WRRC

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Proceedings of Conference on "Trends in Water Management"

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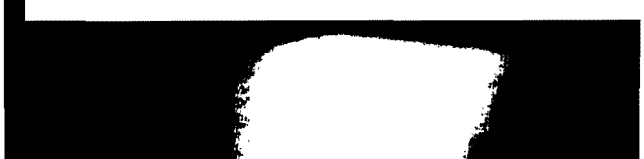

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FOREWORD

The Water Resources Research Center of the University of Minnesota was established for the purposes of encouraging, supporting, and coordinating research and education in all aspects of water resources.

As interest in scarce natural resources increases, more decisions with respect to water resource use and management have come to be made in the public sector.

In recognizing that the public sector is playing an increasingly dominant role in water management, the University of Minnesota Water Resources Research Center, on December 19, 1974 sponsored a Conference called "Trends in Water Management." Major papers were given by members of several agencies (including State, Federal, and joint State-Federal) highlighting trends in perspective public programs. Discussion followed each of the presentations, allowing members of the audience the opportunity to ask questions of the agency representatives.

This Bulletin consists of the papers presented at the Conference by representatives of several key agencies involved in water planning and management.

Publication Abstract

The program of the Conference consisted of presentations by representatives of the U.S. Army Corps of Engineers, the Soil Conservation Service, the Upper Mississippi River Basin Commission, the Minnesota Pollution Control Agency, the Department of Natural Resources, and the State Planning Agency. The papers addressed questions of, How does the agency perceive its role as a (1) water manager (2) how is that perception reflected in its operation (3) review of current programs (4) comments on anticipated changes or new programs in the next few years.

Key Words: *Water Policy/ *Water Planning/ *Water Management/ Minnesota

INTRODUCTORY REMARKS

By

John J. Waelti

In selecting the theme, "Trends in Water Management," the Conference Planning Committee is giving explicit recognition to the fact that public agencies are having an increasing influence in water management decisions. To fully appreciate this, one has only to look at the record of the 68th Session of the Minnesota Legislature in enacting a host of water-related bills into law. The Critical Areas Act, the Power Plant Siting Act, and the State Environmental Quality Council are examples of the dramatic and far-reaching results of that session.

Ongoing programs from previous sessions include the Floodplain Management Act and the Shorelands Management Act. And there are other controversies which have come into the public spotlight including wetlands and drainage, copper-nickel mining, and taconite tailings. These issues will certainly affect and be affected by public programs.

In addition to state programs, we have the ongoing programs as well as new legislation of the Federal government. The Environmental Impact Statement, a new concept but a seemingly short time ago, is now almost a household word. And we have a host of local programs and controversies ranging from solid waste disposal sites, to zoning controversies.

The hard fact is that decisions relating to water resources increasingly have come to be made by agents of the public. Some have found this trend to be disturbing. In the midst of this trend, we hear pleas for a return to local control and a greater role for the individual. And, no doubt, all of us at some time or another yearn for a return to simpler times -- when individuals could make decisions for which they themselves would reap the benefits of a "good" decision or suffer the consequences of a "bad" decision.

Yearning for such a simple set of circumstances may serve well the cause of nostalgia, but it does little to serve the cause of pragmatism. For the fact is that with respect to water resource decisions, what one individual or economic unit does, more often than not, affects many others. Excessive pumping of groundwater lowers the water table for others. Drainage of wetlands can have widespread affects which are not limited to those making the decision. The decision by a municipality to discharge wastes into a stream affects downstream users not responsible for the decision. The list could go on and on. These are the circumstances which bring us to public water management programs. And the trend is reinforced by population growth, affluence, and generally increasing demands placed upon limited resources.

There is a dilemma, however. While under conditions of increased inter-dependency, the role of the single individual is reduced, the ultimate goal of water policies and programs must be to serve the needs of people, as individuals, as members of interest groups and communities, and as businesses -- all this while minimizing adverse affects on others. This is no small task. And so we compensate; while individuals don't make decisions, the system is designed, or altered, as the case may be, to afford "citizen input."

Someone must be at the focal point of the decision process. We have specialists whose stock in trade is weighing the needs and desires of competing units. We call them politicians. And so the legislature sets basic policy and appropriates the money to purchase the manpower and materials needed to put programs in motion. The actual programs, and details thereof, however, are delegated to executive agencies. And so, of necessity, decisions become politicized and bureaucratized.

Where do individuals come in? Individuals vote on legislators and chief executives. Individuals may be afforded other input through hearings, through representation on citizens task forces, through petitions, or as members of interest groups which can bring pressures to bear on politicians and other decision makers.

None of this may be totally satisfactory to anyone -- least of all the agencies responsible for administering water programs. But the reason for the program is that society, through expression of the legislature, perceives itself to be better off with the public program than without it. And we must remember, that even the most bureaucratized public agency is composed of individuals -- for the most part, individuals who are willing and anxious to inform and in turn, be informed by the public as to their desires and needs. And I'm sure that most of the agency participants in this program today will acknowledge the degree to which discussion with individuals in the past has had a positive influence on public programs.

As much as we might yearn for simpler days and simple circumstances, they are gone forever, if indeed, they ever existed. We are faced with increasing population, and its increasing demand for natural resources. And we won't voluntarily surrender the affluence which has contributed to these increasing demands.

The alternative then is not "no water management programs," but "better water management programs." And that is the subject of this Conference, "Trends in Water Management."

PRESENT AND FUTURE TRENDS in CORPS OF ENGINEERS PROGRAMS AND ACTIVITIES

By

J.R. Calton
Chief, Planning Branch
St. Paul District, U.S. Corps of Engineers

Introduction

The Corps of Engineers has played a key role in water resources development in the United States for 150 years. Corps responsibilities date back to 1824 and 1857, respectively, for improvement of inland navigation and coastal harbors. Initial flood control authorities were provided in 1917 for the Mississippi and Sacramento Rivers and were expanded to a nationwide scope in 1936.

Hydropower came into the program during the 1930's with the construction of the Bonneville and Fort Peck projects in the West. In 1944, Congress established a nationwide policy for hydropower and added major drainage to our flood control mission. At that time, Congress also provided the first general authority to develop the recreation potential created by our reservoir projects, and in 1946 established a national program for public benefit to protect coastal shores from erosion.

These multiple objectives were further expanded in 1958 to include water supply, hurricane flood protection, and fish and wildlife enhancement. Two years later, a program for providing floodplain hazard information was initiated. During the next decade new responsibilities were assigned with regard to urban water supply planning and were significantly broadened in 1970 to include consideration of comprehensive waste water management systems and solutions to water quality problems induced by strip-mining operations. And Congress, in the Water Resources Development Act of 1974, provided us with a number of new program authorities. Thus, during the period since the mid-1930's that I have been associated with the Corps of Engineers, I have observed and experienced many changes in water management policy and our approach to its implementation. I will discuss some of the trends in water resource management as I see them from my rather parochial viewpoint.

The Civil Works Program

The Corps of Engineers is a nationwide organization of over 39,000 employees, of which 30,000 are primarily associated with the Civil Works Program. This program is managed through the Office of the Chief of Engineers and two supporting organizational levels. The first is composed of 14 division engineer offices, 11 of which have civil works

responsibilities. These offices supervise the second level - the district engineer offices, which are the primary executive and operational units of the organization. Thirty-six of the 39 districts have civil works responsibilities, including the St. Paul District which encompasses all of Minnesota except a small portion in the southern and southwestern part of the State.

A brief summary of the results of the Civil Works Program will indicate its scope to date.

Nearly 3,400 projects and project modifications have been completed for the multiple purposes previously mentioned.

The flood control and multiple-purpose projects have prevented damages of nearly $38 billion, providing a return of $3 for every dollar of investment.

Last year a sixth of intercity transport, over 350 billion ton-miles of cargo, was moved through the harbors and improved waterways provided by Corps projects.

Over 2 trillion gallons of water supply storage is available in our reservoirs, an amount which could supply as many as 4.5 million people on a continuing basis.

Some 14.5 million kilowatts of capacity are installed in 61 operating hydroelectric power projects. Marketing of this capacity and the related 71 billion kilowatt hours of energy generated at thse projects resulted in revenues of $165 million in fiscal year 1973.

About 344 million visitor days of recreation were recorded at our projects in 1973 - greater than attendance at lands and facilities of any other Federal agency.

Presently 282 projects and modifications are under construction, including the Mississippi River and Tributaries Projects for flood control.

Current Program Developments

The Civil Works Program has a history of contributions of truly substantial proportions to the Nation's development, economic security, and welfare. Today there appear to be many opportunities for further help to the American society.

In addition to working directly on problems of national concern, the Corps is devoting an increasing share of its planning capabilities to help State and local authorities to develop programs for water resources management in accordance with their own priorities. For example, 28 urban studies are under way covering major metropolitan areas. The primary aim of these studies is to help provide information needed by State and local officials who must not only relate solutions to urban water problems (such as flood control, water supply, and waste water management) to each other, but to other urban problems (such as open space requirements, neighborhood renewal, and transportation) as well.

