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Water Current

Millard W. Hall
Volume 9, Number 6

Karen E. Stork, Editor
November/December 1977

FROM THE DESK OF THE ASSISTANT DIRECTOR . . .

A recent report by the evaluation committee for the University of Nebraska Area of Excellence Program in Water Resources Management complimented the University's achievements in meeting Nebraska's needs in water resources research and extension. In the same analysis, the committee emphasized needs for greater visibility and coordination of the University's undergraduate and graduate programs for training water resources specialists. To respond, and as part of its continuing effort to strengthen educational programs, the Nebraska Water Center has completed an inventory of existing water resources courses and programs at the University of Nebraska. We feel the results are of general interest and are pleased to report them in this issue.

Our survey uncovered over 80 water-related courses in 15 academic departments, with half of the courses being offered by the Civil Engineering and Agricultural Engineering and Geography Departments. An appraisal of the list reveals that the University offers courses that address practically all aspects of water resources. Some additional course development, such as introductory, sophomore level courses that introduce the interdisciplinary nature of the art and science of water resources, might be warranted to fill the spectrum.

Undergraduates with an interest in water resources can combine many of these water-related courses in any one of seven existing programs at the University of Nebraska. These include the water resources management option with a natural resources major in the College of Agriculture, the natural resources option of the Agricultural Economics Department in the College of Agriculture, the engineering science option or the Interdisciplinary Bachelor of Science Degree Program in the College of Engineering and Technology, the University Centennial Education Program, and both the Integrated Studies and the University Studies Programs in the College of Arts and Sciences. Also, students of any academic department may wish to develop in the water field by concentrating their elective courses in this area.

These programs are described in the respective college bulletins, and all require from 10 to 30 or more semester hour's enrollment in various water-related courses. To illustrate, the two programs in the College of Agriculture are designed specifically for students who wish to prepare for positions in industry, government, and education which deal with land and water use and conservation.

The College of Agriculture's natural resources curriculum deals with the use, management and conservation of renewable natural resources. Options are available so that a student may select specialized training in a number of related areas, including water resources. This option provides an education for persons who wish to prepare for positions dealing with the conservation, planning, management and use of water.

The two programs in the College of Engineering and Technology recognize that our technological society has a variety of problems that require training in more than a single traditional engineering discipline; thus mature students with special interests in water resources are allowed to depart from the normal engineering curriculum by substituting eight to ten water-related or other selected courses for normally required courses.

The Integrated Studies and University Studies Program of the College of Arts and Sciences are available for persons interested in the biological, physical, social, and political science approaches to environmental and water resources problems. These programs combine a considerable number of courses from those regularly offered by the College of Arts and Sciences with several courses in water resources to produce programs which meet specific individual needs.

The Centennial Education Program could be selected by students interested in combining independent studies in water resources with courses in the social or physical sciences, literature, the arts, and philosophy. This program allows a limited number of students to waive up to one-third of the normal departmental requirements.

Graduate programs in water resources at the University of Nebraska include water resource majors in Civil Engineering and Agricultural Economics, or minors in many departments such as Geology, Geography, and Agricultural Engineering. The University of Nebraska confers master of science and master of arts degrees and allows students to choose between thesis and non-thesis options. Qualified graduate students may also enroll in the specially designed Interdepartmental Water Resources Planning and Management Program, which facilitates the necessary crossing of academic lines in an interdisciplinary field such as water resources.

A post-baccalaureate Professional Development Degree Program is also available for students with science or engineering degrees who have been out of school for several years. Credit is received by attending institutes, short courses, seminars, conferences, and by correspondence study and evening courses.

We feel that the inventory of courses and programs will help us in identifying means of coordinating water studies at the University of Nebraska and adding visibility to this important academic area. We are planning many activities that we feel will strengthen the University's offering. As always, your comments on this issue will be welcome in helping us expand interest in the area, correct deficiencies, and meet the present and future demands for water specialists.

ON THE HOMEFRONT

INTERDISCIPLINARY WATER RESOURCES SEMINAR

Once again the Water Resources Center will sponsor an interdisciplinary seminar during the spring semester. This year's seminar will focus on a discussion of the National Water Policy Review and its implications at the regional, state, and local level. Plans are to incorporate a field trip to one of the Natural Resources District offices into this year's agenda. A complete listing of topics and speakers will be available soon.

