

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

---

Water Current Newsletter

Water Center, The

---

9-1983

## Water Current, Volume 15, No. 5, September/October 1983

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 15, No. 5, September/October 1983" (1983). *Water Current Newsletter*. 151.  
[https://digitalcommons.unl.edu/water\\_currentnews/151](https://digitalcommons.unl.edu/water_currentnews/151)

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

Conservation & Survey  
Division

NOV 10 1983

University of Nebraska

September/October 1983

## DIRECTOR'S REPORT

The Nebraska Sandhills is a geologically unique area with a long history of use in rangeland cattle production. Groundwater in the Sandhills is unrivaled in its quantity and quality. Advances in irrigation technology and increased scarcity of water supplies have brought, and may continue to bring, change to this previously stable, low population region. The resulting effects on people and natural resources cannot be predicted with confidence as knowledge about the region, its resources, and its physical and biological systems is relatively limited.

An Institute of Agriculture and Natural Resources (IANR) Sandhills Task Force recently completed an extensive report on the education and research opportunities available for IANR in this area of the state.

The task force report contains a descriptive and resource inventory of the Sandhills, a discussion on the extent of knowledge about this area, and opportunities for research and education. Several premises about future conditions in the Sandhills are advanced in the report: (1) irrigated cropland acreage in the Sandhills can be expected to increase over the foreseeable future; (2) rangeland cattle ranching will continue to use the greater part of the Sandhills lands, and will remain the dominant form (in areal extent) of Sandhills agriculture throughout the foreseeable future; (3) expansion of irrigated agriculture will result in localized problems of erosion and continued additions of agricultural chemicals to the groundwater supply, with the latter condition having the most important long-run implications; and (4) increasing scarcity of water in the Great Plains will result in increased pressures for transfer and use, or use in place, of water from the Sandhills aquifer.

Based on these premises, the principal recommendations of the task force concerning opportunities for research and education in the Sandhills may be abbreviated as follows:

- (1) Research and education programs of IANR that directly support improved management of irrigated crop production and contribute to the reduction of associated effects on soils, groundwater, surface water, and rangeland productivity should receive priority emphasis during the remainder of the twentieth century.
- (2) Present research and education programs that directly support improved management, productivity and adaptation of rangeland cattle ranching over time should be enhanced.
- (3) Data gathering needed for building basic understandings of geology, hydrology, ecology, and localized Sandhills conditions should be expanded and coordinated with other agencies and entities.
- (4) Efforts to identify the consequences for wildlife and environmental conditions in the Sandhills of the anticipated changes should be expanded.
- (5) Efforts to identify the preferences of Sandhills residents with respect to anticipated changes and the alternatives for people and institutions should be initiated.

Copies of the IANR Sandhills Task Force report may be obtained from the IANR Vice Chancellor's office or from the Water Resources Center.



NEBRASKA WATER RESOURCES CENTER



## **WATER RESEARCH FUNDING UPDATE**

H.R. 2911 (Water Resources Research Act of 1983) has been unanimously approved by the House Interior and Insular Affairs Committee. This bill would continue authorization of a network of state water resources research institutes at a level of \$10 million per year and includes state cost sharing at a rising state/federal ratio. H.R. 2911 will be ready for consideration by the full House as soon as the committee report is written. It may be necessary for the Rules Committee to consider this bill before it goes to the floor for full House consideration. If this is the case, flood consideration may be delayed for a brief period.

The companion Senate bill S.684 has already been approved by the Senate. If the House approves H.R. 2911, these two bills will go to a conference committee for resolution of any differences. The House bill (but not the Senate version) requires regular evaluation of the water research institutes, allows peer review of research, and provides for technology development in addition to providing for basic research.

Appropriations bills for water research were recently approved by a House-Senate Conference Committee on Appropriations for Interior and Insular Affairs. Appropriations for the Department of Interior for FY 1984 will include \$6.35 million for water resources research institute programs. However, no funds were appropriated for the Office of Water Policy which administered this institute program in FY 1983. The institute program will be administered by Surveys, Investigations and Research in the U.S. Geological Survey. No funds were provided in this bill for research programs operated by the Office of Water Research in the Bureau of Reclamation. It is expected that both the House and the Senate will pass the Interior Appropriations bill as recommended by the conference and that the President will sign it.

