

WATER RESOURCES RESEARCH INSTITUTE

Table with 2 columns: Article Title and Page. Includes items like 'Stanley County Completes Feasibility Study for Management of On-Site Wastewater Systems' and 'SPECIAL REPORT: Sanitation and Alternative Wastewater Treatment Problems in Western North Carolina'.

STANLY COUNTY COMPLETES FEASIBILITY STUDY FOR THE MANAGEMENT OF ON-SITE WASTEWATER SYSTEMS

Stanly County, located in the Piedmont region of North Carolina, is faced with severe soil con-

ditions for conventional septic tank performance. The county has a high percentage of soils that are rocky, shallow, and with high clay-silt contents. Some housing developments in Stanly County have experienced 50 percent failure rates with septic tanks. These problems have led the county to explore the feasibility of management of various on-site and cluster systems under a 208 areawide water quality planning grant.

To assess the extent of septic tank failures, the county cooperated with EPA to use infrared aerial photography to examine some 2000 home sites. From these photographs, they were able to identify 210 probable surface septic system failures and actually inspected 100 sites. Fifty percent of these sites were failing. Aerial photography was also used to help the town of Albemarle decide which of 10 proposed areas for annexation were having the greater problem with failing septic systems and needed city services.

Stanly County currently has in operation a dozen low-pressure, on-site treatment systems. With these systems an entire soil absorption field is dosed approximately twice a day with effluent under pressure and distributed through 1 and 1/4-inch PVC pipe with 1/4-inch holes at the bottom of the pipe. The PVC pipe is normally laid in 4-inch wide trenches 8-10 inches below the soil surface. The County Health Department has developed suggested guidelines for installation of low-pressure, home sewage systems.

The Stanly County Health Department and County Government also explored the economic feasibility of maintenance programs for various alternatives on site systems. Systems included those with two absorption fields which are alternatively used, low-pressure systems, mound systems, and recirculating sand filter with spray irrigation. Management requirements and costs for these systems were developed in the study.

In Phase II of its project, Stanly County officials will consider the possibility of obtaining P.L. 92-217 set aside funds from the 201 facilities planning program for the actual establishment and implementation of a county maintenance system for on-site and cluster treatment systems.

Details regarding the results of Phase I of the Stanly County Project can be obtained from George Fleming, Water Quality Management Planning Branch, Division of Environmental Management, Raleigh, North Carolina 27611.

**NEW INSTITUTE TECHNOLOGY
TRANSFER EFFORT TO ASSIST
WITH NATIONAL CONFERENCES
AND WORKSHOPS**

The Water Resources Research Institute will undertake a technology transfer program to assist in

the development of conferences and workshops in support of the Office of Water Research and Technology (OWRT). The project is designed to identify appropriate areas for technology transfer and assist in those efforts needed to conduct conferences and workshops as a part of OWRT's national technology transfer program. James M. Stewart, Acting Director of the Institute, is principal investigator. The project is funded by the Office of Water Research and Technology.

**RALEIGH WASTEWATER TREATMENT
PLANT HEAVY USER OF ENERGY**

According to Z. Bryan Hill, Raleigh Finance

Director, the city's Neuse River waste treatment plant is using more electricity than anticipated. The July power bill totaled \$86,112 and for the year could exceed \$1 million. The city budgeted \$940,000 for utility costs for the plant, up more than \$200,000 over the total bill for last year.

**OPPORTUNITIES FOR WATER
CONSERVATION IN
AGRICULTURE**

Research at the University of Nebraska has shown that if improved irrigation practices

could be used to schedule irrigation, nearly one-half of the water and energy could be saved. For sprinkler irrigation, the problem is to make effective use of rainfall and stored moisture in the soil profile. Surveys indicate that most of the irrigation systems now in use have excess capacity. Because of fear of drought and lack of information on actual soil and water conditions, farmers use the excess capacity to apply unneeded water.

Irrigation losses also represent energy losses. Energy requirements for irrigation from ground water are directly proportional to the amount of water applied and the lift involved. If the research could be applied to farming practice, more than \$45 million in energy could be saved in Nebraska alone.

Nebraska irrigators using center pivot sprinkler systems have been applying an average of about 16 inches of water per acre. Yet, research has shown that 8-11 inches produced maximum corn and sugar beet yields. Thus, water conservation to maximize the effectiveness of irrigation not only saved substantial quantities of water and energy, but increased production as well. An additional economic

and environmental payoff is to reduce the leaching and loss of nitrate fertilizer.

The Nebraska experience clearly points the way to substantial economic gains from water conservation in agriculture through application of the right amount of water at the right time.

This information was presented to an Engineering Foundation Conference on Water Conservation Needs and Implementation Strategies in July 1979 by Dr. Paul Fischbach, Extension Irrigationist, Cooperative Extension Service, University of Nebraska. A copy of Dr. Fischbach's paper is available in the Institute Reading Room.

**STATE OUTDOOR RECREATION
PLAN PUBLISHED**

The North Carolina State-wide Comprehensive Outdoor Recreation Plan sets

forth a wide range of issues and problems including natural heritage and recreation concerns and details the State's role and commitment to resolving those problems.

The document, prepared by the North Carolina Department of Natural Resources and Community Development, Division of Parks and Recreation, details actions scheduled over the next five years. How they will be accomplished, who is responsible, and why they are necessary are identified.

Water resources are an important aspect of recreation in North Carolina. There are a total of 135 lakes or reservoirs, with a surface area of 100 acres or more, that are entirely within the State. In addition, there are five reservoirs that are partially within the State. The total surface area of such lakes and reservoirs within the State is approximately 265,000 acres. These figures do not include surface area of the several sounds that total approximately 1.6 million acres. There are a total of about 15,300 miles of streams in the State; of these, based on water quality classification, about 11,500 can be considered fishing streams. The total miles of trout streams amount to over 4,000, and there are 28,300 acres of trout ponds. Access is provided by private marinas and 124 boat access areas operated by the Wildlife Resources Commission.

