NEWS

# WATER RESOURCES RESEARCH INSTITUTE

OF THE UNIVERSITY OF NORTH CAROLINA

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CONTENTS



## NORTH CAROLINA'S APPROACH TO THE CONTROL OF TOXIC SUBSTANCES

Dr. Don Huisingh, Project Leader, N. C. Toxic Substances Project, presented a progress report to the Southeast Conference on Toxic Chemicals in Water on April 14-15 in Charleston, S. C. This important undertaking is expected to establish a sound basis for an integrated State program for the management of toxic substances and could well serve as a model for other states.

Huisingh described North Carolina's efforts under the Federal Toxic Substances Control Act (TSCA) to develop a comprehensive and integrated system to insure the long-term protection of human health and the environment through the identification, assessment, and control of toxic substances.

The first task was to select 100-150 toxic substances for high priority attention from among the 50,000 or more substances of potential use in the State. The National Occupational Health Survey provided input on chemicals likely to be used in production and related exposure. The major Standard Industrial Classifications in North Carolina were determined and employment figures estimated. These exposure and use data were merged in the computer with substance-specific toxicity data from the national Registry of Toxic Effects of Chemical Substances and the EPA production inventory. Analyses performed on the merged files identified a list of substances which was further refined through reference to lists developed by national and international agencies. The resulting list of toxic substances was circulated among a large number of State employees and university researchers working in the health and natural resource fields. Their comments and suggestions helped to produce the initial list of 73 organic and 22 inorganic toxic substances for study by the project team.

The next step was for the Research Triangle Institute to develop detailed dossiers on each substance in the initial list of toxic substances. Each dossier will contain a concise and factual summary of basic information on the known health effects, applicable regulations, and recommendations about emergency response; physical and chemical properties, general toxicity, carcinogenicity, mutagenicity, teratogenicity, and environmental fate; and a selected bibliography. The first set of dossiers are scheduled for completion by mid-summer 1981.

Once the dossiers are completed, a group of experts will be convened to perform the final selection of substances most deserving detailed human exposure and adverse health effects assessment in North Carolina. Exposure and risk assessment methods are in the planning stage.

All of the foregoing steps will be useless without a comprehensive toxic substances management plan. This will be designed to perform four complementary functions:

1. TO ANTICIPATE or prevent a toxic substance problem from occurring.
2. TO ALERT the necessary officials when a toxic substance problem has developed or is developing.
3. TO ASSESS the nature of a toxic substance problem and determine the extent of adverse effects.
4. TO AMELIORATE, solve, or minimize a toxic substance problem.

The project is scheduled for completion by the end of calendar year 1982.

# # #

YEAST FROM HOLDING POND CAUSES FISH KILL

The Enforcement and Emergency Response section of the Division of Environmental Management (DEM) is working to complete an investigation of one of the larger fish kills on record in North Carolina.

The incident occured the last week in June in the Yadkin River. Over 100,000 fish were killed when yeast from a break in a holding pond entered the River above the Highway 64 bridge along the Davie-Davidson County line.

The yeast, to be used for animal feed, came from the Pillsbury Co. and was stored in a holding pond owned by Brakes, Inc.

The investigation by DEM will include an assessment of costs as well as civil penalties.

Cleanup and replacement costs were over $32,000 for a July, 1980 fish kill on the Neuse River. Over 10,000 fish were killed when caustic soda from the Raleigh Water Treatment Plant spilled into the water. #

CLEAN LAKES PROGRAM UNDERWAY

The Division of Environmental Management's Clean Lakes Program, with funding from EPA, got underway in June. Its ultimate goal is to protect or restore North Carolina's public freshwater lakes for recreational activities.

The first stage of the program, classification, will continue through 1982 and include sampling of 45 lakes this summer (70 altogether), according to Ann Witzig, Project Manager. Questionnaire responses from municipal officials helped identify lakes to be surveyed. Information on such factors as water quality (including trophic status), general physical characteristics, and watershed will be gathered for each lake.

On the basis of this classification, lakes will be assigned priority for further study and restoration, Phases I and II, respectively. Funds will be sought for this two-phase cleanup program upon completion of the classification in December, 1982.

Lakes chosen for cleanup will be those whose protection or restoration is judged to provide the greatest public benefit at least cost. #

"N.C. 2000" TO LOOK AT STATE'S FUTURE

A new program initiated by Governor Hunt will call on citizens as well as leaders to take part in choosing directions for the state's future. The process involves identifying issues of concern and available choices for action.

