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# Water Current

Volume 7 Number 4

April 1975

## WHY PLAN FOR WATER AND LAND RESOURCES MANAGEMENT?

by

Carroll M. Hamon, Director, Platte River Basin Study  
Missouri River Basin Commission

Statewide comprehensive planning for water and related land resources management has been underway in Nebraska for about 10 years. Before that, most resources planning was carried out for watersheds or projects by federal agencies concerned with water and land development and conservation. This type of project-oriented planning served its purpose in developing much of our resources. But as demands for resource output increase and resources available are developed and become scarce, the competition for their use increases and the need for planned utilization and conservation becomes more evident. State or basinwide comprehensive planning which considers all aspects of water and land use and the effects of development or non-development is now being carried out at local, state and federal levels.

Why is comprehensive planning needed at all? Wouldn't the money be better spent on project and program development that would show immediate results? I'm sure that in some cases the answer is yes. But, in general, plans are needed to guide decision making for future natural resource management. We all make plans for future activities; some are made in our heads, some on the back of an envelope, and others, when very complicated, require much time, many dollars and presentation to those who will be affected.

Planners are often accused of perpetuating their own self interest by recommending that additional planning be undertaken after initial plans are made. However, it is necessary that plans be flexible and that they be updated. Needs and goals of society change as time progresses, so the planned management of our natural resources must change to accommodate social changes. The recent emphasis on environmental values, energy needs and the depletion of crop surpluses are examples of present day changes affecting planning for water and land management. In many areas, this will require updating of existing plans.

Nebraskans are now realizing that water and land resources must be managed, not just developed and used. Proper management is more complicated than development and requires that many factors included in economic development, environmental quality and social well-being must be considered as natural resources become more fully utilized, population increases, and an improved quality of life is demanded by society.

NEBRASKA WATER RESOURCES RESEARCH INSTITUTE



## ON THE HOMEFRONT

### DUANE ACKER TO HEAD KANSAS STATE

Dr. Duane Acker, Vice Chancellor of the Institute of Agriculture and Natural Resources at the University of Nebraska-Lincoln, will become President of Kansas State University on July 1 it has been announced.

Dr. Acker assumed the position of Vice Chancellor at UNL April 1, 1974. Prior to that time he was Dean of the College of Agriculture at South Dakota State University. Dr. Acker noted that he regrets leaving the University of Nebraska, but felt "there was no alternate route to take because of the importance of the opportunity."

Chancellor James Zumberge described Dr. Acker as "one of the outstanding educators and administrators in America" and cited his "excellent job in organizing and developing the Institute."

## REGIONAL NEWS

### NEBRASKA WATER QUALITY REPORT

A draft copy of Nebraska's first statewide Water Quality Report compiled by state and federal officials under the direction of the Nebraska Department of Environmental Control (DEC) has just been released. The report notes that eliminating pollution of Nebraska's streams and rivers by 1985 (as ordered by Congress in the 1972 amendments to the Clean Water Act) will cost more than \$2.3 billion. However, the report indicates that zero discharge of pollutants into streams and rivers probably can never be achieved.

The purpose of the report is to give Congress an idea of the costs, problems and likelihood of meeting the 1985 zero pollution date. Similar studies are underway in other states. The draft report is being submitted to state and federal agencies for comment, and the final report will be submitted to the Environmental Protection Agency by June 1.

Ray Hartung, chief of the DEC Water Quality Section, noted that in the \$2.3 billion estimate for eliminating pollution in Nebraska's waters, several items were not included such as costs of industrial waste treatment, costs of eliminating runoff from such sources as roadside ditches and stream banks and costs of maintaining the staff and running the programs to meet the 1985 zero pollution goal.

The draft report lists Salt Creek as one of the dirtiest streams in the state while the Niobrara River was listed among the cleanest. Others on the five worst list were the Wood, Nemaha, Big Blue and South Platte Rivers and



Papillion Creek. Listed among the best with the Niobrara were the Upper White, Upper Elkhorn, Loup and Hat Rivers and Lodgepole Creek. Regarding Salt Creek, the draft report said high levels of dissolved solids, nitrates, phosphates and fecal bacteria from municipal sewage account for much of the creek's poor water quality.

The draft report contains comments from state and federal agencies indicating little likelihood that the goal of zero discharge of pollutants can be reached in Nebraska by 1985. This goal does not appear to be either physically or economically feasible, although no one suggested that it is not technologically feasible at present to meet the 1985 deadline. The report stated that more analysis of problems and goals is needed as well as considerable public participation.