In many of the urban studies, alternative waste water solutions are being developed to meet the requirements of the Federal Water Quality Act Amendments of 1972. This is being done so that State and local officials will be able to determine which system is best suited to a given area, and to obtain funds from the Environmental Protection Agency (EPA) to design and construct waste water treatment facilities. The Duluth-Superior Urban Study is ongoing in this area and is directed toward development of solutions to the Duluth flood problem, provision of a safe water supply, and appropriate consideration of the waste water management problems of the area.

The floodplain management services program demonstrates both a most welcome growth in public understanding of flood phenomena and a growing requirement for Corps planning assistance. Programs of floodplain management highlighting land-use regulations as a key to solving the problem now are under way in many States and hundreds of communities. Each year has seen an increase in the program through which we provide floodplain information and related planning and technical guidance.

Services to States and agencies through this program will continue to mount, as will our contributions to the Federal flood insurance program. Under this program, assistance is provided to communities through the Federal Insurance Administration in the delineation of flood-prone areas. The Congress has indicated that this activity is to receive the highest "practicable priority," and we anticipate even further increases in the already large volume of requests for assistance under this program.

The Water Resources Development Act of 1974 authorized a number of new activities for which implementing guidelines and criteria are now being developed.

Section 1 authorized preparation of phase 1 general design memorandums, the first stage of advanced engineering and design studies, for several projects including the program for local flood protection on the Zumbro River at Rochester, Minnesota. Advance engineering and design for these projects is authorized but only upon a finding made available to the Senate and House Public Works Committees, that the project is without substantial controversy, that it is substantially in accordance with the project document plan, and that the further design will be compatible with any project modifications under consideration. This action is the first time that the Public Works Committees have asked for a recheck on certain projects prior to authorizing preconstruction planning.

Section 2 authorized the project for flood control at Prairie du Chien, Wisconsin. This project is unusual since it represents the first large-scale evacuation of a floodplain with local cooperation set at 20 percent of all project costs. The plan provides for relocation of about 157 homes and small businesses, acquisition and demolition of 48 structures, raising about 33 homes above flood levels, and flood proofing other structures, together with provisions to regulate future use of the floodplain. The project is subject to the provisions of the Uniform Relocation Assistance and Land Acquisition Policy Act of 1969. The 1969 Act provides for fair

and equitable treatment for displaced persons toward purchase of a decent, safe, and sanitary dwelling and, in itself, represents a trend toward an improvement in compensation of displaced homeowners.

Section 12 provides a highly important deauthorization authority for assisting us in eliminating any public concern that the Crops might undertake water resources projects conceived in a bygone era under outmoded standards. Under this authority, the Secretary of the Army will submit an annual report proposing the deauthorization of projects. These will be projects which have not been funded in the preceding 8 years and which no longer have public support or are considered unresponsive to contemporary standards and future needs. The first of these reports, which will be fully coordinated with State and Federal agencies, will be submitted early next year.

Section 22 authorizes the Corps to cooperate with any State in preparing its own comprehensive intrastate basin plan. This "effort sharing" authority provides for the Corps to submit reports and recommendations with respect to appropriate Federal participation in carrying out such plans and should help greatly to insure our responsiveness to State planning priorities. Under this authority the States have an opportunity to be involved at the start rather than, as often in the past, to respond to requests for comments on water resource improvements desired by counties, cities, or local groups.

Section 24 directs the Corps to review the items of local cooperation which have been required for water resource development projects under Corps jurisdiction and to report with recommendations on those items which should be required for various types of projects. Not since the basic cooperation requirements were established in 1936 has such a review been made although, by authorization of projects with additional or more specific cooperation required from time to time, Congress has approved needed changes in local participation in certain types of water resource projects.

Several sections of the Act increase the amount authorized to be appropriated each year for small projects which can be approved by the Chief of Engineers without separate authorization by Congress and increase the Federal amount which can be expended on each such project. Such increases do not generally increase the scope of such public works but reflect increasing costs of all improvements as labor and materials prices increase.

Sections 32, 54, and 55 authorize the development of new technical assistance plans to combat shoreline and streambank erosion problems, including innovative demonstration projects. However, only four streambank erosion control demonstration projects were authorized, none in Minnesota. Section 54, which may be cited as the Shoreline Erosion Control Demonstration Act, provides only that at least two such demonstration sites shall be on the shorelines of the Great Lakes. Because of the largely rocky nature of the Lake Superior north shore, the bank erosion problems in the portion of Minnesota bordering on Lake Superior are not as great as those being experienced by other States.

Section 77 modified the Federal Water Project Recreation Act by separating the local share of costs allocated to recreation from those allocated to fish and wildlife enhancement by continuing the 50-percent cost sharing for recreation while reducing the local share of costs assigned to fish and wildlife enhancement to 25 percent.

Section 80 directs that the interest rate formula for discounting future benefits and computing project costs shall be the formula set forth in Senate Document 97, 87th Congress. This action resulted in the use of a 5 7/8-percent interest rate by Federal agencies for water resource projects except for those projects under construction or those for which assurances of cooperation were provided prior to December 31, 1968. This formula allows for a maximum increase of one-fourth percent per year. For the latter projects the interest rate in effect continues. The Act also provides for a presidential study of the principles and standards for planning and evaluating water related projects, including the interest rate formula.

Section 82 modified section 5 of the 1941 Flood Control Act to authorize the Corps of Engineers to provide emergency supplies of clean drinking water, on such terms as are determined to be advisable, to any locality which is confronted with contamination of its source of drinking water likely to cause a substantial threat to the public health and welfare of the inhabitants of the locality. This clarification of the law was undoubtedly the result of the problems which arose during the past year when asbestos-like material was found in the waters of Lake Superior.

Dredged Material Disposal

Dredging to create and maintain navigable channels for our Nation's waterborne commerce - a basic activity and responsibility of the Corps - inherently requires first, removal of large quantities of sediment, which must be disposed of economically but with the least possible adverse environmental impact; and second, mobilizing sufficient dredge capacity to meet the growing needs for construction and maintenance of projects where a special dredge plant is required.

Localized studies have been made to investigate the environmental impact of specific disposal practices and to explore alternative disposal methods; however, these have not provided sufficient definitive information for general application or predictive capabilities. Therefore, a research program of national scope is under way at the Corps Waterways Experiment Station to seek answers to basic and critical questions.

The answers will come from the combined field and laboratory investigations being conducted. The objective of our Dredged Material Research Program is to develop technically satisfactory, environmentally compatible, and economically feasible alternatives for dredging and disposal. This includes considering the dredged material itself as a manageable resource in contrast with an earlier philosophy which considered dredged material as a nuisance waste product to be dumped in our open waters or on our marshes without any awareness of the environmental consequences.

Lack of knowledge about these consequences has caused us to use interim measures in an effort to reduce or prevent degradation of water quality. These measures include confining dredged material within dikes and attempting to analyze the sediments themselves for traces of pollution. Since the effect of dredging on water quality has been acknowledged as an unknown more than a reality, Congress accepted the need for fundamental and applied research to provide permanent solutions.

At the direction of the Appropriations Committees, we are conducting a comprehensive study of national dredging requirements and capacity - including both Federal and non-Federal sectors. This study will provide an overview of work load requirements and an evaluation of the type, condition, and suitability of plant now operated by the dredging industry and the Corps of Engineers. It will also indicate the type and number of dredges which will be needed in the near-term future. When completed, the study should provide the Congress with the basic information necessary to determine the future role of the Federal Government in the dredging field.

More locally, in the reach of the Upper Mississippi River within the St. Paul District which covers the watershed south to Guttenberg, Iowa, we have initiated a resource management study in an effort to provide positive alternatives to the existing management methods. A partnership team concept has been developed with all interested Federal agencies, State agencies of the contiguous States, and other entities cooperating in the study. Within the partnership organization the various study tasks are assigned to work groups of the partnership team members. A plan of study has been prepared and provides not only for field investigations but also for implementation and evaluation of test cases for alternative actions. Our objective is to formulate a plan of action to manage the river in the most beneficial manner, recognizing the total resource needs including fish and wildlife, recreation, navigation, water quality, and other values. We are concerned with the problem of management of dredge material expected to be handled in the coming season as well as the long-term solutions which may be obtainable.

Permits

Recent years have seen a major expansion in regulatory permit programs, coupled with a greatly increased complexity of issues involved. This has been the result of broadened regulatory concepts and the requirements of new legislation.

Historically, the decision to issue a permit for work in navigable waters rested almost entirely on the effect of that work on navigation. Pursuant to requirements of recent Federal legislation - as interpreted by court decisions and our regulations - this decision is now based on whether the proposed activity is in the public interest. This requires an analysis of a wide range of factors, including environmental concerns. In addition, our definition of "navigable waters of the United States" has been revised to incorporate recent judicial definitions of this term, and has resulted in the inclusion of many water bodies which have not previously been subject to our jurisdiction.

New legislation has also increased the scope and complexity of the Corps regulatory permit program. The Federal Water Pollution Control Act Amendments of 1972 requires the Corps, in coordination with the Coast Guard, to review all discharge permit applications filed with EPA or the States for their impact on navigation and anchorages. EPA has estimated receipt of about 200,000 such applications. In addition, this law requires Corps permits for the discharge of dredged or fill material into navigable waters. It also poses certain procedural and substantive review requirements in the processing of these permit applications.

The number of permit applications annually processed by the Corps has doubled in recent years. We are now handling about 100 a year, and the number of applications is increasing.