Among the issues already designated for further attention is water resources.

Hunt, in introducing the "North Carolina 2000" program, noted a number of changes that have been predicted for the state over the next 20 years, such as population increases and more high-skill jobs. He also pointed to present trends and changes that will affect the future, among them increases in energy demands and highway use, loss of prime farmland, and fluctuations in the school-age population. Of water, Hunt said, "Three of our major river basins will have less than a 20 percent surplus of water by 2000. Half of our population currently lives in these areas. How can we support continued growth?"

The N. C. 2000 program will last from 18-24 months. To guide the program, Hunt has established the Commission on the Future of N. C., comprised of members of the State Goals and Policy Board, members of the General Assembly, and other state leaders. In June he asked the chairmen of state boards, commissions, and advisory bodies to lead their groups in identifying issues important to the state's future. Their report at the end of August will form the foundation for local meetings across the state in the fall. Choices identified through discussion and debate at these meetings will in turn help shape a questionnaire to be sent to citizens statewide in the spring of 1982. #

N. C. BIOLOGICAL MONITORING GROUP

The Biological Monitoring Group of the Division of Environmental Management consists of three Environmental Biologists: David Penrose, David Lenat, Ken Eagleson; and three Technicians: Ross Green, Kay Dechant (Asheville), and Robert (Mike) Birckhead. The group has been in existence for four years, producing three DEM reports. Data generated in this period has contributed to ten technical papers.

Monitoring capability includes both bioassay and benthic macroinvertebrate surveys. Bioassay is a technique which directly assesses toxicity using standard test organisms. It is ideal for determining toxicity of effluents before introduction into the environment. A mobile bioassay system has been set up where flow-through and static tests may be conducted using Daphnia and a variety of fish species.

"Benthic macroinvertebrates" are small organisms associated with the bottom of streams, rivers and lakes. The biological monitoring group has conducted benthic surveys throughout North Carolina as part of DEM's 208 work. These surveys include intensive monitoring of urban runoff, agriculture, construction, mining and silviculture. Monitoring waste in 1981-1982 will include further studies of urban streams, agricultural "best management practices" and landfills. A large amount of time will also be devoted to the production of an "assessment document"--a stream-by-stream collation of biological data for all of North Carolina. This data will be combined with chemical-physical information, modelling, etc., to accurately determine the nature and extent of pollution in North Carolina's waters.

For further information you may contact any of the above listed persons at 733-6946. . . . *EMC NEWS*

SEDIMENT EFFECTS ON STREAM BENTHOS

Scientists with the N. C. Division of Environmental Management studied two Piedmont streams to determine the effects of sediment inputs from road construction on organisms living on the bottom of streams. These animals, called "benthic macroinvertebrates," are important both as water quality indicators and as fish-food organisms. The data on the benthic macroinvertebrates show that the stream community responded to increased sediments in two different ways. Under high flow stream conditions, the benthic fauna occupy mainly the rocky substrates. As sediment is added to the stream, the rocky area available as habitat decreases, resulting in reduced numbers of benthic organisms remaining. The scientists, David R. Lenat, David L. Penrose and Kenneth W. Eagleson with the Division of Environmental Management, reported quite a different situation during low stream flow conditions. Stable-sand areas support very high densities of certain organisms. In fact, the number of macroinvertebrates might be higher than in control (unaffected) areas. There were distinct changes in community structure or the diversity of organisms. These data are important in the interpretation of surveys of areas affected by non-point source pollutants. Results are detailed in *Hydrobiologia* 79: 187-194, 1981. #

WILDLIFE COMMISSION BANS COMMERCIAL FISHING ON HIGH ROCK LAKE

At its meeting on June 22, the N. C. Wildlife Resources Commission passed a regulation banning commercial fishing on High Rock Lake because of mercury contamination.

The ban on commercial fishing prohibits the use of fish traps in High Rock Lake south of I-85, in Leonard's Creek, and in Abbott's Creek downstream from the Lake Thom-A-Lex dam. Recently, levels of mercury which exceed public health standards have been found in fish in these waters. This regulation was passed at the request of the North Carolina Division of Health Services. #

WATER REUSE POTENTIAL--PUBLICATION OF THE NATIONAL LEAGUE OF CITIES

"Technical advances, legislative mandates with built-in financial incentives and reports of water shortages make water reuse an option deserving of serious consideration in community water management according to a publication prepared by the National League of Cities and written by Dot Bryan.

