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Water Current

Volume 6 Number 6

June 1974

FROM THE DESK OF THE DIRECTOR . . .

On June 10, 1974, representatives of State Natural Resources Districts, the U.S. Geological Survey, Soil Conservation Service, Missouri River Basin Commission, Corps of Engineers, Environmental Protection Agency, Nebraska Department of Water Resources, State Office of Planning and Programming, Natural Resources Commission, Game & Parks Commission, Department of Environmental Control, the League of Women Voters and various segments of the University of Nebraska met to review research needs for the coming year.

Based on written statements of those participating and other interested persons, ten major study areas were identified: (1) groundwater; (2) water quality; (3) conservation and water use efficiency; (4) environmental quality; (5) planning-management technology; (6) flood control; (7) socio-political issues; (8) energy-water relationships; (9) transbasin diversion; and (10) sedimentation-stabilization.

Each of these principal areas was evaluated by the group and specific topics needing research were identified. In the field of groundwater, several aspects related to data were of concern. In particular, more information is needed on rates which can be sustained by various mechanisms for artificial recharge. Companion to data needs, it is important to extend and improve the mechanics of modeling groundwater systems with particular emphasis on interactions between surface and groundwaters and on water quality.

In the water quality area, nonpoint source pollution, projections of water quality based on various schemes of development, mechanisms to protect groundwater resources and wastewater management were considered highly important issues.

In the area of conservation and water use efficiency, management and scheduling of irrigation, implementation of known technologies and control and regulation of municipal water systems were identified as areas needing further study.

Numerous other topics emerged relative to the major sub-divisions outlined. Specific research needs identified by this group will be of great value in planning the Institute's program for fiscal year 1976. Insofar as it is practical, ideas of the workshop will be incorporated in an overall program of research dedicated to providing answers to important water-related questions in Nebraska.

NEBRASKA WATER RESOURCES RESEARCH INSTITUTE

ON THE HOMEFRONT

1974 SUMMER INSTITUTE

The Nebraska Water Resources Research Institute will sponsor a one-week Summer Institute July 21-26, 1974 on "Quantitative Planning Techniques in Water Resources." The objective is to provide training in the application of simulation and optimization techniques to the planning and analysis of water resources systems. Primary emphasis will be given to application. Approximately 50 percent of the program will be devoted to workshops providing participants an opportunity to manipulate operational models. A case-study approach will be used to relate lecture materials to workshop activities. Both surface water and groundwater systems will be discussed. The role of quantitative models as practical planning tools will be considered.

Speakers and topics for the Institute program are as follows:

Introduction to Water Resources Systems	Warren Viessman, Jr., Director Water Resources Research Institute
Simulation Model Structuring - Surface Water Components	Gary L. Lewis, Assistant Professor Dept. of Civil Engineering University of Nebraska-Lincoln
Simulation Model Structuring - Ground Water Components	Peter W. Huntoon, Assistant Professor Department of Geology University of Wyoming
The Big Blue River Basin Model - A Case Study	Peter W. Huntoon
Screening Models for Water Resources Planning	D. Peter Loucks, Chairman Dept. of Environmental Engr. Cornell University
The Elkhorn River Basin - A Case Study	Gary L. Lewis
Simulation and Optimization - Combined Tools for Flood Control Planning	Gary L. Lewis, D. Peter Loucks, Isaac Yomtovian, Research Assoc. Water Resources Research Institute

For further information contact: Dr. Warren Viessman, Jr., Director, Water Resources Research Institute, 212 Ag. Engineering Building, University of Nebraska, East Campus, Lincoln, Nebraska 68503. Telephone (402) 472-3307.

DEADLINES FOR RESEARCH PROPOSALS

Deadlines for filing research proposals for fiscal year 1976 with the Water Resources Research Institute have been established. Matching grant proposals must be received not later than September 15, 1974 and annual allotment proposals not later than December 15, 1974.

