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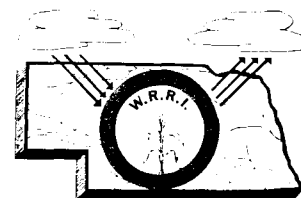
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WATER RESOURCES NEWS

NEBRASKA WATER RESOURCES RESEARCH INSTITUTE
212 AGRICULTURAL ENGINEERING BUILDING

THE UNIVERSITY OF NEBRASKA
LINCOLN, NEBRASKA 68503



Volume 5 Number 9

September, 1973

FROM THE DESK OF THE DIRECTOR . . .

Research in support of the state water resources planning process can be a highly productive university service.

While much has been learned about many hydrologic, economic and other processes involved in planning, there is a great need to provide methodologies which treat planning regions as comprehensive systems reflecting interactions between physical, environmental and human factors. This indicates a greater emphasis on methodologies to predict or simulate the functioning of complex multi-factor processes. For example, the planner evaluating the consequences of a proposal for irrigation development over time is really in need of tools to simulate the performance of the total mix of policies, physical works, hydrology, social customs, etc. as they integrate to modify some parameter of interest such as groundwater level. A knowledge of individual processes is needed, but the joint functioning of these is what must actually be understood.

It must also be understood that planning for the use and development of water resources is only part of the total planning process. Water cannot be divorced from other aspects of the environment, nor can water resources planning be conducted in a vacuum detached from considerations of transportation, urban blight, agricultural practices, land use, etc. Water resources problems often result from poor land management and improper use. The amount of stream-flow, its time distribution and its quality are in large part affected by a variety of man's alterations of the land. To treat the water problem without simultaneously treating causative land-based factors is wasteful and intolerable. The rational approach is to consider land and water resources as a single system in important planning processes.

State planning strategy must be set by acts of the legislature, but legislators cannot formulate sound policy without a good deal of knowledge not presently available. Without adequate models and evaluation techniques, policy will be formed more on the basis of opinions, pressures of interest groups and emotions than on facts.

INSTITUTE ACTIVITIES

Nebraska Institute Hosts Energy Conference

The Nebraska Institute is sponsoring a conference entitled "The Role of Water in the Energy Crisis." It will be held on October 23-24 at the Nebraska Center for Continuing Education. The registration fee is \$17 per person. Excellent housing accommodations are available.

The objective of the program is to identify ways in which the water resources community can help solve or alleviate national and regional energy problems. Topics to be discussed will include various aspects of energy-water relationships (economic, environmental, political-social and technological); the role of water research in the energy crisis; regional energy-water problems; and an assessment of research needs.

Warren D. Fairchild, newly appointed Director of the Water Resources Council, will speak on "The Role of Water in the Energy Crisis" and Warren A. Hall, Director of the Office of Water Resources Research, will discuss the "Role of Water Research in the Energy Crisis."

The following is a list of speakers and their topics: Ernest A. Engelbert, Director, Public Administrative Program, University of California, "Political-Social Aspects of Energy-Water Relationships;" Robert K. Davis, Staff Economist for National Audubon Society, The Johns Hopkins University, "Economic Aspects of Energy-Water Relationships;" Loyd K. Fischer, Professor, Department of Agricultural Economics, University of Nebraska-Lincoln, "Environmental Aspects of Energy-Water Relationships."

For further information, contact Dr. Warren Viessman, Jr., Director, Nebraska Water Resources Research Institute, 212 Ag. Engineering Bldg., University of Nebraska-East Campus, Lincoln, Nebraska 68503.

NWRRRI Awarded Research Contracts

The Missouri River Basin Commission, Army Corps of Engineers and Nebraska Department of Environmental Control have recently contracted with the Nebraska Institute to conduct special projects related to the Platte River Level B Study.

The Missouri River Basin Commission has asked the Institute to develop a screening model for evaluating alternatives for water resources development in the Elkhorn River Subbasin. The objectives are to: (1) screen a set or sets of proposed activities for water resources development in the Elkhorn Basin measured against prescribed objectives; (2) conduct sensitivity analyses of model runs; and (3) indicate the alternatives for development which appear to approximate optimality in terms of stated objectives.