The following is a brief summary from that publication:

To some local officials, the idea of reusing water is new and even disturbing. Some consider municipal wastewater a nuisance. But the fact is that water reuse occurs naturally in some places and on a planned basis in others. As a resource, reused treated wastewater can help solve problems of both quality and quantity. Water shortages can be alleviated; reclaimed wastewater can be used instead of potable water for irrigation, industry, groundwater recharge and recreation.

Federal officials estimate that only 2 percent of the available municipal wastewater is being reused. It is only sensible to explore the possibilities for putting the balance to productive use. Significant potential for increasing reuse exists, particularly in irrigation and industrial applications. As a start, local offcials can consider using wastewater to water parks and golf courses and to meet the needs of municipal power stations. If treated wastewater were used for these and other nondomestic purposes, cities might save enough fresh water to satisfy the increase in demand for general water supply.

Although no one now takes water directly from a municipal treatment plant for domestic purposes, research is under way about the feasibility of doing so.

At present, reuse projects are conducted mainly as a matter of choice; as demands on dwindling water supplies continue to increase in some parts of the country, the element of choice may disappear and reuse may be the only way a community can augment its water supply.

The publication *Water Reuse* can be obtained from the National League of Cities, 1301 Pennsylvania Avenue NW, Washington, D.C. 20004. #

PROPOSED FEDERAL LEGISLATION CALLS FOR STATES TO SHARE IN COST OF WATER PROJECTS

A proposed National Water Resources Policy and Development Act of 1982 (S621) contains provisions for a 75-25 percentage ratio for federal/state funding of water projects. This new legislation introduced by Senators Pete Domenici and Daniel Moynihan would provide block grants to states based on a formula which considers each state's population and size.

Congress presently authorizes and sets priorities on a case-by-case basis. Under the proposed legislation (S621) each state could determine its own project priorities. Under this measure states would have greater involvement in the federal water planning process and would focus more federal attention on water priorities.

Rose McCullough of the Sierra Club testifying on the legislation preferred instead of a block grant approach that a "water bank" program be established to provide loans to municipal and private systems for water supply, repair and conservation programs. #

AGRICULTURAL TOUR OF BEST MANAGEMENT PRACTICES AUGUST 19

A tour of Hill Crest Farms at Purnell near Wake Forest, North Carolina, on August 19 will feature the use of soil and water practices that can fit into an overall agricultrual production system and at the same time increase profits. Among the management practices employed on this farm are grassed waterways, a swine waste management system, conservation tillage, soil testing, irrigation and good water management.

Among the hosts for this tour are the Soil and Water Conservation Districts, ASCS, and the Agricultural Extension Service.

The Tour will begin at 8:30 am on August 19. For additional details, contact Buddy Atkins at 737-2675. #

NEW INSTITUTE REPORTS *Algal Assay Studies of the Chowan River* by Mary M. Sauer and Edward J. Kuenzler.

The overenrichment of lakes, rivers, and coastal waterways with plant nutrients is an important factor behind deteriorating water quality. Increased nutrient inputs, especially nitrogen and phosphorus, result in biological changes in the receiving water body; these include increased phytoplankton numbers and shifts in the biotic structure of the community.

The nutrient in shortest supply, in respect to the requirements of the algae, will become the limiting factor. Nitrogen and phosphorus are nutrients required for phytoplankton growth. Other essential nutrients are present in sufficient concentrations at most times. Therefore, nitrogen and phosphorus are often found to limit algal growth. Additional limiting factors besides nutrient availability are light, temperature, and grazing.

Algal assays performed upon water from the Chowan River during the summer of 1980 suggested phosphorus is the more critical limiting nutrient to growth of the nitrogen-fixing bloom-forming genera *Aphanizomenon* and *Anabaena*. The algae growth studies also indicate that reduction of nitrogen concentrations in the Chowan River without concomitant reduction of phosphorus levels could result in conditions that favor growth of nitrogen-fixing blue-greens over other algae.

A copy of the report *Algal Assay Studies of the Chowan River North Carolina*, No. 161, is available free to North Carolina residents. A fee of $8 is charged to those out of state.

