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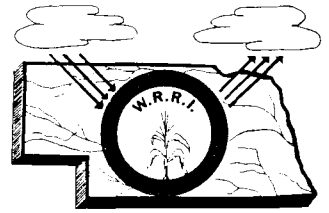
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WATER RESOURCES NEWS

NEBRASKA WATER RESOURCES RESEARCH INSTITUTE
212 AGRICULTURAL ENGINEERING BUILDING

THE UNIVERSITY OF NEBRASKA
LINCOLN, NEBRASKA 68503



Volume 5 Number 11

November 1973

FROM THE DESK OF THE DIRECTOR . . .

Opportunities for cost effective research related to energy-water issues are abundant. Many research options are open. These include prospects for studies of: (1) ways to increase production or availability of energy resources, decrease consumption and increase non-fuel sources of energy; (2) effects and acceptability of governmental influence on life styles; (3) the effects of alternative policies on the environment; and (4) effects of alternative policies on income distribution patterns.

It would be impossible to list all fruitful avenues for energy-water research, but some important issues which need immediate attention include:

- (1) What and who will be affected by energy decisions?
- (2) How can existing systems be changed to implement economies and conservation measures?
- (3) How can public use policies be changed and the public motivated toward such change?
- (4) What are the legal and institutional constraints which limit our ability to effect change?
- (5) What are the political, social and economic implications of what we are doing and proposing to do technologically?
- (6) What is the maximum load that ecosystems can withstand relative to energy and other resource developments?
- (7) How can systems of power production, waste heat and agriculture, etc. be integrated?
- (8) What are the socio-economic impacts of energy use reductions?
- (9) How can the environmental impact of water-power development be assessed?

Water and energy are currently cheap and the public attitude is adjusted to this philosophy. As a result, in the short run important decisions related to the energy crisis will clearly fall more in the realm of the socio-economic-political arena than in the area of technology. The need for a rational and carefully developed program to explore major social, political and economic aspects of energy-water interrelationships is urgent.

CONFERENCES

Conference Slated For February

The Iowa State University Engineering Extension Service and the Department of Civil Engineering, and the Iowa Section of the American Society of Civil Engineers will host the 12th Annual Water Resources Design Conference on the topic "Advanced Waste Treatment to Meet Water Quality Standards." The conference will be held February 13-15, 1974 at Memorial Union on the Iowa State University campus.

This year's conference is directed at advanced wastewater treatment methods used to meet stream water quality standards. The program will cover fundamentals of advanced wastewater treatment; workshop sessions will be held in which case studies or current stream requirements will be used as a basis for selecting and designing advanced wastewater treatment facilities. Topics will include advanced biological and physical-chemical systems, consideration of operation and maintenance requirements for these systems, the relevancy and problems associated with current stream classification and stream water quality criteria, and the state and federal water quality management programs.

For further information contact: Charles S. Oulman, Chairman, Department of Civil Engineering, Iowa State University, Ames, Iowa 50010.

FEDERAL HIGHLIGHTS

Energy Crisis May Cause Mineral Shortages

In late October the Department of the Interior's Assistant Secretary for Energy and Minerals, Stephen A. Wakefield, told the Senate Minerals, Materials and Fuels Subcommittee that a very serious mineral shortage was likely to follow the present energy crisis. Wakefield explained that as the easily accessible ore deposits disappear and excavation must begin, more and more energy is required for the excavation processes. The increased need for energy during the crisis will mean that mineral prices will go up because of their scarcity.

Wakefield urged immediate action to revamp the present Federal mineral leasing laws and to review the U.S. tax structure so that mineral producers might be given some incentives. He also recommended that a U.S. Department of Energy and Natural Resources be established by the Administration.

Chlorine Shortage Near

Residents of many major cities in the United States may be boiling water for drinking purposes if the foreboding shortage of chlorine cannot be averted. The shortage is not one of volume, for 800,000 more tons are estimated for next year's production. The real problem is distribution. Chlorine manufacturers are finding out that sales to plastics firms are far more profitable than those to city governments. The suppliers are predicting a 15 to 50 per cent cutback in sales to municipalities.

Representative Paul Rogers, D-Fla., current chairman of the Public Health and Environment Subcommittee of the House Commerce Committee, is working on legislation to correct the problem. Rogers related how New York City had stopped chlorinating processes in four sewage treatment plants and that Detroit, Michigan, at one time was down to a one day's supply. Several cities had to dump raw sewage into waterways so that they could save their dwindling supplies of chlorine for purification of drinking water.

Water Bill On Its Way

On October 12, 1973, the House passed and sent to the Senate a \$1 billion Water Resources Development Act. The only amendment to the bill, offered by Rep. Jim Wright, D-Tex., provides for deauthorization of projects for which no money has been appropriated in the last eight years.