The 1971 list of potential natural and scenic rivers included a total of 1,353 miles of streams. Study efforts since then have produced a list of 28 streams with high potential for inclusion in the natural and scenic rivers system.

For additional details regarding the Outdoor Recreation Plan, contact:

North Carolina Division of Parks and
Recreation
512 N. Salisbury Street
Archdale Building
P. O. Box 27687
Raleigh, NC 27611

(919) 733-7795

**NORTH CAROLINA WATER
RESOURCES CONGRESS
EXTENDING ITS
MEMBERSHIP**

Everyone who has an interest in water resources development and management is being encouraged to become a member of the

N. C. Water Resources Congress. This includes State, county and municipal agencies, industries and businesses, and chambers of commerce.

The Water Resources Development Program is essential to provide for the long-range industrial and economic development and for our population growth and human needs to include agricultural enhancement. The platform of the North Carolina Water Resources Congress is to support the North Carolina Water Resources Development Plan and Program which includes supply for all purposes, flood control, soil erosion, irrigation, navigation improvements, low-flow augmentation to enhance water quality, hurricane flood protection of our coastline and the attending water-based recreation and the enhancement of our fish and wildlife resources. It is affiliated with the national Water Resources Congress which provides support to the wise development of water resources at all levels of government on a nationwide basis.

Congress is requiring greater non-federal cost participation in all water resources projects. Greater public support is needed to demonstrate the popularity of these projects which provide permanent capital improvement with average annual benefits exceeding the average annual cost.

For further information and application for membership, write to N. C. Water Resources Congress, P. O. Box 12205, Raleigh, NC 27605, or call 919/733-4064.

**THE RELATIONSHIP OF SOILS
TO STORMWATER RUNOFF EXPLORED**

In recent years there has been increased interest to find alternate ways of handling urban stormwater runoff as a means of reducing downstream impacts. A research study was conducted over the last four years in the Soil Science Department at NCSU to study the potential of reducing the production of runoff from suburban Piedmont landscapes. Reducing the volume of runoff from short duration, high-intensity rainstorms is an appealing concept for the reduction of downstream hydrologic impacts.

The researchers found a total lack of soil-water data for suburban areas; therefore, they conducted a study of selected small suburban areas to document and develop an understanding of the factors affecting runoff production from rainstorms that cause downstream flooding. The attempt was to determine and describe the types of runoff-producing areas that contribute to the hydrograph peak.

Particular attention was given to a comparative study of stormwater soil infiltration on forest, pasture, and suburban sites. The magnitude and type of change in soil-water conditions that result from suburban development was documented. For

example, measured final constant infiltration rates of man-disturbed suburban soils (18 to 36 percent of the suburban sites) were 1 to 5 percent of those for forest soil and 3 to 16 percent of those for the least disturbed urban soils. Impervious surfaces ranged from 27 to 39 percent of the suburban sites. The differences in soil conditions of a forest, pasture, and suburban watershed were related to rainfall-runoff records.

The research study was undertaken by Dr. Barrett L. Kays while at North Carolina State University and now with Sunbelt Planning Associates in Raleigh. The findings will be of interest to urban stormwater engineers, urban non-point runoff specialists and soil erosion control officers. Copies are available on loan from the WRRRI library or D. H. Hill Library at NCSU. Copies are available through University Microfilms, Ann Arbor, Michigan. The complete title of this doctoral research is "The Relationship of Soil Morphology, Soil Disturbance and Infiltration to Stormwater Runoff in the Suburban North Carolina Piedmont."

**NEED FOR WATER
RESEARCH STRESSED**

Water research research in the United States may be giving too much attention to immediate problems at the neglect of long-term problems, according to Joseph S. Cragwall, Jr., associate director of the U. S. Geological Survey, Department of the Interior.

In an address before the annual meeting of the Universities Council on Water Resources at Rutgers University, New Brunswick, NJ, Cragwall said that the nation has entered into an era of increased competition for water. "This is particularly true," he said, "in the arid and semi-arid West where energy development competes with irrigated agriculture for water and where the situation is compounded by population growth and new instream requirements for water.

"I see nothing to reverse this trend," Cragwall said. "In fact, as the nation attempts to become energy self-sufficient, the competition for water will increase. As this happens, public awareness of water problems will be sharpened, as well as the need for better water management and, along with it, research and manpower."

In his address, Cragwall expressed concern that national policies aimed at improving water management neglect to emphasize the need for research and supporting technology in order to supplement the policies, despite the fact that national water supply and demand are among the top three on the priority list of critical national issues published by the Office of Technology Assessment of the Congress.

Cragwall said that a recent review of water research revealed that the federal government is spending more than \$300 million on water resources research, funded by about 22 federal bureaus and agencies. Cragwall noted, however, that much of this research is done by mission agencies that support research in efforts to better accomplish their missions.

"Whatever the total research view, on hand or in prospect," Cragwall said, "there is the larger on-going

task of hydrologic investigation, water resources assessment, environmental impact, and projections of developmental requirements. I suggest that the university community continue to make significant contributions to all such needs--not only on research, but also on planning analysis and resource assessment as well."

Cragwall said that the highest priority water resource research areas presently within the USGS include:

- * High and low-level nuclear waste disposal;
- * Regional aquifer (subsurface, water-bearing rocks) studies--covering major aquifers of the nation;
- * Urban hydrology;
- * Studies of water use;
- * River quality assessments--including the impact of water quality changes on the ecosystem; and
- * Drought analysis.

. . . Water Current
Nebraska Water Resources Center

GROUNDWATER SUPPLY ISSUES: Taken as a whole,
A GAO ASSESSMENT from a national perspective, ground-

water is plentiful. Despite this fact, however, serious problems are emerging in the use of groundwater supplies in many localities. Overpumping and contamination are the cause of many of these problems.

