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Water Current

Volume 6 Number 8

August 1974

GUEST EDITORIAL

by

Dayle Williamson, Executive Secretary
Nebraska Natural Resources Commission

MANDATORY VERSUS VOLUNTARY

How soon will soil erosion become illegal? Many people are uptight about this question because slowly but surely soil erosion is becoming illegal across the country. A number of states have already passed stiff laws to require landowners to hold topsoil in place.

The federal government is becoming increasingly interested in the problem. The Environmental Protection Agency has been given authority by Congress through P.L. 92-500 to control pollutants discharged into waters. Soil sediment, of course, falls into this category as it has been accused of being the "world's greatest pollutant."

For years, our local conservation districts with the technical assistance of SCS, the financial assistance of ASCS and landowners participating on a voluntary basis, have been attacking the nonpoint source pollution problem. The voluntary approach record has been fair to good, but will it stand in the future? In Nebraska, less than one-third of the crop land has been adequately treated with erosion control measures. Actually, during the decade of the seventies, we are seeing many erosion control practices being eliminated, due to the expansion of irrigation and large-scale farming methods. The erosion control picture on our grasslands is no better.

Much needs to be done in the soil sediment area. The national goals, as espoused for swimmable waters by 1983, will call for tremendous sediment load reductions. Sediment control efforts will have to be carried out in rapid-fire succession to meet these goals. Research has led the way in developing methods to reduce nonpoint source runoff to tolerable levels. Continued close liaison must be maintained with researchers to assure cost evaluation of an applied erosion control program.

As I look at it, the challenge of controlling sediment will require herculean efforts during the remaining part of this decade and on into the next. If such efforts are not put forth, mandatory erosion control measures will certainly be upon us.

NEBRASKA WATER RESOURCES RESEARCH INSTITUTE

ON THE HOMEFRONT

DEADLINES FOR RESEARCH PROPOSALS

Deadlines for filing research proposals for fiscal year 1976 with the Water Resources Research Institute have been established. Matching grant proposals must be received not later than September 15, 1974 and annual allotment proposals not later than December 15, 1974.

Prospective principal investigators should make an appointment to discuss their proposals with the Institute Director before they begin writing.

For further information, contact: Warren Viessman, Jr., Director, Water Resources Research Institute, 212 Ag. Engineering Building, University of Nebraska-Lincoln, 472-3307 or 3305.

NWRRI HOSTS RESEARCH IN ACTION CONFERENCE

The Nebraska Water Resources Research Institute is conducting a two-day conference entitled "Research In Action - Technology for Implementing Water Research Results," to be held December 5-6, 1974 at the Nebraska Center for Continuing Education. The objective of the conference is to develop techniques for getting quick and effective action from water research results.

Warren A. Hall, Acting Director of the Office of Water Research and Technology, will give the keynote address, "Action from Research."

The following topics have been chosen for discussion: The Need for Effective Research Translation, The Importance of Research in State and Federal Water Planning, The University's Role in Research Implementation and Research Applied to National Needs.

For further information and registration form, please contact Dr. Warren Viessman, Jr., Director, Nebraska Water Resources Research Institute, 212 Ag. Engineering Building, East Campus, University of Nebraska, Lincoln, NE 68503 or phone 402-472-3307 or 3305.

REGIONAL NEWS

DEC DIRECTOR NAMED

Daniel T. Drain of Columbia, Missouri has been named Director of the Nebraska Department of Environmental Control. Mr. Drain succeeds J. L. Higgins.

Drain attended Purdue University for 2 years, received his AB in government economy from Indiana University, was granted a one-year fellowship to Harvard University's Center for International Affairs and received his MBA in marketing and finance from the University of Missouri.

He spent many years in the U.S. Navy as Chief of Staff of several forces and as executive assistant to the Chief of Navy Personnel. While in the Navy, he developed and promulgated regulations concerning air, water and noise pollution for commands of up to 125 ships. He was responsible for pollution control measures of 24 major shore station operations and for controls on oil spills and other polluting discharges from afloat commands.

NEBRASKA RECEIVES DISCHARGE ELIMINATION PERMIT

The Environmental Protection Agency granted control of the National Pollution Discharge Elimination System to Nebraska on June 12. This makes Nebraska the eleventh state in the nation and first in Region VII to receive this program.

Nebraska has assumed a leadership role in the fight against water pollution and this program will do much to improve the state's waters. All persons (excluding single family dwelling septic tanks), municipalities, industries and other dischargers must apply for a permit.