The seminar will be held on Wednesdays from 3:00 - 5:00 p.m. in the East Union and is open to upper classmen, graduate students, staff, faculty, and all others with an interest in water resources. Students wishing to receive one or two hours credit should register in their departmental seminar and/or special studies course listings. Attendance and notetaking will satisfy the one-hour requirements; a term paper will be an added requirement for anyone wishing to receive two hours of credit.

The Water Resources Center would appreciate it if you would bring the seminar to the attention of students and other interested persons. If you have any questions regarding the course content or requirements, please contact the Center at 472-3307.

PROCEEDINGS AVAILABLE FROM NWRC

The Nebraska Water Resources Center (NWRC) announces the availability of two publications. The first is the Proceedings of the 1977 Interdisciplinary Water Resources Seminar on "Water Resources Planning and Management." This is a publication of presentations by speakers at the seminar series and includes such titles as: "An Introduction to Nebraska Water Rights Law" by J. David Aiken; "Water and the Economy" by Raymond Supalla; "Water Resources of the Missouri River Basin" by Warren Viessman, Jr.; "Major State Water Issues" by Senator Maurice A. Kremer; and "The Economics of Local Administration and User Finance For Water Resource Investments" by Steve H. Hanke.

Also available is the Proceedings of a conference held in November 1976 entitled "Water Problems in the Rural Environment--Alternative Solutions for Water Supply and Wastewater Disposal." The purpose of this conference was to describe the current rural water situation. Rural water supply and wastewater disposal problems including both quantity and quality were considered. The socio-economic and technological aspects of alternative solutions to rural water problems and the various impacts involved in changing or improving the current situation were examined. Future research and related needs to solve various rural water problems were outlined.

Copies of both publications may be obtained by contacting the Nebraska Water Resources Center, 310 Agricultural Hall, University of Nebraska, Lincoln, Nebraska 68583.

NWRC REPORTS AVAILABLE

With the close of the federal fiscal year, the Nebraska Water Resources Center announces the availability of the following Project Completion Reports:

- (1) "Detection of a Potential Health Hazard in Recreational and Other Surface Waters" - William O'Dell, UNO.
- (2) "Computer Modeling to Maximize Water Use Efficiency and Reduce Energy in Irrigation" - James Gilley, Department of Agricultural Engineering.
- (3) "Wastewater Treatment and Reuse by the Soil-Plant System" - James Gilley.
- (4) "Groundwater Recharge Model and Field Project Implementations" - Deane M. Manbeck and Howard Wittmuss, Department of Agricultural Engineering.
- (5) "Nitrogen Source Differentiation Through Carbon Isotopes" - Roy F. Spalding, Conservation & Survey Division.
- (6) "Improved Water and Fertility Management For Irrigation Systems" - Paul Fischbach and Darrell Watts, Department of Agricultural Engineering.
- (7) "Herbicide Transport in Soil Under Center Pivot Irrigation Systems" - Terry L. Lavy, Department of Agronomy.
- (8) "Validation and Implementation of a Simplified Streamflow Simulator" - Alvin J. Surkan, Department of Computer Science.

Copies of these reports are available, while they last, from the Nebraska Water Resources Center, 310 Agricultural Hall, University of Nebraska, Lincoln, Nebraska 68583.

WATER RESOURCES IN NEBRASKA

MRBC ADOPTS WATER RESOURCES PRIORITIES

Priorities for implementation of 130 water resources programs and projects were among recommendations adopted by the Missouri River Basin Commission at its 22nd quarterly meeting November 2-3 in Omaha, Nebraska.

Program or project priorities were recommended in each of six different categories. Top priorities under each category for the fiscal year beginning October 1, 1978 were:

- (1) Data Collection and Analysis--Acceleration of soil surveys in cooperation with state agricultural experiment stations.
- (2) Planning-Related Research--Finding ways to turn completed research on efficient use of water into reality.
- (3) Special Studies--Studying the possibility of artificially recharging underground water supplies in the South Platte River Basin of Colorado.
- (4) Regional Planning--Developing a comprehensive water plan for the Republican River Basin in Nebraska.
- (5) Implementation Studies--Studying the possibility of creating a national recreation area along the Lower Platte and Elkhorn Rivers near Omaha.
- (6) Program Implementation--Stabilization of eroding river banks below Garrison Dam in North Dakota. Eventually to lead to similar work along the entire Missouri River.