If water is being removed from a groundwater storage area (aquifer) faster than it can be replaced by natural recharge, overpumping is occurring. This is known as "water mining."

The side effects of water mining include contamination, diminished stream flow, and damage to aquatic and wildlife habitats.

Contamination results from the movement of polluted or salt water into a groundwater aquifer as overpumping lowers the level of the underground water table below that of adjacent areas. During low streamflow periods, a significant amount of the streamflow comes from groundwater seepage and natural springs. Lowering the groundwater table by overpumping thus not only results in diminished streamflows and the drying up of wetlands but may cause serious harm to wildlife habitats which depend on these water sources.

Landfills, septic tanks, toxic and hazardous materials, municipal and industrial waste discharges and wastes from concentrated animal feeding operations are also proving to be major causes of groundwater contamination in many areas of the Nation. Recovery from contamination is slow; indeed, it may be considered a semipermanent condition once it has occurred.

The U. S. General Accounting Office (GAO), an independent watchdog agency responsible to Congress, has identified a number of issues and concerns which should be addressed if groundwater supplies are to be more adequately safeguarded:

1. Is there enough information for effective planning and management of this source?
2. What is being done to control excessive withdrawals and to encourage aquifer recharges?
3. Do laws, regulations and agency policies adequately recognize the relationship between surface water and groundwater?
4. Are there effective ways to protect groundwater from contamination?
5. What efforts are being undertaken to find better ways to protect, recharge, and manage groundwater resources?
6. Do federal agencies (and state and local agencies) consider groundwater problems in their projects and programs?

. . . Lyle S. Raymond, Jr.
Water Resources Information Specialist
Center for Environmental Research/
Cooperative Extension
Cornell University

DEPARTMENT OF AGRICULTURE
STRENGTHENS NATURAL RESOURCES
AND ENVIRONMENTAL EFFORTS

Secretary of Agriculture Bob Bergland has taken steps to strengthen the department's

commitment to research, extension, and teaching, and to emphasize its role in natural resources management and environmental quality protection.

Bergland announced the following changes in the department:

--Anson R. Bertrand, Director of Science and Education, has been promoted to report directly to the Secretary and will continue to head the Science and Education Administration.

--M. Rupert Cutler, who has been Assistant Secretary for Conservation, Research, and Education, has been named Assistant Secretary for Natural Resources and Environment.

In addition, Bergland announced the establishment of a new agency, the Office of Environmental Quality, and named Barry Flamm as Director. His agency will report to Cutler.

OUR NATION'S WETLANDS The President's Council on Environmental Quality has produced an exceptionally attractive and well written booklet

to provide a broad and balanced review of the status of our nation's wetlands. The publication is designed to provide lay readers with a scientific, social, and political understanding of our current wetland policies and concerns.

This publication was coordinated by the Council on Environmental Quality and is available at no charge in limited quantities from the Office of Federal Activities, U.S. EPA, 230 South Dearborn Street, Chicago, IL 60604.

TOXIC SUBSTANCES STRATEGY COMMITTEE REPORT AVAILABLE

The federal government must take additional steps to protect the public from hazardous chemicals in the environment and the workplace, according to a report released by President Carter's Toxic Substances Strategy Committee.

The draft report, which is being circulated for public review and comment, recommends new legislation and other federal actions to deal with the growing problem of human exposure to toxic chemicals.

The wide-ranging report is the result of two years of study by an 18-agency committee established by President Carter in 1977. The committee is chaired by Gus Speth, Chairman of the President's Council on Environmental Quality, and includes representatives of all federal agencies with major research, regulatory or other responsibilities for toxic chemicals control.

"Man-made toxic chemicals are a significant source of death and disease in the United States today," Speth said. "In the workplace alone, more than 100,000 workers are believed to die each year as a result of physical and chemical hazards, and occupational exposure to carcinogens is a factor in an estimated 20 to 38 percent of cancers."

Speth said the Toxic Substances Strategy Committee and other interagency groups have been working together to improve the federal government's programs to control toxic chemicals.

"The Strategy Committee report," he said, "provides the first systematic assessment of the problems and shortcomings in federal research and regulatory efforts, the steps now being taken in the federal government to overcome those problems, and recommendations for further improvement."

NOTE: Copies of the Strategy Committee's draft report are available from the Council on Environmental Quality, 722 Jackson Place, N.W., Washington, DC 20006. Please send a self-addressed mailing label.

PROBLEMS IN MEETING FUTURE WATER DEMANDS There are several potential answers, including conservation, but "no simple solutions exist" for resolving the nation's

growing water crisis, according to a General Accounting Office (GAO) report. Severe shortages and even complete depletion could occur in some major metropolitan and other high-growth areas by the turn of the century, the report says, and conservation alone will not be sufficient to avert the problems, which will be brought on by a number of different causes.

Among the most pressing problems are overdraft of high-quality groundwater supplies and inadequate water transmission systems, the report notes. Aside from the obvious merits of conservation, perhaps the most important need is for sound management practices, but none of the potential solutions (like interbasin transfer, for instance) could be applied nationwide.

Copies of the GAO report, "Water Supply for Urban Areas: Problems in Meeting Future Demand" (CED-79-56), are available from GAO, Distribution Section, Room 1518, 441 G Street, NW, Washington, DC 20548.

. . . Water News
Virginia Water Resources
Research Center

EPA OFFICIAL INCLUDES NORTH CAROLINA 208 STUDY EXAMPLE IN TESTIMONY

The U. S. Environmental Protection Agency Administrator Douglas M. Costle in his July 18,

1979, testimony on Section 208 of the Clean Water Act and the non-point sources of water pollution cited an example of work accomplished in North Carolina:

"The North Carolina 208 process identified, evaluated, and is nearing implementation of a management practice which will result in a conservative savings estimate of \$3,000,000 per year in operation and maintenance costs. The practice, seasonal effluent limitations, would provide increased discharge of oxygen consuming wastes (BOD and NH3-N) during the winter months (November thru March). During this season, high stream flows and low temperatures allow for greater natural assimilation of oxygen consuming wastes. The summer period (April thru October) is the critical season in relation to the effects oxygen consuming wastes have on natural waters; however, it is also the period when oxygen consuming waste treatment is most effective.

