NEWS

WATER RESOURCES RESEARCH INSTITUTE

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NEW INSTITUTE REPORTS

Report No. 42

A Comparative Study of State Water Pollution Control Laws and Programs

by

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This study of the water pollution control programs of Maine, Michigan, New York, North Carolina, Pennsylvania, and Virginia reviews the evolution of water pollution control programs in general and those of the states in particular. It offers insights into the laws, policies, and institutional arrangements of the six states included in the study. Strengths and weaknesses of state programs are noted. The report includes a check list of some of the best features of state water quality management programs as reflected in the actual experience of the study states. Appendices include a summary of the literature, laws, and programs of particular states, the text of North Carolina's statutes and regulations, illustration of the use of "citizen suits" in Pennsylvania, and responses from the individual states as to current progress.

Report No. 71

Effects of Land Use on Municipal Watersheds

by

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and
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North Carolina State University

This report covers a three-year study of the effects of land use on the Lake Michie Watershed and its effects on water quality, quantity, and timing of flow. It will be of interest to planners, engineers, foresters, municipal officials, and regulatory agencies concerned with the management of municipal watersheds. Recommendations are as follows:

1. Improve road maintenance practices, stabilize cuts and shoulders and direct road drainage through filter strips rather than directly into a stream.
2. Obtain control over livestock access to streams, particularly to prohibit the establishment of hog wallows astride live streams.
3. Develop controlled waste disposal sites at safe distances from drainage channels of the stream system.
4. Encourage land use conversion practices that take maximum advantage of soil improvement provided by decaying tree stumps which aid in deeper percolation of water into soil.
5. Acquire, or obtain control of, well-vegetated filter strips adjacent to all live streams and the lake.
6. Establish stands of loblolly and shortleaf pine along the lake shore to create a more trafficable margin around the lake.
7. Encourage better forestry practices on the part of the land owners as a means of obtaining favorable hydrologic conditions as well as creating an economic resource for the land owner.
8. Hire a professional forester to promote better forestry activities on the watershed and to act in an extension capacity to the land owners.
9. Construct a stilling pond at the head of the lake to control further movement of sediment deposits into the lake.

URBAN LAND USE AND HYDROLOGY

A new report, "Identification of Urban Watershed Units Using Remote Multispectral Sensing" by Root and Miller of Colorado State University (ERC Report No. 29), will be of interest to hydrologists and planners concerned with urbanizing areas.

The rapid pace of development in the urban fringe has significant hydrologic effects. Changes due to urban development of natural watersheds are shown by an areal analysis of thirteen small watersheds from 40 to 600 acres located in the Denver suburbs. Airphotos for each of the watersheds were obtained at 5 to 10-year intervals for as far back as 1935. The surface composition of each watershed was determined from the airphotos, in terms of common urban surface materials such as rooftops, asphalt, and lawns. Examination of the results shows the developmental trends in changes in the impervious cover of each watershed and the effects on this imperviousness of different seasonal characteristics.

The authors state that new urban hydrology analysis methods are necessary to keep pace with such rapid changes in surface cover. Recent progress in urban watershed modeling is a partial answer, but further progress in relating changing surface cover to urban hydrology requires refined and timely measurements of the surface cover. This study illustrates the use of remote multispectral imagery to provide the more detailed analysis of surface characteristics which can, in turn, be related to hydrologic effects and input into watershed models.

A method is proposed for determining the optimum wavelength bands to be used for differentiating ten types of urban surface materials via automatic image processing based on measured spectral curves of the materials. The results can be used in the design or use of instruments to map urbanizing areas.

NORTH CAROLINA ACTIONS UNDER RIVERS AND HARBORS ACT OF 1899

The Justice Department recently brought civil actions under the 1899 Rivers and Harbors Act against North Carolina land developers.

Suits filed in the U. S. District Court in New Bern charge three land developers with excavating and filling lands adjacent to navigable waters without obtaining the necessary permit from the Corps of Engineers. The developers are also charged with dumping dirt and sand on the banks of navigable waters and that such materials are liable to be washed into the water and impair navigation in violation of the 1899 Act. Charged are: Owen Fulford of Harker's Island; Lawrence Owens of Phillips Boatyard, Wanchese; and Sam Beacham, owner of Outer Banks Contractors, Inc.

The court was asked to enjoin the defendants from further excavation and filling of waters adjacent to navigable waters.