The bill provides for a 5-5/8 per cent interest rate to determine the benefit-cost ratio of a proposed project (prescribed in a 1968 formula) rather than using the 6-7/8 per cent asked for by the Water Resources Council.

Other key provisions of the bill are as follows: (1) A \$2 million a year program to provide grants of up to \$200,000 to states for planning water resource development projects; (2) Authority for the Corps of Engineers to build small flood protection projects (costing no more than \$2 million) in areas that have been declared a major disaster area within the previous 5 years; (3) An increase in the federal government's share of fish and wildlife "enhancement" costs in projects from 50 to 75 per cent; (4) Requiring consideration of "non-structural alternatives" before construction of flood control works to protect flood plains; and (5) Continued funding of 16 comprehensive river basin plans and specifically 20 projects in 15 states for construction by the Army Engineers.

Environmental Education Act Extended

The House, on a 335-60 vote, passed and sent to the Senate a bill authorizing \$45 million for a 3-year extension of the Environmental Education Act. An amendment to the bill (H.R. 3927) calls for the federally supported programs to give "due consideration" to the economic implications of their activities.

The \$45 million will be split over three fiscal years - \$5 million for fiscal 1974; \$15 million for 1975; and \$25 million for 1976. Over the past three years the Office of Environmental Education received 4,700 requests amounting to almost \$180 million but was only able to fund 286 projects for a cost of about \$5.8 million.

Underground Water Supply In Danger

The U.S. will face serious underground water contamination unless more than 1 billion gallons of oilfield brine and industrial wastes are no longer pumped into underground water supplies. This was the key finding of the Geological Survey at a Symposium on "Underground Waste Management and Artificial Recharge" held in New Orleans on September 26-29, 1973.

The USGS scientists presented papers which included facts on the following:

- (1) Snake River Plain - for the last 20 years low-level radioactive wastes have been injected into the aquifer in the Snake River Plain, by the National Reactor Testing Station in Idaho, at a rate of 1 billion gallons/year. Low but detectable concentrations have now spread over a 15-square mile area.
- (2) Norfolk, Virginia - In Norfolk, fresh water has been injected and then recovered from a saline aquifer with success, which indicates that the city may be able to store fresh water in the aquifer for use in the dry season.
- (3) Wilmington, North Carolina - Bacteria have proven beneficial in dissolving the organic contents of injected wastes in an underground saline disposal area near Wilmington.

Proceedings of the symposium, in 2 vols., may be purchased from the American Association of Petroleum Geologists, P.O. Box 979, Tulsa, Oklahoma 74101.

Water Projects Endangered By Mining

Rep. Henry S. Reuss, D-Wis., Chairman of the Conservation and Natural Resources Subcommittee of the House Government Operations Subcommittee of the House Government Operations Committee, reported that water resources projects built by the Army Corps of Engineers in Appalachia have suffered millions of dollars of damage from coal mining operations.

Reuss reported that investigations of eight projects by GAO showed that the Kentucky Fish Lake area alone had been so badly devastated that it would cost the Corps \$1.2 million just to build more dams for sediment control and to reclaim the land. Reuss pointed out that the Corps Engineers neglected to take the proper precautions to prevent this from happening..."and now the taxpayer is being asked to foot the bill to rehabilitate the project without any real assurance from the Corps that it won't happen again--at Fishtrap or elsewhere."

Guidelines Suit Filed

President Nixon, WRC Director Warren D. Fairchild and the Water Resources Council have been named as defendants in a suit to halt implementation of the Council's new guidelines for evaluating future projects. The suit was filed in the U.S. District Court in Washington, D.C. by the Water Resources Congress, eleven national and regional organizations and five individuals. The plaintiffs contend that the defendants are supporting guidelines that would do "irreparable damage" to the plaintiffs and the American people.

The major complaint against the guidelines is directed to the increased discount rate for evaluating cost-benefit ratios from 5-5/8 per cent to 6-7/8 per cent. Congress has already passed legislation calling for the retention of the 5-5/8 per cent rate. The plaintiffs argue that the newly adopted guidelines would enhance construction of the low capital intensity projects providing immediate returns but that large projects, such as multi-purpose river basin development, would become economically unfeasible.

Muskie Speaks Out On Waste Planning

Sen. Edmund S. Muskie, D-Me., Chairman of the Senate Air and Water Pollution Subcommittee, charges that the Administration has "deliberately ignored" a law for development of regional waste management plans to help protect water quality. He said that none of the \$50 million authorized in contract authority for the long-range growth problems has ever been spent.