"The management practices analysis was developed into regulations which allow winter season effluent limits to exceed summer effluent limits by as much as a factor of two. In addition, a benefit-cost study of the seasonal effluent limits showed no significant social or environmental costs but considerable economic savings.

"For example, for one city with a 16 MGD facility, the savings were estimated at \$9,000,000 for capital costs and \$250,000 for operation and maintenance costs. It is estimated that design modifications, more accurate accounting of industrial savings, and other factors could easily make actual savings in the \$5,000,000 to \$10,000,000 per year range for North Carolina."

The work cited was supported by the Division of Environmental Management under the 208 Areawide Water Quality Management Program. Copies of the study report (No. 135) are available from the North Carolina Water

Resources Research Institute, 124 Riddick Building, North Carolina State University, Raleigh, NC 27650. Copies are free to North Carolina residents and \$4 for out-of-state residents.

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STEWART RECEIVES
OUTSTANDING EXTENSION
SERVICE AWARD

Dr. James M. Stewart is a recent recipient of an Outstanding Extension Service Award at North

Carolina State University. Dr. Stewart is currently Acting Director of the Water Resources Research Institute. His efforts have been extensive in North Carolina and nationally in the field of technology transfer. In the State of North Carolina he has worked closely with the water management professionals to provide new technology and obtain input for new research. Dr. Stewart has organized numerous state and regional workshops and developed innovative approaches to improve scientific efforts in the water industry. He was the coordinator of the first regional technology transfer project sponsored by the Office of Water Research and Technology and has been designated by Institute Directors in the South Atlantic-Gulf Region as the technology transfer contact person for the regional network of water research institutes. He serves on the National Technology Transfer Committee of the Office of Water Research and Technology and the Universities Council on Water Resources.

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EPA ANNOUNCES MAJOR AWARD
TO STUDY ACID RAIN

As part of President Carter's recent initiative to investi-

gate acid rain problems, the Environmental Protection Agency's Office of Research and Development has awarded \$500,000 to North Carolina State University in Raleigh.

The award, announced by Dr. Norman R. Glass of EPA's Environmental Research Laboratory in Corvallis, Oregon, funds the first year of a five-year, multi-million-dollar program to study the effects of acid precipitation on the environment.

The Cooperative Agreement with North Carolina State is funded through EPA's Anticipatory Research Program. A panel of experts from the United States, Canada, and Norway will help provide policy and scientific direction.

Dr. Ellis B. Cowling has been named principal investigator for the program. Dr. Cowling is Associate Dean for Research in the University's School of Forest Resources and a noted pioneer in acid precipitation research.

This five-year effort establishes a major long-term investigation into this rapidly spreading phenomenon. The University will serve as the focal point for funding and administering related research projects in other universities and institutions.

Acid precipitation is a by-product of modern technology and primarily created by emissions from fossil-fuel power plants, industrial installations and automobile exhausts. The emissions carry sulfur and nitrogen compounds into the atmosphere where they are chemically changed into acid forms and carried by wind and weather patterns hundreds of miles from the original source.

Dr. Glass notes that precipitation in most of the country east of the Mississippi River is now acidic. The area affected by acid precipitation and the degree of acidity, compared to pure rain or snow, have increased markedly during the past 30 years.

There is extensive evidence, Dr. Glass says, that acid precipitation is causing diverse and costly damage. Some streams and lakes have become so acid that fish cannot survive, and damage to agricultural crops and timber production is suspected.

Soil fertility can also be decreased. Acid precipitation can affect some kinds of man-made materials, for example, accelerating the deterioration of limestone buildings, statuary and painted surfaces.

The research supported by this Cooperative Agreement is designed to determine what lakes, streams, forests, crops, animals and ecosystems are being damaged or are vulnerable, and the extent of that damage.

The scientists hope to develop ways to predict damage that may result as the nation moves toward increased use of coal as a primary energy source and thus improve EPA's regulatory decisions in the coming years.

NEW INSTITUTE REPORT

Use of Fluvial Processes to Minimize Adverse Effects of

Stream Channelization by Nelson R. Nunnally, Department of Geography and Earth Sciences, University of North Carolina at Charlotte, and Edward Keller, Department of Environmental Studies, University of California, Santa Barbara.

Stream restoration is a means for restoring flow efficiency in streams that have become debris-choked and eroded due to the direct or indirect actions of humans. Such degraded streams are typically characterized by debris jams, severe bank erosion, overwide channels, and heavy sediment discharge brought on by altered stream regimes, land use changes or prior channelization. Compared to channelization stream restoration involves trading off some loss in flow efficiency for a more stable channel morphology and significantly better aquatic and fluvial ecosystems.

Stream restoration is accomplished by removing debris jams and providing fairly uniform channel cross-sections and gradients while preserving meanders, leaving as many trees as possible along stream banks, and stabilizing banks with vegetation and riprap where necessary. Economically, the cost of restoration is typically less than one-tenth of the cost of channelization.

Experiments with stream restoration on Briar Creek, Gum Branch and Mallard Creek in Charlotte, North Carolina, have been extremely successful. Despite several storms with heavy rainfall, some of which exceeded ten-year design storms, few significant areas of bank failure have occurred in the restored sections even though massive failures occurred during the same period on untreated streams nearby. Public enthusiasm and support for the project is very high with most residents of flood-prone neighborhoods perceiving considerable improvement in flood hazards and reduced erosion without significant reduction in wildlife.