## **STUDY OF OGALLALA AQUIFER PROPOSED**

Senator Peter Domenici (R-NM), in the Senate's Subcommittee on Water Resources, has proposed an amendment to S.1739 to study the Ogallala Aquifer. The amendment proposes a five-year \$11 million per year research and demonstration program for six states (Colorado, Kansas, Nebraska, New Mexico, Oklahoma and Texas) to investigate ways to solve water depletion problems relating to the Ogallala Aquifer.

S.1739 is Senator James Abdnor's water project bill which still faces committee and floor action and then is apparently headed for a conference committee with Congressman Robert Roe's (D-NJ) bill, H.R. 3678.

## **WATER RESOURCES SEMINAR ANNOUNCED**

The topic for the 1984 Water Resources Seminar Series conducted by the Water Resources Center will be "THE SANDHILLS OF NEBRASKA — YESTERDAY, TODAY AND TOMORROW."

Presented each spring semester, the seminar series focuses on current water issues. The future of the Sandhills in Nebraska has been an area of interest and study involving many state and federal agencies. As reported above, IANR has recently completed a study on research and education opportunities in this area. The Nebraska Natural Resources Commission as well as the Soil Conservation Service are currently conducting studies on this critical area of the state.

Over the years, the Sandhills have supported a relatively stable, but evolving, agricultural economy. Recent changes resulting from the expansion of center pivot irrigation have affected a small proportion of the region. However, the sand plains experience with irrigation expansion over the past two decades and the availability of large water supplies in the Sandhills portend future changes that could be significant in their extent and effects on the region. The seminar series will explore the present physical characteristics of the Sandhills and discuss possible future changes.

The Water Resources Seminar Series is offered through the Department of Forestry, Fisheries and Wildlife as FFW 415/815 and is cross listed as Natural Resources 415/815 as well as in the Departments of Geography and Geology (1 hour credit). The seminar series will be held on Wednesday afternoons at 3:30 p.m. in Room 430 Morrill Hall on City Campus beginning on January 18, 1984. Seminar sessions are open to students, faculty and the public. A complete listing of seminar topics and speakers will be available in December.



## **BOGARDI VISITS UNL**

In early August, water resources scientist Dr. Istvan Bogardi, from Godollo University of Agriculture, Budapest, Hungary, visited the University of Nebraska. During his 2-1/2 days on the Lincoln campus, Bogardi conversed with faculty from the Departments of Agricultural Engineering, Civil Engineering, Agricultural Economics, Geography, the Conservation and Survey Division, the Water Resources Center and International Programs. He also met informally with a group of about 20 federal and state agency personnel and discussed water-related topics of mutual interest. Bogardi's research experience with optimization in water resources management issues was pertinent to a number of activities presently under way in Nebraska.

## **HAROLD STEVENS TOUR**

In late September, NWRC Director Bill Powers and communications assistant Brad Gustafson were part of a University group which participated in a one-day tour of public power and irrigation projects in west central Nebraska. The tour, led by Harold Stevens, extension agent-chairman for Dawson County, took more than 25 participants from Lake McConaughy near Ogallala east to the headgates of the Thirty Mile Irrigation Canal near Brady, with briefings along the way from officials of the Nebraska Public Power District (NPPD) and the Central Nebraska Public Power and Irrigation District (CNPP&ID).

The tour group visited such sites as the new hydro power plant under construction just below Kingsley Dam, Lake Ogallala, the Platte Valley Diversion Dam, the Paxton Cut and Siphon, Sutherland Reservoir, the CNPP&ID Diversion Dam at North Platte and the headgates of the Tri-County Supply Canal and the Gothenburg Irrigation Canal. The group also took brief tours of the coal-burning Gerald Gentleman Power Plant near Sutherland and the North Platte Hydro Plant.

According to Stevens, this was the 38th such tour he has led over more than 20 years. The tours are conducted up to three times a year depending upon requests and are open to anyone or any group that wishes to participate.

## **UNL FACULTY ATTEND WATER CONFERENCE**

Several UNL faculty participated in the July 20-22, 1983 National Specialty Conference held in Jackson, Wyoming, sponsored by the Irrigation and Drainage Division of the American Society of Civil Engineers (ASCE). The conference theme, "Advances in Irrigation and Drainage: Surviving External Pressures," attracted more than 180 attendees.