#### FUNDS REQUESTED FOR MRBC YELLOWSTONE STUDY

Appropriations requested from Congress for fiscal year 1976 include funds for the Water Resources Council to be used for an energy-related study in the Missouri River Basin. The comprehensive study to be conducted by the Missouri River Basin Commission (MRBC) is of the Yellowstone River Basin and adjacent coal fields in Montana, Wyoming, North Dakota and South Dakota.

According to Nicholas L. Barbarossa, MRBC Planning Director, the study was requested because of the mounting pressures exerted upon the Yellowstone Basin and adjacent coal fields to meet the nation's energy needs. He noted that "the purpose of the MRBC study will be to delineate the issues and problems, to evaluate alternatives and to recommend a basin plan for implementation, including necessary studies and research. At the same time, the study will guide some compatible implementation actions that may be taken with knowledge of the effects on the water and related land resources of the area."

The proposed study is for one year at a federal cost of about \$1 million plus state contributions of \$1.29 million. Barbarossa said that "the plan for development of water and land resources on the short term, as in the case of coal, must be compatible with long-term uses such as agriculture to ensure they are not precluded in the future."

#### AGREEMENT REACHED ON WATER MARKETING

The Departments of the Army and Interior have reached an agreement on the marketing of water for industrial uses from the six federal Missouri River reservoirs. Under the agreement, the Bureau of Reclamation would administer the program in conjunction with the Corps of Engineers.

According to the office of Jack O. Horton, Assistant Secretary of Interior for Water and Land Resources, the two departments are now developing criteria and procedures for implementation of the agreement.



### OLD WEST GOVERNORS CHALLENGE CORPS POWER

The five governors of the Old West Regional Commission (Montana, North Dakota, South Dakota, Wyoming and Nebraska) recently approved a resolution which challenges the Army Corps of Engineers' power to declare rivers navigable and take jurisdiction over such rivers and streams. The governors called on Congress "to eliminate the authority of the Corps of Engineers to further preempt state control of such waterways without state permission."

Last summer it was learned that the Corps was considering designating the Platte River navigable because it had once been used by fur traders. "Such designations of navigability usurp the power of the state to develop and conserve the rivers and related lands," the governors stated in their resolution.

### FEDERAL HIGHLIGHTS

#### WATER CRISIS PREDICTED

In a report presented to the National Water Conference in Washington, D. C. April 22-24, the Water Resources Council (WRC) said that America's efforts to solve the energy crisis are thrusting the nation toward a potential future water crisis. "Today our water requirements are snowballing," the report noted, "and as we evaluate requirements to 1985, we can already see that a water crisis is in the making. We have moved too slowly, or our requirements have rapidly escalated almost unnoticed."

The conference opened amid predictions that both the quantity and quality of water in years to come could trigger a crisis that would make the energy problem pale in comparison. Agriculture Secretary Earl Butz and former Interior Secretary Rogers C.B. Morton warned that farmers and consumers must not take plentiful, clean water for granted.

Secretary Butz noted that farmers must realize water may be a limiting factor in feeding the world, and it may become more costly. "Too many of us regard water as a free resource," Butz said. He suggested that since the amount of food that can be grown is limited by available water, agriculture will have to either increase the water supply (perhaps by weather modification) or use water more sparingly.

The WRC released a study showing that the United States must develop more than 7 million acre-feet of consumable water by 1985 to provide the water needed for energy production alone. This would be above present requirements. The situation is particularly critical west of the Mississippi River, where oil, vast coal deposits and huge oil shale beds all require large amounts of water as their energy potential is exploited.



Russell Peterson, chairman of the Council on Environmental Quality, noted that the waters which surround us are a "fragile, finite, life-sustaining environment which we are punishing at a rate wholly unprecedented in the three million year existence of man." Unless industry and government seriously consider the potential damage to water, "they will tend to minimize the importance of protecting environmental quality when it conflicts with economic development," he said.

#### EPA DRINKING WATER SURVEY SHOWS POSSIBLE CARCINOGENS

A survey of the nation's drinking water supplies prepared by the Environmental Protection Agency (EPA) shows chemicals, some of which are suspected to be cancer producing, present in each of the 79 cities tested. EPA Administrator Russell E. Train said it appeared the organic chemicals in most cases resulted, at least in part, from chlorination of the water supplies through chemical reaction with substances in the water. However, he stressed that chlorination still appears to be the best way to control a variety of public health problems.

Chloroform was found in the water supply of every city tested. It is a suspected cancer causing agent in its gaseous state, although less is known about its impact when ingested.