The regional water and related land resources priorities adopted by the Commission will be forwarded to the U.S. Water Resources Council, Congress, and other agencies which will decide whether to finance them.

FEDERAL HIGHLIGHTS

NATION NOW USING MORE THAN 420 BILLION GALLONS OF WATER A DAY

As of 1975, the Nation's water use had grown to an average of about 420 bgd (billion gallons a day), but the rate of growth appears to have slowed, according to the latest five-year assessment compiled by the U.S. Geological Survey, Department of the Interior.

The USGS report notes that the average of 420 bgd of water withdrawn from surface and groundwater sources to meet the needs of public supplies, commerce, industry, irrigation, and rural water users amounts to an average of about 1,900 gallons per person per day, a 100-gallon increase since 1970, but the smallest percentage increase since the assessments began in 1950.

C. Richard Murray, hydrologist, USGS National Center, and senior author of the report, said: "The 420 bgd represents a 12 percent increase in off-channel water use since 1970 and about a 110 percent increase since we first started making estimates in 1950. Despite the doubling in water use in the last 25 years, the 1975 figures indicate a slowing down of the rate of increase."

Based on data supplied by numerous field offices of the USGS and other federal, state, and local agencies, the latest national assessment of surface- and groundwater use for a wide range of industrial, agricultural, and domestic activities reveals that:

Although the average use of fresh and saline water in the U.S. is about 1,900 gpcd (gallons per capita per day), it varies greatly from state to state, ranging from one-twelfth of the national average to 11 times that average (160 gpcd in Rhode Island to 21,000 gpcd in Idaho). High per capita values are characteristic of thinly populated states having large acreages of irrigated land.

The quantity of freshwater consumed--that is, water made unavailable for further possible withdrawal through such processes as evaporation or inclusion in manufactured products--averaged 96 bgd for 1975. In contrast, return flow, about 72 percent of the water withdrawn from ground- and surface-water sources, was available for additional use.

In the United States more water is withdrawn for industrial uses than for any other category of off-channel use. In 1975, industry used about 240 bgd, including some 70 bgd of saline water. About four percent of the freshwater withdrawn for industry was consumed. About 81 percent of the water withdrawn by industry was used in the generation of thermoelectric power, an 18 percent increase since 1970. More than 80 percent of the industrial water was withdrawn in the eastern United States. Important developments in the conservation of water and the substitution of saline water for the freshwater traditionally used by industry.

Irrigation ranks second in off-channel water use in the United States (141 bgd or 158 million acre-feet per year), but it is by far the greatest consumer of water (80 bgd or 89 million acre-feet per year). From 1970 to 1975, the amount of farmland irrigated increased some nine percent to about 54 million acres, while the use of irrigation water increased 11 percent. The 80 bgd of water consumed by irrigation far exceeds the consumption of all other categories combined: 6.7 bgd for public supplies, 6.1 bgd for self-supplied industry, and 3.4 bgd for other rural uses.

Use of water for public supplies amounted to 29.5 bgd, an increase of eight percent in the five-year period, 1970-1975, and about 168 gallons per person per day for people served in the United States, Puerto Rico, and the Virgin Islands. About 70 percent of the public water supply was for domestic and public use; the other 30 percent was used by commerce and industry.

Of the various categories of off-channel water use, the smallest withdrawal was the 4.9 bgd for rural domestic and livestock use, a ten percent increase from 1970 to 1975.

The average annual streamflow in the conterminous United States is about 1,200 billion gallons a day, which can be used as a rough measure of the Nation's total potential water supply. This is about three times the cumulative, off-channel water withdrawals, and about 12 times the estimated quantity of water consumed in 1975. In addition, groundwater reserves are estimated to be about 15 to 20 times larger than the supply available from surface water storage. It must be remembered, however, that these favorable ratios bear little resemblance to the actual supply-demand situation for a given river basin because of such factors as varying amounts of precipitation, reservoir storage, groundwater recharge, geographic requirements, and potential reuse of the supply.