Muskie was particularly critical of the Washington, D.C. situation where controversy has arisen over an advanced waste treatment plant which is intended to serve the metropolitan area in Maryland. The federal government is supposed to pick up 75 per cent of the cost. Part of the 1972 Clean Water Act (Sec. 208) was drawn up for the purpose of helping Congress decide what course should be taken in such areas.

Ex-Governor Peterson Replaces Train

On October 15, 1973, President Nixon appointed Ex-Governor Russell W. Peterson of Delaware as chairman of the Council on Environmental Quality to fill the vacancy left by Russell E. Train. Before Peterson was elected governor of Delaware in 1968, he headed the development and research division of E.I. DuPont de Nemours & Co., Inc.

Mr. Train was appointed head of the CEQ February 9, 1970, and served in that capacity until September 13, 1973, when he was appointed administrator of the Environmental Protection Agency.

REGIONAL NEWS

What Happened On The Big Blue?

The flood of the Big Blue River in October 1973 may have caused more damage than any previous flood in that river's history, but it may also have some payoff in instigating a new look at better flood prevention measures for the area.

The Big Blue Basin has been studied by the Army Corps of Engineers since 1961. Their 1972 report concluded that none of five proposed dam sites would be worth construction in terms of benefits over costs. The Corps figured that the proposed upstream dams on the Big Blue would not yield more than 41¢ to 82¢ in benefits per \$1.00 in costs. Although only one of the five proposed dam sites would have directly afforded relief to the hardest-hit town of Beatrice in the October flood, it is difficult to determine the benefits this dam would have yielded in relation to the estimated \$5 million in damages. The potential for zoning and other non-structural flood control measures also needs to be evaluated so that future hardships can be minimized if not prevented.

Information Dissemination Program Instituted

The Nebraska Association of Resource Districts Research Committee is requesting data on research projects for its information dissemination program.

Information is desired on the following subjects:

- (1) Grass seedings along irrigation ditches
- (2) Weed control in native pastures
- (3) Fertilizer use on native grasses
- (4) Minimum tillage
- (5) Controlled grazing projects
- (6) Feedlot waste control
- (7) Tile waterways
- (8) Buried terrace outlets
- (9) Groundwater situation in Box Butte County
- (10) Effects of mulch tillage on erosion control
- (11) Planting dates for conifers in western Nebraska
- (12) Methods of controlling erosion in wheel tracks on center pivot systems
- (13) Economics of irrigated pasture
- (14) Relationship of irrigated pasture on forage crops and Sandhills rangeland
- (15) Hybrid grasses
- (16) Bank stabilization on streams

Gerald Erickson, Chairman, Nebraska Association Resource Districts, P.O. Box 507, Wahoo, Nebraska, would appreciate receiving any available information on these topics.

Higgins Appointed Water Board Liaison Officer

J.L. Higgins, Director, State Department of Environmental Control, has been appointed by Governor J. James Exon as Nebraska's liaison officer with the National Commission on Water Quality. Governor Nelson A. Rockefeller, N.Y., Chairman of the Commission, has asked each governor to appoint a liaison officer to work directly with the Commission, which is composed of House and Senate members and the public at large.

The National Study Commission was established under the Federal Water Pollution Control Act Amendments of 1972 to make a complete investigation of the effects of attaining or not attaining the Act's 1983 goals. The Act proposes to eliminate pollution from the nation's waters in ten years so that they will be clean enough for recreational purposes and for the protection of fish and wildlife. In two years, the Commission will submit a report to Congress on the results of the investigation and will also offer their recommendations.

MRBC Announces Newsletter

The Missouri River Basin Commission, as one aspect of their effort to develop an active program of information regarding water and related land resources in the Basin, announces a new publication--the MRBC Basin Bulletin. Contents of the newsletter may be the opinions of Commission members or staff or thoughts reprinted from other publications.

For further information, contact: John W. Neuberger, Chairman, Missouri River Basin Commission, Suite 403, 10050 Regency Circle, Omaha, Nebraska 68114.

PUBLICATIONS

New EPA Publication Out

EPA is in the process of publishing a multi-volume legal reference work that contains all the statutes and regulations governing the EPA. The seven chapters of the book will be entitled: General, Air, Water, Solid Waste, Pesticides, Radiation and Noise. Each chapter will include statutes and legislative history, citation to regulations, executive orders and guidelines and reports.

The chapters entitled "Solid Waste" and "Noise", are available now and the rest of the chapters will be published during the next six months. These chapters will be published in several volumes for easier handling.

The work may be purchased from: Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, (prices vary). The stock number for the entire set is 5500-0065 and the chapter order is 5500-0065 plus GPO catalogue number for the specific chapter. (EPI.5/3:S04/VI for "Solid Waste: and EPI. 5/3:N69/VI for "Noise".)