ENVIRONMENTAL IMPACT STATEMENTS

U. S. Department of Agriculture

Soil Conservation Service

Chicod Creek Watershed - A watershed project which would involve land treatment on 12,200 acres and the construction of 66 miles of channel works, one 12.4 acre warm water impoundment, 11 rock structures, 30 water-control structures, 10 sediment traps, and 2 wildlife wetland preservation areas. The project is intended to reduce flood water damage and erosion, and to improve soil quality. Approximately 576 acres of cropland and wood land will be lost to channels, spoil deposits, and the warm water impoundment. Wildlife habitat will be reduced in both quantity and quality. (FINAL)

Atomic Energy Commission

William B. McGuire Nuclear Station - A construction permit to the Duke Power Company for a two-unit station. Each of the pressurized water reactors will be cooled by once-through flow of water from Lake Norman; discharge will be at 16 degrees F above ambient. Small amounts of non-radioactive chemicals will be released to the water; an estimated dose of 78 manrem per year (within a 50-mile radius) will be released to the environs. (DRAFT)

Federal Power Commission

Green River Project - Application for relicensing by the Duke Power Company. Project consists of two developments; one has a hydroelectric plant of two 2500 kw and the other 2750 kw. Development has been in operation since 1925. Statement foresees no significant and adverse impacts. (DRAFT)

Department of Transportation

Construction of 3.2 mile section of 4-land loop around City of Raleigh. Project will connect US-64 and I-40. A 4(f) statement will be filed as land will be taken from Worthdale Park. (FINAL)

Construction of 8.9 miles of roadway from US-129 to NC-28. Siltation and channelization of Sweetwater Creek will affect aquatic life. (FINAL)

EFFECTS OF LOGGING ON STREAM QUALITY

Studies of the Effects of Watershed Practices on Streams by the Oregon State University School of Forestry have recently been reported by EPA in its Publication 13010 EGA 02/71. These involved two small streams in Oregon's Coast Range. One watershed contained three small clearcuts; the edges of the clearcuts were generally 100 feet from the main stream. The second watershed was completely clearcut and most of the main stream exposed. A third watershed and some uncut subwatersheds were retained as uncut controls. The three watersheds range from 175 to 750 acres in size.

The diurnal temperature regime was not altered after logging on the watershed with three small clearcuts. The fully clearcut watershed had a maximum diurnal change in temperature of 8°F before it was logged, but 28°F after logging. The maximum temperatures recorded in the two years after logging on the patchcut watershed was 60 and 61.5°F - little different from the control. The maximum temperature on the fully exposed stream after logging was 85°F - a 28°F increase. All temperature regimes had a trend toward the prelogging condition in subsequent years.

The effects of road building, clearcut logging, and slash burning on suspended sediment production from the three forested watersheds were also studied. Sediment yield was monitored for seven years prior to road building and clearcut logging in two of the three watersheds; and for four additional years during and after treatment. Road building significantly increased sediment yield in patchcut and clearcut watersheds. Annual sediment yield increased markedly after logging and burning, and although it declined in subsequent years, was still significantly higher than normal for four years after treatment had been initiated. The results indicate that clearcut logging does not cause major impact on sediment concentrations, but that road building and perhaps burned areas are important sources of sediment.

WATER QUALITY CRITERIA

The Environmental Protection Agency has issued revised compilations of all State water quality criteria approved under the Federal Water Pollution Control Act. These include criteria for turbidity, settleable solids, phosphate, oil, mixing zones, disinfection, dissolved oxygen, dissolved solids, heavy metals, antidegradation, radiation, acidity, alkalinity, bacteria, nitrate, temperature, and stream use designations.

The Agency also issued digests of standards for eleven states and D. C., listing water quality criteria and stream use designations, as well as an overview of the states' water quality implementation plans. North Carolina is not included among these states.

SECOND STATE SIGNS AGREEMENT WITH EPA ON WASTE PERMITS

Michigan has joined Oregon in signing agreements with EPA to establish federal-state cooperation in preparing and issuing municipal and industrial permits for waste discharges to state waters. Under these agreements the states will have primary responsibility for contact with permit terms, furnishing EPA with information required by that Agency.

NATIONAL WATER COMMISSION REPORTS

The National Water Commission has announced the release of two reports which were prepared to provide technical background for the commission's deliberations on national water policy. The reports deal with desalting and water use and management aspects of steam electric power generation. Both studies are available from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Va. 22151. All reports ordered must be prepaid or charged against an existing account.