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

For further information, contact: Dr. Warren Viessman, Jr., Director, Water Resources Research Institute, 212 Ag. Engineering Building, University of Nebraska, Lincoln, Nebraska 68503. Telephone 472-3307.

SUPPORT AVAILABLE FOR PhD CANDIDATES

The University of Nebraska announces availability of support for advanced graduate studies in water resources. Candidates will be given the opportunity to associate with active research related to analysis and simulation of regional water resources systems.

Interested persons should contact: Dr. Warren Viessman, Jr., Director, Nebraska Water Resources Research Institute, University of Nebraska, 212 Agricultural Engineering Bldg., East Campus, Lincoln, NE 68503. Telephone (402) 472-3307 or 3305.

FEDERAL HIGHLIGHTS

EPA AND FEEDLOT INDUSTRIES

According to a report approved by the House Government Operations Committee, the Environmental Protection Agency should specifically define those feedlot operations required to apply for National Pollutant Discharge Elimination System (NPDES).

The report was prepared by the Government Operations Conservation Subcommittee and recommends that EPA survey the feedlot industry and define in terms of the number of animals handled in those operations what constitutes "concentrated animal feeding operations." Section 502 (14) of the Federal Water Pollution Control Act stipulated that such operations be subject to the NPDES permit program.

Previously, EPA's guidelines required the smallest feedlots to control discharges but finally exempted all but the largest operations.

Subcommittee Chairman, Henry S. Reuss (D-III) said, "EPA's vacillation between these extremes has largely disregarded both the statutory requirements and the pollution potential of many feedlots."

The report also recommends the Agriculture Department allocate \$8 million for development of feedlot waste control practices. It suggests the Department participate in a cost-sharing program for the development of methods for producing fertilizer from animal wastes. The report suggested the Interior Department should support research and pilot plant development to convert animal wastes to oil and other fuels.

EPA--NO EXCEPTION

The Environmental Protection Agency (EPA) has contended that Section 102 (2) (c) of the National Environmental Policy Act of 1969 (NEPA) does not apply to EPA's environmental regulatory activities and that it, EPA, need not prepare environmental impact statements for its activities.

Under recent congressional pressures, EPA will begin preparation of impact statements on October 15, 1974 in connection with the following:

1. Clean Air Act (42 USC 1857 et seq.)
 - a. National ambient air quality standards under section 109.
 - b. Regulations prescribing substantive criteria with major significance for the preparation, adoption, and submittal of implementation plans by states under section 110.
 - c. New source performance standards under section 111.
 - d. National emission standards for hazardous air pollutants under section 112.
 - e. Motor vehicle emission standards under section 202, excluding light duty vehicle standards.
 - f. Regulations controlling the composition of fuel or fuel additives under section 211 (c).
2. Noise Control Act (42 USC 4901 et seq.)
 - a. New product noise emission standards under section 6.
 - b. Railroad noise emission standards under section 17.
 - c. Motor carrier noise emission standards under section 18.
3. Atomic Energy Act (42 USC 2011 et seq.)

Generally applicable radiation standards under the Atomic Energy Act.
4. Marine Protection, Research, and Sanctuaries Act (33 USC 1401 et seq.)
 - a. Criteria for the evaluation of permit applications under section 102 (a).
 - b. Designation of sites for dumping under section 102 (c).
5. Federal Insecticide, Rodenticide, and Fungicide Act (7 USC 135 et seq., as amended by 7 USC 136 et seq.)
 - a. Cancellation of pesticide registrations after an adjudicatory hearing under section 6.
 - b. Pesticide disposal regulations under section 19.

FIRE ON ASBESTOS

Russel W. Peterson, Chairman of the Council on Environmental Quality, warned that problems associated with dumping 67,000 tons of taconite waste daily (over the past 18 years) into Lake Superior may not show up for 10 years.

He said, "The findings will be based largely upon the fate of over 200,000 people exposed to asbestos dumped into the source of their drinking water. He told members of the Institute of Environmental Sciences that the initial court order shutting down the Reserve Mining Company plant is viewed by some people as "the act of an irresponsible judge pushed by environmental extremists." Nothing, he said, could be further from the truth.