Compliance with the National Environmental Policy Act

Enactment of the National Environmental Policy Act (NEPA) has had a profound effect on our work. The act hastened recognition of the environmental quality aspects of our planning, construction, and operation and maintenance activities. It has required the development of new expertise in setting forth the impacts of our program on the natural ingredients for long-term quality of life. NEPA also has given us an intimate acquaintance with injunctions, court orders, appeals, and lawyers.

NEPA is basically a good statute that was long overdue. Its goals are valid and essential, although some of its administrative procedures are cumbersome and time consuming. Properly done, an enviornmental study should be part of the basic planning process. There should be no need for a separate review, comment, and processing once we get through the initial backlog of projects that were planned before NEPA came into existence.

I believe that our performance under NEPA has been responsive and will continue to improve with additional experience. We have written over 50 environmental impact statements and have about 100 more under way or scheduled for completion in the next 3 years.

Principles and Standards

The Water Resources Council's Principles and Standards became effective on October 25, 1973, and the discount rate provisions were modified by Section 80 of the Water Resources Development Act. The Council and the affected Federal agencies are working toward a consistent set of procedures for interpretation and application of the Principles and Standards. A draft Engineer Regulation has been furnished to our field offices for interim guidance pending a Water Resources Council determination regarding its consistency with the Principles and Standards.

Survey reports submitted to the Congress this year will have an addendum that supplies abbreviated information reflecting the new standards. All survey reports submitted after June 30, 1975, will be in full compliance with the new standards.

Incorporation of the new standards into planning procedures is a difficult and challenging task. Consideration must be given to a wider range of alternative solutions to land and water problems, a greatly expanded set of potential project effects will have to be investigated, and greater reliance will be placed on public participation in formulation and evaluation of proposed measures. We fully expect, however, that the results of our efforts will be project recommendations that more fully meet the emerging needs of our country.

Public Participation

Probably one of the most significant changes in the Corps planning process has been our efforts to obtain greater public participation in project studies. Our problem is similar to that of other Federal agencies and private industries that are involved in planning and developing structural works. That is, who speaks for the public; the property owners who may be adversely affected, the environmentalist, or project proponents? To resolve this problem we have established Citizens Committees composed of representatives from all concerned groups, with representatives of the Federal and State agencies serving as consultants to the Committees. The advantages and disadvantages of all alternatives can then be explored in an atmosphere of factual information and a minimum of emotional concern. Citizens Committee meetings are supplemented by two or three more formal public meetings. This approach has not resolved all conflicts of interest, but the citizen participation provides the public with a better understanding of problems and alternatives so that sound recommendations can be made. We can expect continued and increasing public participation in our future water resource planning work.

Flood Plain Management Services

We provide services to the communities of the St. Paul District in three areas. First, we prepare in response to specific requests floodplain information reports. These reports provide communities with hydrologic and hydraulic information on flooding so that floodplain regulations may be formulated and adopted. Since its inception we have prepared or have in preparation a total of 34 reports as follows: Wisconsin, 11; Minnesota, 19; North Dakota, 2; and Michigan, 1. Second, we participate when requested in the preparation of flood insurance reports which provide data so that insurance rates can be established for the community on a statistical basis. A total of 17 flood insurance reports have been or are being prepared: Wisconsin, 6; Minnesota, 7; and North Dakota, 4. Third, we provide continuing responses to inquires relating to flood experience in particular areas. Approximately 200 such inquiries are received for processing each year.

Conclusion

Over the years the Corps of Engineers has demonstrated its capability to adjust to changing public needs, to realign priorities to meet public desires, and to comply with new policies and procedures. In the years ahead we can see the continued public concern for protection of the environment resulting in new concepts in management of water and related land resources. We can also foresee increasing numbers of citizens willing to take the time to participate in the planning and decision-making process. The emphasis will continue to be on alternatives, with more weight being given to nonstructural measures, disposal of dredge materials in areas where the materials will serve a useful purpose, regulations to prevent unwise occupation of identified floodplains, waste water management to assure clean water, and appropriate land management and erosion control measures to retard the degradation of our river valleys.

TRENDS IN PROGRAMS OF THE
SOIL CONSERVATION SERVICE

By

Harry M. Major,
State Conservationist,
U.S. Soil Conservation Service

I appreciate, very much, the opportunity to talk with you as we express our concerns and exhcange our knowledge toward the goal of wise management of our State's water resources.

The people of the United States have suddenly found that our natural resources are not limitless. They are finite and delicate. Water is no exception. In fact, water is one of the most used and, consequently, one of the most misused and abused of all our resources. The continued existence of water as a resource to be used and enjoyed by man is dependent upon management. Water management is necessary. It is crucial, and I am glad we are here talking about it.

The Soil Conservation Service has several authorities and program activities which deal with the management of water and related resources. The first and major activity is conservation operations, where the SCS provides assistance to landowners in the planning and application of soil and water conservation practices. We have the responsibility to carry out the small watershed protection and flood prevention program under PL-566. Under the Food and Agriculture Act of 1962, SCS has administrative responsibility for the U.S. Department of Agriculture in servicing resource conservation and development projects, and under section 6 of PL 566, we provide assistance in the study of river basins. We are the lead agency in the cooperative soil survey with the Land Grant Colleges and Forest Service. SCS has most of the technical responsibility for the application of practices in the rural environmental conservation or agricultural conservation programs, and the technical responsibility for planning and delineating water bank lands under the Water Bank Act of 1970. The SCS has responsibility under the National Flood Insurance Program of 1968 to provide information on flood plain areas and establish flood risk zones. Flood hazard analyses are conducted by SCS under the provisions of House Document 465 of the 89th Congress to assist in the application and development of flood data for delineating flood plains and in the preparation of flood plain regulations.

In addition to these authorities and program activities, the Soil Conservation Service has responsibility in the application of the Water Resource Council's principles and standards, in carrying out environmental assessments and preparing environmental impact statements under the National Environmental Protection Act of 1970 for project type measures.

Conservation Operations

The conservation operations program of assisting landowners to plan and apply conservation practices to their land operates through Minnesota's 93 Soil and Water Conservation Districts.

In our services to districts, 63,000 landowners have become district cooperators in Minnesota to voluntarily apply conservation practices to 17,000,000 acres of land. Of these, 37,500 landowners have developed plans and are carrying out conservation practices on 8,500,000 acres.

Contour farming and terraces, for example, are designed to protect sloping cropland from damage by runoff water. These two practices keep water on the field where it is needed, rather than allowing it to run uncontrolled down the slope damaging crops, creating gullys and carrying topsoil off the field and into our streams in the form of sediment. Through the efforts of soil and water conservation districts, and with technical assistance from the Soil Conservation Service, Minnesota farmers are contour farming about a million acres and have installed more than 3,000 miles of terraces. Technical assistance has been provided in planning and applying 785 animal waste control systems that protect water sources from pollution and improve water quality.

Other practices that result in erosion control and water management are stripcropping on 1,000,000 acres and minimum tillage or no tillage as a part of crop residue management on 3/4 of a million acres. Landowners have also constructed 22,700 stockwater and wildlife ponds, 11,900 erosion control structures, and 78 multi-purpose wildlife and recreation dams. These and many other practices help control erosion, prevent runoff, and improve water quality.

Soil and water conservation implicates the SCS in a wide variety of activities, mainly because soil and water management are interrelated. And water is at both ends of the picture. For instance, water causes soil erosion -- at rates of up to 25 tons per acre per year on poorly managed sloping land and as a result affects the quality of water in wetlands, streams, and lakes.

So, our basic philosophy on water management is that the quality of water, on the surface or underground, must be protected -- protected from pollution caused by soil erosion, feedlot runoff, and industrial, agricultural and domestic waste. That water must be available for wildlife, recreation and other uses and used as efficiently as possible, and where water damages fields, homes and communities in the form of flooding, or saturation of the soil, or just running down hillsides -- conservation practices must be applied to protect our agricultural potential, our property and our lives.

One activity that is often important to our conservation program is drainage. The Soil Conservation Service sometimes gets adverse public reaction on the issue of drainage. But this is usually because people do not fully understand drainage and its useful impacts.

The Soil Conservation Service does not advocate drainage of wetlands. In fact, there are many situations in which we refuse a landowner's request for drainage assistance. We will not assist a landowner desiring to drain wetlands classified as types III through VIII, as classified by U.S. Fish and Wildlife circular 39.

The Soil Conservation Service endorses drainage as a land and water management practice only when it is necessary -- when it is needed by a farmer to produce a crop on his cropland. How serious is the cropland drainage problem in Minnesota? 9.7 million acres of Minnesota cropland require improved drainage for the production of a good crop. This amounts to about 43 percent of all Minnesota cropland.

We support drainage as a necessary conservation tool for improving agricultural production on these poorly drained soils. At the same time, we recognize that there are instances when drainage and channel modification can have adverse effects on fish and wildlife habitat. We help landowners minimize these adverse effects to the fullest extent possible.

In many cases, we mitigate harm to fish and wildlife by encouraging development of areas which benefit fish and wildlife as part of the conservation plan for the watershed project. In many other cases, water development for wildlife or recreation is a major objective of the project or plan.