The other contracts involve a complementary study of nonpoint source pollution. Objectives of these projects are to: (1) test the applicability of current water quality modeling capabilities for estimating effects of nonpoint source pollution on water quality in the Platte River Basin; and (2) obtain data for verification of state-of-the-art modeling techniques and/or development and testing of new techniques.

Title II Deadline Announced

The Office of Water Resources Research has announced Title II research proposals under the 1964 Water Resources Research Act should be submitted no later than January 11, 1974 for consideration for fiscal year 1975 funding.

Title II of the Act authorizes the Secretary of the Interior to make grants, contracts and matching or other arrangements with educational institutions, private foundations or other institutions, with private firms or individuals whose training, experience and qualifications are, in his judgment, adequate for the conduct of water research projects, and with local, state and federal government agencies to undertake research into any aspects of water problems related to the mission of the Department of the Interior which he may deem desirable and which are not otherwise being studied.

Within the broad research program authorized by Congress, the Office of Water Resources Research desires to encourage and support research investigations which hold promise of contributing to the solution of important water problems. The following is a list of OWRR Priority Research Subjects:

- (1) Improvement of Water Resource Planning, Managerial, Financial, Operating and Regulatory Policies
- (2) Water Resources Policy and Political Institutions
- (3) Hydrologic Systems Analysis
- (4) Urban and Metropolitan Water Resources Problems
- (5) Ecologic Aspects and Environmental Consideration of Water Resources Planning and Management
- (6) Evaluation of Economic Importance of Various Uses of Water, Cost Allocation, Cost Sharing, Pricing and Repayment
- (7) Analysis and Evaluation of Water Resources Projects
- (8) Groundwater Supply, Management and Protection
- (9) Protection and Rehabilitation of Estuarine Resources
- (10) Thermal Loading Problems
- (11) Water Demand Considerations

For further clarification of these research priorities and examples of specific research requirements, please contact Dr. Warren Viessman, Jr., Director, Nebraska Water Resources Research Institute, 212 Ag. Engineering Bldg., University of Nebraska, Lincoln, Nebraska 68503 (402-472-3307). Detailed instructions and forms for the submission of proposals for consideration for funding under the Title II provisions of the Water Resources Research Act may also be obtained from the Nebraska Institute.

CONFERENCES

Call for Papers - Environmental Engineering Conference

A call for papers relating to research, development and design studies in environmental engineering is being made for presentation at the annual Environmental Engineering Division Specialty Conference to be held at the Pennsylvania State University July 8-11, 1974.

Program areas include: agricultural waste management; atmospheric pollution (including air pollution aspects of transportation systems, and air pollution impact analysis); environmental quality management; solid waste management; sanitary engineering aspects of nuclear energy; thermal effects; industrial waste practices; urban wastewater engineering; wastewater treatment plant design; financing and charges for wastewater systems; water pollution control planning; water purification and environmental engineering manpower development.

Abstracts containing title, author and affiliation, and a summary not to exceed 500 words should be sent no later than October 15, 1973, to: Dr. Raymond W. Regan, Program Chairman, Civil Engineering Department, 212 Sackett Building, Pennsylvania State University, University Park, Pennsylvania 16802.

FEDERAL

Water Resources Planning Criteria Endorsed by President

The Water Resources Council has adopted and President Nixon has approved new principles and standards for planning water and related land resources which will systematically relate all aspects of water and related land resources planning to economic, environmental, regional and social well-being planning criteria. They will be used by federal agencies in regional or river basin planning and in planning federal and federally assisted water and related land resources programs and projects.

In announcing his approval of the new planning criteria, President Nixon said, the Principles and Standards ". . . represent the culmination of several years review by the Water Resources Council to develop improved planning criteria to achieve our goal of wise use of the nation's water and related land resources with full consideration to the protection of our environment. I commend the Water Resources Council for accomplishing such a difficult task."

The "Principles and Standards," which are now being prepared by the Council for publication in the "Federal Register," represent a marked departure from past resource planning which was based primarily on the economic impact of land and water resources. In the new system, planning for the use of the nation's water and land resources will be carried out in the context of two broad national objectives relating to national economic development and environmental quality. Each objective will be given equal consideration in the conservation, development and use of our nation's water and land resources. All positive or beneficial effects are to be evaluated as are all negative or adverse effects. Values will be expressed in appropriate monetary or quantitative units or in appropriate qualitative terms.