*Wastewater Management in Coastal North Carolina*

A team of researchers from the Department of Environmental Sciences and Engineering at UNC-CH, the Institute of Government at UNC-CH and the Department of Soil Science at N. C. State University, examined institutional management and treatment alternatives for handling wastewater in coastal communities.

Rapid growth and development, particularly for tourism and second homes, in coastal North Carolina have already done serious damage to the aquatic environment. High-density residential and hotel developments, with inadequate facilities for wastewater collection and disposal, have resulted in a proliferation of septic tanks and other inadequate treatment units. Local groundwater supplies have been contaminated. Economically and recreationally important shellfish growing areas in inland coastal waters have been badly polluted to the point that extensive productive beds have been closed. Unless sound wastewater management practices are introduced, the threat to the public health and despoilation of additional shellfish areas can be expected to continue. Increased development will exacerbate the problems.

In order to assess the options for sound wastewater management in coastal North Carolina, two areas were selected for study: the Dare County area in the north, and the Carteret County area (with a small portion of Onslow County) in the south.

Three options for wastewater management were examined, all based on sewerage of developed areas, with treatment appropriate to the method of disposal: 1) Discharge to inland coastal waters; 2) Discharge to the ocean; and 3) Disposal on the land. Wastewater reuse is discarded as an option because water supply resources are found to be ample in the study area. Disposal on wetlands is also not evaluated in detail because of uncertainties over allowable loadings, and its clearly high cost in the areas under study.

The report concludes that ocean outfalls exhibit considerable economies of scale. Despite high cost of sewerage for the ocean disposal option, this option was considered no more expensive and generally less costly than the other options.

Free copies of this report number 165 are available from the Institute for North Carolina residents. A fee of $8 is charged to out-of-state residents. #

NEW COURSE--MANAGEMENT OF HAZARDOUS CHEMICAL AND LOW LEVEL RADIOACTIVE WASTE

The departments of Chemical and Nuclear Engineering at North Carolina State University are jointly presenting a timely course on Hazardous Waste Management, which is open to practicing engineers, safety officers, and other individuals responsible for hazardous chemical and/or low level radioactive wastes.

The course will utilize lectures, field trips, and student projects to provide: 1) Information on current practices and regulations for management of hazardous chemical and low level radioactive wastes, 2) Experience with actual waste management problems and solutions. Emphasis is on recycling, land treatment, incineration, waste exchanges and other techniques to minimize the need for waste burial, 3) Information on texts, literature, "experts", short courses, and equipment suppliers to assist individuals in solving the specific waste management problem(s) of their company or institution, and 4) Information on problems associated with siting, ownership, insurance, and ultimate disposal.

Instructors are Professors J. Ferrell and M. Overcash of Ch.E. and J. Kohl of NE. The 3-unit graduate credit course, NE 591 E/ChE 598E, will meet at NCSU beginning Monday, August 31st on Monday and Wednesday afternoons 3:25 to 4:40 p.m. (or as arranged to meet student needs).

For more information, a course outline and a "special student" enrollment form, contact J. Kohl, 737-2303.#

WORKSHOPS AND CONFERENCES

The Louisiana State University Symposium on Hazardous Waste Management: Protection of Water Resources will be held on the campus of Louisiana State University in Baton Rouge, Louisiana November 16-18, 1981. The Symposium will present a comprehensive discussion of the modern technological approaches available for the assessment, design, construction, and operation of hazardous waste management systems for the protection of surface and ground water. For further information please contact: Doreen Maxcy, Continuing Education Division, Louisiana State University, Baton Rouge, LA 70803 (504) 388-6621.

The Fourth World Congress on Water Resources will be held September 3-11, 1982, at Buenos Aires, Santa Fe and Parana, Argentina and will focus on "Water for Human Consumption, Man and His Environment."

General topics to be covered at the congress include: water and system engineering; educational, economic and soical aspects of water; environmental aspects of water; and water law and administration.

Abstracts of papers for the congress currently are being accepted. For more information on this program, registration, paper topics, and abstract guidelines, contact Glenn E. Stout, Water Resources Center, University of Illinois, 208 N. Romine, Urbana, IL 61801 (217) 333-0536.

The Fundamentals of Ground-Water Quality Protection is the topic for an intensive two-day seminar on the mechanisms of ground-water contamination and techniques for investigating, monitoring and responding to ground-water quality problems. The seminar will be held October 5-6, 1981 at the Hyatt Cherry Hill (Philadelphia area), Cherry Hill, NJ.