Water Bank

In 1970, the Water Bank Program was approved by Congress and the Soil Conservation Service was given the technical responsibility for assisting landowners in the protection of Wetland Types III, IV and V and adjacent lands for the use of wildlife. Water Bank acres are set up under 10 year contracts with payments commensurate with the productivity of the land. We provide the necessary technical assistance to landowners who own eligible wetlands and wish to convert this land and some of the adjacent upland to habitat for ducks, geese, pheasants and other forms of wildlife.

Some 29,000 acres in 13 western Minnesota counties have been set aside under the Water Bank program. This program is an integral part of the water management philosophy of the Soil Conservation Service.

Watershed Protection and Flood Prevention

PL-566

The Soil Conservation Service has been implementing the small watershed protection and flood prevention program with local sponsors in Minnesota since 1954. Seven small watershed projects are complete, five are under construction, one was recently approved for construction, five projects are in the process of planning and 29 additional applications have been approved by the State Soil and Water Conservation Commission.

All of these projects are sponsored and planned by local people with SCS assistance. Objectives include flood control, erosion control, community development, recreation and water management. All of our work is directed at helping to develop the economy of an area through the use of water and land resources and protecting the environment through sound conservation and management of land and water resources.

Principles and Standards

Just over one year ago, the U.S. Water Resources Council published it's principles and standards for water and related land resource planning. These principles and standards guide all planning efforts toward two objectives -- national economic development and environmental quality. Today, we in SCS are following these principles and standards in planning our resource conservation and development projects, watershed projects, and in our river basin studies. In fact, USDA was the first Federal department to submit it's procedures for implementing the principles and standards. To date, I know of no other Federal Department that has taken this step.

The Water Resources Council's principles and standards emphasize the need for public participation in all stages of the planning process. This is nothing new for the Soil Conservation Service. Public participation is inherent to our role as a technical agency carrying out the wishes of local sponsors. However, we are concentrating our efforts on projects which people want to move on -- where local people have done their homework, no longer are we holding the hands of local sponsors of watershed projects. If a local group is not ready, willing and able to carry out its responsibilities in planning a project and enlisting local support for it, or if there is controversy and local sponsors cannot agree on what they want, we will terminate planning on that project and move along to another project where the sponsors have the support and capability to move their project. In Minnesota, we have had projects on the books for ten years before they have been approved for operations. Such delays are unnecessary and intolerable.

We are attempting to speed up the planning process on water resources projects by making full use of outside expertise. During the past year, the soil conservation service, nationwide, contracted for one and a half million dollars of technical help from consulting firms and universities. In Minnesota, we contracted for more than $160,000 of environmental and archeological assessments, engineering surveys, hydrologic studies and soils information. We will be utilizing even more such help in the years ahead.

The trend toward involvement by more agencies, more organizations and more private citizens in our projects is a trend that we welcome. The SCS has as two of its top priorities more face to face contact with groups and individuals and a greater emphasis on quality of work rather than quantity. I believe that these two priorities are dependent upon one another.

River Basins

If the Soil Conservation Service is to provide needed help on soil and water projects and river basin studies as outlined by concerned participants, then there needs to be full cooperation and open lines of communication between our agency and our sister agencies: the Minnesota Department of Natural Resources, the U.S. Fish and Wildlife Service, the State's Economic Development Regions, the State Planning Agency, the Environmental Protection Agency, the Corps of Engineers and others.

River basin planning by the Soil Conservation Service is similar to our other work with individuals and local groups. The main differences are that river basin planning covers a larger geographical area, involves more people and has broader objectives.

Three agencies of the U.S. Department of Agriculture - the Forest Service, the Economic Research Service and the Soil Conservation Service participate in these studies with local and state agencies. The Soil Conservation Service has leadership responsibility for USDA.

We are fortunate to have the unique Southern Minnesota Rivers Basin Commission guiding our efforts in the Southern Minnesota Rivers Basin study. The Commission is the only one of its kind known now working on a river basin study anywhere in the country. Since it was establsihed by the Minnesota Legislature in 1971, the Commission has been invaluable to us and to the people who will be the eventual beneficiaries of this study. The Commission has established policy Committees throughout the basin. These Committees direct our studies toward the appropriate problems and evaluate the studies we make. As a result of guidelines from these advisory Committees, we have concentrated on flooding problems in the Yellow Medicine and Lac Qui Parle River Basins.

The Southern Minnesota Rivers Basin Commission has also been successful in coordinating our effots with other agencies and they encourage public involvement in the planning process.

We are also participating with other state and Federal agencies in the Metropolitan Regional Area Level B study. This study, being guided by the Upper Mississippi River Basin Commission and the State of Minnesota, will result in a regional plan for the seven county Metropolitan area for water and related land resources. The Metropolitan Council is also playing an active role in this study.

We also cooperate with the River Basin Commission for the Upper Mississippi, Missouri, and Great Lakes areas in furnishing land use and water resource information for Minnesota.

Resource Conservation and Development

Thirty-two Minnesota counties are participating in resource conservation and development projects. Local sponsors are sponsoring more than 500 measures designed to develop the rural economy and protect and

improve the environment. About half of these measures relate to water resources. Local sponsors are using the resource conservation and development program to conduct such measures as groundwater surveys on over a million acres, community sewage systems and watershed treatment to reduce water pollution caused by nutrients, development of public water-based recreation and wildlife areas, control of roadside, streambank, lakeshore and other kinds of erosion, and the control of rough fish in lakes.

The interest shown by local communities, organizations and other agencies indicates that resource conservation and development measures will continue to flourish. And why not? In this day of credibility gaps, people find it refreshing that they can work with government to solve their land and water problems with a maximum of action and a minimum of planning. And in resource conservation and development programs, people are finding it especially refreshing to see a concern for environmental protection balanced with rural economic development.

All three of our resource conservation and development projects -- WESMIN in the West Central portion of the State: Headwaters in the North: and ONANEGOZIE in the Northeast and North Central -- are coterminous with Minnesota's economic development regions or are proposed to be expanded to meet these boundaries.

At the present time, most of the cost for applying resource conservation and development measures falls upon the local sponsors. Soil and Water Conservation Districts, Counties and Townships are carrying about 70 percent of the load, especially in the areas of construction and maintenance. The remainder comes from Federal, State and local funds.

Flood Hazard Analysis

In Minnesota, the Soil Conservation Service cooperates with the Department of Natural Resources on flood hazard analyses. These studies fit our objective of controlling erosion because flooding is a major cause of soil erosion and damage to the land. The objective of flood hazard studies is to delineate the areas subject to inundation by one hundred year frequency floods. We mark these areas on maps for use by cities, towns and counties to develop their flood plain regulations.

The Soil Conservation Service performs flood hazard studies for the benefit of communities -- to help them protect their land and their residents from damage by floods.

The key to understanding our soil and water management philosophy is to realize that our job is providing assistance to groups and individuals regardless of whether they are communities regulating flood plains or farmers using their land in accordance with soil and water conservation principles. We have the technical expertise to assist people in establishing good management practices on their land. I should emphasize, however, we can advise and assist -- not regulate.

Flood Insurance

Under the National Flood Insurance Program of 1968, the Soil Conservation Service has administrative responsibilities along with other Federal agencies to cooperate with the Department of Housing and Urban Development (HUD). We intered into an agreement with HUD to provide information on flood plain areas, establish flood risk zones and make estimates with respect to rates of probable flood caused losses. The Soil Conservation Service cooperates under an interagency agreement to undertake these studies and provide information concerning other natural disasters such as mudslide areas. We cooperate with the Federal Insurance Administration on a reimbursable basis in supplying this information.

These are crucial times. American agriculture is being called upon to increase production in the face of food shortages. It is difficult to balance increased agricultural production and the protection of wildlife habitat and our soil and water in general. We recognize this dilemma and try to assure the most beneficial balance in all of our soil and water conservation activities.

For the past 40 years, the Soil Conservation Service has been concerned with controlling erosion; with increasing the potential for agricultural production; and with developing the rural community. These basic objectives are just as valid today and even more timely.

Throughout its lifetime, the Soil Conservation Service has used a multi-disciplinary team of soil conservationists, engineers, hydrologists, biologists, foresters, agronomists, geologists and soil scientists in all of its planning and technical assistance programs. In recent years we have brought recreation specialists, environmental specialists, landscape architects and sanitary engineers into the picture. And the reason for that is simple. Soil and Water Management has become more complicated as resource use has intensified.

No longer is the cost benefit analysis the only consideration in selecting alternatives to solving resource problems. We have learned that there are other criteria that need to be considered in addition to the obvious monetary and economic considerations.

Today there are more subtle and more challenging environmental effects for us to weigh. And these need to be considered very seriously. This involves many more disciplines, many more agencies, and, most importantly, many more segments of the public in the management of our soil and water resources.

It is incumbent upon the Soil Conservation Service, then, to work with other agencies such as those represented here today to assure that people who use our State's water resources do so with prudence and care. Those of us who are technical assistance agencies must continue to provide good advice and help so that our water resource management philosophies are reflected in the actions of those who own and operate the land.

To our sister agencies who have power to regulate land and water use, we stand willing to provide our knowledge and the lessons of our experience to you as you guide the management of our finite water resources in the challenging years ahead.