A planning discount rate to reflect the relative value of beneficial and adverse effects occurring in the future as compared with the present has been established by the Council. The rate has been established at 6 7/8 percent and will change up or down, as appropriate, not more than or less than 1/2 percent per year. The "Principles and Standards" will be applied to all currently authorized but unfunded projects on a selective basis to be determined by the head of the agency.

Additional Title II Grants Issued

Eight additional research projects have been selected for inclusion in the fiscal year 1974 water resources research program authorized under Title II of the Water Resources Research Act of 1964.

Title II programs are administered by the Office of Water Resources Research and provide funds to support the work of highly skilled and knowledgeable water research organizations and individuals, both academic and nonacademic, in undertaking research into any aspects of water resource problems related to the mission of the Department of the Interior.

The eight projects have been transmitted to the President of the Senate and the Speaker of the House of Representatives, where they are required to remain for 60 days while the Senate and the House are in session. After completion of the waiting period, contract and grant agreements will be executed.

The following is a list of the eight additional projects:

University of Minnesota, Minneapolis, Minnesota--"Computer Programs and Simulation Models in Water Resources: Scope and Availability," \$39,198;

University of Nebraska, Lincoln, Nebraska--"Environmentally Compatible Practices for Intensive Irrigation Development," \$85,000;

Cornell University, Ithaca, New York--"Regional Water Resources and Land Use Policy," \$69,915;

University of Wyoming, Laramie, Wyoming--"Economic Effects of High Irrigation Levels on Alfalfa and Barley," \$108,767;

University of Virginia, Charlottesville, Virginia--"Development of a Method for Continuously Monitoring Surface Water Quality Parameters," \$120,000;

American Society of Civil Engineers, New York, New York--"A Mechanism for the Transfer of Urban Water Research Results and Technology," \$44,400;

Kell, Alterman, Runstein & Thomas, Attorney at Law, Portland, Oregon--"Power Shortage Contingency Program for the Pacific Northwest: Legislative, Regulatory and Institutional Aspects," \$50,000;

Authur D. Little, Inc., Cambridge, Massachusetts--"Research on Water Resources Evaluation Methodology," \$88,500.

The Pros and Cons of State Environmental Centers

In hearings before the Senate Interior Committee on July 30, a bill (S.1865) to create state and regional environmental centers received academic support but administration opposition.

John H. Gibbons, Director of the Environment Center, University of Tenn., in supporting the proposition, noted "it will be a challenge to establish and maintain an environment center for each state that successfully carries out the intentions of this act."

In opposing the legislation, Dr. Laurence E. Lynn, Jr., Assistant Interior Secretary for Program and Budget, observed that the government spent \$556 million on environmental programs in fiscal 1970 and will use an estimated \$1 billion plus in fiscal 1974.

New Office of Research and Development

The Environmental Protection Agency has established a new Office of Research and Development with four main operating units.

EPA Assistant Administrator Stanley M. Greenfield will head the new organization. The operating units include the following: Office of Program Integration headed by Dr. Leland D. Attaway; Office of Environmental Engineering directed by Albert C. Trakowski; Office of Environmental Sciences managed by Dr. Herbert L. Wiser; and the Office of Monitoring Systems headed by Willis B. Foster.

DEFENDANT: Office of Saline Water PLAINTIFF: Representative Craig Hosmer

The Office of Saline Water won the approval of Congress for a \$6.6 million increase in authorized spending despite a fierce battle by Representative Craig Hosmer, R-California.

A bill (S.1386) to increase authorized spending from the \$2,527,000 requested in President Nixon's budget for fiscal 1974 to \$9,127,000 was approved almost unanimously in both the Senate and House. In the House, however, a separate vote on an amendment calling for an increase was approved.

Hosmer said the amendment was a "handout" and a "treasury raid." He labeled the main purpose of the additional \$6.6 million as keeping "the OSW bureaucracy alive." Representative H. R. Gross, R-Iowa, supported Hosmer. On the other hand, Representative Harold T. Johnson, chairman of the subcommittee that handled the bill, noted the additional money would indeed keep OSW alive--saying that the amount requested by the President would "really dismantle" the agency.