Presenting papers were: Norman L. Klocke, Ass't Professor of Agricultural Engineering, "Daily Trends in Soil Evaporation and Plant Transpiration for Irrigated Corn," and M.-L. Quinn, Ass't Professor of Water Resources, Water Resources Center, "Effects of Irrigated Agriculture on Groundwater Quality and Recharge in the North and Central Plains States." DeLynn Hay, Extension Water Resources Specialist, Dept. of Agricultural Engineering, presided over the session: On-Farm Irrigation System Design and Management. Other sessions addressed such topics as watershed modeling, on-farm water quality control and mining impacts on groundwater. One afternoon was devoted to a thorough discussion of the Bureau of Reclamation's Jackson Lake Dam, along with an on-site inspection of that structure.



## RESEARCH REVIEW

Project Title: *Analysis of Tax Incentives for Intensive Irrigation Development in the Nebraska Sandhills*

Principal Investigator: *Maurice E. Baker, Professor of Agricultural Economics, UNL*

The overall objective of this study was to quantify tax incentives for concentrated irrigation development in the Nebraska Sandhills. The research quantifies the economic incentives for irrigation development under current federal income tax regulations. This is important in understanding motivations for irrigation development; thus, this study provides a starting point for designing alternatives for public management of irrigation development.

Budgets for investments, costs and returns for crop production, and analysis of resulting income tax liabilities were simulated for case studies of irrigation developers who were: (1) ranchers, (2) farmers, (3) long-term investors, and (4) short-term investors. The unit of analysis was one center pivot system on a quarter section of former Sandhills rangeland.

The returns on equity ran over 60 percent per year in some years for some investors. Likewise, returns of 4 to 6 percent per year were also common. The wide range reflected the effects of income tax regulations which permit deduction of interest and depreciation.

The short-term investors maintain high returns on equity by liquidating after every fifth year. Reinvesting to tax shelter this income permits the development of three new quarters from the proceeds of the first one.

For most investors, before-tax cash flows were negative until the loan on the well and center pivot was retired. Thus, for most investors, nonfarm income or income from other farm enterprises was required to supplement revenue from irrigated crop production during the repayment of well and pivot loans. Aftertax cash flows were positive for all simulated cases. The flows increased with increases in leverage and marginal tax rates.

Copies of the project completion report are available at the Water Resources Center.

## FACULTY PROFILE

Maurice E. Baker, or "Maury" as he is known on campus, is a Professor of Agricultural Economics with the Institute of Agriculture and Natural Resources at UNL. Maury is beginning his seventeenth year at UNL, teaching and conducting research in the area of natural resource economics.

A native of eastern Indiana, Maury first attended Purdue University, where he earned both a B.S. in ag education and an M.S. in ag economics. After receiving his Ph.D. in ag economics from Ohio State University in 1961, Maury spent five years at Rutgers University in the Department of Agricultural Economics and Marketing.

*"When I started out my specialty was in ag marketing," Maury said, "but because of a small department and the need to cover several areas with a relatively small staff there, I was asked to shift to resource economics. I have absolutely no regrets about the switch. Both are fascinating areas, but particularly in this state, resource economics is much more exciting."*

Since arriving in Nebraska in the fall of 1966, Maury has been involved in other research projects in the field of water resources, including research on irrigation development and transbasin diversion. Research in other areas has included pollution control, solar-powered swine operations and integrated pest management systems.

About his recently completed research project on tax incentives in the Sandhills, Maury noted that economic incentives for Sandhills development differ depending upon the type of investor.

In the project completion report, Maury writes, *"If the public wishes to influence the rate and/or concentration of irrigation development, changes in the economic incentives must be a part of the plan. If there is a desire to regulate certain types of irrigation developers, public management alternatives must change the economic returns for selected classes of investors. That is, if the desire is to discourage the short-term investor, the rules must be such that they reduce the short-term gains from irrigation development without discouraging other developers (ranchers, farmers and long-term investors)."*

Brad Gustafson  
Water Resources Communications



## CALL FOR PAPERS

The Ground Water Committee of the Irrigation and Drainage Division, American Society of Civil Engineers (ASCE), is sponsoring a session on Economics and Ground Water at the October 1984 ASCE Convention in San Francisco. Papers are invited on economic aspects of managing ground water resources. Papers could cover a wide range of topics from economics of well construction vs. yield to economic models of ground water basins. Abstracts of not more than 300 words should be submitted to Don Finlayson, California Department of Water Resources, Northern District, P. O. Box 607, Red Bluff, CA 96080.