He also stated that "Jobs are vital to all of us, and we must do all we can to protect them, but the lives of 200,000 people are also important." The CEQ chairman said that Reserve's 3,200 employees affected by the legal struggle between EPA and the company "have only Reserve to blame for their predicament." He pointed out that the company's offer to modify plant operations to alleviate the health problems, providing the federal government pays for the modifications and the judge eliminates his health findings, is unacceptable.

Peterson stated, "This proposal would make it very difficult for those who later contract asbestos-related diseases to recover damages from Reserve." He added that the federal government has already spent millions of dollars on the case. "If jobs are lost as a result of this case, it is only because the company has failed both the community and its workers."

SOLAR HOT WATER HEATER AVAILABLE

The first commercially available solar hot water heater was recently demonstrated in Phoenix, Arizona. The unit consists of solar panels and a hot water storage tank. It is distributed in the U.S. by Sun Source Subsidiary of Daylin, Inc., (9606 Santa Monica Blvd., Beverly Hills, California 90210). The solar panels are manufactured in Israel where solar hot water heaters have been available for 15 years.

U.S. distributors point to legislation pending in Arizona, Texas, California and Florida to grant reduced property taxes to people using solar water heaters as offering a potential market for 300,000 units by 1975. The total U.S. market is said to exceed two million units per year.

CANCER FROM DRINKING WATER

Drinking water containing unusually high concentrations of nitrate may increase the incidence of cancer of the stomach. This is the tentative conclusion of a report which analyzed deaths from cancer in the town of Worksop in Nottinghamshire, England.

These findings are published in the "British Journal of Cancer." A comparison of deaths from cancer between 1958-1971 in Worksop, with several nearby towns with far lower nitrate in drinking water, showed that stomach cancer was the cause of 27 percent more fatalities than in control towns. Worksop's water contained 90 mg per liter nitrate while other towns had no more than 10 mg per liter. The World Health Organization recommends 100 mg per liter as the safe maximum level of nitrate.

Similar observations have been made in Narino, Columbia, South America which has a high nitrate level. Nitrate content in U.K. drinking water has been on the rise for 30 years. It was once thought this was caused by artificial fertilizers. It is now believed to be treated sewage discharged in rivers which supply the drinking water.

1975 AUTOS MAY BE HEALTH HAZARDS

New studies confirm that sulfuric acid is emitted from catalytic converters (to be installed in 1975 automobiles) at an approximate rate of .05 grams per mile and that palladium and platinum releases from the use of converters continue to present a health hazard.

These studies support the apprehensions of many that the methylation of platinum and palladium in public drinking water supplies represents a long-range threat. The process may prove similar to the methylation of mercury, with palladium, platinum and other "noble metals" released into the atmosphere from the converters and finding their way into water supplies. Prudence may dictate postponement of installation until questions on health hazards can be answered.

SOIL ACTS AS NEUTRALIZER

Researchers at Penn State University have found that soil may be to acid-mine water what bicarbonate of soda is to an upset stomach. They have discovered that many soil types act as highly effective buffers in neutralizing water contaminated by acid-mine seepage.

Soils containing calcium carbonate proved most effective in producing an alkaline water devoid of heavy metal concentration. Even acidic soils demonstrated an ability to improve the pH level of acid water by removing up to 75 percent of the acid.

PEOPLE IN THE NEWS

JACK C. JORGENSEN APPOINTED ASSOCIATE DIRECTOR OF OMRR

The Department of the Interior announces the appointment of Jack C. Jorgensen as Associate Director of the Office of Water Resources Research (OMRR). Mr. Jorgensen assumes major responsibilities for carrying out a nationwide program of research directed toward developing new and improved technology and methodology for solving critical national, regional, and state water resource problems.