Copies of the report, "Estimated Use of Water in the United States in 1975," published as USGS Circular 765, may be obtained free on request to the Branch of Distribution, U.S. Geological Survey, 1200 S. Eads Street, Arlington, Virginia 22202.

SAVE WATER, SAVE MONEY

Water conservation in the home not only helps stretch the Nation's water resources but can save money too, according to a new U.S. Geological Survey leaflet.

The nine-page brochure, prepared in cooperation with the government of Fairfax County, Virginia, describes practical ways of cutting down on water use and waste in the home and estimates the money that could be saved at the same time.

According to the leaflet, "The Nation's overall water resources are more than adequate to meet any foreseeable need. Our average annual streamflow alone is about three times greater than present water use, and groundwater resources are even larger.

"Unfortunately, the distribution of our water resources is uneven and sometimes irregular, and the cost of maintaining ample water supplies of good quality is increasing.

"In some parts of the country, the increased demand has already produced local water shortages that will limit future development. Other areas face continuous and costly problems in developing and maintaining a safe and adequate supply. Each of us can help stretch our water resources by conserving water and using it more wisely in our own homes as well as in our communities. At the same time, by saving water, we can save money too."

As the Nation's principal water data agency, the USGS receives many requests for information on water use and conservation. Based in part on actual cost estimates from Fairfax County, Virginia, the following tips are a few of those in the leaflet that suggest ways to save water--and money:

Water Cost: Many consumers have little idea of the quantity and cost of the water they use. An average single family home with three to four people in northern Virginia, for example, uses about 88,000 gallons of water per year or an average of more than 240 gallons per day. Combining water and sewage treatment charges, a homeowner may pay close to \$1.65 for each thousand gallons of water used, and an average family may spend as much as \$150 a year for the water it uses. The actual cost and use, of course, vary throughout the country.

Spend Wisely: Perhaps the first step in cutting down on water use is to become aware of just how much water is required for simple household chores. Perhaps we can then learn to spend more wisely by not spending 20 gallons of water for a ten-gallon chore. For example, flushing a toilet takes three to six gallons. Is one facial tissue worth six gallons?

The Silent Leak: The silent toilet bowl leak is probably the single greatest water waster in most homes. In some areas, such leaks cause about 95 percent of the complaints about excessive water use charges. A leak of one gallon every six minutes--not an unusual amount--totals ten gallons per hour or 240 gallons per day, almost equal to the average amount of water consumed each day in a single family home. To detect the silent leak in a toilet bowl, place a few drops of food coloring in the tank. If the color shows up in the bowl, there's a leak.

Single copies of the new leaflet, "Save Water, Save Money" are available from the Branch of Distribution, U.S. Geological Survey, 1200 South Eads, Street, Arlington, Virginia 22202.

NEW WATER CENTER DIRECTOR AT TEXAS TECH

Dr. Robert M. Sweazy has been named as Director of the Water Resources Center at Texas Tech University, succeeding Dan M. Wells who died on August 12.

Dr. Sweazy has been Assistant Director of the Center since 1970 and served as Acting Director for nine months in 1975. Sweazy is also an associate professor of civil engineering at Texas Tech.

A native of Chanute, Kansas, Dr. Sweazy received his bachelor's and master's degrees in biology and chemistry at Wichita State University. His doctoral degree in civil engineering, with a specialization in environmental engineering, was earned at the University of Oklahoma.

In addition to teaching, he has been a research associate at the University of Missouri, a water chemist for the city of Wichita, Kansas, and a consultant for the Northern Natural Gas Company. Sweazy was presented the Texas Tech College of Engineering first annual Award for Excellence in Teaching through Research in 1975. He is author or co-author of approximately 50 scholarly presentations and published papers.

CONFERENCES

9th INTERNATIONAL CONFERENCE IAWPR

The 9th International Conference of the International Association on Water Pollution Research (IAWPR) will be held in Stockholm, Sweden, June 12-16, 1978, and will cover the broad topics of advanced wastewater treatment, sludge treatment, urban run off, and receiving waters.

