NEWS
WATER RESOURCES RESEARCH INSTITUTE
OF THE UNIVERSITY OF NORTH CAROLINA
NORTH CAROLINA STATE UNIVERSITY AT RALEIGH UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL

Number 24 January, 1968

INSTITUTE ADVISORY COMMITTEE MEETS IN RALEIGH

A very useful meeting of the Advisory Committee was held at the N. C. State Faculty Club on January 11 in spite of just about every kind of adversity the weather man could dredge up. Dean Fadum represented the Board of Directors and Colonel George Pickett, Director, N. C. Department of Water and Air Resources, presided as Chairman of the Committee.

In his report to the Committee, Director Howells said that nearly all of the research projects being considered by the Institute for funding during the coming year were developed by faculty members in direct response to recognized water resource problems confronting the State. One of the most urgent of these deals with the ground water difficulties related to phosphate mining in Beaufort County where protection of the ground water supply from salt water intrusion is essential to the continued development of eastern North Carolina. A research project under the direction of Dr. J. K. Sherwani, Department of Environmental Sciences and Engineering of the University of North Carolina at Chapel Hill, has been undertaken by the Institute in cooperation with the Department of Water and Air Resources. Funds for the initiation of the work have come from the Institute's current annual allotment by the Office of Water Resources Research, Department of the Interior. Additional funds to meet the continuing costs beyond June 30 of this year are being requested from Interior and the State of North Carolina. The project is discussed at greater length in the following article.

Other important research projects now under consideration by the Institute seek to determine the supply of fresh water on the Outer Banks, improved irrigation and drainage practice in the Coastal Plain, water management techniques needed to maintain water quality in the New Hope Reservoir, acceptable water quality standards for color from textile wastes, means for measuring the capacity of water-based recreation areas, techniques for the prediction and guidance of urban development around large reservoirs, the economic feasibility of increasing available water supplies through land management, answers to pressing water law problems, the effect of pollution from agricultural and urban land runoff, the accumulation of fluoride wastes from the phosphate industry by oysters, and answers to other aspects of pollution control. Howells told the Board that while the Institute was established as a cooperative Federal-State research center patterned after the experiment stations, it was still operating almost entirely on its basic annual allotment from the Interior

Department which is far too limited to meet the needs of the State. The Institute cannot, he said, meet its responsibilities as the designated water resources research center of North Carolina unless the State contributes to the support of this program. The Committee passed a resolution recognizing that water is a crucial factor in the total development of North Carolina; that serious problems in water conservation, development and management are now arising that threaten to interfere with the effective utilization of the State's water resources; that these problems cannot be solved in the absence of a strong research effort; that the Institute is prepared, as the State's water research center, to undertake research projects directed toward the most pressing water problems through utilization of the formidable research capability of the Consolidated University of North Carolina and other Senior Colleges and Universities of the State; affirming that the Committee reviewed the Institute's proposed research program and considers it to be essential to the immediate and long-range development of water resources in North Carolina; and urging financial support.

The Committee was also briefed on proposed new training and research programs at N. C. State University aimed at assisting industry and public agencies attain economic new solutions to industrial waste pollution problems. Howells reported that the Departments of Civil Engineering, Chemical Engineering, Food Science, Textile Chemistry, and Wood Science and Technology have jointly submitted a training grant proposal to the Federal Water Pollution Control Administration for financial support of a five-year training program in the reduction, control, and treatment of industrial wastes. This would integrate the principles of preventive and curative waste control and treatment into undergraduate and graduate curricula in textile chemistry, wood science and technology, and food science and provide new training opportunities for students in the industry programs to better prepare themselves to cope with the increasingly complex waste problems. It would also extend the range of training opportunities for sanitary and chemical engineers employed by the public agencies and industry to include the in-plant control of wastes as well as waste treatment. Another major objective would be to conduct short courses in industrial waste control and treatment for industrial and public agency personnel.

Three related research projects initiated this fiscal year by faculty members of the Departments of Economics, Food Science, Wood Science and Technology, and Textile Technology, with University and other funds were also reviewed for the Committee. Proposals for continued support have been submitted to the Federal Water Pollution Control Administration. These deal with water use and pollution abatement in the food processing industry, an industry-wide evaluation of waste management by the various types of paper mills in the South, and an economic analysis of textile waste problems.

