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THE UNIVERSITY OF NORTH CAROLINA  
WATER RESOURCES RESEARCH INSTITUTE

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TO: Recipients of WRRRI News

FROM: WRRRI

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# WATER RESOURCES RESEARCH INSTITUTE OF THE UNIVERSITY OF NORTH CAROLINA

Number 200

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### AQUATIC WEED COUNCIL ACTIVE IN SEVERAL AREAS

The 16-member North Carolina Interagency Council on Aquatic Weed Control, formed in June, is now meeting on a regular basis and is looking at a number of

issues related to the control of hydrilla and other aquatic weeds that threaten the state's waters.

At the October 1 meeting, Council members reported activity on several fronts. The Division of Environmental Management's hydrilla monitoring program continues to investigate reports of suspected infestations of the weed. There are presently 15 sites in the state where hydrilla has been confirmed. Although hydrilla has received the most attention recently, other aquatic weeds (e.g., duck weed, Brazilian elodea) are also a concern in the state. DEM plans a monitoring program to investigate their occurrence.

Herbicides are one means of controlling aquatic weeds. DEM is developing a general permitting process to cover the use of herbicides. Those planning the aquatic use of herbicides must apply to DEM.

The Wildlife Resources Commission has begun experimental studies with grass carp to determine how effective the herbivorous fish are at controlling aquatic weeds in North Carolina waters. One small

pond in the Raleigh area has been stocked with the fish, and the Commission is seeking permission from pond managers to stock others. They want to determine the correct stocking rate and information about the grass carp's behavior in this state's water.

An Institute research project on hydrilla has completed preliminary surveying of the weed in five of the major lakes in the Raleigh area. All hydrilla sites in the area are being appraised for control strategies, and permission to work in four of the lakes has been obtained.

### IMPLEMENTATION OF RURAL CONSERVATION PRACTICES MAY BE AFFECTED BY ECONOMY

The current economic situation faced by farmers in many states has reduced their ability to carry out important

conservation practices. Milton E. "Bud" Mekelbury, president of the National Association of Conservation Districts, cites a number of cases where farmers in financial trouble have delayed or failed to complete cost-sharing conservation such as contouring, contour terraces, and strip-cropping.

The situation in North Carolina appears somewhat better. Farmers are following through with cost-sharing practices with the Agricultural Stabilization and Conservation

Service (ASCS). According to Bruno Mangum with ASCS, North Carolina farmers are carrying out practices such as sod waterways, winter cover crops and livestock lagoons. "All of the available cost-sharing money will be used up," he said.

Jim Canterbury, State Resource Conservationist with the U.S.D.A. Soil Conservation Service, sees the situation as mixed. He said, "North Carolina tobacco farmers have not been impacted as much as the grain farmers." Grain farmers faced with low grain prices, high fertilizer, equipment and interest costs are hard pressed to find resources for conservation. According to Canterbury, more information on farmers conservation activities will be known in late October or November--a period in which many conservation practices are implemented.

**NRCD UNDERTAKES STREAM WATCH PROGRAM**

As a part of the Department of Natural Resources and Community Development (NRCD) water agenda, a Stream Watch

Program has been developed and initiated by the Division of Environmental Management. The new program is directed to increasing public participation to overview the stream systems in North Carolina.

According to Lee Fleming, Water Quality Chief for the Division of Environmental Management, the program would include:

- Increased public involvement through slides and brochures, educating the public as to the water quality perspectives in North Carolina. This information would be available to the public through any form in the Field Offices or the Central Office in Raleigh, and could be used by the citizens to evaluate the need for a Stream Watch Program.
- Application and designation of a specific group on a case-by-case basis as a Stream Watch organization. This would be an application to the Secretary of this Department and a designation that this group has been designated as a Stream Watch Program.
- Improved public understanding of government's role in managing and protecting water quality. This will also be implemented by other NRCD divisions, specifically Forest Resources, Inland Fisheries and Parks and Recreation.
- Conduction of stream walks in which groups will utilize available mapping, available computer printouts, checklists, etc. in assisting the stream walk itself to understand the specific water quality environmental effects.
- Promotion of stream environment by advising on restoration and recreational activities.

Fleming stated that the logical progression does allow for public involvement, education and awareness of water quality perspectives within our State resources.