Train noted that "our basic conclusion from the survey is that the problem of organic chemicals in public water supply systems exists throughout the country. And even at the low levels we found, the chemicals are a matter of concern that warrants the diligent carrying out of our safe drinking water plans."

Train said that EPA has asked the National Academy of Sciences to assess the health impact of the initial findings, and EPA will report to Congress in June in a more comprehensive fashion.

#### WATER RESOURCES SCIENTIFIC INFORMATION CENTER

The Water Resources Scientific Information Center (WRSIC) was established under the Water Resources Research Act of 1964. Operations began in the fall of 1967 with the prime objective of disseminating scientific and technical information which is of interest to the water resources community.

The guiding principle in these operations is the use of existing research resources and competencies of federal agencies, universities and other organizations (including the major information and documentation services) as sources of processed information. All input is made machine-readable to facilitate searching, retrieval and composition by computer and to utilize the latest information handling techniques in developing national systems for information transfer. Access to the data base is available to anyone who



needs it. Information may be obtained in the form of publications or special literature searches prepared by centers which are part of the WRSIC network of computer retrieval terminals.

The information covered by WRSIC includes a classification scheme of ten related fields: (1) nature of water; (2) water cycle; (3) water supply augmentation and conservation; (4) water quantity management and control; (5) water quality management and protection; (6) water resources planning; (7) resources data; (8) engineering works; (9) manpower, grants and facilities; and (10) scientific and technical information.

The major contributors of input to the data bank include: literature centers of competence and information analysis centers; state water resources research institutes; federal agencies with water-related research; large discipline-oriented abstracting services; and foreign countries. Information on current research projects is collected from principal investigators by the Smithsonian Science Information Exchange.

The WRSIC network of computer retrieval terminals includes the following centers:

Cornell University  
Water Resources & Marine Sciences Center  
468 Hollister Hall  
Ithaca, New York 14850

University of Wisconsin  
Water Resources Center  
1975 Willow Drive  
Madison, Wisconsin 53706

University of North Carolina  
Water Resources Research Institute  
124 Riddick Building  
Raleigh, North Carolina 27607

University of Arizona  
Water Resources Research Center  
Tucson, Arizona 85721

Water Resources Scientific Information Center, Manager  
Office of Water Research and Technology  
U. S. Department of the Interior  
Washington, D. C. 20240



#### NATIONAL DRINKING WATER ADVISORY COUNCIL NAMED

Russell Train, Administrator of the Environmental Protection Agency, has announced the members of the National Drinking Water Advisory Council as provided for in the Safe Drinking Water Act (P.L. 93-523). They are: Henry J. Graeser, Dallas Water Utilities; John Hernandez, University of New Mexico; C. C. Johnson, Malcolm Pirnie in Washington, D. C.; Russell Christman, University of North Carolina School of Public Health; Walter K. Morris, President-Elect of AWWA, Harrisburg, Pennsylvania; Henry J. Ongerth, representing the Conference of State Sanitary Engineers from California; Chester A. Ring, Vice President of AWWA, Elizabeth, New Jersey; Betty Abbott, City Councilwoman, Omaha, Nebraska; John Beare, Washington State Health Director; Jack Garnett, Monsanto Co.; Hollis Ingraham, retired New York State Health Commissioner; Jay Lehr, National Water Well Association; Harold W. Wolf, Director of the Water Resources Center, Texas A&M University, Dallas; William R. Ralls, Commissioner, Michigan Public Service Commission; and Mrs. Jeanne C. Rhineland, Concern, Inc., Washington, D. C.

The Council held its first meeting in February in Washington, D. C., and it was announced that C. C. Johnson will act as chairman. The committee discussed the development of national standards for public drinking water supplies as well as organizational details and arranged to meet periodically in the future.

#### POLLUTION TAX URGED

In a recent study jointly sponsored by the Brookings Institution and Resources for the Future, Allen Kneese and Charles Schultz have concluded that present federal environmental programs which are based on subsidies and regulations are "cumbersome, corruptible, arbitrary and capricious." They suggest that regulatory authority be retained in order to prohibit discharge of highly toxic substances. However, a more effective way to reduce pollution would involve adjusting the tax rate to afford the economic incentive needed to achieve desired levels of pollution control.

The authors suggest that a "pollution tax" would provide a least-cost system by encouraging the greatest reduction in pollution where the reduction cost is lowest. Economic process changes would also be encouraged in preference to more costly waste treatment. Because the tax would be passed on to consumers, they would be encouraged to buy products whose manufacture involved less pollution.