PROJECT ON COMPUTER SIMULATION OF GROUND WATER AQUIFERS TO GET UNDERWAY

Authorization has been requested from the Office of Water Resources Research for the utilization of available funds for the immediate initiation of the research project involving computer simulation of aquifers of the Coastal Plain in North Carolina. This will be carried out at the request of the Department of Water and Air Resources and in close cooperation with its Division of Ground Water. Dr. J. K. Sherwani of the Department of Environmental Sciences and Engineering, University of North Carolina at Chapel Hill, is the principal investigator. Continuing support beyond the present fiscal year will be requested from OWRR in the Department of the Interior and the State of North Carolina.

The objective of the project is to investigate the dynamic behavior of the Castle Hayne aquifer which underlies the phosphate ore body and is also the principal source of water supply for all purposes in the region. It is proposed to simulate aquifer behavior and to forecast and evaluate the response of the aquifer to alternative strategies of development. Computer simulation, both analog and digital, will be used for this purpose.

The State is in a position to guide the orderly development of ground water resources before excessive withdrawals cause irreparable damage. Results of this research will help in the selection of an optimum development and control policy. They will also be helpful in guiding the data collection program by pointing out the gaps and delineating the sensitive parameters.

CHAPEL HILL TO HOST 17th ANNUAL WATER CONFERENCE

The Department of Environmental Sciences and Engineering of the University of North Carolina at Chapel Hill will host the 17th Southern Water Resources and Pollution Control Conference to be held on April 16, 17, and 18, 1968. The annual event is jointly sponsored by N. C. State University, Duke University, and the University of North Carolina at Chapel Hill with the meeting location rotating annually between the campuses.

The keynote address on the opening day will be given by Lieutenant General William F. Cassidy, Chief, Corps of Engineers, U. S. Army, who will speak on "New Considerations in Small River Basin Planning."

A very fine program has been prepared which will be of great interest to persons interested in water pollution and other aspects of water resources management.

REPORT OF STUDY ON LAKE-ORIENTED SUBDIVISIONS IN NORTH CAROLINA NOW AVAILABLE

The first of two reports to be prepared for the study of "Lake-Oriented Subdivisions in North Carolina: Decision Factors and Policy Implications for Urban Growth Patterns," under the direction of Professor Shirley F. Weiss, Center for Urban and Regional Studies, Institute for Research in Social Science, University of North Carolina at Chapel Hill, has now been published. A limited number of copies are available from the Institute upon request. The report, "Part I - Developer Decisions," by Raymond J. Burby, III, Research Fellow at the Center, calls attention to a number of areas of concern relative to public policy and community lakes. Among these are:

Lakes and the Public Interest

Since every urban area has just a finite number of potential sites for lake construction, expropriation for private use raises some serious questions of the public's interest in these developments. In no case were lakes investigated in North Carolina open to "public" use.

Lakes and Public Safety

Among lake-oriented subdivisions investigated very few met even one of the basic requirements for public safety. The author states that a potentially more serious question concerns adequate construction of the dam itself. Many lake-oriented subdivisions are designed around pre-existing lakes initially intended for agricultural purposes. In the process of urbanization, runoff characteristics and stream hydrology are drastically changed from earlier conditions with associated hazards of washout and flooding of downstream areas.

Community Lakes and Water Quality

Another aspect of the lakes deserving of special treatment is the definite hazard of water pollution. In Chapter IV of the report the author noted that developers who used environmental innovations of this type tended to do so when they could avoid expensive public services--such as sanitary sewers. As a result, most lake-oriented subdivisions depend upon septic tanks for waste disposal. As the developments increase to urban densities, drainage of effluents into the lake is bound to cause problems. Even before this point in development, however, pollution may become a serious problem. The author reports that in several areas in the State the best lake sites have impervious soils which provide very poor drainage fields for septic tanks. Where septic tanks fail and back up effluent, the discharge naturally goes to the lake. Despite the potential seriousness of this problem, there is apparently no public agency in the State which regularly inspects the quality of these bodies of water.

Ownership and Liability

Ownership and liability in case of accidents is another aspect of lake-oriented subdivisions which calls for some degree of public concern, the report concludes.

The author believes that solutions to many of these problems might start with the inclusion of provisions in local subdivision ordinances to govern the use of lakes and other bodies of water and by assuring that the development is adequately designed at the start.

INSTITUTE DIRECTOR APPOINTED TO ADVISORY COMMITTEES

The Institute Director, David H. Howells, has been appointed to the Southeastern Forestry Research Advisory Committee by Director of the Southeastern Forest Experiment Station, Walter M. Zillgitt, for a two-year term beginning January 1, 1968. The primary function of the committee is to meet periodically with the Director and his staff to critically examine the effectiveness of the current Southeastern Station program.