"Desalting" was prepared by the commission's staff, under the supervision of Victor A. Koelzer, Chief of the Environmental and Engineering Sciences Division. The purpose of the report is to evaluate the state of the art of saline water conversion as a means of increasing water supply. Progress in desalting technology is summarized, and the report examines the applicability of various desalting processes to different water supply situations. Particular attention is given to the costs of desalted water and opportunities for making costs competitive with other sources of supply. The report concludes that desalting has a significant future in certain specialized situations. Copies may be purchased from NTIS under Accession Number, PB 209 942, for $5.45.

The second report, entitled "The Water Use and Management Aspects of Steam Electric Power Generation," is part of a larger commission effort to explore present and future water problems. The report assesses the cause, magnitude, and effects of heated discharges to water and related aspects of cooling system operation. Attention is focused on the need to provide better information on which rational decision making may be based. Based on a consideration of the probable timing and possible impacts of new technologies, it is pointed out that two perspectives are needed in addressing this issue: (1) the near to intermediate term when plants will have to be sited based on currently available technology, which highlights the need to develop better insights into the overall effects of heat discharge, and (2) the longer term when a greatly expanded R&D program might have a significant impact on the means of generation and the quantity of waste heat discharged. The Accession Number is PB 210 355 and the price is $4.85.

WATER POLLUTION CONTROL PLANNING

The importance of intelligent water quality planning is emphasized in a voluminous study of "Public Regulation of Water Quality in the United States," by N. William Hines for the National Water Commission (see p. 4, June News).

"State agencies have the responsibility," he says, "to stimulate and coordinate local and regional planning activities, and to apply sound planning principles to all aspects of the state program." He continues: "The frequent reexaminations of goals and strategies inherent in good planning is an important exercise for administrators. Unfortunately, planning is more exhorted than practiced by most states. Planning is another low-visibility element within state programs which has suffered disproportionately the effects of the chronic financial starvation of state agencies. While a need for more planning should not be an excuse for failure to resort to regulatory action, neither should regulation proceed in disregard of existing plans.

A problem to date has been that existing plans tend to be too large scale and long range to furnish useful guidance in making immediate regulatory decisions. The report recommends concentration on development of immediate impact plans to guide current regulatory activities, but not to the exclusion of more ambitious long-term planning.

HAZARDS LINKED WITH LARGE-SCALE WATER DEVELOPMENT

Long-term regional and continental environmental hazards that could result from large-scale water developments are often glossed over, a scientist of the U. S. Geological Survey, Department of the Interior, warned.

In a recent paper (August 1, 1972) presented to the Water Resources Symposium, International Geographical Congress, at the University of Victoria, British Columbia, Canada, Dr. Raymond L. Nace, a research hydrologist, USGS, Raleigh, North Carolina office, said that "traditionally, planners and developers have given little thought to potential side effects and long-term ecological consequences of water manipulations," and that "often, when they occur, have come as surprises."

Some of the "surprises," Nace noted, are earthquakes caused by dams and impounded water, land subsidence caused by ground-water pumping, and epidemic spread of water-borne disease in irrigation projects.

"Adequate means are not available to cope with many environmental hazards," the Survey scientist emphasized, "and their occurrences are warnings of disastrous consequences that may result from ever larger assaults being planned upon the environment in many parts of the world."

"Endangered biological species, disrupted landscapes, and other environmental effects are symptoms of inadequate application of science," Nace told the symposium. "When the 'Face-lifters' of Mother Earth alter natural systems, they disturb the natural dynamics, and set in motion forces that follow, not necessarily their wishes, but the inexorable laws of physics, chemistry, and biology," he said.

As just one example, Nace commented on a proposed large-scale southward diversion of great rivers that now flow into the Arctic seas. "This would alter the existing heat, water, and atmospheric vapor balances of the Arctic area and of the regions to which the water would be diverted. Climates would be modified. The change in distribution of earth mass conceivably could affect the earth's rotation and precession of its axis of rotation, and while the relation of these to earthquakes is conjectural, a known cause of earthquakes is 'geostatic' loading by dams and impounded water."

Nace emphasized, however, that he does not subscribe to the creed of environmentalists who seem to believe that any development is bad, and that we must return to Nature. "Recognition of hazard possibilities should not blind us to real opportunities; the difficulty is to use opportunities in ways that will have rational, predictable outcomes," he said.

