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

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INSTITUTE ANNUAL REPORT

The Institute's Annual Report for the period from July 1, 1965, to June 30, 1966, has been prepared and will be made available to all persons interested in the over-all water resources research and education programs of the Consolidated University of North Carolina on or about September 1. Additional copies can be obtained upon request to the Institute.

TEXTILE WASTES RESEARCH PROGRESS

In May, 1965, Dr. Harley Y. Jennings, Department of Textile Chemistry, North Carolina State University, undertook a feasibility study concerning the recovery of wastes from the desizing of fabrics as an approach to the alleviation of stream pollution. The initial objective was to (1) examine the possibilities of recovering existing size materials, and (2) examine the possibilities of using materials of known ease of recovery from aqueous solution as possible sizes. A search of the chemical literature concerning warp-size wastes, as well as other sources of pollution from textile mills, was made. It was found that there has been an almost complete lack of effort in the field of recovery and reuse of chemicals as a means of abating stream pollution.

The literature references have been reported in an Annotated Bibliography which has been key-word coded and indexed to aid in the retrieval of the information. The coding, wherever possible, was done according to the Thesaurus of Engineering Terms published by the Engineers Joint Council. Copies of the Bibliography are available upon request to the Water Resources Research Institute.

In his summary report, Dr. Jennings stated:

"A common first operation in the preparation of cloth for dyeing and finishing is desizing, a process that removes the material added to warp yarns to make the weaving of the fabric possible. Rather large quantities of material are involved (sometimes as high as 20 percent of the weight of the cloth) and since they are usually biodegradable, contribute greatly toward stream pollution when present in the effluent from the finishing plant. As much as 60 percent of the total biological oxygen demand of streams accepting finishing plant wastes may be assigned to warp sizes. A possible way to alleviate this situation is to recover the warp size from the desizing medium and dispose of it as a solid material; or, if possible, reuse it as a warp size. Thus, it appeared desirable to investigate the feasibility of the recovery and reuse of such materials.

"The approach to this problem was to dissolve the size from the warp in the least amount of water possible and to use this solution as the base for a further sizing formulation. Carboxymethylcellulose (CMC) was used for this project. From a series of experiments it was found possible to remove from the sized warp one-third of the CMC applied. Under the conditions used, a 2% water solution was obtained. A new formulation was prepared from this solution by adding a suitable amount of CMC and when applied to warps was found to give a satisfactory performance. In the initial experiments grey cotton yarns were used for the warps, and in desizing, water-soluble waxes and pectins were also removed. These caused a problem because they decomposed readily giving an offensive odor to the size solution.

"The results of the research during the past few months have provided a method of eliminating the non-cotton, water-soluble materials from the sized yarns. The warps were passed through a bath of boiling water and squeezed before passing into the size bath. Although the yarns treated in this way contained about 70% moisture when they were sized, they picked up sufficient CMC so that they performed satisfactorily on the testing equipment. The water solution obtained from desizing these warps did not develop the offensive odor of the previous experiments. The fact that this procedure did not require the drying step before the final size application makes this procedure commercially feasible. Moreover, more efficient methods for the recovery of the size can be used, and will be investigated."

DILUZIO TO HEAD INTERIOR WATER PROGRAMS

Frank C. DiLuzio, Director of the Office of Saline Water, Department of the Interior, has been nominated to be Assistant Secretary for Water Pollution Control. It is expected that the Office of Saline Water and the Office of Water Resources Research, as well as the new Federal Water Pollution Control Administration, will come under Mr. DiLuzio's jurisdiction in the near future.

Mr. DiLuzio has extensive experience as an engineer, research director, and administrator.

INDUSTRY AND WATER POLLUTION CONTROL RESEARCH

Representative Robert E. Jones, Chairman of the House Subcommittee on Natural Resources and Power, has urged a sharp increase in Federal aid for research and development programs to combat water pollution. In proposing that more of these programs be turned over to industry, he said:

"Industry is responsible, in part, for the existence of the pollution. At the same time, it has done much to eliminate pollution. Industry is close to the problem and is knowledgeable in the water pollution field. I believe it should expand research and development programs and I believe the Federal Government should support this expansion in dollars and cents and technical services."