The permit system was established under the Federal Water Pollution Control Act Amendments of 1972, and states were encouraged by EPA to assume the program and operate at local levels. This system may reach the goal of "no discharge of pollutants" by 1985. Permit holders must use the "best practicable technology" by 1977 and the "best available technology" by 1983. Public participation is required in the development, revision and enforcement of all rules, regulations and programs formed under this Act.

SEWAGE TREATMENT PLANT IN LINCOLN

Dorsey Laboratories, a manufacturer of pharmaceutical products in Lincoln, Nebraska, produces about 10,000 gallons of wastewater daily which, after treatment, are discharged into surface waters. In order to ensure maximum pollution control when it enters surface waters, Dorsey has recently constructed a \$200,000 sewage treatment plant.

The wastewater treatment plant first went on line in June of 1973. The plant handles a complex water which has many sources including sanitary, food preparation, industrial processing and laboratory waste.

The plant uses an aerobic process to treat wastewater which first enters a comminutor to pulverize the solids and then goes to a flow equalization tank which balances the flow rate. The wastewater is pumped over a high-rate synthetic media trickling filter. A portion of the wastewater is next drawn off and passed through the activated sludge unit of the treatment system (with the remainder being recirculated over the trickling filter). After chlorination the effluent passes through a sand filter and is then discharged into a ditch which flows into Salt Creek. Excess sludge is disposed of onto drying beds and spread onto the grounds as a soil conditioner.

In order to continue discharging into a state stream, Dorsey obtained an NPDES permit which was issued on June 7, 1974.

NEBRASKA DROUGHT

Concern about falling groundwater levels in the heavily irrigated agricultural counties of Nebraska and the public's assumption that "the state's water supplies are inexhaustible" was expressed by Governor J. J. Exon after a tour of farms in the Upper Big Blue River Basin. The region is suffering from drought conditions which have aggravated declining groundwater supplies and focused attention on the need for more comprehensive water planning.

Farmers in York County are reporting reduced projection from water wells, with levels dropping about one-half foot annually. Conditions are better in Phelps County, where the Central Nebraska Public Power and Irrigation District has been recharging aquifers with seepage from about 600 miles of surface irrigation canals in the area. The switch from surface irrigation to pump irrigation is said to have brought the groundwater withdrawals and recharge into equilibrium.

SOUTH DAKOTA SEEKS ADDITIONAL MISSOURI RIVER BENEFITS

At the Missouri River Basin Commission's meeting on August 7, 1974, South Dakota's Governor Richard Kneip said, "There are still considerable benefits South Dakota could derive from the Missouri River. South Dakota now supports some 32 million acre-feet of water in the four main-stem reservoirs. This represents enough water to place eight inches on every acre in the state. Some 508,000 acres of Missouri River Valley lands were utilized in storage of this water. The state has gained considerable benefits from this water storage and development, but there are considerable benefits that could be derived. Some of those benefits could flow from increased irrigation in the state, be it completion of the Oahe Irrigation Unit or other projects along the Missouri River. Additional benefits could flow to South Dakotans from increased utilization of the stored water for small community and rural water system use. Thus, the challenge to you people as planners and engineers in the various federal and state agencies is how to effectively utilize the resources available to provide benefits to the general public."

Regarding marketing of water from the main-stem reservoirs for industrial use, the Governor raised the question, "If we are to provide water to develop the coal resources for regional and national energy needs, are we going to swap one crisis - energy - for a future crisis in water and food production?"

The Governor also discussed problems in the James River Basin in South Dakota. He said, "As you know, South Dakota has requested a Level B type study in the James River Basin. Recent action on the part of Senators McGovern and Abourezk has resulted in a write-in clause in the public works appropriation bill to provide \$400,000 to initiate this study. If these funds are retained through the House-Senate Conference session and the Administration does not impound such funds, we could easily be in the midst of initiating a major study early this fall." MRBC would conduct the study when and if it is approved.

MAIN-STEM WATER MARKETING

States in which main-stem Missouri reservoirs are located would be preferred customers in the marketing of water from those reservoirs, according to recommendation of a regional ad hoc committee appointed by Washington officials to examine industrial water marketing policy relative to energy development.

The special four-man committee on water marketing was formed about six months ago with members representing the Department of the Interior, the Army Corps of Engineers, the Missouri Basin states and chaired by John W. Neuberger, chairman and federal coordinating officer of the Missouri River Basin Commission.