In a concluding statement, Nace said that "in natural systems, organisms adjust to environmental 'niches' over long periods of time. When a single factor in the balance is disturbed or removed, it sets up a whole series of interactions. Entire populations of specific organisms may be eliminated or harmed. When several or many factors are disturbed, the effects often are so far-reaching that they can hardly be evaluated after they occur, let alone be predicted."

A NORTH CAROLINA SECTION OF THE AMERICAN WATER RESOURCES ASSOCIATION

Efforts are being made to form a North Carolina section of the American Water Resources Association. The objectives of AWRA are:

1. To provide a common forum in which to meet, discuss, exchange ideas, and assist all scientists, educators, scholars, technologists, engineers, legislators, lawyers, planners, research workers, users, consultants, and other persons likewise concerned with the conservation, development, management, and utilization of fresh and marine waters and related resources together with their environmental aspects.

2. To encourage and assist in:

   a. Inventorying the quantity, quality, and location of all waters and related resources.

   b. Ascertaining the present and future needs of people for fresh and marine waters and related resources.

   c. Seeking out and proposing alternative means and solutions to satisfy such needs.

   d. Promoting research and technological, social, economic, and legislative advanced in all aspects of water and related resources planning, utilization, management, and development.

   e. Collecting and disseminating information, knowledge, and data concerning all aspects of water and related resources through publications, symposia, and other media.

   f. Relating the needs of management, educational institutions, and governmental agencies for specialized services and guidance to qualified professionals and consultants in water and related resources and environmental problems.

   g. Opening up and maintaining lines of communication between members of this Association and the public.

3. To promote the rational and objective development and utilization of water resources.

Persons interested in joining the Association can contact either of the following:

Dr. Charles W. Welby
Department of Geosciences
North Carolina State University
Raleigh, N. C. 27607 (Tel. 755-2212)

Mr. Harry E. LeGrand
USGS, Old Post Office Building
Raleigh, N. C. (Tel. 755-4510)

STATUS OF WATER IN NORTH CAROLINA

Streamflow in August continued the receding trend of July and was near normal only in the mountains and western Piedmont. Below normal conditions prevailed in the eastern Piedmont and Coastal Plain for the second consecutive month. Total cumulative runoff for the water year was well above normal.

No flooding was reported during the month. Rainfall, which occurred mostly as scattered local showers, was below the long-term average for August.

Major lakes and reservoirs across the State reported a decrease in storage but most levels were above normal for the month.

Ground water levels fell throughout the State. However, all levels remained above the long-term averages except those in the heavily pumped areas of the Coastal Plain.

- U.S.G.S.

HOUSE-SENATE CONFERENCE AGREES ON WATER POLLUTION CONTROL BILL

House-Senate conferees have reached agreement on a water pollution control bill authorizing more than $24 billion of federal funds to help the states and local communities clean up the nation's waters.

The bill requires secondary treatment for all municipal wastes by mid-1977 and the application of more advanced disposal methods by mid-1983.

For industry, the bill establishes a two-phase cleanup program, with increasingly tightening restrictions on industrial pollution, backed up by penalties of fines and imprisonment for violators.

The long-range goal of the bill is to rid America's waters of all pollution by 1985.

Representative Robert E. Jones of Alabama, Chairman of the Conference Committee, and Senator Edmund S. Muskie, Leader of the Senate Conferees, announced the agreement, which now goes back to the House and Senate for final ratification.

The Senate passed its version of the Anti-pollution legislation last November by a vote of 86 to 0, and the House bill cleared that body last March, 378 to 14.

The Conference Committee resolved all differences between the separate bills over the course of 39 sessions, beginning last May 11.

Highlights of the bill follow:

Funding

Total federal spending authorized in the Conference agreement is slightly over 24.6 billion, approximately the same amount provided in the original House bill. The Senate version called for approximately $20 billion. The Administration had asked for $6 billion to be spread over a three-year period.

Grants to Municipalities

The Conference accepted a House provision authorizing $18 billion in contract obligation authority for federal grants to municipalities, through fiscal year 1975, for construction of waste treatment plants, including sewage collection systems. The Senate bill authorized $14 billion for this purpose but did not include the collection systems.