**PLANS CONTINUING FOR \$400 MILLION PEAT-TO-METHANOL ALCOHOL PLANT**

Peat Methanol Associates, Energy Transition Corporation and Koppers Company Inc. have plans to build a \$400 million

peat-to-methanol alcohol facility on a 15,200-acre tract in Washington County, North Carolina. A decision

to move ahead hinges upon a decision by the federal Synthetic Fuels Corporation which is considering the request for financial assistance that would guarantee loans and a support price for the fuel. A decision on the request is expected in early 1983. If approved, construction would start in the spring of 1983 and production would begin in 1985.

The plant would process about 2,500 tons of peat a day to produce alcohol for automotive fuel. If financially successful, it could be expanded in modules and ultimately reach a size eight times the original.

Air quality, sediment control, and water use including 2 million gallons per day of ground water, wastewater discharge permits for 180,000 gallons per day of wastewater and biological impacts on local waters are among the environmental concerns being addressed by consultants for the firm.

Most of the area to be mined is currently drained and ranges from 5-10 feet above sea level. According to representatives of the company, the land and its drainage system is in no way connected to Lake Phelps.

The Department of Natural Resources and Community Development Peat Mining Task Force reviewed in September its previous recommendations regarding peat use and environmental issues. The Task Force is expected to soon issue a draft of its current recommendations for further action and policy needs regarding the state's role with the proposed peat to methanol alcohol plant.

**NEW MANUAL ON DESIGN AND INSTALLATION OF LOW-PRESSURE PIPE WASTE TREATMENT SYSTEMS**

A new manual has been prepared that could assist many developments in North Carolina to handle wastewater where

soil or water conditions are not suitable for on-site sewage disposal by conventional septic systems. According to the authors, Craig Cogger, Bobby Carlile, and Dennis Osborne at North Carolina State University and Ed Holland at Triangle J Council of Governments, low-pressure pipe (LPP) systems are not a panacea for all the unsuitable soils of North Carolina, but they are useful for some specific conditions where conventional systems have frequently failed.

The manual specifies the procedures and materials to be used for successful siting, design, installation and maintenance of residential LPP systems. Use of proper materials and techniques is critical to the success of the LPP, as well as to all other ground absorption systems. Many engineers, sanitarians, contractors and designers are unfamiliar with LPP construction, and these instructions are designed as an aid to them. Although those who design, build and use septic systems can benefit from this report, it must always be used in cooperation with the local health department. The local health department must first approve a site, and then assign waste flow and soil loading rates.

This manual covers design and installation of small LPP systems suitable for homes and small businesses. Principles are similar for larger commercial and institutional systems, but the special requirements of those systems are not addressed.

Production of the manual on low-pressure systems was supported by the UNC Sea Grant College Program. The publication number is UNC-SG-82-03. A copy may be obtained by writing to UNC Sea Grant College Program, 105 1911 Building, NCSU, Raleigh, NC 27650. There is a \$2.50 charge for the publication.

**NORTH CAROLINA SEPTAGE STUDY REPORT AVAILABLE**

A new report by the Division of Health Services provides the results of a study on the generation, movement and

disposal methods for septage (liquid and solid wastes removed from septic tanks) in North Carolina. In the study, information was obtained from wastewater treatment plant operators, local health departments, households and methods of collection, handling and disposal were observed in all counties of North Carolina.

Data from local health departments revealed that an estimated eighty-seven million (87,000,000) gallons of septage were generated in 1979. Twenty-two counties containing slightly over half of the total state population (53.5%) reported pumping three quarters (74.2%) of the septage. The generation of septage was approximately twenty-seven (27.4) gallons per person per year or seventy-three (72.5) gallons per household per year. Seasonal variations were noted, with the rainy seasons (spring and winter) showing about twenty percent more septage being pumped.

According to the study approximately two hundred (192) land disposal sites for septage were noted; seventy-one (71), or approximately twenty-two percent, of the state's wastewater treatment plants accept septage.

Copies of The North Carolina Septage Study can be obtained from Steve J. Steinbeck, Sanitation Branch, Environmental Health Section, Division of Health Services, P.O. Box 2091, Raleigh, NC 27602-2091.

**REPORT ON HAZARDOUS WASTE IN NORTH CAROLINA**

The Department of Human Resources has recently published a report on the hazardous waste

generated, stored, treated and disposed of in North Carolina in 1981.