Under the committee recommendations, states would have the first option on the federal reservoir water at a wholesale charge per acre-foot yet to be agreed upon. States could then retail the water to industries under their own procedures.

The ad hoc committee proposal further recommended that the user charge to the states be the same from all six of the main stem reservoirs--Fort Peck, Garrison, Oahe, Big Bend, Fort Randall and Gavins Point--and that the charge be subject to renegotiation at five-year intervals during the life of a long-term contract. The committee agreements were limited to provision of industrial water supply directly from the six named Missouri River main-stem reservoirs. The committee did not make recommendations regarding municipal water supply or supplies from tributary reservoirs.

While the maximum amount of water which can be made available for upstream consumptive uses has not been determined, it was agreed that three million acre-feet could be provided annually as an assured supply of water for industrial purposes while continuing to provide water for all other anticipated beneficial consumptive uses.

The ad hoc committee did not recommend solutions to two of the major water marketing issues -- the federal marketing agent or the exact industrial water charge. With regard to the charges for industrial water, the report indicates that general agreement has been reached that the price should be at least sufficient to cover hydropower revenue losses and the increased administrative and environmental costs incident to the industrial water marketing program.

The committee report has been transmitted to Washington for consideration.

FEDERAL HIGHLIGHTS

OWRR REORGANIZED

The Office of Water Resources Research and the Office of Saline Water have been combined into an Office of Water Research and Technology. OWRT will administer the federal side of the state water resources research institute program. The reorganization is a consolidation of water research programs under Assistant Secretary Horton in pursuit of the 1973 recommendations of the National Water Commission. It is not expected to effect operations of state water research institutes.

Warren A. Hall has been appointed Acting Director of OWRT and J.W. O'Meara, Acting Associate Director. In addition, provision has been made for five assistant directors for administration, planning and evaluation, research, development and scientific and technical information.

ERTS BEGINS THIRD YEAR IN ORBIT

Designed to last only one year, NASA's first experimental Earth Resources Technology Satellite (ERTS-1) began its third year in orbit last July 23.

Some of the more dramatic accomplishments of ERTS-1 include the discovery of uncharted lakes in Bolivia, the detection of deeply buried fault lines in the United States, and mapping the extensive 1973 flooding of the Mississippi River.

The U.S. Geological Survey in the Department of the Interior is the largest recipient and user of ERTS-1 data. USGS manages Interior's EROS (Earth Resources Observation Systems) program and the EROS Data Center at Sioux Falls, South Dakota. EROS is aimed at applying ERTS-1 imagery and other space and high-altitude images and data to a wide variety of natural resource, environmental and other earth science studies and projects.

Dr. V.E. McKelvey, Director of the Geological Survey noted that: "ERTS-1 and related remote-sensing techniques are enabling us to make wiser decisions on how to use and conserve our dwindling supplies of natural resources, to locate new deposits of oil and minerals, to inventory our crops and forestland, to make better use of our land and to protect our environment."

Significant results from studies of ERTS-1 images include:

- Aiding in locating areas of potential petroleum and mineral deposits by identifying surface features that provide clues to the location of deposits.

- Spotting areas to drill for groundwater.

- Identifying major linear and curvilinear surface features and features and fault lines. Benefits of this include siting nuclear powerplants and other facilities in areas where they would not likely be damaged by earthquakes.

- Mapping of floods, permitting better design and planning of flood control measures. In an unexpected dividend discovered during the 1973 Mississippi River flooding, scientists can measure the extent of flooding from ERTS images taken after the water has started to recede. This is possible because the soaked and water-damaged flood areas show up as a different shade of color on the ERTS images than areas which were not inundated.

- Revising maps to correct original charting or surveying errors, as well as natural surface changes that have occurred since previous maps were prepared. For example, ERTS-1 discovered previously unknown lakes in Bolivia between the Andes Mountains and the Amazon River Basin. It also found map errors and changes in river channels and islands in the United States.

- Monitoring receding icecaps, especially in Iceland where grazing land is economically important to an island nation with limited farm and rangeland. This permits farmers to quickly fertilize and seed land previously covered by ice rather than waiting for natural re-vegetation.

--Surveying sea and lake ice to reduce hazards to shipping and permit more efficient routing of ships.

--Checking rangeland conditions to permit more efficient grazing and meat production, particularly on leased federal lands where a large percentage of domestic beef cattle spend part of their lives.

--Spotting sediment, oil slicks and other visible pollution in water.