OSW plans to close their plants in San Diego, California; Roswell, New Mexico; and Freeport, Texas even if they receive the additional funds. They will, however, continue work at their site in Wrightsville Beach, North Carolina.

If the President signs the bill, it will not mean automatic additional funding for OSW. The funds must be appropriated under separate legislation. OSW has \$6.7 million in left-over funds from fiscal year 1973 for use in its fiscal 1974 research and development work.

Land Use Bill Approved

The Senate Interior and Insular Affairs Committee approved the National Land Use Policy bill (S.268) on May 22. The legislation authorizes the Secretary of the Interior (following the President's guidelines) to make grants to states for land-use programs and to coordinate interstate planning; to coordinate federal programs and policies having land-use impact; to coordinate planning and management of federal lands and of adjacent non-federal lands; to encourage research and training; and for other purposes.

The bill requires states to assume jurisdiction over five areas or uses of more than local significance--such areas of critical environmental concern as beaches, shorelines, flood plains and historic areas; such key facilities as major airports, highway interchanges, waste treatment facilities, and frontage access highways; such large private developments as major housing subdivisions and industrial parks; and large scale recreational homesite developments.

States are given three years to develop a land use planning process and two additional years to establish methods for controlling critical areas and uses identified in the planning process in order to qualify for the grants. In the first three years states must inventory their land resources and project the social, environmental and economic demands on the resource base.

An Office of Land Use Policy Administration would be established in the Department of the Interior as well as an Interagency Advisory Board on Land Use Policy. In addition to representation from many governmental departments and agencies, the Board would also include two advisors each from state governments and local governments.

Administration Assurances Received for Rural Conservation Program

The Nixon Administration has assured Representative Charles Thone, R-Nebraska, that the new rural conservation program in the 1973 farm bill will be implemented and funded.

Thone said if Congress appropriates money for the previous Rural Environmental Agricultural Program (REAP), the \$175 million held in a pending agriculture money bill will be lost.

The program provides for contracts between individual farmers and the Agricultural Department to accomplish three to 25 years agreed-upon plans for soil and water conservation. According to Thone, Representative James Whitten, D-Mississippi, holds the key since he is Chairman of the Agriculture Appropriations Subcommittee.

Alaska Pipeline Authorized

The Senate has approved the construction of the trans-Alaska oil pipeline. It was agreed that the line would be exempt from further court review on environmental grounds.

The exemption of the \$3.5 billion project from the National Environmental Policy Act was approved when Vice President Agnew broke the 49-49 tie on the controversial issue.

The bill (S.1081) is opposed by environmentalists who fear oil spills by tankers picking up oil at Valdez, the southern terminus of the proposed 789-mile pipeline. They favor a trans-Canadian route to the Midwest--much longer but all overland.

Charge It! Says NTIS

The well-known National Technical Information Service in Springfield, Virginia, has joined the credit-card era.

Dr. Betsy Ancker-Johnson, assistant Commerce Secretary for science and technology, said NTIS has worked out an agreement with the American Express Company which allows credit-card purchases of government products. She said "Anyone who needs government reports or data should be able to buy them as quickly and conveniently as possible."

NTIS adds 60,000 titles a year to its stock, filling 11,000 orders a day. Its files contain 730,000 documents. An on-line computer provides swift location. The reports are on paper, film or tape.

REGIONAL

MRBC Creates New Position--Information Officer Named

The Missouri River Basin Commission (MRBC) is pleased to announce the appointment of William C. Ramige, 27, as information officer--a new position with the Commission.

Ramige formerly was press aide to Rep. James Abdnor, R-South Dakota, in Washington, D.C. He also has been News Bureau editor at South Dakota State University, Brookings, South Dakota, and a writer with the Associated Press, Sioux Falls, South Dakota.

In announcing the appointment, MRBC Chairman John Neuberger said Ramige possesses wide experience in communications as well as a great interest in the natural resources of the 10-state area served by the Presidential Commission.

"Ramige is exceptionally qualified to fill this new and important position with the MRBC," Neuberger said. "His duties will include communicating the activities of the Commission to the general public and editing Commission publications and newsletters. He will work directly with the news media in the 10-state area."