According to the report summary, within the North Carolina hazardous waste management system there are 806 generators and 323 treaters, storers or disposers (TSD's). These are facilities that have notified that they generate hazardous waste and have been processed and given an ID number. The Piedmont Counties include the largest number of generators with Mecklenburg the largest county. Approximately one-third of all generators also are treaters, storers, or disposers (TSD's). Within the North Carolina hazardous waste management system there are 26 off-site TSD's. Most of these serve off-site company plants. Two incinerators, two hazardous waste management storers/transporters, and six resource recovery facilities include all of North Carolina's commercial hazardous waste management facilities. There are no commercial hazardous waste land-farms or landfill facilities. Seventy-two commercial transporters were identified.

North Carolina's 806 hazardous waste facilities generated 1.8 billion pounds of waste in calendar year 1981. Ninety-nine percent of this waste was generated by 17 counties, which are concentrated for the most part in the Piedmont. New Hanover County, however, was the state's largest generator. In recent action by the Solid and Hazardous Waste Management Branch, a major waste produced in New Hanover County was declared not to be hazardous waste. With this change, Wake County becomes the largest producer of hazardous waste.

Most waste is treated on site, 1.6 billion pounds or 74%. Six-tenths billion pounds (26%) is sent to N.C.

off-site treaters, storers, or disposers, with an additional .1 billion pounds going to out-of-state facilities.

Ninety-six percent, of the state's 2.2 billion pounds from generation and storage in 1981 was treated in-state; 1.4 billion pounds by biological treatment and .5 billion pounds or 25% by incineration.

One-tenth percent or 2.5 million pounds was recovered in North Carolina.

North Carolina disposal by landfill includes 1.1 million pounds or less than .1% of the total.

In storage on December 31 was 4% of the total or 79.6 million pounds. Most of the in-storage waste was in surface impoundment - 52.9 million pounds or 66% of the total. There was an additional 23.4 million pounds or 29% in barrels.

**ONTARIO POLLUTION FOUNDATION RELEASES GUIDE TO INDUSTRIAL WASTE REDUCTION**

Hundreds of examples where companies throughout the world have utilized waste recovery and reduction technologies to control

pollution and save money are documented in a new book entitled Profit from Pollution Prevention, released this month by the Pollution Probe Foundation (PPF) of Toronto, Ontario. The central thesis of the book is that pollution control is not a drain on company profits; rather even small companies can increase their profitability by installing closed-loop process systems, redesigning the type and flow of reagents within an individual process and among various parts of a plant, and utilizing recycling techniques and waste exchanges. According to the book's authors, a compendium of examples from diverse industries is especially valuable because different sectors of industry may have already "solved" particular waste problems but not actively communicated their solutions to other industries that could adapt the basic concepts to their own waste problems.

The 416-page book emphasizes both specific waste recovery technologies such as process redesigns, waste segregation, and waste stream combination; and "good housekeeping" measures to reduce waste generation such as mass balance audits, equipment modernization, and automatic process control measures. The book describes applicable waste recovery technologies and provides case histories of successful pollution prevention measures and their economic benefits for each of the following industries: 1) dry cleaning; 2) electroplating; 3) fly ash and sulfur-producing industries; 4) food processing; 5) oil refining; 6) paints and coatings; 7) photography; 8) plastics production; 9) printing; 10) pulp and paper; 11) solvent-producing industries; 12) tanning; and 13) textiles. The guide also discusses 11 waste recovery technologies used by many different industries, including carbon treatment, electro dialysis, ion exchange, and ultrafiltration, outlines alternatives to land disposal for those residues whose generation cannot be avoided, and provides specific contacts in available waste exchanges, industrial economic assistance programs for pollution control, and research centers in the U.S. and Canada studying waste reduction techniques. For further information, contact: Monica Campbell, PPF, 12 Madison Avenue, Toronto, Ontario, Canada M5R 2S1; Tel: 416-978-6155.