ERTS-1, using solar panels for power, transmits its data directly to NASA receiving stations at Goldstone, California; Fairbanks, Alaska; and the Goddard Space Flight Center at Greenbelt, Maryland when the satellite is in direct line-of-sight contact with these stations. Canada and Brazil have one receiving station each, and several other nations have expressed an interest in building their own stations.

A Video tape recorder is used to record images when the satellite is not in direct line-of-sight contact with these stations, and the taped data is later relayed when ERTS-1 makes nighttime passes over the United States.

ERTS-1 also serves as a relay station that picks up signals from scattered and remotely located ground data collection platforms and retransmits this data on hydrologic, seismic and volcanologic conditions to the NASA receiving stations.

Copies of all ERTS-1 images are sent to Interior/Geological Survey's EROS Data Center in Sioux Falls, South Dakota where they are processed, cataloged and made available to all users.

SIROTHERM - AN AUSTRALIAN DEVELOPMENT FOR PURIFYING WATER

Sirotherm is a water purifying process developed jointly by the Australian Commonwealth Scientific and Industrial Research Organization (CSIRO) and the Imperial Chemical Industries (ICI) of Australia, which holds the license for its manufacture and sale.

The engineering techniques involved are simple and reliable with low-energy requirements. Basically, the process consists of pumping pre-treated brackish water through a column of small resin beads where most of the dissolved salts are absorbed. When the resin is saturated with salt, it is regenerated by washing with hot water. The resin bed is then cooled and the cycle repeated. The process is capable of bringing a salinity rate of 1000 to 1200 parts per million down to a drinkable 500 and accomplishing this at a rate of 50 thousand to 50 million gallons a day. (Fifty-million gallons a day is enough water to supply a city of half a million people).

The difference in Australia's method lies in the resin beads. In other ion exchange demineralization processes, expensive acids and alkalies are needed to free the resin beads of impurities. CSIRO has invented a resin which can be regenerated by a simpler and cheaper method of washing with hot water.

For further information contact: Mr. T. J. Sweeny, Technical Service Manager, ICI Australia Ltd., P.O. Box 4311, Melbourne, 3001, Australia.

"PURPOSE, POLICY AND OBJECTIVES"

The Water Resources Council (WRC) has released a statement entitled "Purpose, Policy and Objectives of the U.S. Water Resources Council" to guide the WRC's development and implementation of policies, programs and activities. The statement of purpose sets forth the broad framework and legislative basis for the Council's functions and activities. The statement of policy is a summary of the criteria, assumptions and activities that will guide and carry out implementation of the purpose of the WRC. The statement of objectives sets out a schedule of desired specific accomplishments and activities for the relative near-term future.

Copies of the statement are available from the Water Resources Council, Washington, D.C. 20037.

CONFERENCES

SHORT COURSE: OCEAN ENERGY SYSTEMS

The University of Miami School of Engineering and Environmental Design in cooperation with the National Science Foundation, National Sea Grant College Program and the National Academy of Engineering is sponsoring a course on ocean energy systems. The conference will be held September 22-26, 1974 in Washington, D.C.

Topics to be discussed include the ocean as an energy resource, ocean current systems, ocean wave systems, economics of unconventional energy sources, ocean wind systems, ocean thermal systems, storage and transmission and alternate systems design and analysis.

The objective of the conference is to provide participants with working knowledge of a reference to ocean engineering fundamentals which are applicable to ocean energy systems. Arrangements have been made for participants to receive university credit for attending the course. Each student will receive a certificate upon completion of the four-day program.

The tuition is \$300 (\$275 for MTS students). The fee includes course materials, syllabus, luncheon and a copy of the proceedings. For further information, write: Marine Technology Society, 1730 M Street, N.W., Washington, D.C. 20036.

ASAE SYMPOSIUM IN CHICAGO

The American Society of Agricultural Engineers (ASAE) is planning the National Home Sewage Disposal Symposium at Chicago's Conrad Hilton on December 9-10, 1974. The objective is to exchange information and discuss problems associated with the design, operation and regulation of individual home sewage disposal systems.

The proceedings will provide a "state-of-the-art" summary of current knowledge, equipment, maintenance and installation methods. The complete program will be available August 1, 1974 from ASAE Headquarters, 2950 Niles Road, St. Joseph, Michigan 49085.

CONCEPTS OF GROUNDWATER MANAGEMENT

The Department of Water Science and Engineering of the University of California, Davis, and the University of California Water Resources Center are co-sponsoring "Concepts of Groundwater Management," scheduled for six full-day sessions October 31, November 1 and 2 and November 14, 15, and 16, 1974, on the Davis campus of the University of California.