Mr. Jorgensen joins OMRR from the position of Staff Assistant to Interior's Assistant Secretary for Land and Water Resources where his responsibilities included the development of water resources planning, development, management

and research policies, as well as assisting the Assistant Secretary in the direction and coordination of Interior's water resources planning, development and research agencies. During recent years he has also been an active participant on several special task forces and committees dealing with water resources management, development, and conservation problems and practices. His field assignments have included positions with the Bureau of Reclamation in Oregon, California, and Arizona.

Messrs. Demetres (Jim) A. Vlatas, Quentin L. Florey, and Theodore G. Roefs have been appointed water resources research scientists in the Office of Water Resources Research.

Jim Vlatas, a career federal employee with more than 20 years of service, joined OWRR on March 31, 1974 from the Corps of Engineers where he had responsibilities for planning and management of their Urban Studies Program. Mr. Vlatas holds a masters degree from Columbia University and a Law Degree (JP) from Temple University School of Law in Philadelphia, Pennsylvania.

Quent Florey, also a career federal employee, joined the staff on March 17, 1974 following 24 years of service with the Bureau of Reclamation in Denver. He has most recently served as a technical specialist and advisor to their Applied Sciences Branch. Mr. Florey holds a B.S. degree from the University of Colorado and graduate credits from the University of Colorado and the University of Denver.

Ted Roefs, joined the staff on June 2, 1974. He was formerly with the Department of Hydrology and Water Resources at the University of Arizona in Tucson. He had teaching responsibilities which included course development in application of operations research to water resources problems. Mr. Roefs has done research in areas including analysis of water resources systems, multi-objective planning, information system application and environmental impact statements. He holds an M.S. degree from Stanford University in California.

The new scientists replace Dr. John S. Gladwell who has taken a position as the Director of the Water Resources Research Institute at the University of Idaho in Moscow; Dr. Oliver B. Cope who retired to Colorado and is working for the Colorado Department of Natural Resources; and Dr. Edward G. Altouney who transferred to the Environmental Policy Division, Congressional Research Service, of the Library of Congress in Washington, D.C.

NEW STATE INSTITUTE DIRECTORS

Dr. Warren A. Hall, Director of the Office of Water Resources Research, announces the following changes in the Directorships of various State Institutes:

District of Columbia - Mr. Ralph Palange is the Institute's first Director.

Idaho - Dr. Jack Gladwell succeeds Cal Warrnick.

Illinois - Dr. Glenn Stout succeeds Ben Ewing.

Iowa - Dr. Merwin Dougal succeeds Don Kirkham.

Kentucky - Dr. Robert Grieves succeeds Bob Lauderdale.

Massachusetts - Dr. Berger is back this year after a sabbatical.

Michigan - Dr. Thomas Bahr succeeds Bob Hall.

Montana - Dr. Roy Huffman has returned to fill the Director's job while Helmer Holje is on sabbatical.

Nevada - Dr. George Maxey has returned to the helm after an extended time engaged in other endeavors.

Ohio - Dr. Robert Stiefel succeeds Ken Shumate.

Oregon - Bill Buckley returns to serve as Acting Director while Bob Alexander is temporarily absent.

Puerto Rico - Dr. Roberto Vazquez is Acting Director following the departure of Felix Prieto.

Utah - Dr. Jay Bagley was Acting Director at this time last year; he now succeeds Dean Peterson as Director.

Washington - Dr. Harvey Doerksen is keeping the Washington State Institute operating effectively following the departure of Allen Agnew.

Virgin Islands - Dr. David Bruggs is the first Director of this new Institute.

CONFERENCES

SHORT COURSE AT AMHERST

A short course on the "Application of Stormwater Management Models" will be given at the University of Massachusetts in Amherst on August 19-23. Topics include rainfall runoff relationships, flow routing and stormwater quality and the development and use of computer models for stormwater studies.

Additional information is available from: Course No. CS 74-128, Conference Office, 920 Campus Center, University of Massachusetts, Amherst, Massachusetts 01002.