A copy of the research Report No. 144 may be obtained from the Water Resources Research Institute, 124 Riddick Building, North Carolina State University, Raleigh, NC 27650. The publication is free to North Carolina residents and \$8 for out-of-state residents.

**WORKSHOP ON WATER RESOURCES
PRINCIPLES AND STANDARDS
OCTOBER 4-5**

A workshop on 1979
Water Resources Planning
Principles and
Standards is sched-

uled for October 4-5 at the Hilton Inn in Raleigh, North Carolina. The workshop is designed to enable participants to be aware of recent developments from the federal perspective concerning water resources planning. Current efforts directed to addressing the President's policy initiatives are to be discussed especially as they relate to enhanced federal/state cooperation and improved state water resources planning. Speakers include representatives of state and federal water agencies, river basin commissions, and water planners.

The workshop is sponsored by the North Carolina Department of Natural Resources and Community Development and the Water Resources Research Institute of The University of North Carolina. Questions regarding the workshop should be directed to John Wray (919) 733-7856 or Jim Stewart (919) 737-2815.

**OTHER CONFERENCES
AND WORKSHOPS**

Pressure Sewer Systems - Presented by the Department of Engineering and Applied Science,

University of Wisconsin-Extension on November 26-27, 1979.

Low-pressure sanitary collector systems represent an alternative to traditional designs for sewer service in remote and difficult areas: Low density and/or areas with high water table, hilly and rolling terrain, and waterfront developments. Very flat land can often be served economically with a low-pressure sanitary sewer system.

During this two-day institute conditions will be investigated where pressure sewer collection systems may be applicable. Speakers will review state and federal regulations relating to the construction, maintenance, and operation of low-pressure systems. Case studies of grinder and effluent pump systems will be reviewed from design through operations.

For further details contact Mr. Don Theobald, Program Director, Department of Engineering, University of Wisconsin-Extension, 432 North Lake Street, Madison, WI 53706 or phone (608) 262-2061.

Municipal Sludge Management Institute - Department of Engineering, University of Wisconsin-Extension, October 29-30, 1979.

The processing and ultimate disposal of increasing volumes of sludge has been cited as a significant factor in the rapid rise of wastewater treatment plant construction and operational costs. In an effort to reduce cost, energy-saving techniques and alternative processes for managing sludge are being developed and employed. These approaches must also be environmentally compatible with the available techniques for the ultimate disposal of the sludge.

This Institute will review these new developments in energy conservation, sludge processing alternatives, and control of pollutant migration. Specific topics include energy audits, facility evaluation and rehabilitation, solar heating, sludge dewatering, composting, co-disposal sludge storage, pollution runoff, and heavy metal accumulation in soils.

The program will be of interest to municipal engineers and managers responsible for operating wastewater treatment systems and the consultants who design them. These presentations will also aid regulatory personnel in their review and evaluation of proposed sludge management systems.

For further information contact Mr. Philip R. O'Leary, Program Director, Department of Engineering, University of Wisconsin-Extension, 432 North Lake Street, Madison, WI 53706 or phone (608) 262-2061.

Process Design in Water Quality Engineering - Presented by the Environmental and Water Resources Engineering Program, Center for Environmental Quality Management, Vanderbilt University, Nashville, Tennessee, October 29-November 2, 1979.

The seminar content includes:

- Pretreatment and Physical Treatment
- Biological Treatment Processes
- Advanced Waste Treatment
- Solids Handling

For details contact Janet Vance, Vanderbilt University, Box 6222, Sta. B, Nashville, TN 37235.

Practical Environmental Law - A thorough three-day course in current environmental requirements and in how business can best operate within their bounds sponsored by the University of San Francisco School of Law. It is a concentrated three days of training--18 full hours and training which includes lectures and question-and-answer sessions--a technique which gives you a massive

body of information, plus the opportunity to discuss matters with which you are particularly concerned.

This course will be offered at the following locations and times:

Atlanta - October 8-10 (Mon/Wed)
Atlanta Marriott Hotel
(404) 659-6500

Denver - October 29-31 (Mon/Wed)
Stouffer's Denver Inn
(303) 321-3333

For further information contact Miss J. K. Van Wycks, Seminar Division Office, Suite 500, 1725 K Street, NW, Washington, DC 20006, (202) 337-7000.

Water Law Short Course - Presented by the Cooperative Instream Flow Service Group of the U. S. Fish and Wildlife Service, the Natural Resources Law Institute of the Lewis & Clark Law School, and the Council of State Governments, Richmond, Virginia, November 27-29, 1979.

The Water Law Short Course covers the basic principles involved in the regulation and management of surface waters. A special emphasis is placed on the protection of instream uses of water.

For details contact Katharine Chilcutt, the Natural Resources Law Institute, 10015 S.W. Terwilliger Boulevard, Portland, OR 97219, (503) 244-1181.

POSITIONS AVAILABLE The U. S. Water Resources Council Office of Operations, State Programs Division, has several positions including program assistance specialists and program analysts. For complete details contact:

Personnel Officer
U. S. Water Resources Council
2120 L Street, NW, Room 860
Washington, DC 20037
(202) 254-6448

Chief, Illinois State Water Survey - The Illinois State Water Survey is a division of the Institute of Natural Resources, an agency of State government. The Water Survey conducts a comprehensive program of research, service, and data acquisition which is fundamental to the conservation and development of Illinois water resources.

The Chief of the State Water Survey directs a staff of about 200 persons and is responsible for the scientific and administrative direction of the organization. The Chief prepares and defends the budget in the Executive and Legislative branches of government and must deal regularly with representatives of relevant agencies at all levels of government and the general public. Please send nominations and expressions of interest by October 1, 1979, to:

Mr. Ralph L. Evans, Chairman
Search Subcommittee for Chief
Illinois State Water Survey
P. O. Box 232
Urbana, IL 61801

**WATER RESOURCES CONDITIONS
IN NORTH CAROLINA**

During August streamflow was slightly above normal in the Mountains and Western Piedmont regions and below normal elsewhere. Monthly mean flows at USGS index gaging stations ranged from about 1/3 normal flow for the Neuse River near Clayton (Johnston County) to over 1 and 1/4 times normal flow in the French Broad River at Asheville. Flows in the Mountain region were above normal for the eighth consecutive month. No significant flooding occurred. Runoff from scattered showers caused only minor rises on most streams.