Howells was also elected chairman of a Ground Water Technical Advisory Committee appointed by Col. George Pickett, Director of the N. C. Department of Water and Air Resources. The cited objectives are to achieve a thorough understanding of the hydrology of ground water aquifers in the Beaufort County region; coordinate the collection, assembly, and exchange of data; evaluate and interpret accumulated data; review and evaluate research projects; and generally serve in an advisory capacity to the Board of Water and Air Resources, the industries concerned, and research investigators.

FPC CITES POLLUTION AS TOP UTILITY PROBLEM

FPC Chairman Lee C. White told the 16th Annual Area Power Conference in Minneapolis recently that the most pressing problem for electric utilities is the public demand for rapid improvement in air and water pollution control. Environmental Health Letter of January 1 reports that on the water side of the environment, pollution control may, in some cases, require more expensive installations utilizing less advantageous plant sites and in other instances installation of expensive cooling towers.

WATER RESOURCES COUNCIL AWARDS WATER PLANNING GRANTS

The Water Resources Council has announced that 48 States have been awarded Fiscal Year 1968 planning grants under the Water Resources Planning Act of 1965. The purpose of these grants is to encourage increased comprehensive planning by the States in the development of water and related land resources. North Carolina received $54,200.

NEW PUBLICATION OF "ENVIRONMENTAL REQUIREMENTS OF BLUE-GREEN ALGAE" AVAILABLE

A printing of a 110-page volume on blue-green algae provides the full texts and the discussion of six research papers presented at a two-day symposium sponsored by the Federal Water Pollution Control Administration and the University of Washington.

Entitled "Environmental Requirements of Blue-Green Algae" the volume is now available, according to Dr. A. F. Bartsch, Chief of the FWPCA National Eutrophication Research Program. Copies may be obtained by writing to Eutrophication Research, Pacific Northwest Water Laboratory, Federal Water Pollution Control Administration, 200 South 35th Street, Corvallis, Oregon 97330.

NORTH CAROLINA WASTE TREATMENT PLANT GRANTS AWARDED

Recent announcements from the Department of Interior disclose three grants to North Carolina communities for the construction of waste treatment plants for the abatement of pollution. These are as follows:

Andrews	$ 28,500	Addition of secondary units to existing primary treatment plant (total cost $95,000)
Spruce Pine	$ 41,400	Addition of secondary units to existing primary treatment plant (total cost $138,000)
Tryon	$118,400	Intercepter sewers and new secondary treatment plant (total cost $627,000)

HOUSE HEARINGS SCHEDULED ON RESEARCH AND DEVELOPMENT FOR ENVIRONMENTAL POLLUTION

The major purpose of hearings on environmental pollution scheduled by the Daddario Subcommittee on Science, Research and Development to begin on January 17 is to assure that "scientific knowledge is obtained for control and abatement in time to meet the ambitious schedules for enforcement" set by air and water pollution legislation passed by Congress--according to Air/Water Pollution Report of January 15. Chairman Miller of the full House Committee on Science and Astronautics is quoted as saying that "public opinion and laws alone cannot restore and maintain the quality of our air and water. The work must be done with practical devices and processes which are efficient in relation to their cost." The new series of hearings are said to be "directed at the status of ongoing research and the prospects for early results." Subcommittee Chairman Daddario said further that "We have reached the point where we must be sure that science and technology provide the necessary basis for action to restore and maintain environmental quality. Further delays may lead to deterioration which is irreversible or very difficult to remedy."

ALGAL GROWTH POTENTIAL PROCEDURE PROMISED

The joint government-industry task force to investigate control of eutrophication (over-fertilization of lakes) announced it will develop a standardized procedure to determine the algal growth potential (AGP) of various chemicals and waters. The proposed AGP procedure would be designed to: (1) anticipate the effect on algal production of introducing various nutrients; (2) determine the extent to which nutrient levels must be reduced in a body of water to remedy eutrophication; (3) determine at what point along the time scale of progressing eutrophication a body of water lies; (4) evaluate the effectiveness of waste treatment processes in removing elements that support or stimulate the growth of algae; and (5) be adaptable for special problem purposes.

Details of the project will be worked out under the auspices of the joint task force, who will call upon scientists at the Federal Water Pollution Control Administration laboratories, as well as technical personnel from industry, university experts, independent research institutions and private consultants.

AERIAL WATER QUALITY RECONNAISSANCE DEMONSTRATION KIT

Under a grant awarded in 1962 to demonstrate and encourage the use of aerial methods for water supply and pollution control reconnaissance and surveillance, the Federal Water Pollution Control Administration is distributing training kits (packaged as "Aerial Discovery Training Kits") to Federal, State, and Local water supply and pollution control agencies. Additional kits are also being distributed to colleges and universities which offer courses in remote sensing of the environment. Each kit contains:

Aerial Discovery Manual, Carl H. Strandberg, John Wiley & Sons, Inc., 1967, 249 p.