Chlorine Sources are Scarce

The Metropolitan Water District of southern California, which requires 3,000 to 3,500 tons of chlorine a year to assure purity in drinking water for eight million people, has asked the Environmental Protection Agency to take steps to protect the chlorine supply.

The energy crisis is producing problems in the chlorine industry because the energy needed to produce the chlorine is being restricted.

Frank M. Clinton, Manager of MWD, said many small plants in the Pacific Northwest have closed in recent years. One large supplier predicts that they won't have sufficient hydroelectric power from the Columbia River (or equivalent energy) to meet future needs.

EROS Center Dedication

The \$5 million Earth Resources Observation Systems (EROS) Data Center was dedicated August 7, 1973 by Secretary of the Interior Rogers C. B. Morton in Sioux Falls, South Dakota. The EROS Center is a national headquarters for processing and disseminating spacecraft and aircraft images of the earth and for training users in the application of such data.

In a keynote address, Secretary Morton described the EROS Program as a "most practical and useful development of the nation's space program. . . Although often overshadowed by the more spectacular milestones of our space effort, the EROS Program in a few short years has gotten down to the basic and pressing task of solving some of the real earthbound environmental problems that can best be studied from high altitude and space photography."

Managed by the U.S. Geological Survey, the Interior Department's EROS Program has become the major recipient and user of the data supplied by both NASA's ERTS-1 (Earth Resources Technology Satellite) and by the sensors of the Earth Resources Experiment Package (EREP) aboard Skylab. The EROS Program currently has 65 scientific studies underway to apply space photography and data to resource management and research problems.

New Groundwater Tracing Technique

Post sampling activation analysis is a new technique in groundwater tracing which uses non-radioactive material as a tracer. Following sampling, neutron activation is employed in the quantitative analysis of the tracer. This may provide the answers to complex hydro-geological problems.

Post sampling neutron activation uses the bromide ion as a non-radioactive tracer. Bromide has the following advantages: (1) It is non-radioactive, therefore, presents no radiation hazard. (2) It is an inexpensive tracer with bromide salts such as ammonium, potassium, or sodium bromide costing less than \$2 a pound. (3) The bromide ion follows water faithfully. Tests to date have indicated there is little or no physical or chemical adsorption as water percolates through rock or soil and the ion is not easily reduced to bromine or affected by soil bacteria. (4) Bromine is relatively nontoxic so a concentration of 200 ppm may be employed with no known harmful effects.

(5) Bromine is one of the most sensitive elements for neutron activation.
(6) Finally, the background concentration of bromine is often quite low. In central Pennsylvania tests of bromine concentration measured a mere 30 or 30 parts per billion. The team working on the Penn State project, which is supported by the Office of Water Resources Research, includes Jack Schmotzer, William Jester, Richard Parizek and Kerry Uhler.

Analysis cost is a disadvantage of post sampling neutron activation. Another problem (in some regions) is high salt content which prevents using bromide as a tracer.

Bromide is chemically similar to chlorine so a high bromine background might be met if chlorine concentrations are high.

Problems that are common to hydrogeologists and others concerned with developing groundwater supplies and protecting them from pollution may lead to a wide range of applications of this technique. These include tracing sources of pollution, determining groundwater flow rates, calculating the amount of water in various rock types and pinpointing sources and amount of recharge and direction of flow.

New Strip Mining Technique Developed

A "modified block-cut" method of strip mining has been developed by the Mears Coal Company of Pennsylvania in cooperation with the Pennsylvania Department of Environmental Resources to meet DER pollution control standards, including complete area restoration, with stable and revegetated slopes. This method of strip mining can be used in steep terrain, is economically sound and creates less pollution problems than the usual method of stripping. The new method is not a demonstrational project, but is completely operational, and will become part of permit requirements for any strip mine operator who wants to work on Pennsylvania land of over 14 degrees of slope.

The greatest advantage of the modified block-cut is that after the initial cut the overburden is handled just once--removing it over the coal in the new block and placing it in the previous block cut. With this new method, the total amount of disturbed area is considerably reduced because of the absence of spoil outside the cut. The minimization of the amount of open pit at any one time also greatly reduces the amount of water which must be handled by the operator.