Contact Richard M. Miller, President, American Ecology Services, Inc., 127 East 59th Street, New York, NY 10022 (212) 371-1620. Please register early. #

POSITIONS AVAILABLE

Assistant Professor in the Environmental Engineering area. Vanderbilt University anticipates an opening, beginning September 1981 for a faculty member in this area. Candidates should have the Ph.D. and are expected to teach graduate and undergraduate courses and pursue a program of independent research. Preferred specialties are environmental biology or physical-chemical water and wastewater treatment. A detailed resume, including the names of three references, should be sent to Dr. Edward L. Thackston, Chairman, Department of Civil and Environmental Engineering, Vanderbilt University, Box 133, Station B, Nashville, Tennessee 37235.

Director for Center for Marine and Environmental Studies is open for an individual with an engineering background with research experience in solid, liquid, and hazardous waste control including chemical and biological concerns, and with administrative experience in planning and developing interdisciplinary research and educational programs. Interest in marine science and ocean engineering desirable. Joint appointment with civil engineering department anticipated.

Send your application together with 3 references who may be telephoned to: Dr. J. F. Libsch, Vice President, Research, Lehigh University, Whitaker Lab #5, Bethlehem, Pennsylvania 18015. #

WATER RESOURCES CONDITIONS IN NORTH CAROLINA

For the first time in over six months, flows in most streams across the State were in the normal to above-normal ranges. Locally heavy, scattered rainfall during the first two weeks of June caused rises on most streams and minor flooding along isolated headwater streams. Showers generally diminished toward the end of June and by the 30th, flows in many areas were again in the deficient range. The scattered nature of the showers caused a wide variation in rainfall amounts across the State. According to reports by the National Weather Service, the Raleigh area received only 0.55 inch of rain during the month, making it the driest June in almost 100 years. However, some areas received above-normal amounts such as Greenville (7.07 inches) and Catawba (10.50 inches). These extremely variable conditions resulted in some streams having deficient flows whereas streams in adjacent or nearby basins had normal flows.

Monthly mean flows at USGS index gaging stations ranged from slightly over 1/2 of normal in the Deep River near Moncure (Lee County) to over two times normal in the South Yadkin River near Mocksville (Davie County).

Water levels in shallow, unpumped wells declined slightly in the Mountains, remained steady in most of the Piedmont, and were variable in the Coastal Plain region. As compared to long-term records for June, levels ranged from about 1 to 3 feet below normal.

. . . . .*U. S. Geological Survey*

WATER RESOURCES LEGISLATION IN NORTH CAROLINA

Bills Introduced

Senate

S 711 Sedimentation Act amendments

*"To amend Chapter 113A of the General Statutes to require that local government erosion and sedimentation control programs shall be no more restrictive than the state erosion and sedimentation control program."* Amends GS 113A-54(d)(1) and -60(b) to provide that Sedimentation Control Comm'n develop a model local ordinance on erosion and sedimentation control no more restrictive than the state law (underlined phrase added) and to approve no local ordinance unless its standards equal and do not exceed those of the model local erosion control ordinance (now, equal or exceed).*

*Editors Note: This legislation was considered as an amendment to the Appropriations Bill but was later withdrawn. The amendment could still be activated in the November session of the General Assembly.

S 724 (Joint Res) Coastal Management Act LRC study

*"Directing the Legislative Research Commission to study rules and regulations pertaining to the Coastal Area Management Act."* Directs cited study, to include analysis of necessity, equity and efficacy of current

rules and regulations, and the feasibility of eliminating ineffective ones and modifying inequitable ones. Suggests cochairman of comm'n appoint 3 Senate and 3 House members and 2 public members from coastal area to work with regular members of comm'n. Directs filing of interim report with 1982 session and final report to 1983 session. Effective July 1, 1981.

S 734 Clean Water Bond Act (Iden. H 1339)

*"To authorize the issuance of two hundred twenty million dollars in bonds of the state to provide funds for environmental improvement through grants to units of government for construction and improvement of wastewater treatment works, wastewater collection systems and water supply systems."* Identical to H 1339, digested in House section of this legislative review.