## CONFERENCES

### SHORT COURSE FOR ENGINEERS

California State University at Los Angeles is sponsoring a short course for engineers on "Sediment Transport in Rivers and Estuaries" to be held June 17-20, 1975. The purpose is to present a comprehensive description of sediment transport and related problems and to acquaint participants with the latest developments in sediment transport phenomena.

The course is intended for engineers and administrators interested in the problems of sediment transport in rivers and estuaries. A prerequisite is a bachelor's degree in engineering, science related fields or equivalent. The fee is \$225 including lecture materials.

For further information and reservations, call or write the Office of Community Services, California State University, Los Angeles, 5151 State University Drive, Los Angeles, California 90032. Telephone (213) 224-3503.

### WATER RESOURCES INSTITUTE PLANNED

Colorado State University is sponsoring an Institute on "Application of Stochastic Methods to Water Resource Problems" June 30-July 11, 1975. The purpose is to provide an overall perspective of the basic concepts, principles and methods involved in the practical application of stochastic methods to water resources problems. This will include a review of the state-of-the-art in applying stochastic methods, illustrations of the practical usefulness of stochastic processes to water resources problems and a description of the potential and limitations of using stochastic methods and future research directions in this area. Tuition is \$550 per person plus room and board, and attendance will be limited.

For additional information, contact: Dr. H.W. Shen, Professor of Civil Engineering, Engineering Research Center, Colorado State University, Fort Collins, Colorado 80523. Telephone (303) 491-8552.

### WATER RESOURCES MANAGEMENT CONFERENCE

"A Better Life Through Water Resources Management" is the theme of a conference to be held July 9-11, 1975 at Colorado State University. The conference is sponsored by the Technical Council on Water Resources Management and Planning of the American Society of Civil Engineers.

The conference, which will be followed by scenic and educational tours of the Rocky Mountains and major water resources projects in that area, will stress the positive effect that proper water management and development can have on the environment, ecology and social conditions.

For additional information and reservations, contact: Dr. Neil S. Grigg, Water Resources Systems Program, Engineering Research Center, Foothills Campus, Colorado State University, Fort Collins, Colorado 80523.



## PUBLICATIONS

### UPPER COLORADO FIRST IN NATIONWIDE GROUNDWATER APPRAISAL

The U. S. Geological Survey has announced that the 113,500 square-mile Upper Colorado River Region, which includes parts of Colorado, Utah, Wyoming, New Mexico and Arizona, is the first of the nation's 21 major water resource regions to be evaluated for groundwater development potential. The nation's vast and often overlooked groundwater resources--perhaps 15 to 20 times larger than the storage volume of our streams, lakes and reservoirs--are expected to play an increasingly important role as major water sources in many parts of the country in the decades ahead.

According to Gerald Meyer, chief of the U.S. Geological Survey's Groundwater Branch, "the Upper Colorado Region is a particularly suitable starting point for the new national appraisal because the region's present and potential uses of groundwater in many ways reflects the national picture." Commenting on the first report published as part of the new USGS national groundwater appraisal, Meyer noted that the Upper Colorado Region could tap an estimated 115 million acre-feet (37 trillion gallons) of water from underground supplies. "This region," Meyer said, "is especially significant because it contains most of the nation's richest oil shale reserves, a potentially important source of energy, but one that would require large amounts of water to develop."

According to the USGS report, development of groundwater in the Upper Colorado River Region would present problems because large areas of the region are underlain by saline water even at shallow depths, and in some places fresh water supplies are quite deep or not available in large quantities. In addition, much of the groundwater is in tightly consolidated rocks that generally yield water to wells slowly and thus large-scale development may require a large number of wells. In some places, groundwater withdrawals will decrease streamflow. The report also notes that "more study, including the use of simulation models, is needed to fully evaluate the potential and to determine the most feasible development options."

The 40-page report describes the availability, quality, quantity and use of groundwater in the Upper Colorado Region and also discusses the limitations and problems associated with increased development of the resource. Copies of the report entitled "Summary Appraisals of the Nation's Groundwater Resources -- Upper Colorado Region," published as USGS Professional Paper 813-C, may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402 for \$3.15. Prepaid mail orders (payable to the U.S. Geological Survey) may also be sent to the Branch of Distribution, U.S. Geological Survey, 1200 South Eads Street, Arlington, Virginia 22202.