REPORT ON WATER-RELATED RESEARCH INTERESTS IN NORTH CAROLINA UNIVERSITIES AVAILABLE

The Water Resources Research Institute has undertaken the preparation of a research plan to guide the development of its long-term program. This will be oriented toward the State's overall economic development policy and water resources plan and will include an assessment of the State's water resources problems, a report on water resources research interests in the senior colleges and universities of North Carolina, an inventory of water resources research projects currently underway throughout the State, and a schedule of water resources research needs.

The Report on Water Resources Research Interests in the Senior Colleges and Universities of North Carolina has now been completed and is being distributed to all university participants and State and Federal water resource agencies. Additional copies are available upon request to the Water Resources Research Institute.

A companion report, an inventory of water resources research projects currently underway throughout the State, is nearing completion and will be distributed during the first week of September.

EFFECTIVE USE OF THE SEA

President Johnson has released a report by the President's Science Advisory Committee entitled "Effective Use of the Sea," which was prepared in response to the President's deep concern with marine science and technology.

The report recommends a doubling of federal support in marine science and technology during the next four years. The recommendation is based on an analysis of opportunities for expansion of commerce and industry in the oceans, as well as considerations of national security. As an aid to this expansion, the report suggests the Government should provide services, such as maps of the ocean bottom and detailed forecasts of weather and sea conditions.

The report declares that a major opportunity to greatly expand the yield of food from the sea has been identified. Much more food is required to prevent widespread malnutrition among the exploding populations of the world, the panel noted. It said this would be accomplished largely by scientific research on farming and fertilizing shallow waters at the margins of the ocean and by development of suitable farming technology for export to less industrialized nations.

The report notes that almost half of our population lives near the margins of the sea or the Great Lakes and depends on the beach and water to an increasing extent for recreation. The environment near these shores is being modified rapidly by human activities in ways that are undesirable, for example, by pollution.

Present oceanographic research in the critical near-shore region is considered grossly inadequate. The panel concludes that research and development related to preserving and restoring the near-shore environment will yield long-term social and economic benefits which will amply return the cost.

There is an urgent need to establish marine wilderness preserves, the report finds.

In order to achieve these and other goals, a major governmental reorganization is proposed. Activities now included in the Environmental Science Services Administration, Geological Survey, Bureau of Commercial Fisheries and most of the oceanographic activities of the Bureau of Mines and Coast Guard should be combined in a single agency, the panel recommends. The new agency would not be an oceanographic agency but would support a broad range of federal activities in the science and technology of the environment--land, sea and air--as well as fostering the development of oceanic resources.

Because research in ocean science and technology has developed rapidly in quantity and quality in the last five years, the report recommends that these fields should become normal components of the academic curriculum at universities throughout the nation and not be limited to near-shore institutions. Moreover, Marine Study Centers should be established to permit lawyers, economists, scientists and engineers to work together to achieve the effective use of the oceans.

Present arrangements for ship operations and scheduling make it difficult for many scientists and students to do research at sea, the panel noted. Primarily for this reason, but also with the hope of more economical operations, the report recommends that research ships should be clustered into fleets operated by user groups consisting of all interested universities and laboratories in a large region such as the Gulf Coast or the Great Lakes region.

LEGAL IMPLICATIONS OF WATER QUALITY STANDARDS

Professor Milton S. Heath, Jr., Assistant Director, Institute of Government, University of North Carolina at Chapel Hill, presented a paper on the "Legal Implications of Water Quality Standards," at the National Symposium on Quality Standards For Natural Waters at the University of Michigan on July 19-22, 1966. The Symposium was sponsored by the Sanitary Engineering Division of the American Society of Civil Engineers, the University of Michigan, Water Pollution Control Federation, and the Association of State and Interstate Water Pollution Control Administrators. Heath discussed the machinery for formulating and applying water quality standards, the potential scope of standards, the practical limits on regulation or standards, and the method of dealing with established concerns and vested rights. His principal conclusions were as follows:

1. Most of the broad legal issues in the field of water quality management embody a rich mixture of law, engineering, policy, governmental administration, and economics. On this plane of discussion rarely does one meet with a simple, straightforward, unmixed question of law.

2. The blossoming of a full-fledged federal interest in water quality management opens up many new opportunities for more effective pollution abatement, but at the same time it complicates an already complex field of activity.