Groundwater levels declined across the entire State. Levels were below long-term averages in the Coastal Plain region and slightly above elsewhere.

NATURAL RESOURCES AND ENVIRONMENTAL LEGISLATION PART III

Water Pollution

S 212, enacted as Ch. 633, is the water pollution counterpart to S 64 and is aimed at making North Carolina's water pollution control statutes consistent with the 1977 federal clean water amendments, in order for the State to maintain control over the National Pollution Discharge Elimination System (NPDES) for discharge to surface waters. Specifically, the legislation does the following:

- (1) Defines "waste treatment management practice," in the language of the federal amendments, as "any method, measure or practice to control plant site runoff, spillage or leaks, sludge or waste disposal and drainage from raw material storage which are associated with, or ancillary to the industrial manufacturing or treatment process of the class or category of point sources to which the management practice

is applied." The new law allows these practices to be imposed upon point sources, supplemental to effluent limitations, for any specific pollutant designated as toxic or hazardous under the Federal Water Pollution Control Act.

- (2) Empowers the Environmental Management Commission (EMC) to adopt and promulgate management practices and to prescribe practices necessary to prevent or reduce the amount of pollutants entering the State's waters.
- (3) Requires that persons disposing of sludge from waste treatment operations, consistent with the regulations and requirements of the Resource Conservation and Recovery Act, or allowing pollutants to enter an area of the State's waters managed for the production or maintenance of harvestable plants or animals (aquiculture) to acquire a permit from the EMC to carry out these activities.

- (4) Empowers the EMC to certify and approve requests by operators of publicly owned treatment works to administer and enforce a pretreatment program to control pollutants which are interfering in treatment processes and to require pretreatment programs to be developed where necessary to achieve compliance with the Federal Water Pollution Control Act and the Resource Conservation and Recovery Act. Pretreatment programs submitted to the EMC by treatment operators must include the adoption of pretreatment standards, a permit or other equally effective system for controlling pollutants entering the treatment plant, and the ability to enforce the program.
- (5) Gives the EMC more flexibility in granting variances by allowing the Commission to grant a variance, where circumstances require, without prior hearing and notice, for a period of no more than ninety days. Prior to this enactment, the law required that public hearings be held before the Commission granted any variance. The new law also amends GS 143-215.3(e)(2) to permit variances to be granted in cases where compliance cannot be achieved through application of the best available technology "economically reasonable." Previously, the law required an "economically achievable" criteria to be applied.
- (6) Increases from five thousand dollars (\$5,000) to ten thousand dollars (\$10,000) the maximum civil penalty to be imposed by the Commission for violations and increases by the same amount the maximum daily penalty for assessing continuous violations.

The original bill contained several other provisions which, again, were eliminated in line with the objective of meeting bare minimum federal requirements, and no more. These included more extensive management practice powers, stiffer criminal penalties, and the deletion of the direction to delegate certain minor septic tank controls to local health departments.

A third pollution bill, H 1195, which did not pass would have made certain administrative changes in the State's pollution control program, particularly relating to the authority of the Environmental Management Commission. Among other things, the bill would have added to G.S. 143-211 a statement of intent that the powers of the EMC and the Department of Natural Resources and Community Development be interpreted so as to enable them to qualify to administer federally mandated environmental management programs and to accept federal funds for such programs. The bill also would have authorized the Department to accept and administer federal funds for water and air pollution control programs and would have established conflict-of-interest provisions in accordance with federal laws. An amendment added in House Committee that would add four legislators to the EMC provoked considerable controversy and slowed the progress to the bill after it passed the House. Since the bill passed and was still in Senate committee upon adjournment, it may be considered again during the 1980 session.

Legislation amending the industrial and pollution control bond law (H 213), was also ratified this session as Ch. 109, broadening the acceptable financing arrangements for pollution control and industrial projects.

Ch. 889 (H 1458), a bill that grew out of the concern of the North Carolina Farm Bureau and other agricultural interests with pending EMC proceedings addressed to the algal blooms on the Chowan River, amends G.S. 143-215.2 to make the EMC's authority to issue special orders to persons who are contributing to pollution of the State's waters inapplicable to farm operations. Such activities as land preparation and use for planting, growing or harvesting plants, crops, or other agricultural products or raising livestock or poultry are thereby exempted from this EMC authority.

A further narrowing of the State's water quality controls was enacted with ratification of Ch. 929 (S641), the second of the two Textile Manufacturer's Association bills. It adds to G.S. 143-214 authorization for any person to petition the EMC for a hearing for a revision of the water quality standards applicable to a specific stream segment into which the petitioner discharges or proposes to discharge. The EMC may revise the standards if it finds that (1) natural background conditions in the stream segment prevent the attainment of applicable water quality standards, or (2) "irretrievable and uncontrollable man-induced conditions" prevent attainment, or (3) application of effluent standards more stringent than those promulgated by the EPA would result in adverse social and economic impacts which outweigh the public benefits that would result from maintaining the standards, and (4) there is no clear relationship between the costs to the petitioner of achieving the effluent limitations necessary to comply with the standards and the benefits to be obtained from application of those effluent limitations (including the incremental benefits to the receiving waters).

The act stipulates that the revised standards must be no less stringent than those which can be achieved by applying the highest level of treatment which will result in benefits bearing a "reasonable relationship" to the costs to the petitioner. In no case can the standards be less stringent than the level attainable by applying the effluent standards and limitations promulgated by the EPA. Furthermore, no revision is to be made which endangers human health or safety. The act appropriates to the Department of Natural Resources and Community Development \$45,000 for each fiscal year of the biennium for implementation.