#### PROCEEDINGS OF RURAL ENVIRONMENTAL ENGINEERING CONFERENCE AVAILABLE

In 1973 a conference on rural environmental engineering problems was sponsored by the Environmental Program and Water Resources Research Center at the University of Vermont and the Environmental Studies Center and Land and Water Resources Institute at the University of Maine. Papers by the 43 engineers and scientists who participated in the conference have been published in a book entitled "Water Pollution Control in Low Density Areas -- Proceedings of a Rural Environmental Engineering Conference." This represents one of the first attempts to bring experience and knowledge to bear on a neglected area of environmental quality control.

The book is divided into six sections: (1) land treatment of wastewater; (2) septic tanks and their effects on the environment; (3) groundwater problems; (4) rural water supply problems; (5) nonpoint pollution; and (6) low-cost wastewater treatment facilities for rural areas. The book was edited by William J. Jewell, Associate Professor of Agricultural Engineering at Cornell University and Rita Swan, former editor of the Environmental Program of the University of Vermont.

The cost of the book is \$25 and may be ordered from the University Press of New England, Box 979, Hanover, New Hampshire 03755. A 10 percent discount is given to teachers and libraries; all foreign orders and orders from individuals must be prepaid.

#### WASTE MANAGEMENT HANDBOOK AVAILABLE

The Environmental Protection Agency has developed a handbook which provides guidance to states in areawide planning under Section 208 of the Federal Water Pollution Control Act. The handbook covers such items as area boundaries, population, industry, water quality, local government intent and public participation.

Copies may be obtained by writing the Office of Water Planning and Standards, Water Planning Division, EPA, 4th and "M" Streets, S. W., Washington, D. C. 20460.

#### RESEARCH REVIEW

Project Title: Biological Control of Blue-Green Algae

Principal Investigator: Eugene L. Martin, Ass't Professor, Microbiology  
School of Life Sciences

In the 1960's the Army Corps of Engineers built many flood control lakes or small reservoirs in eastern Nebraska. These lakes are contiguous to the Lincoln area and comprise the Salt Valley Watershed. They frequently receive large amounts of nutrients (especially inorganic nitrates and phosphates) from the runoff of fertilizers and animal wastes.



For a given lake, extensive algal growth is called an algal bloom and results from the combination of high levels of inorganic nitrates and phosphates, warm water temperatures and lengthy periods of sunlight. The lakes literally turn green with the tremendous numbers of algae. Not only do algal blooms destroy the beauty of lakes, they also impair their value as recreation areas. It is not pleasant to swim in a clinging slimy mass of algae, and it is nearly impossible to fish in an algal bloom since line and bait are completely covered. Algae may affect a lake even more seriously by dying. The bacteria utilizing the dead algae can drop dissolved oxygen levels below that which fish must have to live. In addition to the concomitant development of foul and putrefying odors, the lake eutrophication process can be greatly accelerated by algal blooms through the constant accumulation of organic-rich sediment on the lake bottom. In the overall lake eutrophication process, a given lake can go from clear, deep water to a swamp, thereby negating any value as a flood control system.

The immediate objectives of this project are, first, the isolation of specific blue-green algae strains that are responsible for the algal blooms observed in the surface waters of eastern Nebraska, and, second, the search for naturally occurring viruses and bacteria that are capable of selectively attacking these bloom-causing strains of blue-green algae.

The main types of bloom-forming blue-green algae have been isolated and identified as members of the following genera: Aphanizomenon, Anabaena and Microcystis. Uni-algal cultures have been already obtained and work is currently underway to remove any remaining bacteria contamination of these cultures.

At this time, three bacterial and six viral agents have been isolated which selectively attack strains of the blue-green algae. Once adequate characterization of bacterial or viral agents has been accomplished, studies on simulated blue-green algal blooms will be initiated. A laboratory tank, where the environment (pH, mineral concentrations, light and temperature conditions) can be regulated to that of eastern Nebraskan lakes, will be set up and seeded with one or a combination of the bloom-causing blue-green algae. Introduction of varying concentrations of one or several biological control agents will follow and the results of tests will be monitored. These results would include blue-green algae concentration, biological control agent concentration, and any change in the environmental conditions of the tank. The final step of the project would then be to extend testing to a small pond or lake.

In conclusion, it is hoped that bacteria and viruses can be used alone or in combination to lower the algal population to levels which will permit the widest use of the surface waters of Nebraska.



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38. Ground-Water Levels in New Mexico, 1972, J. D. Hudson, U.S. Geological Survey, Santa Fe, New Mexico.
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41. Sensitivity of Vertebrate Embryos to Heavy Metals as a Criterion of water Quality Phase II, Wesley J. Birge, John J. Just, University of Kentucky, Water Resources Research Institute, Lexington, Kentucky, 1975.

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