THE ROLE OF UPPER MISSISSIPPI RIVER BASIN COMMISSION IN REGIONAL WATER AND RELATED LAND RESOURCE PLANNING

By

George W. Griebenow, Chairman,
Upper Mississippi River Basin Commission

Sound programs for river management stems only from thoughtful planning in response to public demands. Wise planning not only requires improved means of predicting consequences of particular projects and programs, more accurate forecasting of technological advances, better methods of considering non-market costs and estimating the benefits of formulating alternative measures -- it requires, also, administrative organizations which can deal effectively with the magnitude of today's water resource problems. It is with this institutional need in mind that the Congress, following the recommendations of the Senate Select Committee, enacted the 1965 Water Resource Planning Act authorizing the establishment of Regional River Basin Planning Commissions throughout the country. The Upper Mississippi River Basin Commission, which I chair, is but one of six such commissions in the Nation.

River Basin Commissions are the most recent mechanisms for conducting regional water and related land resource planning and represent the first such devices fostered by National Legislative Policy.

In the past, planners have approached the planning of water resources from a fairly narrow standpoint. Lacking an adequate understanding of the effects that their actions would have upon the entire water and related land system, specialists have struggled with problems and proposed fragmentary "solutions" related only to their own disciplines. In the development of our water resources, countless organizations -- both public and private -- have produced a welter of plans which as often as not, have been inconsistent with one another.

Planning for river management today, in such a way as to meet many diverse needs, is a complex endeavor; for modern society demands more of planners than careful attention to geophysical and economic variables. Contemporary planners recognize that programs must encompass considerations of aesthetic, cultural, social psychological, educational and political factors. Continued population growth, economic development and urbanization make interrelationships of various system elements increasingly imperative.

Only extensive collaboration among many individuals and disciplines can effectively assist in planning for the wise management of our resources in a total system context. To approximate our goals most closely, we must approach river resource programs from a comprehensive viewpoint which requires the equal participation of all affected persons, organizations, and disciplines. "Comprehensive," used in this sense, means the equitable representation of all interested sectors of society, as well as the examination of all problem areas and alternative solutions to determine their interdependencies. All agencies -- Federal, State, local and private -- must be partners with the public in programs which investigate interrelationships between river resource management and the management of other human and natural resources.

We must recognize, too, that river resource problems such as those associated with floods, water supply and pollution, navigation and electrical power are no longer solely local quandries. They are, more often than not, problems national in scope and impact, and thus should be amenable to treatment through national and regional programs. In fact, it is increasingly less feasible to regard state and local jurisdictions as adequate planning areas. And, although some local watersheds or river reaches may be units suitable for comprehensive planning, our regional and national problems surpass their boundaries.

Basically, our river basin commission has five functions. First, it coordinates the plans of Federal, State, local and non-governmental entities. In assigning this function, Congress was cognizant of the fact that both State and local governments have statutory authority and experience in preparing plans for water and related land resources, and that a Federal-State Commission should be the primary instrument for harmonizing these plans with Federal and regional planning. Secondly, the river basin commission has the specific responsibility of preparing and keeping current, insofar as possible, a comprehensive, coordinated joint plan for management of all the water and related land resources within its jurisdiction. A third responsibility is for the Commission to recommend long-range schedules of priorities for collecting and analyzing basic data, as well as for investigating, planning and constructing projects. A fourth function authorizes the Commission to undertake and execute any studies essential to the preparation of the Region's comprehensive plan. Finally, when its comprehensive plans go to the President, Congress and to the Governors and State Legislatures, the Commission must annex a recommendation to those plans for their implementation. Thus, the Act attempts to provide for full use of the comprehensive plans, as well as for continuity in the planning process.

When establishing the river basin commission, Congress recognized the need for checks and balances. It also realized that the commission's sovereign members -- the Federal Government and the States -- cannot be compelled against their will to act by majority vote of the commission. Accordingly, the Act reposes upon the concept of consensus, rather than that of majority vote.

Clearly, one of the roles of the river basin commission is to facilitate interaction between State and Federal Agencies. On the Upper Mississippi River Basin Commission, six State and 10 Federal Members join on a basis of equality; they are together responsible

for prompting a region to face current, well-known exigencies -- metropolitan water supply, large-scale waste treatment systems, stream regulation and flood control.

Still more arduous is the Commission's responsibility to identify new, emerging problems and to seek appropriate solutions. Questions dealing with the new aesthetics of water-oriented land use, pollution, and the preservation of unique ecological values must not be shelved during the quest for solutions to more traditional problems.

Our Commission's programs, supported in part by a Commission staff consisting of 15 personnel, are largely oriented towards the development of a comprehensive, coordinated, joint plan (CCJP). The CCJP identifies those water and related structural and non-structural projects, programs and other measures designed to enhance the economic, environmental, and social conditions of our area of responsibility. It will include a framework study and revisions through national assessments; Level B Studies and revisions to reflect changed conditions; and the results of appropriate Commission, Federal, State, regional, interstate, local and non-governmental planning studies.

The CCJP will be developed through a continuous, dynamic, planning system with the following components: comprehensive information base, decision-oriented information base, planning program priorities, planning program strategies, and planning program implementation.

The decision-oriented information base will be a concise summary of the comprehensive information base emphasizing tabulations and visual displays including a series of overlays displaying current and projected needs and resources, and the alternative plans for development, conservation or preservation, providing a pictorial basis for: predicting the impacts of current and future developments upon the region's water and land resources, and identifying conflicts between alternative resource programs and projects.

On October 24, 1974, our Commission established a National Assessment Committee composed of six State and seven Federal members. That Committee will assist our Commission and its staff in discharging its responsibilities as a Regional Sponsor for the 1975 assessment in the Upper Mississippi and Souris-Red-Rainy Regions.

The 1975 National Assessment is a three-year effort being sponsored by the U.S. Water Resources Council with assistance from 21 Regional Sponsors to identify and describe for two time frames (1975-85 and 1985-2000) the Nation's severe water and related land resource problems; identify and establish priorities for Level B Study needs; and develop appropriate conclusions and recommendations for resolving identified problems from both the National and State/Regional viewpoint. Extensive public participation is required in developing the assessment.

This will be the Nation's Second National Assessment, the first being completed in 1968. Current plans call for the 1975 assessment

to be completed by November 1977. Both Congress and the Executive Branch view the 1975 assessment as a major tool or source of information to assist them in making better water-related management, planning, research, and data collection decisions. Similarly, the results of this Assessment will be valuable to the Region's many local, State, Regional and Federal Agencies with resource management, planning and conservation responsibilities.

Our Commission launched the Twin Cities Metropolitan Area Level B Study in April 1974. The study was requested by Governor Anderson and was approved and funded through the U.S. Water Resources Council for a period of two fiscal years. The Level B Study is being conducted under the guidance of a Committee composed of Federal, State and local members.

The Study will address major Federal and non-Federal issues requiring near and mid-term (15 to 25 years) solutions, and it will identify major data gaps, unmet needs, and requirements for implementation of Level B plans. It is to be based largely on judgmental planning; strong central management; immediate and iterative plan formulation (involving public review and feedback); no new original data collection; and increased emphasis on participation and leadership of the State.

The Twin Cities Metropolitan Area Level B Study area comprises 2,820 square miles within Minnesota and coincides with the Minneapolis-St. Paul Metropolitan area. The Study is aimed at resolving water supply, water quality, flood damage, recreational, preservation and protection of the environment, and other problems.

The Level B Study will formulate alternative plans to achieve varying levels of contributions to specified components of objectives, analyze the differences among alternative plans which reflect different emphasis among specified components of objectives, and select a recommended plan from among the alternative plans.

Our Commission has submitted to the U.S. Water Resources Council for possible future funding five proposals for Level B studies in the following areas in order of priority: Chicago Metropolitan area, Upper Mississippi River Main Stem, Rock River Basin, Fargo-Moorhead area, and Wisconsin-LaCrosse Rivers area.

Our Commission, as part of its coordinating program, is taking an active role in facilitating the preparation of an economically and environmentally balanced Upper Mississippi River 9-foot navigation dredging practices plan. Funds have been provided through the U.S. Army Corps of Engineers to initiate a study aimed at evaluating the current operation and maintenance activities associated with the 9-foot navigation channel and alternative methods of operation and maintenance.

A plan will be prepared to assure optimum public beneficial utilization of the channel and associated areas. Factors to be considered in the plan include erosion and sediment control, placement of dredged material, dredging operations, dam operations, lock operations, and dredged material uses.

Although the lead agency responsibility for the study will be with the St. Paul District, Corps of Engineers, our Commission through its Dredge Spoil Disposal Practices Study Committee will provide overall coordination. Executive level subcommittees will provide general guidance to study teams. Federal and State agency personnel will participate on the Committee, subcommittees, and study teams. Local and Regional agencies and representatives of broad-based citizen, environmental, developmental, and other groups will also be invited to periodically review study findings and provide advice. The study is scheduled for completion by the end of fiscal year 1977 and it will consider both short-range (1975 and subsequent dredging seasons) and long-range programs for the effective management of the 9-foot navigation channel.