Essentially, the purpose of S 64 as originally introduced was to make it more difficult for the EMC to require additional treatment by means of water quality limited standards. The original bill would have simply prohibited the EMC from imposing water quality limited standards more stringent than effluent limitations without finding that the benefits outweigh the costs. The elaborations added in the act as finally passed were the result of extended bargaining between spokesmen for the Textile Association and the EMC; this bargaining process appears to have materially softened the impact of the original proposal. But extensive interpretation, and perhaps litigation, may be required in order to make clear the full implications of Ch. 929.

Ch. 566 (S 666) adds a new subsection to G.S. 143-215.67 empowering the Environmental Management Commission to authorize a governmental unit to accept additional wastes into its waste disposal system when the commission finds that the unit has secured a means of financing a new or improved waste disposal system which will adequately treat the additional waste, and that the added waste will not significantly degrade the quality of receiving waters. The commission may place conditions on waste discharge permits issued under G.S. 143-215.1 when necessary to implement these provisions, including specifications as to the size, character and number of additional discharges.

Ch. 619 (S 627) carries out the recommendation of the Triangle J 208 Study to make it clear that all local

governments have the authority to install and otherwise provide for septic tanks and other on-site disposal systems as a means of wastewater collection and disposal.

Ch. 554 (H 58) eliminates the grandfather clause of the wastewater treatment plant operations certification law, G.S. 90A-40(d), effective July 1, 1979--ten years after initial passage of this law. It also establishes a fee schedule for the various certificates and renewals under the law.

. . . Milton S. Heath, Jr.
Sandi Postel

Editor's Note: Next month's issue will carry new legislation on toxics, hazardous substances, and solid wastes.

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

- "Perspectives on Agricultural Water Use and Conservation," (Paper), 7/79, by P. E. Fischbach, Dept. of Agricultural Engineering, Agricultural Engineering Bldg., East Campus, U. of NE, Lincoln, NE 68583.
- "Chief Joseph Dam Columbia River, Washington - Community Impact Report Update III Conditions at Peak Impact," 12/78, by A. A. Harnisch, avail. from NTIS, US Dept. of Commerce, Springfield, VA 22151. (06B)
- "The Role of Conservation in Water Supply Planning," (78-2), 4/79, by D. D. Baumann, et al, avail. from NTIS, US Dept. of Commerce, Springfield, VA 22151. (03D)
- "North Carolina's 1978 Statewide Comprehensive Outdoor Recreation Plan," by Div. of Parks & Recreation, NRCD, Archdale Bldg., P. O. Box 27687, Raleigh, NC 27611. (Ref. Rm.)
- "Condition and Operation Studies - Recreation," (Research Rpt. 78-R3), 11/78, by R. E. Brown, et al, avail. from NTIS, US Dept. of Commerce, Springfield, VA 22151. (06A)
- "Impact of Dam and Lake Construction On Rural Economies," (79-R4), 4/79, by US Army Engineer, Missouri River Div., avail. from NTIS, US Dept. of Commerce, Springfield, VA 22151. (06G)
- "Quantitative Situational Analysis--A Planning Tool for Water Resource Managers," (#120), 3/79, by H. J. Nicholson, et al, WRRRC, Purdue U., West Lafayette, IN 47907. (06A)
- "Doing Social Effects Assessment: Two Cases from A Corps Field District," (78-R4), 11/78, by Ruth Love, avail. from NTIS, US Dept. of Commerce, Springfield, VA 22151. (06B)
- "Work Plan for Supplemental 208 Funds (Detailed Description of tasks and schedules to be accomplished with \$373,000 in supplemental 208 funding)," 6/78, by Div. of Environmental Management, NRCD, Archdale Bldg., P. O. Box 27687, Raleigh, NC 27611. (R.R. 208)

Water Quality Management

- "Improvement and Evaluation of Techniques for the Mechanical Removal and Utilization of Excess Aquatic Vegetation," '78, by R. G. Koegel, et al, avail. from Depts. of Agricultural and Mechanical Engineering, U. of Wisconsin-Madison, WI 53715. (02L)
- "First American-Soviet Symposium on Chemical Pollution of the Marine Environment," (EPA-600/9-78-038), 12/78, by K. K. Turekian, et al, avail. from NTIS, Springfield, VA 22161. (EPA)
- "Effects of Chlorinated Seawater on Decapod Crustaceans and Mulinia Larvae," (EPA-600/3-79-031), 3/79, by M. H. Roberts, Jr., et al, avail. from NTIS, Springfield, VA 22161. (EPA)

"Erosion and Sediment Inventory for North Carolina," 8/77, by USDA, SCS, P. O. Box 27307, Raleigh, NC 27611. (02J)

"Waterborne Transmission of Giardiasis," (EPA-600/9-79-001), 6/79, Sponsored by the Health Effects Res. Lab. and the Municipal Environmental Res. Lab., avail. from NTIS, Springfield, VA 22151. (EPA)

"Comparison of Three Waste Leaching Tests," (EPA-600/2-79-071), 7/79, by R. K. Ham, et al, avail. from NTIS, Springfield, VA 22161. (EPA)

"Progress in Wastewater Disinfection Technology," (Proceedings of the National Symposium Cincinnati, Ohio September 18-20, 1978), (EPA-600/9-79-018), 6/79, by A. D. Venosa, avail. from NTIS, Springfield, VA 22161. (EPA)

Water Quantity Management

"Instream Flow Strategies for Washington," (FWS/OBS-78/46), 5/78, by W. Nelson, et al, avail. from Western Energy and Land Use Team, Office of Biological Services, Fish and Wildlife Service, US Dept. of the Interior, Drake Creekside Bldg., 2625 Redwing Rd., Ft. Collins, CO 80526. (02E)

"Irrigation Scheduling--Technology Transfer Program Using AGNET Computer System and Other Tools," (Paper), 6/79, by P. E. Fischbach, et al, Dept. of Agricultural Engineering, Agricultural Engineering Bldg., East Campus, U. of NE, Lincoln, NE 68583.