**CANADIAN WASTE MATERIALS EX-CHANGE VALUES TRANSFERS AT \$5.4 MILLION CANADIAN PER YEAR**

The Canadian Waste Materials Exchange (CWME) of Mississauga, Ontario, has conducted 250 waste

transfers since its creation in 1978, according to its most recent progress report. It has received a total of 10,096 inquiries about 1468 different wastes, and successfully transferred 15 percent of the wastes listed in its system. Forty-nine percent of the transfers involved hazardous wastes, for an average yearly total of over 56,000 metric tons of hazardous wastes exchanged. CWME manager Robert Laughlin estimates the value of all the wastes transferred at \$5.4 million Canadian per year, but he calls this a "conservative estimate" of replacement value. The actual value of transactions between companies buying and selling wastes is not reported to CWME, and Laughlin told HMIR that it could be anywhere between \$2 million and \$10 million Canadian. Wood and paper products were exchanged more often than any other wastes, accounting for 48 transfers; organic chemicals and solvents placed second with a total of 46 transfers. Metal-bearing sludges were listed most frequently among CWME's compilation of "wanted wastes." Ontario and Quebec accounted for 60 percent and 21 percent of the transfers conducted; Laughlin noted that Ontario's percentage of reported transfers was proportionately greater than its share of Canadian industrial activity.

CWME serves 3700 companies throughout Canada and abroad. Originally funded by Environment Canada, its yearly operating cost of approximately \$60,000 Canadian is now shared by federal and provincial governments as well as subscribers. For more information, contact: Robert Laughlin, CWME, c/o Ontario Research, Sheridan Park Research Community, Mississauga, Ontario, Canada L5K 1B3; Tel: 416-822-4111.

**MASSACHUSETTS LEGISLATION PROVIDES FUNDS FOR WATER RESOURCES MANAGEMENT**

Legislation passed recently by the State of Massachusetts will provide \$357.5 million for a comprehensive water

resources management strategy.

Massachusetts Governor Edward J. King signed the Water Pollution Control and Water Conservation Loan Act on July 10. The funds will be supported by bond issues and will be allocated to cover a wide range of water concerns.

According to a report in the AWWA "Mainstream" newsletter, \$250 million will be used for wastewater cleanup, to continue that state's work toward improved water quality (45 percent of the state's rivers are now rated fishable and swimmable, as opposed to only 16 percent in 1979). Sixty million has been designated for leak detection and system rehabilitation.

A \$25 million fund will provide for water construction grants, and \$10 million will be used to clean up water supplies (contamination has forced shutdown of wells in some communities) and help alleviate water shortages. Ten million dollars has been earmarked for the acquisition of water supply sites; \$2.5 million is to be used for water audits in state, county, and municipal buildings.

**USE OF MODELS FOR WATER RESOURCES MANAGEMENT, PLANNING, AND POLICY**

A recently completed study by the Office of Technology Assessment for the U. S. Congress shows that mathematical models have signif-

icantly expanded the Nation's ability to manage and wisely plan the use of its water resources, and promise even greater benefits in the future. However, the rapidly advancing field of water resource modeling has outstripped the capacities of Federal, State, and local agencies to support and effectively use these tools.

As the United States approaches full use of its water resources, the ability to analyze the consequences of water resource development becomes increasingly important and difficult. Mathematical models--most often computerized--are extensively relied on to meet this purpose. They are among the most sophisticated analytic technologies available, despite varying technical capabilities among the many water resource issues. They are significantly improving the accuracy of information on water supplies, floods and droughts, water quality, and the economic and social consequences of water-related development and controls.

Models can substantially reduce the cost of managing water resources. For example, models are used to predict the water quality that would result from proposed wastewater discharge, before costly treatment systems are built. They assist in decisionmaking by providing information for people to interpret in light of existing laws, political and institutional structures, and informed professional and scientific judgment.

Much of the analysis presently performed to assess water resources would not be feasible without current modeling capabilities. Models are also relied on to perform analyses required by many of the major Federal laws, including the Clean Water Act, the Water Resources Planning Act, and Federal flood control legislation.

The Federal Government spends approximately \$50 million per year on water-related mathematical models to help plan billions of dollars of annual water resource investments, and help manage hundreds of billions of dollars of existing facilities. Nonetheless, no overall strategy for developing and using models exists within most Federal agencies. Little effort has been made to coordinate the development, use, and dissemination of models throughout the Federal Government, or to assist State and local governments in using these tools. As a result, many legislative requirements and decisionmaker needs for information are not being met. Moreover, many water resource agencies, particularly at State and local levels, are unaware of currently available models that could be applied to their information needs.