I believe that the institution through which we are working is a progressive step forward in multi-state water and land planning. It is the most recent system devised to improve the manner in which we approach planning for the development and management of water resources in the United States. Its design includes two objectives which other approaches to water and related land resources planning were unable to fully accomplish. The first objective of this new system is coordinating the planning programs of all federal water-oriented agencies. This kind of activity, if successful, is vital to any comprehensive look at the multi-faceted problems posed by water. The second major objective basic to the commission device is establishing, between the Federal Agencies and the States, a planning partnership relative to water and related land resources. The absence of a true Federal-State partnership in water resource planning lies at the root of past failures to solve, with dispatch, pressing water problems, and is basic to the conflict that continues even today between the states and the federal development agencies on major water management projects.

TRENDS IN WATER RESOURCES PROGRAMS OF THE DEPARTMENT OF NATURAL RESOURCES

By

Eugene R. Gere, Director
Department of Natural Resources
Division of Waters, Soils & Minerals

Introduction

Minnesota, the twelfth largest state in the United States, with an area of 84,068 square miles derived its name from the Indian language meaning "sky-tinted waters." It's indeed a land of sky-tinted waters, for it contains over 4,000 square miles of surface water in lakes and streams, including more than 12,000 lakes of 10 acres or more in area and about 25,000 miles of streams. It has vast supplies of clean, cool underground water contained in the unconsolidated and consolidated rocks which underlie the land surface.

Although local pollution and supply problems exist in the state on a general statewide basis, Minnesota's surface and underground water are available in good quantity, have reasonably good quality and are used for a wide variety of domestic, recreational, commercial, and industrial purposes. The management of these vast recources is a major task.

Although many of the major responsibilities for administering statewide water resources programs are vested in the Department of Natural Resources under the direction of the Commissioner of Natural Resources, there are a number of other state and local government agencies involved in various aspects of water resources management. This multiplicity of involvement has created, and will continue to create, problems in effectively administering a state water resources management program until there is a concerted effort to coordinate the various needs and concerns of the various levels of government in a unified manner under a workable state framework. State government agencies must be able to address water issues with one voice in order to provide local governments with advice, assistance and guidelines in making local decisions and administering water resources management programs within a coordinated and unified statewide framework and objectives for the mutual benefit of all of Minnesota's citizens.

Scope of Water Resources Programs

In recognition of the fact that Minnesota's water resources can be productive and life supporting at times and damaging, destructive and a threat to life at other times, the state has developed a variety of legislatively authorized programs to protect the water and related land resources from misuse by man and to promote wise use and development, while at the same time establishing procedures to protect the public from the adverse effects of water resources excesses or deficiencies such as floods, high water, and droughts.

The Division of Waters, Soils & Minerals of the Department of Natural Resources is responsible for carrying out many of the programs which implement the laws. Although the Division, acting for the Commissioner of Natural Resources, has a wide range of duties and responsibilities, it has been greatly hampered in administration of the various programs by a lack of adequate funding and staffing. The 1971 and 1973 Legislatures enacted a number of important and progressive laws to protect both the people and the water resources of the state but little or no consideration was given to provide the necessary funds and personnel required for meaningful implementation of this legislation.

Nevertheless, limited progress has been made in implementing the programs, although the progress has been slow because of the inadequate manpower and funds.

Ongoing DNR programs which provide valuable protection for our natural and human environment can be divided into three general management classes based on the type of water resource involved. These water resource types include lakes, streams, and groundwater, and there are specific programs for each.

Lake Management

Programs related to lake management presently guide and control the activities of man on the shorelands adjacent to lakes, within the lakes, and on the surface of lakes.

One of the most important of these programs involves the management of shorelands adjacent to lakes. The State Shoreland Management Program directly affects land uses within 1,000 feet of a lake. The primary responsibility for the program is vested with local units of government through counties or municipalities. The program is designed for local government administration and enforcement, through adoption of appropriate local ordinances, as approved by the DNR under minimum statewide standards and guidelines promulgated by the DNR.

The original shoreland management program established in 1969 pertained only to lakes in unincorporated areas of the state, under county administration. Since that date, statewide Shoreland Management criteria, rules and regulations and procedures have been promulgated by the DNR, and all counties have adopted ordinances approved by the state. The 1973 legislature amended the act to add shorelands in incorporated areas, under the authority of municipalities, and rules and regulations containing guidelines and criteria for implementing the shoreland management of lakes in incorporated areas were required to be available by no later than April 1, 1974.

There are presently 9,692 lakes within unincorporated areas for which there are county shoreland management ordinances in Minnesota. The shorelands of an additional 907 lakes, located wholly or partly within incorporated areas of the states, will soon be controlled under municipal shoreland management ordinances which meet state standards. The state shoreland rules and regulations are designed to protect owners of shoreland

property, considered for development, from property damage due to high water through controls of setbacks, placement of structures and other land use zoning and building code measures. The lakes are likewise protected from harm by shoreland developers and users through restrictions on lot sizes, sanitary regulations and other land use zoning and building code controls.

One of the major benefits of the Shoreland Management Program is that it provides that the state develop the necessary tools, advice and assistance for use by the local units of government, who are the most aware of local problems and most accessible to property owners. Shoreland zoning also prevents undesirable development patterns and unwise land uses and therefore is considered to be one of the most expedient means of insuring a proper balance between resource protection and resource use.

One of the disadvantages of the Shoreland Management Program involves maintaining consistency of management regulation when certain lakes are bordered by shorelands in several communities and counties. Another disadvantage with the present program is that it is, by necessity, designed to provide only broad, minimum statewide criteria for development of shorelands of several major classes of lakes but it does not provide for shoreland ordinances on a detailed case-by-case basis which address specific problems related to specific lakes.

Some parties argue that there is another disadvantage of the present state assisted local program because the local political and developmental pressures may result in ineffective controls which will satisfy only local interests. Such parties claim that there should be state control to remove issues from local pressures. Experience with the program since 1970 indicates these concerns are largely unfounded and the program is generally providing effective environmental controls of new developments along Minnesota's lakeshores.

The Minnesota law established to protect lakes from unwise use and development within the lakes are contained in Minnesota Statutes, Chapter 105 which has provisions for restricting those uses or activities which would cause destruction of lakes by draining, filling, improper regulation of lake levels, and destruction of important ecological characteristics of lakes. Chapter 105 provides mechanisms for controlling dredging in the lakes and adjacent to the lakes, construction of channels and lagoons, and the construction of dams and control structures on lakes. The permit laws are comprehensive enough to provide for necessary regulation of activities within lakes but there are certain essential guidelines and criteria which must be provided before the permit system will be a viable mechanism. The 1973 legislature redefined "public waters" and "any waters of the state which serve a beneficial public purpose," and set forth a list of specific purposes which would quality. The lack of sufficient personnel and time within the Division of Waters, Soils and Minerals has prohibited the designation of "public waters" throughout the state based on the enumerated purposes and as a result each determination is made on a case-by-case basis causing considerable confusion regarding the status of public waters. Efforts are being made to establish rules and regula-

tions containing guidelines and criteria for regulating various works within beds of public waters but until sufficient staff and funds are made available, the establishment of rules and regulations will only be accomplished slowly, on a "piecemeal basis" since most day to day efforts are directed toward investigating and receiving new and pending permit applications. The present backlog of permit applications pending action is approximately equal to the amount of new applications received each year.

There have been repeated requests for transfer of the permit responsibilities to the DNR field regions for implementation. As soon as adequate guidelines and criteria for work within the beds of public water can be developed, many of the permit functions can effectively be transferred to regional DNR offices for regional administration and upon adequate testing and experience it may be possible to eventually transfer some permit responsibilities to local governments under state guidance and supervision.

Another major problem with the permit system is that it is intended to provide general coverage on a statewide basis and does not provide for the detailed lake-by-lake considerations which address all activities affecting or influencing the individual lakes on a comprehensive lake management basis.

In order to resolve conflicts involving various uses of the water surface of Minnesota lakes and streams, the 1971 Minnesota Legislature amended the State's Water Safety Act to allow the Commissioner of Natural Resources to regulate the use of watercraft on the waters of the state. Under the 1971 law (Minnesota Statutes, Chapter 361.26), the Commissioner could adopt such regulations only when requested to do so by a local unit of government (i.e. a county, township, village, or city). These regulations would only pertain to watercraft and could restrict the type and size of watercraft used on a body of water, the areas used by watercraft, the speed of watercraft, the times when watercraft could be operated and the minimum separation distance between watercraft. The law also required that a public hearing be held prior to the adoption of any water surface use regulations and such regulations could not be put into effect until approved by the Board of County Commissioners for the county or counties in which the body of water is located.

The DNR's Division of Waters, Soils and Minerals was given the responsibility for implementing this particular program and has already acted upon several requests for the establishment of water surface use regulations under the 1971 law. However, experience with the law indicates that water surface use regulations cannot be imposed on one body of water without affecting the types and intensity of use on nearby bodies of water. Water surface use zoning cannot be concerned only with solving individual problems on individual bodies of water but must instead be directed toward creating an effective statewide water surface use management system.

Realizing the need for such an approach; the State Legislature proposed several changes to the Water Safety Act during the 1973 Legislative Session and on May 24, 1973 Governor Wendell Anderson approved Laws of Minnesota 1973, Chapter 702. This act authorized the Commissioner of Natural Resources to adopt statewide rules and regulation governing the use of watercraft on the surface waters of the state by January 1, 1975. Under this Act, local units of government have the power to establish ordinances to control the use of watercraft on waters within their territorial limits, provided that such proposed ordinances are approved by the Commissioner of Natural Resources prior to adoption. Furthermore, any water surface use ordinances adopted by a local unit of government after January 1, 1975 must be consistent with the statewide rules and regulations to be formulated by the Commissioner of Natural Resources.