"Development of an Extension of Illudas Model for Continuous Simulation of Urban Runoff Quantity and Discrete Simulation of Runoff Quality," (#109), 7/79, by J. Han, et al, WRRRC, Purdue U., West Lafayette, IN 47907. (04A)

Miscellaneous

"An Annotated Bibliography on Water Conservation," (79-3), 4/79, by D. D. Baumann, et al, avail. from NTIS, US Dept. of Commerce, Springfield, VA 22151. (03D)

S P E C I A L

SANITATION AND ALTERNATE WASTEWATER TREATMENT PROBLEMS IN WESTERN NORTH CAROLINA

by Susan M. Smith
Program Director for Resource Management
Center for Improving Mountain Living
Western Carolina University

A number of serious problems concerning even the simplest of sanitation and waste disposal systems exists in the mountainous region of western North Carolina. This predominantly rural region lacks most of the conventional municipal sanitation services that are available to more populated regions of the State. Only 15 percent of the total population of the area has access to public wastewater treatment facilities. At the same time there is an almost total dependence on shallow or marginal water tables for domestic water supplies. Soil quality, bedrock permeability and porosity and erosion control are also highly important factors that always must be considered in any type of excavation. Subdivision sites and second home developments are increasingly being located on steep slopes or flood plains with subsequent problems associated with erosion or water runoff. The common cut-and-fill method of construction is not ideal for the installation of adequate conventional septic tank systems. The effects of poor sewage treatment and unprotected water supplies can have a serious impact on the region and, indeed, the State as a whole because of its potential for affecting tourist-related industries and second-home development.

A growing awareness among mountain people of the serious nature of waste disposal problems is evident. The Resource Management Program of the Center for Improving Mountain Living, a division of Western Carolina University, is currently working to assist people in western North Carolina to meet their most pressing needs and requirements in sanitation and waste disposal along with the Department of Natural Resources, the Division of Health Services, and County Health Departments.

As a part of this ongoing effort, the Center has conducted surveys on the planning and resource needs in the 28 westernmost counties, and responses demonstrate a concern over the need for improved sanitation and waste disposal systems by community and county staff and decision makers. Brochures providing information on septic tank systems and water resource management were developed and have met a widespread need. Over 5000 copies of "The Failing Septic System" and over 2000 copies of "Back to the Basics" explaining basic water testing principles have been distributed to meet a popular demand for information. The mailing list currently in use by the Center includes over 2000 interested parties including such diverse groups as county commissioners, septic tank installers, banks and local lending institutions, home builders, environmental groups, and public libraries, as well as individual concerned citizens. Editorials and articles in newspapers of the region such as The Asheville Citizen-Times, The Sylva Herald, and The Canton Enterprise have endorsed the distribution of this information on a regional basis. Workshops on water conservation techniques and alternate wastewater systems have been attended by professional personnel, community leaders and concerned citizens from fifteen of the mountain counties.

The most important resource for communities is their own Health Departments. People have direct access to their Health Departments on a day-to-day basis. The Resource Management Program recognizes the need for close working relationships between communities and their Health Departments and is seeking to broaden the range of possible options, alternatives, and solutions that may be available to both. The program also distributes information throughout the region concerning the various Federal, State and local agencies that might be able to assist individuals in the area of sanitation.

An extensive survey in four counties of professional sanitarians and planners to identify the worst problem areas within each county has recently begun. The Center will assist local Health Departments in developing demonstration projects in these areas to solve immediate sewage problems and also help set up public workshops in those areas to better inform community leaders and the general public about feasible alternatives.

One of the problems in Southern Appalachia in the past has been the proliferation of various government and private programs that take little notice of local opinions, preferences or even the participation of local residents. In contrast to this traditional approach, the Resource Management Program seeks to meet regional and local needs, share information, and encourage the active participation of the communities affected by programs.

The local communities have shown that they understand the problems, and they have begun to work on the solutions. But final solutions must depend on the aid and cooperation of State and Federal programs which can greatly affect the region. Ultimately, solutions must be found which local governments can afford and which they can implement for themselves for long lasting success.

Editor's Note: The North Carolina Water Resources Research Institute has awarded a mini-grant to Western Carolina University's Center for Mountain Living for the purpose of assessing, with the aid of local officials, the problems and needs for alternative wastewater treatment systems in the Counties of Jackson, Haywood, Graham, and Macon.

ITEMS OF INTEREST:

N. C. Land Use Congress, Annual Meeting, cover page

On-Site Wastewater Systems, Stanly County, page 1

Workshop on Water Resources Principles and Standards, Oct. 4-5, page 7

New Institute Report:

"Use of Fluvial Processes to Minimize Adverse Effects of Stream Channelization," page 6

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NORTH CAROLINA LAND USE CONGRESS

WATER RESOURCES AND LAND USE ISSUES IN NORTH CAROLINA is the theme for the annual conference of the North Carolina Land Use Congress. The Conference is to be held at the North Carolina State University Faculty Club on October 18. The program for the session includes presentations on water resources and land development, impacts of land development on water and water resources problems. Water resources and land use issues in the Coastal Plains, Piedmont, and Mountains will be discussed by panels composed of three leaders--a developer, a planner, and a local official--from each of the regions.

Featured speakers for the Conference include Robert Scott, Ray Burby, Joseph Phillips, and Neil Grigg. R. Neil Sampson, Executive Director of the National Association of Conservation Districts, will be the banquet speaker for the Conference. Program details and registration information may be obtained by writing to Joe Williams, P. O. Box 27307, Raleigh, NC 27611, or call (919) 733-4043.