Opportunities for congressional action to improve the Nation's water resource analysis capabilities include:

- modifying the mechanisms governing Federal water research to direct adequate resources toward developing research results into usable analytic tools;
- directing individual Federal agencies to provide comprehensive support programs for modeling and other analysis needs, both for their own use and for use at state and local government levels; and

- directing agency resources toward training in the use and interpretation of models, and disseminating information about existing water resources models.

Copies of the full OTA report, "Use of Models for Water Resources Management, Planning, and Policy," are available from the U.S. Government Printing Office. The GPO stock number is 052-003-00880-7; the price is \$7.50. Summaries of reports are available at no charge from the Office of Technology Assessment, U. S. Congress, Washington, D. C. 20510, Telephone: (202) 226-2115.

COE PROGRAM YIELDS INFORMATION ON STREAMBANK EROSION Results of streambank erosion control studies by the Army Corps of Engineers are related in a report to Congress. The recently released report describes the five years of work done under the Corps' "Section 32 Program."

The \$50 million program was authorized by Section 32 of P.L. 93-251, the Streambank Erosion Control Evaluation and Demonstration Act of 1974. The program included an evaluation of the extent of streambank erosion nationwide; research on soil stability and hydraulic processes to identify causes of bank erosion; evaluation of bank protection methods; demonstration projects; and various reports and other materials to disseminate the findings.

The evaluation showed some 142,000 bank-miles of the nation's streams and waterways to be in need of erosion protection, with treatment costs estimated at over \$1 billion annually. The report notes that costs of conventional bank protection methods currently available generally exceed the benefits derived by a large margin, thereby rendering the control of these areas uneconomical from a cost/benefit standpoint.

Numerous specific conclusions from the Section 32 Program are presented in the Main Report to Congress and its eight separate appendices, which together run to 4,000 pages. In general, however, the studies show that there is no universal method that offers low-cost bank protection for situations encountered in the field. Rock will likely remain the material of first choice for bank protection where it is available in sufficient size and is affordable because of durability and other advantages. Other promising techniques under certain conditions include soil-cement, which may be cost-competitive, and used-tire mattresses and bulkheads (effective, but high labor costs for installation when done under contract). Kellner jacks and permeable timber and wire fences were noted to be effective in low-energy environments.

An alternative in situations where the costs of techniques far exceed the benefits may be to perform only minimal protection first, then repair as necessary (e.g., windrow revetment, low-elevation structures, intermittent bank-line revetment, or hard points), the Main Report states. Also, low-grade materials may be satisfactory (e.g., chalk or poor quality rock). The most important conclusion, however, is to provide effective protection at the toe of the bank.

In addition to the report to Congress, the Corps has prepared a pamphlet for public dissemination and is incorporating study results into technical design guidance materials.

For more information, contact the Waterways Experiment Station, Corps of Engineers, P.O. Box 631, Vicksburg, Mississippi 39180.

RECLAIMING MAN-MADE LAKES Man-made lakes in many states are experiencing severe sedimentation problems, which reduce water-storage capacities and degrade water quality, as well as limit recreational opportunities.

In a pilot project at Lake Paradise, Mattoon, Illinois, a number of studies have been conducted on the feasibility and benefits of lake reclamation. Included are studies on the feasibility of dredging Lake Paradise, on the importance of recreation planning to lake reclamation, and on the economics of lake reclamation.

The Lake Paradise studies indicate that the sediment of Lake Paradise can be dredged to increase storage capacity and improve water quality and that sediment can probably be restored as a soil amendment to the surrounding farmland. The studies also indicate that recreation should be an important consideration of lake reclamation planning and that lake reclamation may be cost-efficient compared to other alternatives such as constructing additional water-supply reservoirs.

For additional information on the study see Stout, G.E.; Buhr, R.; Deo, S.R.; Barcelona, M.J.; Absher, J.; and Musser, D. July 1982. The Feasibility and Benefits of Reclaiming a Man-Made Lake: A Case Study of Lake Paradise, Mattoon, Illinois, Research Report 170. Urbana, IL: Water Resources Center, University of IL at Urbana-Champaign. \$4.25. A loan copy is available from the Institute.

NEW INSTITUTE REPORTS *Proceedings of a Workshop on Hydrilla Management in North Carolina*, edited by Ann Witzig, Jeff Heimerman and Barbara Partington.