For an advance program and registration material, contact either: R. S. Engelbrecht, Department of Civil Engineering, University of Illinois, Urbana, Illinois 61801; or the Secretary-Treasurer, International Association on Water Pollution Research, Chichester House, 278 High Holborn, London Wc1, England.

ASCE SPECIALTY CONFERENCE

The Water Resources Planning and Management Division and the Irrigation and Drainage Division of ASCE are jointly sponsoring a Specialty Conference in 1978, with the theme, "Legal, Institutional, and Social Aspects of Irrigation and Drainage and Water Resources Planning and Management." The Conference will be held at Virginia Polytechnic Institute and State University in Blacksburg, Virginia, July 26-28, 1978, with the cooperation of the Virginia Water Resources Research Center.

Session topics may include such areas as competition for water resources in metropolitan areas, legal problems in developing and utilizing water supplies, enhancement of the environment in land and water development, legal problems involved in associated surface and groundwater resources--in short, a wide range of topics that consider the integration of social, legal and institutional considerations with the technical and engineering factors.

For more information on the Conference, contact: William R. Walker, Director, Virginia Water Resources Research Center, VPI & SU, Blacksburg, Virginia 24061. Virginia travel information is also available upon request.

INTERNATIONAL SYMPOSIUM ON URBAN STORM WATER MANAGEMENT

The Fifth International Symposium on Urban Storm Water Management is being planned for July 24-27, 1978 at the University of Kentucky in Lexington. Authors are invited to submit indicative abstracts (250 words or less) of papers for presentation at the symposium. Papers giving research results, design and analysis techniques and/or case studies on the following topics are invited: (1) quantifying rainfall, runoff, non-point water quality and/or sediment production in urban areas; (2) economic trade-off and legal implication associated with urban storm water management; (3) techniques and case studies of innovative systems for managing urban storm water runoff and sediment; (4) hydraulics of urban drainage facilities; and (5) application of remote sensing techniques to urban storm water management.

The symposium is specifically designed to provide practicing engineers with information usable by them in storm water management work. A limited number of more theoretical papers will be accepted. The subject of wastewater treatment will not be included in this symposium.

Initial paper selection will be based upon review of the abstracts. The final acceptance will be based on content of paper and how well it meets the description of the abstract. The following deadlines must be adhered to:

Receipt of 250 word abstract	January 4, 1978
Paper invitation--based on abstract	January 15, 1978
Receipt of photo-ready manuscript	March 15, 1978
Notification of acceptance	April 1, 1978

Mail abstracts and papers to: Ms. Elizabeth Haden, Symposium Coordinator, Office of Continuing Education, College of Engineering, University of Kentucky, Lexington, Kentucky 40506. Telephone: (606) 258-4881.

PUBLICATIONS

NEW PUBLICATION ON PLANNING OF WATER QUALITY SYSTEMS

One of the greatest concerns that mankind will face in the years to come is the availability of clean drinking water. In a recently released book by Lexington Books entitled, Planning of Water Quality Systems, it is noted that little is now being done to protect our fast-decreasing water supply.

Author William Whipple, Director of the Water Resources Research Institute at Rutgers University, treats the question of water quality and pollution control from the standpoint of system planning. He deals with the cycle of pollution as well as the inadequacies of present governmental approaches to controlling it. Many of the technologies required for improved approaches to this problem are also summarized.

Topics covered in the book include: the national water pollution problem; the environmental quality objective; the effects of pollution on receiving waters; urban runoff and nonpoint sources; municipal and industrial wastewater treatment; principles of water quality planning; water quality control in other countries; and pollution control strategy and combined planning.

Planning of Water Quality Systems (256 pages, \$20) is available from Lexington Books, a division of D. C. Heath and Company, 125 Spring Street, Lexington, Massachusetts 02173.

FIRST CHAPTERS IN NEW WATER DATA HANDBOOK PUBLISHED

The Introduction and Chapter 5 of the new, expanded edition of the internationally popular "National Handbook of Recommended Methods for Water-Data Acquisition" are now available, according to the U.S. Geological Survey.

Nearly 10,000 copies of the preliminary edition published in 1972 have been distributed, and the new edition is expected to be even more widely used as the basic handbook for standardized methods of collecting water information.