This course is designed for technical and management personnel of consulting firms, water districts, local, state and federal agencies and others who are interested in groundwater utilization and management. It will cover the fundamentals of groundwater including technical principles and emerging concepts of management. Instruction will be by individuals active in groundwater in the California Department of Water Resources, water districts, and water well contracting, as well as by University faculty and staff specialists.

The course will deal primarily with groundwater in California with emphasis on: the geology and occurrence of groundwater, including basic concepts, technical terms, methods of exploration; groundwater hydrology, including determination of aquifer characteristics by direct and indirect methods, and groundwater systems, artificial recharge, sea water intrusion, land subsidence, and the legal, economic, and institutional aspects of conjunctive use of groundwater with surface water supplies.

For further information, write Joe Scalmanini, Department of Water Science and Engineering, University of California, Davis, California 95616, or phone (916) 752-0453.

PUBLICATIONS

"WATER AND THE ENVIRONMENTAL CRUNCH" - PROCEEDINGS

Princeton University has announced the availability of the proceedings of a conference entitled "Water and the Environmental Crunch." The conference was held at Princeton on April 25-27, 1973.

Contents include environmental aspects of water resources, industry at grips with the water problem, approaching future water problems through research and planning for the future.

The paperback edition contains 205 pages and is available for \$7.50 from the Princeton University Conference Office, 5th Floor, New South Building, Princeton University, Princeton, New Jersey 08540.

EMPLOYMENT OPPORTUNITIES

NEBRASKA COMMISSION SEEKS ENGINEER

The Natural Resources Commission of Nebraska has an opening for a water resources engineer. Requirements include a B.S. or M.S. degree, knowledge of sanitary engineering, hydrology, wastewater sources and treatment, stream and lake water quality parameters and interactions, groundwater and math modeling.

The tasks involve preparation of river basin water quality management plans; reviewing plans and projects concerning water resources, water quality and water development; application of math modeling to stream water quality and flow characteristics; interagency coordination and public appearances.

For further information, contact: Gayle H. Lewis, P.E. Chief, Planning Division, Nebraska Natural Resources Commission, 7th Floor, Terminal Building, Lincoln, NE 68508 or phone 402-471-2081.

RESEARCH REVIEW

PROJECT TITLE: "Alternatives in Area Management of Groundwater"

PRINCIPAL INVESTIGATOR: Loyd K. Fischer
Department of Ag. Economics

The objectives of this project are: (1) to determine the economic consequences of alternative patterns, rates and intensities of groundwater development; and (2) to develop proposals for alternative courses of public action with respect to groundwater.

Research is being conducted on several aspects of the problems associated with the absence of a legal and administrative framework for the development and utilization of groundwater as follows:

- (1) Projections are being made of the expected development of groundwater in various areas of Nebraska and the physical consequences of such development.
- (2) A comparison is being made of the consequences, in terms of total net benefits derived over time from a groundwater aquifer, between the rapid exploitation associated with the "rule of capture" and management of the aquifer as a single decision-making unit.
- (3) An analysis is being made of the Rural Water District as a mechanism for providing domestic water supplies to farms and other rural residents. Included is a comparison of the cost of water provided by a community water system and water from individual farm water systems.
- (4) Water laws and administrative systems of Arizona, New Mexico and Southern California are being appraised with reference to possible applicability to situations in Nebraska.
- (5) Various state and local administrative systems are being analyzed in terms of their utility in the administration of water law.

Preliminary project findings include:

- (1) Present levels and trends of development of pump irrigation will result in economic exhaustion of a significant portion of the state's groundwater aquifers within two decades. Such overdevelopment results in substantially less than maximum potential net benefits being derived.
- (2) In the Sandhills of Nebraska, not water, but a scarcity of tracts of land physically suitable for irrigation appears to be the limiting factor in irrigation development. Potential problems do exist in this as well as other areas from the development for irrigation of tracts not physically suitable.
- (3) In a number of areas of the state other than the Sandhills, neither present nor anticipated demands for groundwater appear likely to exceed the available supply in the foreseeable future.

Limitations on development or use of groundwater necessarily involve the allocation of rights to the water among uses and users. However, unless the rules and regulations established to accomplish the allocation are well-designed and administered, the consequences will likely be a reduction, not an improvement, in the efficiency of water use. The institutional frameworks relative to groundwater which will be developed in Nebraska and elsewhere in the next few years, will be no better than the information possessed by those who devise and establish the legal and administrative systems.

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