A workshop on hydrilla management in North Carolina was held May 4 in Raleigh. Hydrilla is a hardy, fast-growing aquatic weed that has caused serious damage to waterbodies in other states and whose presence has been confirmed in a number of North Carolina locations. Proceedings of the workshop have been prepared and are being readied for distribution by the Institute.

The event featured speakers with extensive experience in aquatic weed research and management. They described hydrilla, its characteristics and distribution, control measures currently available, management programs used in other states, and research in progress. Several of the speakers were from Florida, where severe hydrilla infestations have prompted research and the development of a state aquatic plant control program. They shared their experiences with these efforts.

Topics also included the use of herbicides for hydrilla control, experiences with physical and mechanical strategies, biological research by the Army Corps of Engineers (on insects, plant pathogens, and herbivorous fish), and such programs as the TVA's Hydrilla Contingency Plan.

These presentations are contained in the Workshop Proceedings, which will be available soon from the Institute.

*Treatability Analysis of Digester Supernatant and Other Return Flows to Improve Wastewater Treatment Plant Efficiency* by Philip C. Singer and Desmond F. Lawler.

In this study the significance of return flows from anaerobic digesters and sludge dewatering devices was assessed at five municipal wastewater treatment plants. Digester supernatant was found to represent an important waste load being returned to the main wastewater treatment processes for several pollutants of interest, notably suspended solids, nitrogen and phosphorus. Inefficient solid-liquid separation in the digesters, due to both design and operating limitations, was found to be the major cause of this situation. Waste flows from sludge dewatering facilities were less significant due to better solid-liquid separation.

Laboratory treatability studies conducted on anaerobic digester supernatant indicated that chemical treatment of the supernatant prior to its return to the plant influent could markedly improve its quality, but that such treatment is not necessary if good solid-liquid separation in the digesters could be achieved.

Further laboratory studies on anaerobically digested sludge showed that good solid-liquid separation is difficult to achieve by gravity thickening, but is easily accomplished by dewatering operations, such as vacuum filtration and centrifugation. The type and dose of sludge conditioners, and pH, are important parameters in effecting good separation.

The research results suggest that substantial improvements both in the design and operation of sludge digesters and subsequent dewatering processes are needed to alleviate the problems associated with the return of digester supernatant. These improvements are discussed in the report.

A copy of this report may be obtained free from the UNC Water Resources Research Institute, North Carolina State University, 124 Riddick Building, Raleigh, NC 27650-5999, telephone (919)737-2815. A fee of \$8.00 prepaid is charged for out-of-state requests.

**WORKSHOP ON GROUNDWATER AVAILABILITY IN THE PIEDMONT, DECEMBER 8** On December 8, the Water Resources Research Institute and Triangle J Council of Governments will sponsor a workshop on "Groundwater Availability in the Piedmont." It will be a day-long session at Mission Valley Inn in Raleigh. A number of

**NEW PUBLICATIONS RECEIVED BY THE INSTITUTE**

(Residents of North Carolina may borrow these from the Institute for a two-week period. Where individual copies are desired, readers are encouraged to request copies from the organization issuing the publication. The addresses are provided by the NEWS for this purpose.)

Water Resources Planning

"Use of Models for Water Resources Management, Planning, and Policy and Summary," 8/82, Office of Technology Assessment, Congressional Board of 97th Congress, avail. from Supt. of Doc., USGPO, Washington, DC 20402. (06A)

Water Quality Management

"National Acid Precipitation Assessment Plan," 6/82, by The Interagency Task Force on Acid Precipitation, 722 Jackson Place, N.W., Washington, DC 20006. (02B Acid Precipitation)

speakers will cover such topics as groundwater occurrence exploration, site selection, construction, water quality, and planning considerations. More information will be provided in the next issue of this newsletter regarding registration.

**CONFERENCE ON WATER POLICY IN THE SOUTH, NOVEMBER 18-19** On November 18-19, 1982, three regional committees of state Experiment Stations and Extension Services at Southern Land Grant Colleges and Universities (Natural Resource Economics, Extension Public Affairs and Community Development) will sponsor a conference titled "Water Policy in the South" in Memphis, Tennessee. The conference will focus on inter-basin and interstate transfers, demand management and conservation, water rights, nonpoint source pollution, a model water code, the role of water in economic development and related topics. Speakers and discussion leaders will be selected from among water experts from throughout the South.

For registration information, contact the Southern Rural Development Center, Box 5406, Mississippi State, MS 39762, telephone - 601-325-3207.