3. The most difficult unresolved issues for the lawyer and public administrator in the field of water quality standards today--and at the same time the most interesting--revolve around the question of practical limitations on regulations. While these may not always have been matters of pressing concern to water quality managers, the rapidly quickening pace of water pollution control activities is calculated to bring these questions to the forefront in short order. The time is at hand, he said, to take a long, hard look at the unresolved issues which he referred to as "practical limitations" on regulation of individual polluters and of polluters in the mass.

MAJOR BREAKTHROUGH IN POLLUTION CONTROL

A review of operational data on three sewage treatment plants in San Antonio, Texas, is expected to lead to the major and early breakthrough in water pollution control.

Secretary of the Interior Stewart L. Udall has announced that scientists in the Department of the Interior's Water Pollution Control Administration have under development a fast and relatively inexpensive way to deal with one of the most baffling problems in water pollution control--the explosive, water-choking, fish-killing growth of algae.

This can be done, according to WPCA, with relatively simple modifications of current waste treatment techniques. Normally, the most complete waste treatment now in use removes most of the impurities from domestic wastes--except phosphates. And these phosphates provide algae with a rich food supply. Water pollution experts have been trying for years to find an economical way to remove phosphates in large scale waste treatment operations. As is often in the case of scientific investigations, the clue the experts were looking for came about almost by accident.

During the review of operating data from the San Antonio, Texas, activated sludge sewage treatment plants, it became evident that either there was something wrong with the data on the three plants or that there was something going on that was worth looking into. The reports on two of the plants were like the reports on other such plants anywhere in the country. The plants were performing very effectively, but with typically low phosphate removal. However for some reason, virtually no phosphates were getting through the other plant. Yet it is basically the same kind of plant as the other two and treats the same kind of wastes.

The operation of activated sludge treatment plants is effective by their structural and hydraulic design and by the rate of input of the liquids being treated, the amount of aeration, the concentration of bacteria used, and other operational features which can be modified. The WPCA investigators found that the San Antonio plant with the high phosphate removal was being operated differently from the other two in a number of ways. They then changed five of the operational features of one of the other plants--one that had been removing no phosphates--and phosphate removal suddenly shot up to over 90 percent. The investigators got this result by increasing the aeration, increasing the concentration of bacteria, reducing the time for settling, decreasing the time that settled materials remained in the settling tank, and increasing the ratio of bacteria to organic materials. It is not yet known what brought about the increased phosphate removal--whether it was the result of one or several or all of these changes.

Since then, wastes at several other plants around the country have been treated experimentally in the same manner and without exception, very high phosphate removal has been achieved. The WPCA scientists and engineers will begin an intensive program of coordinated investigations with non-governmental researchers in an attempt to accelerate the development of maximum removal of phosphates as a regular part of municipal waste treatment.

PUBLIC HEALTH SERVICE INVOLVEMENT IN WATER RESOURCES RESEARCH

With the removal of the water pollution control program from the Public Health Service and transfer to the Department of the Interior through the establishment of the Federal Water Pollution Control Administration, there have been many questions as to the nature of water-related research support still available from the Public Health Service.

Secretaries Udall and Gardner of Interior and Health, Education and Welfare have now agreed that the Public Health Service will devote its water-related research effort--extramural and intramural--to waterborne diseases and the epidemiological, microbiological, radiological, and toxicological hazards of waterborne contaminants; the effects of such contaminants on water supplies, shellfish and other marine foods and water contact activities. The Public Health Service research program will be devoted to the causes, diagnosis, treatment, control, and prevention of physical and mental diseases and impairments of man resulting from polluted water. It will advise the Department of the Interior on criteria for water quality, insofar as the public health aspects are concerned.

Research personnel will want to keep this agreement in mind when considering the preparation of grant applications. Research proposals dealing with water pollution which were previously submitted to the Public Health Service now go to the Federal Water Pollution Control Administration in Interior and it is important for the investigators to distinguish between the health and conservation orientations of the two Federal Agencies in developing their proposals.