ICE-WRC CONFERENCE

The Interstate Conference on the Environment (ICE) and the U.S. Water Resources Council will host a conference entitled, "Integrating Natural Resource Programs" to be held August 27-28, 1974 in Cincinnati, Ohio.

The major emphasis will be directed to improving communications and coordination among levels of government and to integrating water quantity and water quality planning and coordinating water and related land resources planning efforts with federal and federally assisted land programs, including: coastal zone management, land use, and flood plain management.

The need to relate the problems and issues existing in natural resources management to research and development priorities and activities will also be explored.

Additional information may be obtained by writing the Water Resources Council, 2120 L Street, N.W., Washington, D.C. or by phoning 202-254-6453.

INTERNATIONAL SEMINAR

Unesco and the International Water Resources Association is sponsoring an International Seminar on Education on Water Resources to be held in Paris on March 24-27, 1975.

In order to provide the foundations of constructive thinking on theoretical, technological and practical problems of teaching and research in water resources, the program of the seminar consists of the following subject areas:

- (1) Place of education in water resources and its relationships to environmental problems.
- (2) Trends in water resources research, technology and management and their implications for educational programs.
 - a. Needs for manpower
- (3) Teaching methods.
 - a. Philosophy, concepts and approaches
 - b. Tools and aids
- (4) Continuing education and interdisciplinary training.
- (5) Priorities for developing countries; education policies.
- (6) International action for promoting education in water resources.

All correspondence concerning the seminar should be addressed to: Dr. Jean J. Fried, General Secretary of the Organizing Committee, International Seminar on Education in Water Resources, Institute de Mecanique des Fluides 2, rue Boussingault, 67000 Strasbourg, France.

ASAE SYMPOSIUM

The American Society of Agricultural Engineers is sponsoring the International Symposium on Livestock Waste - 1975. The symposium will be held April 21-24, 1975 at the University of Illinois, Urbana-Champaign, Illinois.

Three types of programs will be structured. These are: Literature Review on the State of the Art; Assessment of Existing Complete Manure Management Systems; and Reports on Research.

For general information, write: ASAE, P.O. Box 410, St. Joseph, Michigan 49085.

PUBLICATIONS

WATER RESOURCES RESEARCH EXPANDS INTO SOCIAL SCIENCES AREA

Water Resources Research, published by the American Geophysical Union (AGU), is a leading journal of basic and applied research in the water resources field.

Professionals are encouraged to submit manuscripts relating to studies in the social, behavioral and legal areas dealing with water. Papers need not be highly quantitative or mathematical. They can deal with topics beyond water systems as long as they involve water or are applicable to water problems.

For manuscript ideas and information, contact: Charles W. Howe, Editor, Water Resources Research, Department of Economics, University of Colorado, Boulder, Colorado 80302.

GEOMORPHOLOGY PROCEEDINGS AVAILABLE

Proceedings of a two-day geomorphology symposium held at the State University of New York at Binghamton on September 28-29, 1973 are now available. Entitled "Fluvial Geomorphology," the volume contains all the papers presented at the conference.

The cost of the Proceedings is \$7.00 and anyone desiring a copy should contact Marie Morisawa, editor, Publications in Geomorphology, State University of New York at Binghamton, Binghamton, New York 13901.

ENVIRONMENTAL DATA AND INFORMATION REPORT

The National Oceanic and Atmospheric Administration has recently published a report on environmental data and information.

NOAA collects, stores and distributes information obtained from the Environmental Data Service on the oceans, the atmosphere, the earth, the sun and the weather.

For information on the report, contact the National Oceanic and Atmospheric Administration, Washington, D.C. 20235, (202) 343-8921.

LARGE RIVERS OF THE UNITED STATES

A ten-page circular "Large Rivers of the United States," published by the U.S. Geological Survey is a table listing the nations's 28 large rivers in order of average discharge for the 30-year period, (1931-60 or 1941-70). It also lists the area of each river basin, length of each river, the most distant source and the mouth of each river.

Copies are available without cost from the U.S. Geological Survey, National Center, Reston, Virginia 22092. Specify USGS Circular 686.