Additionally, the bill gives authorizations to an appropriation already approved by Congress, amounting to $350 million, to fund the grant program for the fiscal year which ended last June 30.

Of the $18 billion authorization, $5 billion would be applied to fiscal year 1973, $6 billion to fiscal year 1974, and $7 billion to fiscal year 1975.

Because of the contract obligation provision, no significant impact would be felt on federal spending until fiscal 1975, when the first major appropriations would be required to pay off the contracted obligations.

Allocation of Sewage Treatment Grants

Federal grants for construction of municipal treatment plants would be distributed on the basis of need within the separate states, as determined by the Environmental Protection Agency's latest study for the years 1972-74, the "Economics of Clean Water Report."

The original House bill would have allotted the grants on the basis of need, but using an earlier study as its base. The Senate version would have distributed the grants among the states on the basis of population.

Federal Share of Treatment Plant Costs

The federal government will provide 75 percent of the cost of constructing a community's waste treatment plant, leaving it up to the states and local municipalities to work out the funding of the remaining 25 percent.

The original House bill would have permitted grants up to 75 percent of the total cost and the Senate bill up to 70 percent, but only if the states contributed at least 15 percent in the House bill and 10 percent in the Senate bill.

Deadlines for Industrial Compliance

The Conference agreement requires all industries discharging into the nation's waters to apply the best practicable control technology by July 1, 1977, and the best available technology by July 1, 1983. The original deadlines in both the House and Senate bills were January 1, 1976, and January 1, 1981, but the Conferees agreed to push those dates forward because of the time consumed in completing Congressional action.

In enforcing the 1977 "best practicable technology" regulation, the Environmental Protection Agency (EPA) would take into account the total impact of the action on plants within a given category (e.g., steel, chemical, paper) considering overall financial ability to comply, and the national impact of compliance on communities and workers.

In enforcing the 1983 "best available technology" regulation, EPA must consider whether such application is economically achievable by the category or class of industries affected, and, at the same time, will result in reasonable progress toward the national goal of eliminating all water pollution.

Standards

The Conference agreement provides for continuation of the water quality standards already in existence, plus limitations on the amount of effluents a plant may discharge into any of the nation's waters. In every case, the effluent limitations must be sufficiently stringent to maintain the quality of the water as prescribed by the standards, but effluent limits will be a minimum measure of compliance.

Impact Study

The Conference agreement requires that a study be undertaken into the environmental, technological, economic, and social effects that would result from enforcing the 1983 "best available" regulation on industry and attaining the 1985 goal of pollution-free water. The study will be undertaken by a 15-member Commission, five each to be appointed by the President, the House, and the Senate, utilizing the resources of government and private research organizations.

The original House bill would have required that the study be conducted by the National Academies of Science and Engineering and that upon receipt of the report, Congress would have to take affirmative action before the "best available" regulations would be triggered into operation.

The Conferees accepted the Senate position that no such "trigger action" would be required.

Environmental Financing

The Conference accepted a House provision establishing an environmental financing mechanism with an initial authorization of $100 million, to help hard-pressed communities obtain capital for their share of waste treatment plant construction costs. The agreement limits the life of the mechanism to three years. This provision was not in the Senate bill.

Permits

The Conference agreement directs the EPA Administrator to establish guidelines within which the separate states must operate their permit programs. Each state program must be approved by EPA and is subject to takeover by EPA if the state fails to live up to its responsibility.

Pending issuance of the federal guidelines, those states which have workable, approved permit programs will continue to operate those programs, subject to a permit-by-permit veto by EPA.

After the guidelines have been promulgated, EPA will no longer have this permit-by-permit veto power, except under two specific conditions:

1. Where a state permit does not conform to the guidelines and requirements of the law; or
2. Where the governor of a down-stream state demonstrates that his waters are being polluted by permitted effluent discharge in another state.

Permits already issued to industries under the 1899 Refuse Act will be considered as permits under the new legislation, and vice versa, leading to a phasing out of the 1899 Act's application to water pollution control.

The original House bill had no provision for permit-by-permit veto power to be vested in EPA. The Senate version made no provision for an interim state program pending issuance of the federal guidelines but would have given EPA continuing permit-by-permit veto power.

Dredge Material Disposal

The Conference agreement accepted a provision similar to the original House language establishing a separate permit program for the disposal of dredged or fill material in the nation's waters, to be administered by the Corps of Engineers.