HOUSE

H 1339 Clean Water Bond Act (Iden. S 734)

*"To authorize the issuance of two hundred twenty million dollars in bonds of the state to provide funds for environmental improvement through grants to units of government for construction and improvement of wastewater treatment works, wastewater collection systems and water supply systems."* Bond election. Authorizes State Treasurer, with consent of Governor and Council of State and favorable referendum vote of state voters, to issue and sell "North Carolina Clean Water Bonds" in amount not to exceed $220 million. Election date to be fixed by Governor no later than Nov. 2, 1982; election may be held on same day as any other state, county, municipal, or district election. Issuance of Bonds. State Treasurer, with approval of Governor and Council of State, shall fix interest rates, prices, issuance dates, and maturity dates not to exceed 30 years. Authorizes issuance of bond anticipation notes. All proceeds from bonds or notes shall be placed in special "Clean Water Fund" administered by Dep't of Administration. Use of Bond Proceeds. Grants. Moneys in fund shall be used for grants to gov't units for construction of new, or improvement or expansion of, existing wastewater treatment works, wastewater collection systems, and water supply systems. Funds may be applied to purchase of real property if acquisition costs are a substantial portion of project costs, but if any federal loan or grant funds are used in projects, such costs are not eligible costs. Maximum grant may not exceed 25% of total construction costs or 50% of the nonfederal share, whichever is less, unless Dep't of Administration determines larger percentage is necessary to qualify for federal loan or grant, to meet extreme public necessity or to provide funds for purchase of real property for which federal funds may not be used. Grants in excess of 25% must be approved by Advisory Budget Comm'n and may not exceed 30% in any case. Contingency Account. Dep't of Administration with concurrence of Advisory Budget Comm'n shall allocate up to $6 million in Contingency Account to be used for administrative expenses.

Pollution Control Account. $120 million is allocated for construction, improvement or expansion of wastewater treatment and collection system; $80 million shall be used for eligible construction costs of approved wastewater treatment works projects; $40 million allocated to counties in proportion to each county's population as determined by 1980 census for wastewater collection system. Water Supply Systems Account. Allocates $94 million for grants to gov't units for water supply systems, of which $68 million is allocated to counties on basis of population and $26 million for specific project grants. Annual allocations. Allocations of funds subject to annual cumulative spending limits. Uncommitted funds from 1977 Clean Water Bonds shall be allocated pursuant to this act. Provides for allocations of uncommitted funds from various accounts. Applications. Applications shall be accompanied by environmental assessment. Division of Health Services (receives water supply grant applications) or Environmental Management Comm'n (receives wastewater project applications) may require environmental impact statement. A public hearing shall be held on any application for a project grant. Priorities. Priorities among applications assigned quarterly. Unsuccessful applicants may apply for consideration in up to four succeeding consecutive quarters. Withdrawal of grant commitment. Grant commitment may be withdrawn if financing or contract arrangements have not been made with one year of acceptance.

Dep't of Administration, Comm'n of Health Services, and Environmental Management Comm'n may promulgate rules and regulations subject to approval of Advisory Budget Comm'n. Three agencies above in cooperation with State Treasurer shall prepare annual report for Advisory Budget Comm'n. State Treasurer may not sell bonds during 1981-83 biennium requiring debt service during that period unless there are sufficient funds to pay such debt service in Treasurer's debt service appropriation for biennium.

*Editor's Note: This legislation was referred to the Senate Finance Committee and can be considered by the General Assembly in November.

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

"A Study of Some Empirical Methods of Determining the Unit Hydrograph," (Interim Rpt. #1), 9/80, by V. Singh, et al, WRRI, Mississippi SU, Mississippi State, MS 39762, Price: $8. (02E)

"A Guide to Designing a Community Water Conservation Program," (NE244), by T. Shelton, et al, avail. from Cooperative Extension Service, Rutgers--The State U of New Jersey, New Brunswick, NJ. (03D)

"The Impact of Behavioral Factors on Residential Water Conservation," (Tech. Completion Report), 12/80, by J. Mowen, et al, avail. from Oklahoma WRRI, OK S U, Stillwater, OK 74078. (03D)

Water Quality Management

"Survival, Dissemination, and Public Health Significance of Human Enteric Viruses in Ocean Waters Off O'ahu--Viability and Die-Off; Role and Effect of Antiviral Agent(s)," (UNIHI-SEAGRANT-CR-81-06), 5/80, by P. Loh, et al, avail. from U of Hawaii, Honolulu, HI. (05B)

"The Effects of Freshwater Discharge on Estuarine Nursery Areas of Pamlico Sound," (CEIP 79-11), 5/81, by R. Jones, et al, NRCD, Div. of Marine Fisheries, Morehead City, NC 28557. (02L)

"Better Monitoring Techniques are Needed to Assess the Quality of Rivers and Streams," (CED-81-30, Vol. I), 4/30/81, by US Comptroller General, avail. from USG Acct. Off., Document Handling and Information Services Facility, P. O. Box 6015, Gaithersburg, MD, 20760.