**WATER RESOURCES CONDITIONS IN NORTH CAROLINA** Streamflow during September was below normal across the state and in the deficient range (lowest 25 percent of record) in the Mountains and Piedmont. Streamflow compared to long-term median at four representative index stations was as follows: French Broad River at Asheville (Mountains) 745 cfs, 68 percent of median; South Yadkin River near Mocksville (western Piedmont) 112 cfs, 60 percent of median; Deep River at Moncure (eastern Piedmont) 128 cfs, 32 percent of median; and Contentnea Creek at Hookerton (Coastal Plain) 209 cfs, 72 percent of median.

At month end streamflow was below normal in the Mountains and western Piedmont and normal or slightly above normal in the eastern Piedmont and Coastal Plain.

Ground-water levels in water table wells fell seasonally except in the Coastal Plain. Water levels are 1 to 3 feet above long-term averages and 1 to 5 feet higher than a year ago.

. . . . U. S. Geological Survey

"Anoxic Nutrient Regeneration and the Eutrophication of Estuarine Waters," 2/81, by S. W. Nixon, et al., RI WRC, U. of RI, Kingston, RI 02881. (02L)

"North Carolina 1981 Annual Report of Hazardous Waste, Generated, Stored, Treated or Disposed," 7/82, by O. W. Strickland, et al., NC Solid & Hazardous Waste Management Br., Div. of Health Services, Box 2091, Raleigh, NC 27602-2091. (05A Hazardous Waste)

"The North Carolina Septage Study," by S. C. Grayson, et al., avail. from S. J. Steinbeck, Sanitation Br., Environmental Health Section, Div. of Health Services, P.O. Box 2091, Raleigh, NC 27602-2091. (05E)

Miscellaneous

"North Carolina Administrative Code, Title 15, Dam Safety," 6/15/80, by Env. Management Comm., NCDNRCD, P.O. Box 27687, Raleigh, NC 27611. (08A)

"A Report from The Conservation Foundation--State of the Environment 1982," by The Conservation Foundation, 1717 Massachusetts Ave., N.W., Washington, DC 20036, Price - \$15.00.

"A Manual of Marsh and Aquatic Vascular Plants of North Carolina with Habitat Data," (#247), 1/77, by E. O. Beal, avail. from Agricultural Communications, 318 Ricks Hall, NCSU, Raleigh, NC 27650, Price - \$2.00. (021 Aquatic Weeds)

SPECIAL

County Government and Water Quality

*(Presented by Grover C. Lancaster, Jr., Past President, North Carolina Association of County Commissioners at the Coastal Water Management Symposium, September 16, 1982, New Bern, N. C.)*

Although county involvement in protecting and improving water quality has expanded dramatically during the last several years, North Carolina county governments have a long standing commitment to water quality. There is a long history of participation by counties in water quality issues, beginning with the inspection of septic tanks to protect well water used for household consumption. Today counties are involved, both individually and collectively, in a broad range of water resource issues, including: The planning and construction of multi-million dollar water supply and sewage treatment systems, and the river basin planning process.

County commissioners are now taking part in water resource related activities as full partners with state and municipal government. For far too long we all have taken the availability of good water for granted. Our state before has been blessed with a seemingly inexhaustible supply of fresh water. Now, we realize that water, like the air and the land, is a finite resource which must be managed and protected for the public good. Accelerated development across the state has made us aware of how easily water quality can be degraded and how apparently plentiful water supplies can be depleted.

In many parts of North Carolina, further development has been inhibited by water resource limitations. At present there are over forty municipalities which cannot add new users to their sewage systems because the discharges from those systems currently do not meet water quality standards. On the supply side, the issue of insufficient water to sustain long-term growth has begun to surface in the Piedmont.

The first and foremost reason for county involvement in the area of water quality is to protect the public health. In 1911, the general assembly authorized the formation of county boards of health with the power to enact regulations to safeguard the public health. By 1949, all North Carolina counties were served by a single-county or district health department.

One of the most important aspects of county health services is the inspection of septic tanks. The primary purpose of this service is the protection of household water supply.