## CONFERENCES AND MEETINGS

- Dec. 4-7, 1983 The fourth annual Agri-Turf Irrigation Exposition and Conference will be held in Denver, Colorado. The theme of the conference is "Irrigation Today and Tomorrow: Priorities, Conflicts, Opportunities." Billed as the world's largest exhibition of irrigation equipment, the show will feature the latest in agricultural and turf irrigation equipment, services and technology in over 50 major project categories. Conference chairman is Laverne E. Stetson, Assoc. Professor of Ag Engineering at the University of Nebraska-Lincoln. For additional information contact the Irrigation Association, 13975 Connecticut Avenue, Silver Spring, MD 20906. Telephone: (301) 871-1200.
- Dec. 5-9, 1983 American Geophysical Union (AGU) fall meeting and "Symposium on Optimization Techniques for Managing Groundwater and Stream-Aquifer Systems" will be held in San Francisco. For additional information, contact Dr. S. Gorelick, USGS Mail Stop 21, 345 Middlefield Road, Menlo Park, CA 94025. Telephone: (415) 323-8111, Ext. 2141.
- Dec. 12-13, 1983 A National Conference on Advances in Infiltration sponsored by the American Society of Agricultural Engineers (ASAE) will be held in Chicago, IL. Topics will include: physics of infiltration; parameters in infiltration equations; measurement of infiltration; applications in irrigated and dryland agriculture; applications in watershed hydrology; and special problems. For additional information, contact Cathy Ziegert, Meetings Secretary, ASAE, 2950 Niles Road, St. Joseph, MI 49085. Telephone: (616) 429-0300.
- Jan. 24-25, 1984 Second National Water Conference with the theme "Fate of Toxics in the Natural Environment" will be held at the Academy of Natural Sciences in Philadelphia, PA. Co-sponsored by the Academy of Natural Sciences, the American Water Works Ass'n and the Water Pollution Control Federation, the workshop will discuss the implications of recent findings on present and proposed toxic substance control regulations, hazardous waste laws and the Clean Water Act. For additional information contact James Wilson, Second National Water Conference, The Academy of Natural Sciences, 19th and the Parkway, Philadelphia, PA 19103. Telephone: (215) 299-1107.

## POSITIONS AVAILABLE

### Hydrologist - University of Arizona

The Water Resources Research Center at the University of Arizona has an opening for a Hydrologist. This is a nontenure track, 12 month position. Requirements include Ph.D. in hydrology, civil engineering or related field with five years of experience.

The position will involve responsibilities in both technology transfer and research. Technology transfer duties will include implementing a total information dissemination program for the Center, i.e., the hydrologist will develop a comprehensive program for collecting and analyzing information bearing on the solution of water resource problems in Arizona and disseminating this information by means of workshops, conferences, seminars and bulletins. Research duties will include providing leadership in a long-term research program with an emphasis in analysis and management of the water resources in the state and in planning for future water resource needs. A working knowledge of water law would be essential in addressing the diverse problems of state and public concern.



Applications will be accepted until January 1, 1984 with the beginning date for employment negotiable. Interested applicants should send a letter of application, resume, transcripts and the names of three references to: Dr. L. G. Wilson, Acting Director, Search Committee, Water Resources Research Center, Room 102 Douglass Building, University of Arizona, Tucson, Arizona 85721.

#### Hydrologist - University of Wyoming

The Water Research Center at the University of Wyoming has an opening for a Hydrologist. This position is a tenure track appointment with joint assignment to an appropriate academic department. Academic rank and salary will be commensurate with experience. Qualifications include a Ph.D. in hydrology or related science. Field experience is required and in-depth experience in arid lands or montane hydrology is preferred.

This position will be expected to: (1) participate in all of the Center's activities including research, service, teaching and extension; (2) develop and implement a research program appropriate to the water resource needs of Wyoming; (3) participate in multidisciplinary research programs; (4) contribute to the University's academic programs dealing with water and participate actively in the Center's Graduate Program in Water Resources; (5) direct graduate student research; and (6) obtain outside research funding.

Applications will be accepted until December 15, 1983. Interested applicants should send a letter of application (stating research and teaching interest), resume, representative reprints and three letters of reference to: Dr. Harold Bergman, Search Chairman, Wyoming Water Research Center, Box 3067, University Station, Laramie, WY 82071.

### REPORTS AVAILABLE AT NWRC

The following Reports are available at the Nebraska Water Resources Center covering Center-sponsored research projects.