EVAPORATION SUPPRESSION - ABSTRACT

"Evaporation Suppression" is an addition to the series of bibliographies in water resources compiled from the Water Resources Scientific Information Center, Office of Water Resources Research. The abstracts are retrieved from the center's computer program and cover 319 different investigations of attempts to diminish water loss by evaporation from water sources and soil.

Requests for copies of WRSIC 73-216, should be addressed to the National Technical Information Service, Springfield, Virginia 22151.

WATER RELATED LAND USE PLANNING GUIDELINES

"Water Related Land Use Planning Guidelines," by W.E. Bullard, is a 32-page publication explaining the various undertakings involved in designing land use plans based primarily on resource and social analysis techniques. The publication includes sections on citizen participation, tasks involved in planning, geological input and development of management policy.

Requests for copies should be addressed to: Interstate Commission on the Potomac River Basin, Suite 814, 4350 East-West Highway, Bethesda, Maryland 20014.

WASTEWATER CIRCULAR AVAILABLE

The Cooperative Extension Service at Pennsylvania State University has released "Spray-Irrigation Disposal of Wastewater." The report provides a basic philosophy of wastewater renovation and disposal through the living-filter concept developed at Penn State University and outlines fundamental factors that must be considered in planning and operating a spray-irrigation disposal system.

Single copies may be requested from the Cooperative Extension Service Pennsylvania State University, 204 Agricultural Engineering Building, University Park, Pennsylvania 16802.

AIR QUALITY ABSTRACTS

Pollution Abstracts, Inc., has published a one-volume, comprehensive summary of Air Quality Abstracts. The abstract contains highlights from publications--domestic and foreign-- including technical journals, conference proceedings, research papers, government reports and documents of limited circulation. Contents include: emission sources, atmospheric interactions, air quality measurements, control methods, effects--human health and well being, effects--plants and animals, effects--materials, legal and administrative aspects, basic sciences and technologies and general aspects.

The book may be obtained for \$75 from Pollution Abstracts, Inc., P.O. Box 2369, La Jolla, California 92037 (714-292-1515).

MEASURING SMALL STREAM VALUES

The University of Kentucky conducted a study to quantify intangible values peculiar to a small stream and its watershed.

Conclusions reached are:

- (1) A scene that includes a view of running water is usually preferred over one that includes still water or no water at all.
- (2) The stark beauty of a desert, lava flow or a winter pasture is not perceived by most people.
- (3) Some types of visual pollution (i.e., misfit billboards) are not recognized as such by some groups of people.
- (4) Familiar scenes are not considered particularly beautiful even though they may be so to outsiders.
- (5) Occupation and life style seem to have more effect on an individual's concept of natural beauty than age or sex.
- (6) People agree on what's very beautiful or very ugly in a scene but disagree on the in-between.
- (7) The semantic differential method as applied in this study yields measures of preference that are well-correlated with on-site evaluations by competent judges.
- (8) Predicting preference from the physical content of a scene yields only approximate results.
- (9) Reducing the number of stream characteristics used to compute uniqueness ratios did not greatly change the uniqueness rankings of the study streams.
- (10) The recommended procedure for evaluating small streams is the factor-score approach supplemented by a carefully conceived and executed preference study. The procedure should be applied to a random sample of all small streams in a state or region to establish a stream hierarchy. Factor scores and/or rankings for a given stream could, if desired, be worked into a benefit-cost or other such computation in the form of a weight or multiplier.

The report, "Measuring the Intangible Values of Natural Streams, Part II" (Research Report No. 66) may be obtained from the Water Resources Research Institute at the University of Kentucky.

AGU WATER RESOURCES MONOGRAPH

"Outdoor Recreation and Water Resources Planning" is the third of a series by the American Geophysical Union.

In recent years, outdoor recreation and the consideration of environmental amenities have taken on great importance in the planning of water resources. The result has been a growing need to adequately provide for these concerns. This volume sets forth the major principles that should be followed and suggests practical methods for their implementation.