The Introduction explains the scope of the ten technical chapters of the "National Handbook," and gives the background and organizational relationship of the federal interagency recommended-methods activity. Chapter 5, "Chemical and Physical Quality of Water and Sediment," recommends methods for acquiring quantitative data on chemical characteristics of stream sediments and on all common constituents present in surface and groundwaters, including fresh and saline waters, sea water, and brines. Information on sampling equipment, storage and preservation of water samples, and quality control are also included.

The remaining nine chapters, which include recommended methods for surface water quantity, groundwater quantity, sediment, biologic and bacteriologic quality of surface and groundwater, soil water, drainage-basin characteristics, evaporation and transpiration, snow and ice, and hydrometeorological observations, are in preparation and will be released as they become available during the next year.

Copies of the Introduction and Chapter 5 are available from the Office of Water Data Coordination, U.S. Geological Survey, 417 National Center, Reston, Virginia 22092.

POSITIONS AVAILABLE

OPENING FOR WATER RESOURCES DIRECTOR

A Director of the Water Resources Research Institute is being sought at Clemson University in South Carolina. The responsibilities of the Director will require approximately 70 percent of this individual's time. The remaining 30 percent would be devoted to research in his home department.

The Director will be responsible for carrying out a program of water resources research, training of water scientists and technology transfer. Other duties and responsibilities will include: (1) administering research funds available to the Institute through federal, state and other sources; (2) coordinating and cooperating with other State Institute Directors in planning and conducting regional research and technology transfer programs pertaining to water problems in the Southeast; (3) serving as Chairman of the Institute Directorate and consulting with the Institute Policy Board on policy and procedural matters regarding the continuing operation of the Institute; (4) coordinating closely with Institute research project leaders in timely execution of research and in the writing of annual and completion reports; and (5) preparation of budgets for the operation of the Institute and supervision of budget accounting procedures and reports. It is the Director's responsibility to provide leadership in all Institute matters, ranging from initiation of current, timely research in water problems to completion, reporting and information dissemination based on research results.

Prior administrative experience is desirable but not necessary. Experience in water resources research is highly desirable. Other qualifications include the ability to effectively administer a group of individual project leaders and the initiative to pursue a strong research program.

A Ph.D. is required in a discipline related to water resources. Salary is negotiable.

For further information, interested applicants should contact: Dr. Luther P. Anderson, Dean, College of Agricultural Sciences, 101 Barre Hall, Clemson University, Clemson, South Carolina 29631. Telephone: (803) 656-3015.

DIRECTOR SOUGHT FOR MASSACHUSETTS WATER CENTER

The University of Massachusetts announces an opening for Director of the Water Resources Research Center beginning September 1, 1978. Specific responsibilities for the Director include the following:

- (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. Then initiate the preparation of research proposals by the Water Resources Research Center and conduct funded research.
- (3) Manage the research program including assisting University faculty in preparing research project proposals, evaluating research proposals for scientific merit and relevancy to need, collaborating and consulting with water resources officials of the state, and arranging for timely preparation of progress, annual, special and project completion reports.
- (4) Work jointly with University departments in establishing new, important educational programs in the water resources fields and in improving existing programs.
- (5) Respond to requests for public service by providing assistance on water resources problems, and by encouraging University faculty to respond to such requests.
- (6) Improve and administer an information dissemination service designed to respond to the needs of various categories of users of information.

Departmental affiliation and salary will be commensurate with experience. Applications and resumes should be submitted by December 15 to: Search Committee for Director of Water Resources Research Center, A-223 Graduate Research Center, University of Massachusetts, Amherst, Massachusetts 01003.

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

POSITION SOUGHT FOR POLISH PROFESSOR

Goshen College in Goshen, Indiana is trying to locate a position for Dr. Andrzej Ciepielowski, a visiting Polish professor. He received his Ph.D. in 1972 from Warsaw Agricultural University. Dr. Ciepielowski is a hydrologist and has worked mainly with calculation methods of high water flow in small catchment areas, calculation methods of water flow in rivers, and flood control.

Dr. Ciepielowski's areas of interest include: (1) research done in experimental hydrological basins in general; (2) work in hydraulic laboratories; (3) mathematical modeling of small watersheds of an agricultural nature; and (4) empirical methods of calculating characteristic flow in ungauged catchment areas.