NEW WATER RESOURCES BILLS INTRODUCED IN THE CONGRESS

S. 3598	To amend the Internal Revenue Code of 1954 to encourage the construction of facilities to control water and air pollution by allowing a tax credit for expenditures incurred in constructing such facilities and by the deduction, or amortization ov a period of 1 to 5 years, of such expenditures.
H.R. 16005	
H.R. 16078	
H.R. 16194	
H.R. 16260	
H.R. 16281	
H.R. 16284	

Note: The above bills are similar, but not identical.

SEA GRANT COLLEGE BILL REPORTED OUT

The House Committee on Merchant Marine and Fisheries on July 27, 1966, favorably reported H.R. 16559 to authorize the establishment and operation of sea grant colleges and programs by initiating and supporting programs of education and research in the various fields relating to the development of marine resources.

FIRST MARINE GEODESY SYMPOSIUM

The Columbus Laboratories of Batelle Memorial Institute and the Coast and Geodetic Survey are jointly sponsoring the first symposium on marine geodesy at the Battelle Auditorium in Columbus, Ohio, on September 28-30, 1966.

Following the theme "Marine Geodesy--Present and Future", the symposium will present a broad view of problems facing the marine geodesist; the marine geodetic requirements of the scientific, industrial, and governmental communities; the present and projected technologies applicable to these problems and requirements; and the economic and scientific forces motivating the new discipline of marine geodesy.

NEW PUBLICATIONS RECEIVED BY THE INSTITUTE

Man's Environment in the Twenty-first Century, edited by Charles M. Weiss, seminar series of Department of Environmental Sciences and Engineering, School of Public Health, University of North Carolina at Chapel Hill, organized to probe ahead 35 years into the 21st century to assess biological, chemical, physical and human factors of greatest significance in defining man's future environment.

Alternatives in Water Management, a report of the Committee on Water, Division of Earth Sciences, National Research Council, which identifies several water management principals not receiving adequate attention at the present time.

Techniques for Hydrograph Synthesis Based on Analysis of Data from Small Drainage Basins in Texas, by Michael D. Hudlow, Water Resources Institute, Texas A & M University.

Status of P. L. 566 Watershed Projects in North Carolina, July 1, 1966, Soil Conservation Service, U. S. Department of Agriculture.

Proceedings Eleventh Annual New Mexico Water Conference, on water economics with limited supplies and the increasing population.

Waterfront Renewal, report of the Wisconsin Department of Resource Development on the renewal of urban waterfronts.

Federal Water Resources Research Program for Fiscal Year 1967, Federal Council for Science and Technology.

Handbook of Basic Water Law, prepared under the direction of George W. Hardy, III, Resources Research Institute, Louisiana State University.

A Method for Calculating and Plotting Surface Wave Rays, Technical Memorandum No. 17, U. S. Army Coastal Engineering Research Center.

A Tractor-Mounted Suspended Sand Sampler, Reprint, U. S. Army Coastal Engineering Research Center.

Computerized Location Models for Assessing of Indirect Impacts of Water Resources Projects, by Edgar M. Hoover, Water Resources Investments Project, Institute for Urban and Regional Studies, Washington University, St. Louis, Mo.

Research Grants Index Fiscal Year 1965, (2 Volumes), Public Health Service, Department of Health, Education and Welfare.

Effective Use of the Sea, Report of the Panel on Oceanography, President's Science Advisory Committee, June, 1966.

Conflicts in Land and Water Uses, Proceedings of the 7th Annual Fontana Conservation Roundup, June 15-17, 1966.

Recommendations for Watershed Research Programs, Panel on Watershed Research, Office of Water Resources Research, June, 1966.

Residential Developer Decisions, Weiss, Smith, Kaiser, and Kenney, Center for Urban and Regional Studies, Institute for Research in Social Science, University of North Carolina at Chapel Hill.

Small River Basin Development in Eastern North America, by Timothy O'Riordan, Water Resources Center, Cornell University.

North Carolina State Laws, Policies and Programs Pertaining to Water and Related Land Resources, Ohio River Basin Comprehensive Survey, Preliminary Draft, Ohio River Division, Corps of Engineers (prepared by N. C. Department of Water Resources with major assistance from Mr. George Goodwyn, Assistant Attorney General, and Mr. Milton S. Heath, Jr., Assistant Director, Institute of Government, University of North Carolina at Chapel Hill)

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