Contents include: demand and outdoor recreation, estimating demands at specific sites, value and benefits, estimating recreational values, displaced facilities and benefit calculations and some limits and strategies.

The monograph is available for \$3.50 from the American Geophysical Union, 1707 L Street, N.W., Washington, D.C. 20036.

ENVIRONMENTAL LAW CONFERENCE PROCEEDINGS

"Canada's Environment: The Law on Trial" is a proceedings of an Environmental Law Conference held in Winnipeg in April 1973. It was sponsored by the Manitoba Institute for Continuing Legal Education and the Agassiz Centre for Water Studies. It was published by the Agassiz Centre for Water Studies and edited by Professor C.G. Morley.

The conference attempted to define those environmental problems which confront Canadian society today with concurrently, the law available to assist us in dealing with these problems. People from a wide range of disciplines and backgrounds were invited to contribute because of their relevant expertise, experience and interest in Canadian environmental problems.

The proceedings is of considerable benefit to all persons with an interest in and responsibility for defining environmental problems and developing effective policies and truly systematic laws to meet these problems.

The publication is available from: The Agassiz Centre for Water Studies, Room 230, Engineering Building, University of Manitoba, Winnipeg, Manitoba, R3T 2N2 for \$4.00.

RESEARCH REVIEW

PROJECT TITLE: "Improved Water and Fertility Management in Irrigation Systems"

PRINCIPAL INVESTIGATORS: Paul E. Fischbach, Dept. of Ag. Engineering
Darrell G. Watts, North Platte Station

The objectives of this study are to develop water and fertility management practices which maximize the efficiency of water use and minimize the nitrate pollution hazard related to intensive agricultural development on sandy soils

and to design and execute programs for technology transfer and implementation of research results on an area-wide basis.

Four major experiments are involved in this project: (1) To determine the optimum amount and frequency of irrigation, (three irrigation frequencies and four amounts of water will be applied to corn with an automated solid set sprinkler system) and to determine several methods of scheduling irrigations, i.e., weather factors (computer scheduling), tensiometer and electrical resistance blocks. (2) To compare the effectiveness of ground application of nitrogen fertilizer versus increment application through the systems. Treatments will include applying all fertilizer by one or the other method and a combination of methods. (3) To determine how much water loss and leaching of nitrates occur over a range of conditions which may represent the extremes of management that would be practiced under irrigated agriculture in the Sandhills. (4) To study the timing and amount of nitrogen application in relation to the timing and depth of application of irrigation water.

After one year of this project some tentative conclusions may be drawn. Some experiments where various amounts of water were applied each irrigation and several frequencies of irrigation were studied show that 0.52 inches every 3.5 days produced 109 bushels of corn per acre while 1.05 inches every 3.5 days only increased the yield to 113 bushels per acre. Additional water reduced yields. Two hundred pounds of nitrogen per acre produced only 10 more bushels of corn per acre than 150 pounds of nitrogen with the same water treatments.

In another experiment, nitrogen applied to the ground surface was compared to nitrogen applied through the sprinkler system. No difference in corn yields was measured when 1.5 inches of water was applied each week. When 27 inches of water per irrigation season was applied with 200 lbs of nitrogen treatment per acre, about 10 pounds of nitrogen was leached with each inch of water that passed below the 5-foot depth in the soil.

This project will be continued for an additional two years with further experiments and refinement of data. Final research results will be immediately applicable to those planning expanded irrigation development in the Sandhills. Findings will also be applicable to other irrigated areas having coarse textured soils.