"Proceedings of the Groundwater Pollution Conference," (Conf. Series #1), 2/79, edited by C. Lawrence, et al, avail. from Australian Government Publishing Service, Canberra, Australia. (02F)

"Hydraulic Characteristics of the Deer Creek Lake Land Treatment Site During Wastewater Application," (CRREL #81-7), 4/81, G. Abele, et al, avail. from U. S. Army, Huntington, WV 25701. (05E LT)

"North Carolina Surface Impoundment (Wastewater)--Inventory and Assessment, 4/80, by Water Plan. & Dev. Sec., DEM, NCDNRCD, P. O. Box 27687, Raleigh, NC 27611. (05D)

"Seasonal Growth and Uptake of Nutrients by Orchardgrass Irrigated with Wastewater," (CRREL 81-8), 5/81, by A. Palazzo, et al, avail. from Directorate of Civil Works, Office of the Chief of Engineers, Washington, DC 20314. (05E LT)

Water Quantity Management

"Modeling of Alternative Criteria for Dual Purpose Detention Basins," 5/81, by W. Whipple, Jr., et al, WRRI, Rutgers--The State University, New Brunswick, NJ 08903. (04A)

"Land-Water Interactions: Effects of Introduced Nutrients and Soil Particles on Reservoir Productivity," by B. Kimmel, avail. from OK WRRI, OK SU, Stillwater, OK 74078. (02H)

SPECIAL

## Water Quality Problems and Watershed Management Practices of Water Systems in North Carolina

A paper prepared by Edward J. Kaiser, Todd Miller and Raymond J. Burby, all of the Center for Urban and Regional Studies at the University of North Carolina, for the Urban Affairs Conference, details the results of a survey of 52 North Carolina municipal water systems conducted in 1980. Deterioration of the quality of surface raw water supplies, with potentially serious consequences for public health, is a growing national problem. This problem is difficult to solve because many potentially carcinogenic pollutants, such as synthetic organic chemicals, are not removed by conventional treatment methods. As a result, careful management of land uses in water supply watersheds is needed to keep pollutants out of water supply sources. Their paper summarized the status of this national issue in North Carolina and examines watershed management practices which already have been initiated to protect water quality. Except for sedimentation, the survey indicated that problems with raw water quality have rarely occurred, but that the potential for increasing pollution in the 1980s is very high. The threat to drinking water quality comes from three sources: (1) continuation of agricultural runoff; (2) increased stormwater runoff from additional residential and other forms of urban development; and (3) the probable necessity to turn to more urbanized watersheds for future water supplies. What land management exists in water supply watersheds has been designed for other purposes, and effects on raw water quality are largely fortuitous. A serious barrier to expanded watershed management in the future is the need for intergovernmental cooperation. While municipal governments most often own and operate water supply systems, their water supply watersheds lie largely outside their jurisdiction and are under the control of other local governments, usually counties. On the basis of these and other findings from the study, the following recommendations for both state and local governments were made.

State initiatives are needed to:

- Establish the fact that water quality problems exist or are imminent.
- Designate water supply watersheds as critical environmental areas subject to special development controls.
- Make financial assistance available for the development of watershed protection plans.
- Require that all governments with jurisdiction in water supply watersheds cooperate fully in developing and implementing protection programs.
- Expand regulatory authority and assistance programs to control soil erosion and sedimentation from all land disturbing activities, including agriculture.

Localities should adopt water supply watershed management plans which:

- Document the need to control polluting land uses.
- Control quality and quantity of stormwater runoff.
- Limit population density and urbanization.
- Prohibit land use activities which handle toxic substances or discharge water pollutants.
- Assure the continued adequacy of septic tanks and other on-site approaches as a means of sewage disposal.
- Control pollution from agricultural activities.

The research reported in this paper is part of a study, "Promoting Lake Quality Through Local Land Use Management and Control," which was supported by the Division of Environmental Management, North Carolina Department of Natural Resources and Community Development in 1980.

ITEMS OF INTEREST:




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