Under this program, permits would be issued, after notice and opportunity for public hearings, for disposal of such material at specified sites. The sites would be selected in compliance with guidelines developed by EPA in conjunction with the Corps of Engineers. The EPA Administrator is empowered to forbid or restrict the use of specified areas whenever he determines that disposal of material at a site would have an unacceptable adverse effect on municipal water supplies, shellfish, and fishery areas, or recreational activities in a given site.

The Senate bill would have treated dredge and fill materials under the general permit program and made no provision for a separate program.

Citizen Suits

The Conference agreement provides for citizen suits against the government or a private interest for violation or failure to carry out mandatory provisions of the law. The Conferees agreed that such suits may be pursued only where the citizen, or citizen group, has an interest in the matter in litigation, in accordance with the U. S. Supreme Court's 1972 decision, Sierra Club vs. Morton.

Environmental Impact Statements

With the exception of construction of publicly owned waste treatment plants and permits granted for the discharge of pollutants by new sources, no actions taken by the Environmental Protection Agency will be subject to the requirements for environmental impact statements of the National Environmental Protection Act (NEPA).

Permit Jurisdiction

The Conference agreement provides that nothing in the National Environmental Protection Act may be construed as the basis for the establishment by other federal agencies of more stringent controls on the discharge of pollutants than those provided under this Act, nor are such agencies authorized to review or alter effluent limitations issued under this Act.

Thermal Discharges

The Conference agreement provides that the EPA Administrator may waive the requirements of Sections 301 and 306 of the Act (concerning thermal discharges) if the owner or operator of the source of the thermal discharge could be at a higher level than required under Sections 301 and 306 and still be in accordance with water quality standards or otherwise assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which the ischarge is to be made.

WATER RESOURCES LEGISLATION IN THE CONGRESS

New Public Laws:

House

H.R. 14106 — To increase authorization for activities of the Water Resources Council. Signed August 20, 1972 (P.L. 92-396).

Bills Introduced:

Senate

S. 3958 — To amend the Wild and Scenic Rivers Act.

S. 3959 — To authorize the Secretary of Interior to engage in feasibility investigation of certain potential water resource developments.

House

H.R. 16541 — To provide that a certain percentage of money received by the U. S. from royalties and rentals of any seabed within the national jurisdiction of the U. S. shall be paid to the State of the U. S. adjacent to any such seabed and that a certain percentage shall be distributed to other States of the U. S.

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 organizations issuing the publication. The addresses are provided by the News for this purpose.)

Abbreviations used throughout as follows:

EPA	- Env. Protection Agency	USDI	- U. S. Department of the Interior
NCDNER	- N. C. Dept. Nat'l. & Econ. Res.	USGPO	- U. S. Gov't. Printing Office
NTIS	- Nat'l. Tech. Information Serv.	WPC	- Water Pollution Control
NWC	- Nat'l. Water Commission	WQS	- Water Quality Standards
OWP	- Office of Water Programs	WRC	- Water Res. Center
OWRR	- Office of Water Resources Res.	WRRI	- Water Resources Res. Institute
USDC	- U. S. Department of Commerce	WRSIC	- Water Res. Sci. Infor. Center

Water Resources Planning

"Application of Operations Research Techniques for Allocation of Water Resources in Utah," (PRWG73-2) by C. Clyde, et al, Utah Water Res. Lab., College of Engr., Utah St. U., Logan, Utah 84321, Sept. 1971.

"Regional Economic Development--The Role of Water," (PB 206 372) by W. C. Lewis, et al, Utah St. U. Foundation, for NWC, avail. from NTIS, 5285 Port Royal Rd., Springfield, Va. 22151, Oct. 1971, Price $9.

"An Environmental Inventory for the Coastal Plain and Adjacent Atlantic Waters of the Southeastern States, Part III--An Index to Hydrographic Surveys for Coastal and Inshore Waters of the Carolinas and Georgia," (Pub. 72-6), by Coastal Plains Cen. for Marine Dev. Ser., Box 3643, Wilmington, N. C. 28401, June 1972.

"Lake Huron--A Bibliography," (WRSIC 72-210), by WRSIC, USDI, OWRR, Wash., DC 20240, July 1972.

"Lake Superior--A Bibliography," (WRSIC 72-213), by WRSIC, USDI, OWRR, Wash., DC 20240, July 1972.