- (1) *Reduction in Development of Bloom-Forming Blue-Green Algae by Nutrient Enrichment to Maintain Desirable Pre-Bloom Dominants*, Project A-063-NEB Completion Report, J. R. Rosowski, School of Life Sciences, September 1983.
- (2) *Enhancement of Water Quality in Nebraska Farm Ponds by Control of Eutrophication Through Biomanipulation*, Project A-067-NEB Completion Report, G. L. Hergenrader, Dept. of Forestry, Fisheries & Wildlife, September 1983.
- (3) *Parasite Communities as Indicator Systems for Predicting the Effects of Surface Water Management Options on the Biota of Prairie Rivers*, Project A-068-NEB Completion Report, John Janovy, Jr., School of Life Sciences, September 1983.
- (4) *Increased Water Conservation and Percolation Through Improved Tillage Practices*, Project A-069-NEB Completion Report, H. D. Wittmuss, Dept. of Ag. Engineering, September 1983.
- (5) *Analysis of Tax Incentives for Intensive Irrigation Development in the Nebraska Sandhills*, Project A-070-NEB Completion Report, M. E. Baker, Dept. of Ag. Economics, September 1983.
- (6) *Investigation of Surface Water for Contamination with Pseudorabies Virus in Runoff from Quarantined Nebraska Swine Production Areas*, Project A-071-NEB Completion Report, C. L. Kelling, Dept. of Veterinary Science, September 1983.
- (7) *Mathematical Modeling of Ground Water Systems*, Project A-072-NEB Completion Report, J. P. Dauer, Dept. of Mathematics and Statistics, September 1983.



## PUBLICATIONS

The following publications have been received by the Water Resources Center during August and September 1983. They have been forwarded to C.Y. Thompson Library on UNL's East Campus for cataloging. Persons on campus may obtain the publications through UNL's library system. Others are encouraged to request copies they desire from the organization issuing the publication.

- (1) *Water Law in Mississippi—An Overview*, Report D-022-MS, J.I. Palmer, Jr., Dept. of Justice, Mississippi Water Resources Research Inst., P.O. Drawer AD, Mississippi State, MS 39762, July 1983.
- (2) *Seasonal Variations in the Nature and Removability of Reservoir THM Precursors*, Bulletin 127, Virginia Water Resources Research Center, VPI & SU, Blacksburg, VA 24061, June 1983.
- (3) *The Water Resources Research Program of the U.S. Geological Survey, Fiscal Year 1982*, U. S. Geological Survey, U.S. Dept. of Interior, 413 National Center, Reston, VA 22092, February 1983.
- (4) *Total Organic Halogen (tox) Concentrations in the West Lafayette Wastewater Treatment Plant Effluent and the Wabash River*, Water Resources Research Center, Purdue University, West Lafayette, IN 47907, August 1983.
- (5) *Water Resources Research Interests in the Colleges and Universities of North Carolina*, Report No. 3, Water Resources Research Inst. of the Univ. of North Carolina, 124 Riddick Bldg., North Carolina State University, Raleigh, NC 27650, January 1983.
- (6) *Phytoplankton Uptake and Sediment Release of Nitrogen and Phosphorus in the Chowan River, North Carolina*, Report No. 186, Water Resources Research Inst. of the Univ. of North Carolina, North Carolina State University, Raleigh, NC 27650, Sept. 1982.
- (7) *The Use of Landsat MSS Digital Data in Water Quality Mapping of the Neuse River Estuary, N.C.*, Report No. 193, Water Resources Research Inst. of the Univ. of North Carolina, North Carolina State University, Raleigh, NC 27650, May 1983.
- (8) *State Options for Nonstructural Flood Risk Management*, Report No. 196, Water Resources Research Inst. of the Univ. of North Carolina, North Carolina State University, Raleigh, NC 27650, June 1983.
- (9) *Enzymatic Pretreatment of Pulp Mill Effluents Prior to Decolorization by Lime Precipitation*, Report No. 197, Water Resources Research Inst. of the Univ. of North Carolina, North Carolina State University, Raleigh, NC 27650, May 1983.
- (10) *Surface Water Resources of the Cedar River, Beaver Creek and Nearby Streams*, Nebr. Department of Water Resources, P. O. Box 94676, Lincoln, NE 68509.
- (11) *Solubilization Rate of Atmospheric Particulate Matter and Impact on Water Quality*, Report No. A-049-SC, Water Resources Research Inst., Clemson Univ., Clemson, SC 29631.
- (12) *The Estimation and Application of the Demand for Discharge Within the Context of Water Quality Management Systems*, Report No. 105, Dept. of Economics, Clemson Univ., Clemson, SC 29631, June 1983.
- (13) *Effects of Acid Deposition (Rain) on a Piedmont Aquatic Ecosystem: Acid Inputs, Neutralization and pH Changes*, by Alan Elzerman, Report No. 108, Bureau of Reclamation, U. S. Dept. of Interior, Washington, D.C., 20242, May 1983.



