a program or procedure that not only accounts for or monitors the soil-water or plant-water status but also forecasts an optimum time for future irrigations. This schedule should have the capability to predict both the irrigation date and water requirement so that an irrigation cycle can begin and irrigate the entire field before the crop becomes stressed.

Irrigation scheduling requires the ability to predict or estimate daily crop-water use as a function of climate, crop characteristics and soil moisture status. We are developing a mathematical mode for predicting the crop

consumptive use based upon soil properties, climatic inputs and plant growth dynamics. This model has the capability of predicting the soil-moisture distribution within the root zone, the crop water use and deep percolation losses through the bottom of the root zone.

A plant growth model of corn is now being incorporated into the model. This corn growth model allows the prediction of plant growth and yield as a function of climatic input and soil-moisture status. The resulting irrigation model will allow the prediction of crop growth and crop yield as a result of irrigation scheduling procedures and other irrigation management decisions. This model will allow us to investigate the relationships between yield and limited water. As these relationships become better understood, they can be incorporated into irrigation scheduling programs with a management objective of optimizing water use efficiency and energy output to energy input.

The project is primarily a model study; however, at the present time other irrigation research workers are studying different soil moisture regimes under solid set sprinkler and automated gated pipe systems at several locations. These studies will provide data as a source of model calibration and verification.

QUESTIONS AND INQUIRIES

Newsletter items and inquiries should be sent to: Editor, Nebraska Water Resources Research Institute, 310 Ag. Hall Building-East Campus, University of Nebraska, Lincoln, Nebraska 68503; or phone (402) 472-3307.

NEWSLETTER ITEMS SOLICITED

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