The modified block-cut method, coupled with rapid revegetation, minimizes the amount of water which can come into contact with acid-forming material, reduces the disturbed area which can be eroded by water, and reduces the amount of water which must be pumped and treated by the operator.

RESEARCH REPORTS

From Icebergs to Ice Cubes

Two government scientists agree that towing icebergs from the Arctic and Antarctic to water-short coastal areas is an exciting possibility.

Dr. Wilford Weeks, U.S. Army Cold Regions Research & Engineering Laboratory, and Dr. William Campbell, U.S. Geological Survey, in a 22-page report said recent developments such as the use of satellite photography to find icebergs, thermal pollution and the development of tugboats make the idea of towing and melting icebergs more feasible.

Their studies may make it possible to deliver ice to coastal areas in Australia and western South America for less than 1 cent per 1,000 gallons.

Copies of the report entitled "Icebergs as a Fresh Water Source: An Appraisal," Research Report No. 200, are available from the U.S. Army Cold Regions Research & Engineering Laboratory, Hanover, New Hampshire 03755.

Flash-Flood Warning Systems

New flash-flood warning systems have been successful says the National Weather Service. The first device was installed in Wheeling, West Virginia in May 1972. Since then, others have been installed in Plainfield, New Jersey; Chester, Pennsylvania; Wooster, Ohio; Waynesboro, Virginia; Spring City, Tennessee; and Rosman, North Carolina. Several are expected to be in operation within a year throughout the United States.

The warning mechanism has three main elements: an automatic water-level sensor at an upstream point on a river; an intermediate station downstream at a point where both electric power and telephone service are available; and a community alarm station from which warnings can be spread quickly to the public. The system costs about \$3,000. The National Weather Service shares this cost with the communities.

To obtain additional information, write or phone: Office of Hydrology, National Weather Service, 8060 13th Street, Silver Springs, Maryland 20910, (301) 495-2225.

Water Service Prices Studied

The Regional Research Institute at West Virginia University announces the publication of a monograph entitled "Water Service Prices: A Principal Component and Regression Analysis of Determinants." The analysis upon which this

monograph is based attempted to identify factors associated with urban water prices. 1960 data for 400 water utilities were collected on various measures of rates and potential determinants.

Regression results indicated that both metered rates and average rates were significantly influenced by cost or cost-related variables. Furthermore, there was evidence of a strong linkage between publicly-owned utilities and the municipalities they serve. The linkage was shown by a strong negative relationship between municipal water prices and municipal taxes.

Limited copies of this publication are available from the Regional Research Institute, West Virginia University, Morgantown, West Virginia 26506.

New Publication on Weather Modification

The National Oceanic and Atmospheric Administration has published a new report entitled "Weather Modification, Fiscal Years 1969, 1970 and 1971." It summarizes various studies of the economic, ecological, legal and social aspects of weather modification.

The illustrated report was prepared under contract by GEOMET, Inc. and is part of a continuing series.

Economic studies briefly summarized include findings such as:

- Weather modification to increase the water supply of the Colorado Basin would have a benefit-to-cost ratio of 7 to 1;
- Rainfall increases of 12%, 25% and 40% in Illinois during July and August could increase per acre income from corn and soybean crops by \$1.98, \$4.13 and \$6.11, respectively;
- Wheat production in Canada's prairie lands could be increased 3.5% at a cost representing only a fraction of the estimated benefit of \$35 million.

The report may be obtained for \$1.25 by contacting the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

Urban Water Planning Matrix

The U.S. Geological Survey has developed a new approach based on a numerical matrix to help assess the relative importance of urban water problems.

The matrix was tested in the Washington, D.C. and Baltimore, Maryland urban areas. It revealed that problems of municipal water supply and pollution

"loading" of the area's surface water sources ranked as the most critical, and that the most pressing information needs were population distribution and trends, land-use statistics and projections.

Senior author of the matrix, William J. Schneider, Chief of the USGS Urban Water Program in Washington, D.C., said the first test results of the matrix were surprising to many people who are not used to thinking of water problems in terms of population trends and land-use projections. He said "In fact, this is probably the primary value of the matrix; it helps scientists and urban planners to systematically sort out the most pressing problems and information needs."