PUBLICATIONS RECEIVED BY THE INSTITUTE

1. Simplified Atomic Absorption Determination of Stable Strontium in Milk and Hay, Julius Barth, Benjamin H. Bruckner, National Environmental Research Center, Office of Research and Development, U.S. Environmental Protection Agency, Las Vegas, Nevada, February 1974. (C.Y. Thompson Library)

2. Studies in Environment - Volume III - Pollution and the Municipality, Pamela C. Cooper, Samuel J. Kursh, Jeanie Rae Wakeland, Margo Van Winkle, Mary A. Zoller, Office of Research and Development, U.S. Environmental Protection Agency, Washington, D.C., February 1974. (C.Y. Thompson Library)
3. Applications of Reverse Osmosis to Acid Mine Drainage Treatment, Roger C. Wilmoth, National Environmental Research Center, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio, December 1973. (C.Y. Thompson Library)
4. Environmental Radioactivity Laboratory Intercomparison Studies Program, 1973 - 1974, Quality Assurance Branch, Technical Support Laboratory, National Environmental Research Center, Office of Research and Development, U.S. Environmental Protection Agency, Las Vegas, Nevada, February 1974. (C.Y. Thompson Library)
5. Tioga River Basin Mine Drainage Abatement Study - Public Meeting, Department of the Army, Baltimore District, Corps of Engineers, P.O. Box 1715, Baltimore, Maryland, June 25, 1974. (C.Y. Thompson Library)
6. State of Maryland Waste Oil Recovery and Reuse Program, Dr. Edward J. Martin, Mr. Garth D. Guntz, prepared for the Maryland Environmental Service in cooperation with Office of Research and Development, U.S. Environmental Protection Agency, Washington, D.C., January 1974. (C.Y. Thompson Library)
7. Comprehensive Management of Phosphorus Water Pollution, D.B. Porcella, A.B. Bishop, J.C. Andersen, O.W. Asplund, A.B. Crawford, W.J. Grenney, D.I. Jenkins, J.J. Jurinak, W.D. Lewis, E.J. Middlebrooks, R.M. Walkingshaw, Office of Research and Development, U.S. Environmental Protection Agency, Washington, D.C., February 1974. (C.Y. Thompson Library)
8. Final Report on Urban Public Policy and Political Institutions for Water Quality Management on Lake Erie: Year Two, Darryl L. Hessel, BATTELLE, Columbus Laboratories, 505 King Avenue, Columbus, Ohio, May 24, 1974. (C.Y. Thompson Library)
9. Ground-Water Levels in New Mexico, 1970, J.D. Hudson, R.L. Borton, New Mexico State Engineer, Santa Fe, New Mexico. (C.Y. Thompson Library)
10. Simulation City Approach for Preparation of Urban Area Data Bases, Andrew C. Lemer, Office of Research and Development, U.S. Environmental Protection Agency, Washington, D.C., February 1974. (C.Y. Thompson Library)
11. Studies in Environment - Vol. IV, Consumption Differentials and the Environment, Mary Beth Olsen, Ethan E. Bickelhaupt, Donnie H. Grimsley, Cherie S. Lewis, Pamela Scott, Office of Research and Development, U.S. Environmental Protection Agency, Washington, D.C., February 1974. (C.Y. Thompson Library)

12. Promoting Environmental Quality Through Urban Planning and Controls, Edward J. Kaiser, Karl Elfers, Sidney Coln, Peggy A. Reichert, Maynard M. Hufschmidt, Raymond E. Stanland, Jr., Office of Research and Development, U.S. Environmental Protection Agency, Washington, D.C., February 1974. (C.Y. Thompson Library)
13. Radioactivity Standards Distribution Program, 1973 - 1974, Quality Assurance Branch, Technical Support Laboratory, National Environmental Research Center, Las Vegas, Nevada, February 1974. (C.Y. Thompson Library)
14. Proceedings: Mississippi Water Resources Conference, 1974, Water Resources Research Institute, Mississippi State University, Mississippi State, Mississippi. (C.Y. Thompson Library)
15. Applications of Growth and Sorption Algal Assays, Dr. George P. Fitzgerald, Dr. Paul D. Uttormark, Office of Research and Monitoring, U.S. Environmental Protection Agency, Washington, D.C., February 1974. (C.Y. Thompson Library)
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QUESTIONS AND INQUIRIES

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