Dr. Ciepielowski has just completed a six-week intensive English course and speaks and understands English quite well. He will be in the states until July 1978.

Regarding compensation, Dr. Ciepielowski would need a stipend similar to a post doctoral fellowship or graduate assistantship, as he would need to pay his living expenses from his salary.

Interested schools should contact Mary Liechty, Assistant in International Education, Goshen College, Goshen, Indiana 46526. Telephone: (219) 533-3161, extension 218.

FACULTY POSITIONS: CIVIL ENGINEERING

The Department of Civil Engineering, SUNY/Buffalo, announces the opening of two, tenure-track faculty positions beginning September 1978.

- (1) One in the area of Environmental Engineering, specializing in one or more of the following: physical-chemical treatment processes, disposal of waste on land, water supply, urban hydrology.
- (2) One in the area of Structural and Geotechnical Engineering, specializing in one or more of the following: structural analysis and design, structural dynamics, structural materials, structural systems, foundation analysis and design, soil properties and behavior.

Duties involve teaching and student advisement at the undergraduate and graduate level, and initiating and carrying out one's own research program. Salary and rank commensurate with qualifications, with a junior-level appointment preferred. Doctoral degree required.

Please direct inquiries to: Dr. Dale D. Meredith, Acting Chairman, Department of Civil Engineering, State University of New York at Buffalo, Buffalo, New York 14214.

SUNY/Buffalo is an equal opportunity/affirmative action employer. We are especially interested in identifying prospective minority and women candidates. No person in whatever relation with SUNY/Buffalo shall be subject to discrimination on the basis of age, color, national origin, race, religion, or sex.

CIVIL ENGINEERING GRADUATE ASSISTANTSHIPS

The Department of Civil Engineering at the State University of New York at Buffalo invites applications for graduate study and research in Water Resources and Environmental Engineering leading to M.S. and Ph.D. degrees. Several graduate assistantships are available beginning in January for September, 1978. Annual stipends vary from \$3,000 to \$5,000 and, in addition, usually provide for tuition waivers.

For details and applications write to: Dr. Dale D. Meredith, Program Coordinator, Water Resources and Environmental Engineering, Department of Civil Engineering, State University of New York at Buffalo, 4232 Ridge Lea, Buffalo, New York 14226.

SUNY/Buffalo is an equal opportunity/affirmative action employer.

RESEARCH REVIEW

PROJECT TITLE: MAPPING MODEL FOR DETERMINING LAND SUITABLE FOR IRRIGATION

PRINCIPAL INVESTIGATOR: Richard O. Hoffman, Associate Professor
Department of Industrial and Management Systems Engineering
University of Nebraska - Lincoln

The purpose of this project is to investigate the feasibility and test the use of the Department of Commerce's Composite Mapping System (CMS) as a methodology and model for developing a Nebraska map which shows land suitable for the development of irrigation systems. The CMS system's primary advantage is its ability to handle both quantitative and qualitative data and its inclusion of a factor weighting algorithm.

In order to develop plans for managing Nebraska's water resources, the growth and potential growth of irrigation systems must be predicted. For example, in 1972 there were 2,729 active center pivot irrigation systems in Nebraska, and in 1976 there were over 11,000. To predict the potential growth of irrigation and the demand for water resources the location of land suitable for irrigation must be identified.

The new version of CMS-II has been tested in the University of Nebraska Computer Systems and is operational. Work on the data gathering and coding is almost complete. The Nebraska Natural Resources Commission has coded and entered on magnetic computer tape the soil survey maps for seven counties. The soil type was coded within a two- and two-thirds (2-2/3) acre grid. York County has been selected as the test county.

The CMS II mapping system has two sections. Section One deals with the variables and data that affect the suitability of land for irrigation. This includes soil type parameters such as slope, top soil depth, permeability factor, and holding capacity. Other variables such as weather, cropping patterns and economic data can be included.

Section Two of the CMS-II mapping system deals with the subjective weighting of the variables. For example, what relationship exists between land slope and the type of irrigation system. Currently this section of the CMS-II mapping system is being modified into a management exercise format. This will allow the person(s) making the subjective weightings to observe the results of his weighting immediately on a test area. The final product will be a series of computer-generated maps and a set of statistical data.