35 MM Aerial Photography for Measurement Analysis Presentation (Second Edition) Carl H. Strandberg (Published Privately) 1964

Color Slide Demonstration Set #1 (set of 20 35 mm color slides illustrating many sources of water pollution and other aquatic features)

Student stereoscope and assorted other reference materials

The kit received by the Institute will be available for training purposes on a short term loan basis.

STATUS OF STREAM FLOWS AND GROUND WATER IN NORTH CAROLINA

The January 1, 1968, issue of Water Resources Review, U.S.G.S., reported that streamflow was excessive in the west and above normal in the east. The monthly mean flow for the index station South Yadkin River near Mocksville was excessive; monthly flow at this station was above normal for the first time since October, 1966. Streamflow in the Tennessee River basin in North Carolina and Georgia was above normal for the seventh consecutive month. Contents in High Rock, Narrows, and Bridgewater Reservoirs were 90 percent of capacity, 118 percent of average, and 125 percent of those of a year ago.

Ground water levels generally rose. The level at the key observation well at Elizabeth City in the northeast was the highest for December in the 30 years of record.

NEW PUBLICATIONS RECEIVED BY THE INSTITUTE

Water Resources Planning

"Development of Water Resources in Appalachia," 1st Draft
Sub-region J (TVA - Western N. C.)
Appendix B - Hydrology
Appendix P - Agriculture, Forestry & Conservation

"Economic Analysis of Public Water Supply in the Piscatagua River Watershed - I: An Average Cost Approach," D. V. Bourcier & R. H. Forste, WRRC, University of New Hampshire, March, 1967

"Economics in Interdisciplinary Water Resources Analysis," W. Whipple, Jr., Rutgers - The State University, New Brunswick, N. J. 80903, Nov., 1967

NEW PUBLICATIONS RECEIVED BY THE INSTITUTE (cont.)

"Optimum Operations for Planning of a Complex Water Resources System," W. A. Hall & R. W. Shephard, Water Resources Center Contribution No. 122, University of California, Oct., 1967

"Upper French Broad River Basin - Regional Development and Investments Related to the Proposed Water Control System," N. C. State Planning Task Force in cooperation with the Division of Community Planning, Dept. of C & D, Oct., 1967

Water Quality Management

"Aerial Water Quality Reconnaissance Demonstration Kit" (see description elsewhere in *News*)

Analog Computer Simulation of Stream Pollution Dispersion Models with Chemical Reactions," by B. Davidson and "Thermal Pollution of Water Systems," by B. Davidson & R. W. Bradshaw, Water Resources Research Institute, Rutgers - The State University, New Brunswick, N. J. 80903, Oct., 1967

"A Partial Checklist of Florida Fresh Water Algae and Protozoa with Reference to McCloud and Cue Lakes," by J. B. Lackey, Water Resources Research Center Publication No. 3, University of Florida, Gainesville, Fla. 32601, Nov., 1967

"Environmental Requirements of Blue-Green Algae," Proceedings of a Symposium sponsored by FWPCA and the University of Washington, Sept. 23-24, 1966

Water Quantity Management

"Flood Hazard Perception in the Paulins Kill Valley, Warren County, New Jersey," by J. L. Boyer, Water Resources Research Institute, Rutgers - The State University, New Brunswick, N. J. 80903, Oct., 1967

Forest Service Watershed Papers

"Establishment and Progress Report Methodology of a Soil Mantle Hydrology Study," E. R. Burroughs, Jr., and P. E. Packer, July, 1967

"Harvesting the National Forest Water Crop," Forest Service, Nov., 1967

"Statistical Analysis of Ground Water Use and Replenishment," J. D. Rockaway and R. B. Johnson, Water Resources Research Center Tech. Report No. 2, Purdue University, Lafayette, Ind. 47907, Sept., 1967

"Valuation of a Ground Water Supply for Management and Development," by P. A. Domenico, Hydrology & Water Resources Pub. No. 3, Center for Water Resources Research, Desert Research Institute, University of Nevada, Reno, July, 1967

Miscellaneous

"Annual Reports"

Water Resources Research Institute - Univ. of Massachusetts
" " " " - University of Puerto Rico
" " " " - Purdue University
Resources for the Future
Tennessee Valley Authority - Tributary Area Development

Water Resources Research Institute
of The University of North Carolina
124 Riddick Building
N. C. State University
Raleigh, North Carolina 27607