According to this Act, the County Board of Commissioners is empowered to adopt such "Water Surface Use Ordinances" for any body of water situated wholly or partly within the boundaries of the county and not situated entirely within the boundaries of a single municipality. In such cases, the governing body of the municipality has the authority to adopt a water surface use ordinance. In a case where a body of water is located in two or more municipalities, the County Board of Commissioners will retain the authority to adopt such ordinances. Also, if a body of water is located in more than one county, no water surface use ordinance may be put into effect until it has been adopted by the county boards of all of the counties in which the body of water is located.

In addition to the basic regulatory authorities contained in the laws relating to shoreland management, permits and water surface use management, the 1973 Legislature enacted several laws relating to dams and lake improvement districts.

The legislation pertaining to dams is contained in Minnesota Statutes 105.482 and is intended to protect public health, safety, and welfare by promoting the orderly repair and reconstruction of dams, owned by state and local governments, serving the public's interest.

The law provides for financial grants to local governments for repair and reconstruction of local government owned dams subject to provisions that the state grant cannot exceed the amount contributed from locally raised funds exclusive of federal grants. No grants have been requested through fiscal year 1974 and the first part of fiscal year 1975 so there is no experience with the program to date.

Minnesota Statutes 378.41 provided for the establishment of lake improvement districts by counties, cities and villages, for lakes located within their boundaries, based on state guidelines and regulations. The law, enacted in 1973, is designed to allow a local action program to preserve and protect certain lakes, to increase and enhance their use and enjoyment, and to assure protection of the lakes from the detrimental effects of man's activities and certain natural processes.

The law provided that by July 1, 1974, the Commissioner of Natural Resources, should promulgate rules and regulations which establish guide-

lines, criteria and standards for establishment of lake improvement districts by counties, cities and villages. No funds or staff were authorized to carry out this duty and the Division of Waters, Soils and Minerals, acting for the Commissioner, has been unable to provide adequate staff and time necessary for the development of the required rules and regulations.

The Lake Improvement Program has the potential to eventually provide for an integrated approach to solving lake problems and managing lake resources under local government authority within a state framework of guidelines, criteria and standards, but the effective implementation of the program will be delayed until the state has adequately developed all the necessary mechanisms and tools for guiding the wise use and development of the area adjacent to lakes, within the lakes, and on lake surfaces. Continuing efforts are being made to provide the state inputs, but progress is slow without sufficient funding and staffing to accelerate the DNR efforts.

Stream Management

The management of streams is equally as important as management of lakes and several of the laws which govern activities involving lakes apply equally to streams.

The Shoreland Management Act, as it relates to streams, provides for local regulation of shoreland activities within 300 feet of the normal high water mark of a stream or to those lands located between the normal high water mark and the landward side of the flood plain delineated by ordinance for a stream, whichever is greater.

The same standards and criteria promulgated for shorelands of lakes apply to the shorelands of streams, and all counties now have general ordinances which cover the shoreland development of streams. The major problem with the Shoreland Management Act, as it pertains to streams, is that the basic law was primarily developed to cover shoreland uses and developments around lakes, or standing bodies of water in defined basins of limited areal extent, whereas streams are extensive linear bodies of water, with greatly different characteristics and considerable areal extent, which often extends across the political boundaries of cities, villages, and counties and even states. The management of shoreland developments along streams is therefore, much more complex and requires a more comprehensive data base and evaluation and analysis system than now exists, if it is to be as effective as desired.

The permit system, as contained in Minnesota Statutes, Chapter 105, provides for the same essential considerations and regulation of activities, within streams, as set forth for lakes. The jurisdiction over activities within streams is dependent on their status as "public waters" and, as with lakes, there is not statewide classification of streams which are "public waters". In fact, there is not even a basic inventory of streams in Minnesota, a fact which makes meaningful classification and management of streams very difficult and which forces case-by-case decision-making as to jurisdiction.

Activities on the surface of streams may also be controlled under the provisions of Minnesota Statutes 378.32 relating to water surface use regulation in the same manner as provided for lakes. There has been only one stream reported to date with identified water surface use conflict; the St. Croix River.

One of the most important laws related to stream management is the Flood Plain Management Act. The early settlers established themselves along the state's streams to benefit from navigation, water power sources, water supply and for other water-oriented reasons. This early development set the precedent for further development, which was often built without regard for flood and flood effects. As this development increased so did the magnitude of the state's flood problems until today it is estimated that average annual flood damages are approximately $30 million.

The major flood damage areas are along the Minnesota River; the Mississippi River within the metropolitan area and downstream; along the Red River of the plain; and at several communities located along the tributaries to the above streams. Altogether it is estimated that Minnesota has 350 flood-prone communities (about 30 percent of the total communities in the state) and that flood hazard areas exist in 85 of the 87 counties.

Floods along the major streams are caused by excess amounts of rainfall and/or snowmelt and usually occur in the spring. However floods along the tributaries can and have occurred at any time during the year. In recent years floods have occurred throughout the state in 1965 and 1969 and regionally in 1966, 1972 and 1974, causing total damages in excess of $200 million.

The 1969 Legislature enacted the Minnesota Flood Plain Management Act to check the rapid and uncontrolled development of flood plain lands, and the consequent creation of additional flood problems, by requiring its political subdivisions to regulate the manner in which these lands may be used in the future.

In the Act, the Department of Natural Resources is given three broad responsibilities: (1) to provide information on flooding and flood plain management, (2) to render assistance to local governmental units (counties and cities) in developing programs to mitigate flood losses and, (3) to coordinate flood plain management activities at all governmental levels.

Rules and regulations pertaining to management of flood plain areas were promulgated in the fall of 1970 to carry out the purposes of the legislative act. These rules and regulations establish technical standards and requirements for flood plain evaluation, minimum flood plain standards for local zoning ordinances, land uses permitted within the flood plain, supplemental flood plain management measures, regulation of public uses, variances, and general administrative procedures.

Counties and cities are required to incorporate flood plain management provisions into local zoning ordinances, subdivision regulations and health regulations within six months after the Department of Natural Resources determines that sufficient data are available to define flood hazard areas. Local flood plain management provisions must also be approved by the Department before they are enacted. If a locality fails to adopt regulations within the time allowed the Department may adapt an ordinance to the locality. The cost incurred must be borne by the locality.

Minnesota has made a start towards solving its flood problems through implementation of a statewide flood plain management program, and 33 of the 350 communities with flood hazards have enacted approved ordinances. However those measures that have been initiated must be strengthened and accelerated so that all communities have approved ordinances if the overall program objectives are to be realized in the foreseeable future. Both state and federal governments must substantially increase their efforts in providing flood plain information and assistance to local officials. On the other hand local government must have more initiative in seeking solutions to their problems. Under existing federal policies and funding practices it is much easier for a locality to obtain assistance for the planning of local flood protection works, which solve only existing problems, than for assistance in developing a comprehensive flood plain management program to deal with both existing and future problems.

Some local officials have been reluctant to require regulation of identified flood-prone areas because of possible reactions by the affected property owners or fear that property values and/or community growth will be suppressed. However, too often they fail to consider the long-range consequences of their inaction. When streets and other public utilities and facilities that serve a locally approved development or subdivision plat are damaged by flood waters, they are usually repaired at public expense. The community and its citizens will also be required to bear the costs of flood fighting and rehabilitation. Ultimately, flood control works constructed at public expense may be required to protect flood plain occupants. This involves not only the federal share for the planning and construction of such works, whereby we all pay, but often a substantial local share towards the construction and maintenance costs of such projects.

Successful future implementation of the Flood Plain Management Program, as part of a statewide stream management effort, will require accelerated funds and staffing of the program at the state, local and federal level. There is a need for development of adequate flood plain management ordinances for over 300 communities with flood hazard areas if the state is to greatly reduce flood damage costs in the future.

The 1973 Legislature also established a stream maintenance program which provides state grants-in-aid to counties in the removal of rubble and debris from stream beds and flood plains. The program provides statewide coverage and is based on a state grant of up to 75 percent of

the total cost of the maintenance. It does not provide funds for excavating or filling in the streams. The program is an extension of a former law which applied only to specific streams and which provided a state grant of 100 percent of the cost of the maintenance work. Since the law became effective, on July 1, 1973, seven counties, primarily in western and south central Minnesota have obtained grants-in-aid under the program. The program can be useful in keeping stream channels free from fallen trees, debris and other materials which restrict flood flows and prohibit use of streams.

The Minnesota Wild and Scenic Rivers Act, passed by the 1973 Legislature, provides a mechanism for preserving and protecting certain Minnesota rivers and the adjacent lands which possess outstanding scenic, recreational, natural, historic and scientific values. The law provides for a classification of rivers as wild, scenic or recreational and authorizes the Commissioner of Natural Resources to administer the program including conduct of studies, development of criteria for classification and designation and management of the components of the system through promulgation of rules and regulation of rules and regulations. The act further provides a means for assuring local government participation and cooperation in carrying out land use control programs compatible with the classification of specific rivers.