The layout of the matrix is a checkerboard sheet of crisscrossing horizontal and vertical columns. Listed vertically, on the left side, are 51 categories of helpful information. Factors such as runoff, flood frequencies, groundwater availability, municipal supplies, waste treatment systems, pollution, land slope and land use are included. Across the top of the sheet, nine major potential problem categories are listed including water supply and erosion.

The report, "Role of Water in Urban Planning and Management," is published as USGS Survey Circular 601-H. Copies may be obtained free from the Director, U.S. Geological Survey, Washington, D.C. 20244.

Acid Mine Drainage Possible Aid in Wastewater Treatment

Researchers have discovered that acid mine drainage may be an economical source of ferrous iron for the chemical coagulation of municipal wastewater. The acid mine drainage would then be neutralized by the alkalinity in wastewater.

Samples of acid mine drainage were collected at various sites in Pennsylvania close to a wastewater treatment plant. The samples were mixed in varying ratios, then processed in a laboratory scale treatment plant at controlled pH, providing flocculation and sedimentation.

The greatest reduction in phosphorus, ferrous iron and turbidity occurred at pH 8. The treated effluent, raw wastewater and the acid mine drainage were analyzed for turbidity, total phosphorus, BOD, total organic carbon, ferrous iron, total iron, aluminum, sulfate and acidity or alkalinity. Ferrous iron was almost never detectable in the effluent from treatment at pH 8. Sulfate from the acid mine drainage may be sufficiently concentrated in the mixed acid mine drainage and wastewater that the need for cement-rich concrete or sulfate-resistance cement in the construction of the treatment tanks should be investigated.

A cost analysis indicated a maximum distance for economic pumping of acid mine drainage for combined treatment with wastewater. Beyond this distance, treatment with chemicals is less expensive. Rapid estimation of this limiting distance under a given range of site conditions has been charted. Combined treatment was not effective when the acid mine drainage was oxidized with a significant part of the iron in the ferric form.

To obtain a copy of the research report, "Combined Treatment of Municipal Wastewater and Acid Mine Drainage," contact the Institute for Research on Land and Water Resources, Land and Water Research Bldg., University Park, Pennsylvania 16802.

PEOPLE IN THE NEWS

New OWRR Director

Dr. Warren A. Hall was sworn in as new Director of the Interior Department's Office of Water Resources Research on September 12, 1973, in the office of the Secretary of the Interior, Rogers C. B. Morton.

Dr. Hall has been Acting Director of OWRR since October 25, 1972 when Dr. H. Garland Hershey resigned. Dr. Hall joined the Interior Department as Associate Director of OWRR on September 19, 1972 after serving as Professor of Engineering at the University of California, Riverside.

In announcing Dr. Hall's appointment, Secretary Morton noted that OWRR's program includes some 900 research projects in the 50 states and Puerto Rico designed to assist in meeting rapidly growing demands for water resources, clean streams and new water supplies. It utilizes grants and contracts to state research institutes, universities, private firms and other organizations.

"Dr. Hall has set high standards in his capacity as an Acting Director," Secretary Morton said. "His training and experience will continue to prove valuable in carrying out the Department's mission to increase the understanding of physical, biological and social systems involved in the management and protection of our water resources."

While on the faculty at the University of California, Los Angeles, Davis and Riverside, California, Dr. Hall occupied professional positions and served for several years in the posts of Director of the Drylands Research Institute, Director of the University's Water Research Center and Assistant Dean, College of Engineering.

Dr. Hall spent the period from September 1969 to December 1970 in Washington, D.C., as Technical Assistant to the Director, Office of Science and Technology, Office of the President and, at the same time, served as Chairman of the Committee on Water Resources Research of the Federal Council for Science and Technology with responsibility for the broad coordination and review of all federal water resources research programs.

Norman Wengert Joins AWRA Staff

Norman Wengert, Professor of Political Science at Colorado State University, has been appointed associate editor for economic and social affairs for the Water Resources Bulletin, a bi-monthly journal published by the American Water Resources Association.

The appointment, made by the Association's Board of Directors at its summer meeting, was announced by John A. Straayer, Chairman of the CSU Political Science Department.