CEQ Annual Report

The Fourth Annual Report of the Council on Environmental Quality has been presented to the Congress by President Nixon. The report, totaling 500 pages, strongly points out the relationship of land use to almost every environmental problem imaginable. The section on the economic cost of pollution control was updated and expanded. CEQ estimates the costs for total pollution control from 1972 to 1981 will be \$274.2 billion. Major improvements in data and methodology have caused a \$12.8 billion reduction in this cost estimate since last year. The total amount consists of \$121.3 billion for water pollution; \$105.6 billion for air pollution and \$41.8 billion for solid waste.

This report can be purchased for \$4.30 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

RESEARCH REVIEW

Project Title: Influence of Fertilizer Practices on Water and the Quality of the Environment

Principal Investigator: Professor Robert A. Olson
Department of Agronomy, UNL

The basic objective of this project has been to ascertain amounts and sources of nutrient N and P carried in Nebraska surface and groundwaters, and to project measures for controlling the agricultural contribution, if any, of these pollutants to the water resources of the state.

Systematic sampling of rainfall, streamflow and groundwaters has been effected since 1970 with subsequent analysis for ammonium and nitrate N, orthophosphate P and the character of any sediments contained. We have found a range of $\frac{1}{2}$ - 1 lb P and 5 - 14 lbs N per year in the rainfall, increasing from west to east across the state with increasing annual precipitation. The $\text{NH}_4\text{-N}$ concentration essentially doubles that of $\text{NO}_3\text{-N}$; the two together aggregate an average 2 ppm concentration which is essentially triple the average N concentration of streams within the state. Thus, soils and crops accomplish a substantial stripping of N carried in the rain water before it becomes stream flow.

Elevated N and P levels of streams have been traced through correlation to industrial, urban sewage and livestock wastes with very limited contribution from crop production practices. The only appreciable amount of N and P traceable to cultivation is the amount carried in sediment from eroded fields. Stream nutrient concentrations fluctuate widely with varied times and rates of organic waste intrusions and with the magnitude of runoff events. High levels of N are observed especially with peak flow in the spring and fall and are explained partially by the direct runoff of precipitation N into streams during periods of high rainfall intensity.

The soluble P content of Nebraska groundwaters has remained essentially constant at an approximate average of 0.2 ppm during the past ten years. Obviously, treatments of the land surface have had essentially no effect on groundwater P contents and rather the native P of soil materials with which the water table is in equilibrium controls the amount in solution. Nitrate-N in the groundwater, however, has increased approximately 25 per cent statewide during the period as an average. The change has not been uniform; little or no increase is evident in those counties with a deep water table below fine

textured soils at the surface while maximum increase in $\text{NO}_3\text{-N}$ is found in counties with a shallow water table below sandy soils. The recorded increases have occurred during a time interval when fertilizer N consumption quadrupled, irrigated acreage increased by 50 per cent and livestock numbers by 30 per cent, with commensurate growth in human population and attendant industries. Correlation studies comparable to those with surface waters suggest that irrigation practice has contributed more than any other single factor to the growth in groundwater $\text{NO}_3\text{-N}$, particularly so in localities of shallow water table. We find soil materials from the land surface to the water table notably wetter under irrigation than under adjacent dryland. The additional water percolating through affords the means for transport of $\text{NO}_3\text{-N}$ that originated from natural mineralization in the surface soil subsequent to sodbreaking, from human and animal wastes, from geologic sources, as well as from recently applied fertilizer N.

Our field drilling program shows essentially no movement of P downward in any of the soil-crop management systems investigated. A modest increase in $\text{NO}_3\text{-N}$ throughout the mantle-rock profile above the water table is apparent with fallow-wheat cropping compared with adjacent native range, systems where no fertilizer has been used to date. Only modest increases in profile N are reflected also under irrigated corn on deep hardlands compared with adjacent range. Irrigation of corn on deep sandy lands during the past 12 years, however, has created a very substantial $\text{NO}_3\text{-N}$ accumulation throughout the profile, much of it beyond the reach of crop roots. Elsewhere, appreciable $\text{NO}_3\text{-N}$ is found under intensive corn production on subirrigated benchlands, removal of a considerable portion of which is accomplished by alternate periods of alfalfa production. A final unexpected source of $\text{NO}_3\text{-N}$ that has been detected in several locations apparently precedes modern man's arrival on the scene and has been called geologic N for lack of a better name. Its occurrence in amounts of several thousand pounds per acre combined with irrigation practice may well be responsible locally for a considerable portion of any registered increase in groundwater $\text{NO}_3\text{-N}$.

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QUESTIONS AND ANSWERS

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