I am proud to say that we have seen vast improvements during the past twenty years in the quality of health department staff and the techniques employed in septic tank inspection. There has been a continuous interaction between the North Carolina Association of Local Health Directors, an affiliate organization of the Association of County Commissioners, and the State Division of Health Services. This established working relationship was very important in the writing of Ground Absorption Sewage Disposal Act and the development of administrative rules to implement the law. Although not everyone is completely satisfied with the new state regulations, I feel that the involvement of county health officials produced a new system which protects the public's interest without strangling sound development.

Since World War II, North Carolina has undergone a transformation in terms of settlement patterns with increasing numbers of people living outside of municipalities in relatively dense clusters. Although North Carolina has a very progressive annexation law, municipalities have not always been able to absorb these developing fringe areas or to extend water and sewer services in an economical manner.

As a result, county governments have become involved in the financing and operation of water and sewer systems. Since 1955, when the general assembly granted counties the authority to do so, forty-eight counties have provided financial assistance either on their own or in cooperation with municipalities, to various kinds of water supply lines. Also, at least twenty counties are participating in the financing of modern, federally mandated sewage systems.

Over the last ten years, counties have provided over \$110 million for water supply projects, mostly in the form of general obligation bond proceeds. In addition, during the last five years counties and sanitary districts have obtained voter approval on over \$20 million for sewer system bond issues.

The desire to promote development was an important factor in the entry of counties into the area of water and sewer services. However, the over-riding concern among county officials has been, and remains, one of protecting the public welfare in situations where the old approach of individual wells and septic tanks is no longer adequate and where there is no municipal government financially or physically capable of meeting the need.

The involvement of counties in water supply and sewage treatment projects has broadened our awareness of water resource issues and given all of us a keener sense of interdependence in this area. No single county can insure adequate water supply quality without the cooperation of adjoining counties.

A number of counties already have undertaken a regional approach to water and sewer issues. The most notable example involves the counties of Bladen, Brunswick, Columbus, New Hanover and Pender which have joined together to form the Lower Cape Fear Water and Sewer Authority.

Our participation in serving developing areas beyond the reach and capabilities of municipal utility systems also has sharpened county interest in land use planning and control. In a recent survey conducted by North Carolina State University and the Association of County Commissioners, we found that 38 counties now have comprehensive

land use plans, 36 have enacted zoning regulations, and 40 counties regulate subdivisions. I find it interesting that these planning and regulatory activities are no longer limited to the urban counties of the Piedmont. Coastal counties, under the impetus of the Coastal Area Management Act now all have land use plans and quite a few have zoning and subdivision controls.

This same survey indicated that, along with small scale water supply issues, counties also were concerned about protecting water sources. The protection of watersheds, rural pollution control, and water resources for fish and wildlife were listed as potential problems by county managers, with rural pollution from septic tanks ranking first among all problems.

Our increasing interest in broad, long range water policy questions perhaps can best be seen in county participation in the state's river basin planning efforts. As a member of the Local Government Advocacy Council, I had the opportunity to comment on the state's development of the Yadkin-Pee Dee River Basin Study. The state has been most interested in obtaining local government input in these studies and has planned earlier and more active involvement in all future river basin studies, including the Neuse, the Cape Fear and the Tennessee-Little Hiwassee.

Our exposure to broad water policy concerns has increased our sensitivity to some of the tradeoffs involved. How can competing, and sometimes conflicting, needs for water be met? What are the opportunity costs associated with devoting our water resources to one or another immediate use?

In short, counties are involved and must stay involved in the water resources planning and management process. The state can play a key role in leadership and planning. However, the enactment and enforcement of regulations to protect water resources will require close cooperation with county governments. I believe that we have a good track record in this area and will prove to be key actors in preserving our state's water resource for future generations.

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ITEMS OF INTEREST:

- NRCD Undertakes Stream Watch Program, page 2
- New Manual on Design and Installation of Low-Pressure  
Pipe Waste Treatment Systems, page 2
- North Carolina Septage Study Report Available, page 3
- Ontario Pollution Foundation Releases Guide to Industrial  
Waste Reduction, page 3
- Massachusetts Legislation Provides Funds for Water  
Resource Management, page 4
- Use of Models for Water Resources Management, Planning,  
and Policy, page 4
- New Institute Publications:
  - Proceedings of a Workshop on Hydrilla Management in  
North Carolina*, page 5
  - Treatability of Digester Supernatant to Improve  
Wastewater Treatment Plant Efficiency*, page 6
  - Workshop on Groundwater Availability in the Piedmont,  
December 8, page 6

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