"An Aesthetic Overview of the Role of Water in the Landscape," (PB 207 315) by R. B. Litton, Jr., et al, U. of Cal. for NWC, avail. from NTIS, 5285 Port Royal Rd., Springfield, Va. 22151, July 1971, Price $6.

"A Mixed Integer Programming Approach to Planning Multiple Water Sources for Municipal Water Supply, (PRWG 73-3), by N. Hughes, Utah Water Res. Lab., College of Eng., Utah St. U., Logan, Utah 84321, Mar. 1972.

"North Atlantic Regional Water Resources Study," (Report, June 1972 and Annex 1 to Report, May 1972), by N. Atlantic Reg. Water Res. Study Group for N. Atlantic Reg. Water Res. Study Coord. Comm., N. Atlantic Div., U.S. Army Corps of Engrs., 90 Church St., New York, N. Y. 10007--including the following appendices:

A. History of Study
B. Economic Base
C. Climate, Meteorology and Hydrology
D. Geology and Ground Water
E. Flood Damage Reduction and Water Management for Major Rivers and Coastal Areas
F. Upstream Flood Prevention and Water Management
G. Land Use and Management
H. Minerals
I. Irrigation
J. Land Drainage
K. Navigation
L. Water Quality & Pollution
M. Outdoor Recreation
N. Visual & Cultural Environment
O. Fish and Wildlife
P. Power
Q. Erosion and Sedimentation
R. Water Supply
S. Legal and Institutional Environment

T. Plan Formulation
U. Coastal and Estuarine Areas
V. Health Aspects

"Urban Water Planning--A Bibliography," (WRSIC 72-215) by USDI, OWRR, WRSIC, Wash, DC 20240

"Water Resources Planning to Satisfy Growing Demand in an Urbanizing Agricultural Region," (PRWG 100-1), by T. Anderson, Utah Water Res. Lab., Coll. of Engr., Utah St. U., Logan, Utah 84321, Apr. 1972.

"Agricultural Water Demands," (PB 206 790), by Iowa St. U., for NWC, avail. from NTIS, 5285 Port Royal Rd., Springfield, Va. 22151, Price $6, Nov. 1971.

"A Preliminary Survey of Public Water-Related Agencies in Hawaii," (Tech. Rpt. 55) by E. T. Morahan, et al, WRRC, U. of Hawaii, Honolulu, Hawaii 96822, May 1972.

"Watershed Management," (PB 206 370) by W. E. Sopper, Pa. St. U. for NWC, avail. from NTIS, 5285 Port Royal Rd., Springfield, Va. 22151, Sept. 1971, Price $6.

"Water Resources Data for North Carolina, Part 2. Water Quality Records," (1970 Annual Report) by USDI, Geo. Survey, Dist. Chief, WR Div., USGS, 436 Century Sta. P. O. Bldg., 300 Fayetteville St., Raleigh, N. C. 27602, 1972.

"Yadkin River Basin," (Draft), N. C. Water Plan Progress Report, Chap. 43, Off. of Water & Air Res., Dept. of Nat. & Econ. Res., Raleigh, N. C. 27602, June 1972.

Water Quality Management

"Classifying Water Bodies--Feasibility and Recommendations for Classifying Water," (PB 208 667), by R. Aukerman, et al, Col. St. U., avail. from NTIS, 5285 Port Royal Rd., Springfield, Va. 22151, July 1971.

"An Evaluation of DDT and Dieldrin in Lake Michigan," (EPA-R3-72-003), by Lake Mich. Interstate Pesticides Committee of the Lake Mich. Enforcement Conference, for EPA, USGPO, Wash., DC 20402, Price $1.25, Aug. 1972.

"Diatom Populations Changes in Lake George (NY)," (Final Rpt.) by N. C. Clesceri, et al, Rensselaer Polytechnic Inst., Troy, N. Y. 12181, July 1972.

"Environmental Quality and Water Development, Vol. I (PB 207 113) and Vol. II (PB 207 114)," by C. Goldman, U. of Cal., for NWC, avail. from NTIS, 5285 Port Royal Rd., Springfield, Va. 22151, Price $6/vol., 1971.

"Chemical Erosion and Denudation Rates in Middle Tennessee," (Water Res. Res. Ser. 4), by A. Reesman, et al, Vanderbilt U., avail. from Tenn. Dept. of Cons., Div. of Water Res., 2611 W. End, Nashville, Tenn. 37203, 1972.

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