## PUBLICATIONS

# WATER CURRENT

*Water Current* is published by the Nebraska Water Resources Center (NWRC), which is a division of the Institute of Agriculture and Natural Resources at the University of Nebraska-Lincoln.

William L. Powers . . . . . Director

Karen E. Stork . . . . . Editor

Address all correspondence or requests to NWRC at 310 Agricultural Hall, University of Nebraska, Lincoln, NE 68583-0710. Telephone: (402) 472-3305.

The following publications have been received by the Water Resources Center during August and September 1983. They have been forwarded to C.Y. Thompson Library on UNL's East Campus for cataloging. Persons on campus may obtain the publications through UNL's library system. Others are encouraged to request copies directly from the organization issuing the publication.

- (1) *Water Law in Mississippi—An Overview*, Report D-022-M2, J.L. Palmer, Jr., Dept. of Justice, Mississippi State University, Hattiesburg, MS 39402, 1983.
- (2) *Seasonal Variations in the Flow and Sedimentation of the Mississippi River at Vicksburg, Mississippi*, Report D-022-M2, J.L. Palmer, Jr., Dept. of Justice, Mississippi State University, Hattiesburg, MS 39402, 1983.
- (3) *Geological Survey of the State of Nebraska*, Report D-022-M2, J.L. Palmer, Jr., Dept. of Justice, Mississippi State University, Hattiesburg, MS 39402, 1983.
- (4) *Total Organic Nitrogen (TON) Concentrations in the West Laramie River, Nebraska*, Report D-022-M2, J.L. Palmer, Jr., Dept. of Justice, Mississippi State University, Hattiesburg, MS 39402, 1983.
- (5) *Water Resources Research Institute in the Colleges and Universities of North Carolina*, Report No. 1, Water Resources Research Inst. of the Univ. of North Carolina, 124 Riddick Bldg., North Carolina State University, Raleigh, NC 27650, January 1983.
- (6) *Phosphorus Levels and Sediment Release of Nitrogen and Phosphorus in the Clinch River, North Carolina*, Report No. 188, Water Resources Research Inst. of the Univ. of North Carolina, 124 Riddick Bldg., North Carolina State University, Raleigh, NC 27650, Sept. 1982.
- (7) *The Use of a Small MS2 Plant in Water Quality Mapping of the Neuse River Estuary, N.C.*, Report No. 193, Water Resources Research Inst. of the Univ. of North Carolina, 124 Riddick Bldg., North Carolina State University, Raleigh, NC 27650, May 1983.
- (8) *State Options for Nonstructural Flood Risk Management*, Report No. 198, Water Resources Research Inst. of the Univ. of North Carolina, 124 Riddick Bldg., North Carolina State University, Raleigh, NC 27650, June 1983.
- (9) *Emergency Treatment of Pulp Mill Effluents Prior to Discharge by Lime Precipitation*, Report No. 197, Water Resources Research Inst. of the Univ. of North Carolina, 124 Riddick Bldg., North Carolina State University, Raleigh, NC 27650, May 1983.
- (10) *Surface Water Resources of the Cedar River, Beaver Creek and Healthy Streams, North Carolina*, Report No. 199, Water Resources Research Inst. of the Univ. of North Carolina, 124 Riddick Bldg., North Carolina State University, Raleigh, NC 27650, May 1983.
- (11) *Substitution Rate of Atmospheric Particulate Matter and Impact on Water Quality*, Report No. A-049-SC, Water Resources Research Inst., Clemson Univ., Clemson, SC 29631.
- (12) *The Estimation and Application of the Demand for Discharge Within the Context of Water Quality Management Systems*, Report No. 103, Dept. of Economics, Clemson Univ., Clemson, SC 29631, June 1983.
- (13) *Effects of Acid Deposition (Rain) on a Piedmont Aquatic Ecosystem: Acid Inputs, Neutralization and pH Change*, by Alan Elzerman, Report No. 108, Bureau of Reclamation, U.S. Dept. of Interior, Washington, D.C., 20242, May 1983.