The American Water Resources Association is a national, multi-disciplinary association interested in water research, policy, administration and teaching, Straayer said.

The Association issues several publications and annually sponsors professional conferences and seminars.

Wengert teaches courses at CSU on water administration and planning and has completed a number of field studies, including an analysis of the Detroit, Michigan water system and a study of institutions for metropolitan water management.

He has worked for the U.S. Army Corps of Engineers, the U.S. Department of the Interior and the Tennessee Valley Authority. He joined the CSU faculty in 1969 as a Professor of Political Science. Currently, he is in Germany to begin a comparative study of land use controls under a fellowship from the Fund for International Studies of Bonn.

New Chief of Engineers Announced

Lt. General William C. Gribble, Jr., has succeeded Lt. General Frederick J. Clarke as Chief of the Army Corps of Engineers. General Gribble, 56, has been Chief of Research and Development, Department of the Army.

A graduate of West Point, class of 1941, General Gribble served in Alaska and the South Pacific during World War II. Since the War, General Gribble has held such other assignments as Deputy Assistant Director, Reactor Development Division, AEC, Washington, D.C.; District Engineer, Alaska; and Division Engineer, North Central Division of the Army's Corps of Engineers at Chicago. He was promoted to Lieutenant General in January.

RESEARCH REVIEW

Project Title: Animal Waste Utilization for Pollution Abatement

Principal Investigator: Otis E. Cross, Associate Professor
Agricultural Engineering Department
University of Nebraska-Lincoln

Feedlots for finishing livestock have undergone a rapid transition from 100 head farm-feedlot systems to commercial operations enclosing 25,000 or more animals within the space of a few acres. Hence, disposal of large quantities of manure is a problem. Most feedlots in the midwest are still located within reasonable distance to fields. A possible solution is the return of this waste to the soil but at rates greatly above that commonly practiced by the 100 head farm-feedlot operator.

The basic objective of this research was to determine the maximum allowable rate of applying livestock manure to cultivate crops without pollution of surface runoff or underground water. Associated objectives were: (1) To determine the magnitude of surface and groundwater pollution which can result from high rates of manure application on surface irrigated lands; (2) To determine changes in the physical and chemical properties of the soil resulting from high rates of manure applications on surface irrigated lands; (3) To determine the effects of very high manure loading rates on crop production; (4) Establish the initial and basic water intake rates of a furrow irrigated silt loam soil which had various levels of application of beef feedlot manure.

Beef feedlot manure was applied to plots at levels of 0, 40, 120 and 260 tons dry matter per acre in the spring of 1970. Subsequent application levels were 0, 40, 80 and 160 tons dry matter per acre per year. The manure was disk plowed into the soil at 4, 8 and 12 in. depths. A sorghum-sudan forage or sudex was seeded at three plant populations, a "low," "medium," and "high" density and was furrow irrigated according to standard irrigation techniques. Data was documented as to; pollutional potential of surface runoff water, pollutional contribution to underground water supply, physical and chemical changes in the soil, irrigation techniques and crop response.

The following conclusions are the results of the 1970 test. Nitrogen and sodium displacement did not pollute the surface runoff water. The transport of potassium restricted the runoff to irrigation uses only. The underground water retained its potable quality. Repeated annual heavy application of manure may lead to deterioration of the physical properties of the soil, because of the large amounts of sodium and potassium in manure. The manure treatments and plant population treatments were both highly significant in affecting crop yield. The application of 40 and 120 tons of manure significantly increased crop yield while the 260 tons manure application significantly decreased crop yield. Depth of plowing had no significant effect on yield.

Relative to irrigation: (1) The initial water intake rate increased as the quantity of manure application increased; (2) The basic water intake rate increased as more time from date of manure application had elapsed; (3) Manure application decreased the basic intake rate as compared to the basic intake rate on non-manured silt loam soil; (4) Depth of plowing did not appreciably affect the basic intake rate.

Test runs in 1971 and 1972, at the lower manure application rates, changed some of the aforementioned conclusions. The sodium and potassium salts did not continue to increase in concentration. Also, the crop yield at these lower rates (0, 40, 80 and 160 tons dry matter per acre per year) did not indicate any significant differences. All other findings are still valid.

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QUESTIONS AND INQUIRIES

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