No rivers in Minnesota have been designated, classified and are presently managed under the provisions of the act but a detailed management plan has been prepared and is being considered for the Kettle River. In addition, planning is underway for designation, classification and management of the North Fork of the Crow River and the Mississippi River above Anoka.

The St. Croix River, which forms part of the border between Minnesota and Wisconsin in each central Minnesota has been designated and classified under the Federal Wild and Scenic Rivers Act and comprehensive management plans have been developed for the upper St. Croix River above Taylors Falls.

Although the Minnesota Wild and Scenic River Act provides the only comprehensive state mechanism for controlling uses and developments of streams and their shorelands, it is restricted to only certain rivers having outstanding values and since the act is highly protective in nature it is probably not generally applicable to most streams. In addition, the act requires a great deal of detailed study and evaluation and it is therefore unlikely that it will become the major program for managing streams in Minnesota.

The most promising method for accomplishing a comprehensive statewide management program is through an amalgation of the various existing laws previously mentioned in order to provide a unified management program which will control activities; on the land adjacent to streams, within the streams, and on the surface of streams. Much of the necessary framework legislation exists, but there is a need for more factual data on streams, including a stream inventory, and for sufficient staff and funds to enable the DNR to adequately collect and assess stream data,

correlate various aspects of the existing laws and programs and to prepare a coordinated statewide stream management plan and program.

Underground Water Resources Management

The remaining major water resource is the vast underground water resources which underlie the land surface throughout much of the state. Existing laws give the Department of Natural Resources major responsibility for managing the appropriation and use of the waters and for assembling facts on the availability, distribution and use.

Presently the Minnesota Pollution Control Agency and Minnesota Health Department have major authority relating to pollution of ground water and maintenance of safe drinking water and good water quality to protect human health. The Health Department also administers a statewide program to control the registration of well drillers and to provide for adequate protection of public health in drilling of wells.

Although Minnesota Statutes, Chapter 105, provides much of the legal mechanism for regulating appropriation and use of water by the DNR, and although other laws empower other state agencies with duties to protect groundwater quality, there is no comprehensive statewide groundwater management program. Such a program can only be developed when there is an adequate statewide groundwater data base, adequate state staffing and funding, and a coordination of all aspects of groundwater management including quantity, quality, pollution, and supply aspects.

Areas of Major Conflict in Water Resources

Major areas of conflict in water resources at the present time involve the drainage-wetlands controversy, the statewide classification and designation of "public waters," and the overall administration and coordination of state water resources.

The wetlands-drainage controversy primarily involves problems with the desire of agricultural interests for the drainage of wetland areas to allow use and development for agricultural production of food and fiber; although there are also problems involving drainage of wetlands outside of agricultural areas especially within urban areas where high land values encourage developers to drain or destroy wetlands for various purposes. The Department of Natural Resources is charged with the responsibility for managing natural resources, in order to protect the resources, and to promote their wise use and development. There is an urgent need for an immediate concerted effort, involving state and local cooperation, to carefully study and evaluate all wetland areas of the state, and to make rational decisions on the future use and development of the wetland areas. It appears that existing legal mechanisms, for the most part, are generally adequate to provide for control of the wise use and development of wetlands provided that a comprehensive inventory and classification of the wetlands can be made and further that there is adequate balancing of environmental and economic values.

Closely related to the drainage-wetland controversy, and probably inseparable from it at least in agricultural areas, is the need for a statewide inventory and classification of public waters and the development of statewide rules and regulations to implement statewide lake, stream and groundwater management programs.

In summary, considerable progress has been made over the past few years in establishing an adequate legal framework for the management of our valuable water resources. However, the laws themselves do not guarantee effective management of the resource; the law merely provides the basis for establishing effective management programs at all levels of government. To date only the legal commitment, through the enactment of various laws, has been made with little or no consideration of the financial and personnel commitments necessary for translation of the law into effective management programs. The lack of financial commitment on the part of the state along with growing fragmentation of water resource management responsibilities has resulted in uncoordinated and inadequately implemented water resource programs. The most pressing demand now confronting the legislature is to provide the financial and personnel commitment for effecitve implementation of existing water law.

TRENDS IN WATER QUALITY MANAGEMENT

By

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Most of what I intend to say reflects what I believe are some current trends in water quality management. In developing the present program of the Minnesota Pollution Control Agency as it relates to water, certain priorities have necessarily been established. Because of the normal limits on time, staff, and resources, a strategy has been developed to meet those priorities.

I hope through my comments, to give you an overall view of the program we are now implementing, and a general understanding of the approach we are taking in water quality control.

In 1972, a sweeping joint Federal-State campaign to improve water quality was launched when Congress enacted the Federal Water Pollution Control Act Amendments.

The Act set two water quality goals for the nation. The first goal is elimination of the discharge of all pollutants into navigable waters by 1985. The second goal is an interim level of water quality that provides for the protection of fish, shellfish and wildlife and recreation by July 1, 1983. For simplicity, we usually say the interim goal we are working toward is water that is swimmable by 1983.

Because of the huge scope of the water pollution problem, because money and manpower is limited, and because the severity of pollution varies from place to place the Environmental Protection Agency developed a strategy to reach the goal stated in the Act. The strategy is based on two main principles: 1) First, combat pollution where it is most serious and 2) second, prevent clean waters from being polluted.

The major elements of the strategy developed by the Environmental Protection Agency and administered by the Minnesota Pollution Control Agency in Minnesota are: The inventory and assessment of existing water quality, establishment of water quality standards and effluent limitations, issuance of NPDES permits to dischargers, establishment of a priority system for allocating funds for construction grants for publicly-owned treatment plants, and collection of data for non-point pollution control in the future.

Basin Plan

The basic planning mechanism for pollution control is the River Basin Plan (303e). The Basin Plan sets up procedures to manage the water quality of a given River Basin, which is the area drained by a river and its tributaries. The Basin Plan identifies and measures the pollution found in waters within the basin and sets limits on what can be dumped into those waters. It also sets priorities for building sewage treatment facilities in the basin.

To begin with, the U.S. Environmental Protection Agency designated major river basins throughout the country. Of the 11 basins of Minnesota, 10 are natural watershed of the state while one (Twin City Metro Area Basin) is defined by county boundaries for administrative purposes. The responsibility for preparation of state basin plans for Minnesota is divided among three organizations. The Metropolitan Council is responsible for preparing the plan for the Twin City Metro Area Basin, the Arrowhead Regional Development Commission is responsible for preparing the plan for the Lake Superior Basin, and the Minnesota Pollution Control Agency is responsible for preparing the plans for the remaining nine basins.

The purpose of each basin plan is to coordinate and direct water pollution control activities to achieve national water quality goals in that basin.

The first step in controlling pollution is identifying pollution areas. This is a function of the state monitoring program.

Monitoring Program

The state monitoring program supports all of Minnesota's water pollution control activities by supplying the quantitative data needed to determine existing water quality and to understand the causes and effects of such quality. The monitoring program also enables the state to assess the effectiveness of its water pollution control activities. The program is designed to monitor both the quality of effluents discharged and in-stream water quality. The monitoring program consists of a state-wide primary monitoring network, intensive monitoring surveys, groundwater monitoring and compliance monitoring.

The primary monitoring network program is the basic water quality information system for the Minnesota Pollution Control Agency, and it is expanded and refined each year to provide a more comprehensive measurement of the quality of water in Minnesota. In 1974, there were 77 fixed sampling stations, and it is proposed that by 1977, the primary network will consist of 270 monitoring locations. Biological monitoring stations, to evaluate the balance and condition of communities of aquatic organisms and eutrophic conditions, are being added to the primary network in 1975, and, by 1977, 87 biological sampling locations are proposed for inclusion in the monitoring system.

Water samples are collected at fixed locations each month and are routinely analyzed for 33 hydrological, physical, chemical and microbiological parameters. In addition to the monthly primary network stations, six monitoring stations in Lake Superior are sampled annually. Also, there are three continuous, automative monitoring stations located on the Cedar River, Red Lake River and Red River of the North. Two sampling locations on the Blue Earth River are part of the National Water Quality Surveillance system and were selected to reflect the influence of agriculture on water quality.

Complementing the primary monitoring network is the Intensive Monitoring Survey Program which is an in-depth water quality study conducted for a limited amount of time in a specific area where more comprehensive information is needed for the pollution control program. Frequent sampling or measurement of parameters is done at a set of monitoring stations to determine cause and effect relationships.

From 1976 on, intensive surveys will be based on basins and the NPDES permit renewal schedule. Surveys will be conducted one to two years prior to the re-issuance of NPDES permits for a given river basin. Facilities inspection for all dischargers, both principal and non-principal, will be included in the survey. The basin surveys will provide information on compliance with issued NPDES permit requirements, and water quality information necessary for the re-issuance and possible modification of the permits within the basin.

With the issuance of all NPDES permits for point-source dischargers by July, 1975, Compliance Monitoring has increasing importance to the pollution control program. Compliance monitoring detects violations of requirements in NPDES permits; verifies the self-monitoring reports by dischargers; and provides quantitative support if the Agency needs to take enforcement action.

Self-monitoring reports describe the nature of the discharge and the amount of each pollutant being discharged. Any discharge of pollutants above the amount specified in the NPDES permit is a violation and subjects the discharger to enforcement action. Dischargers are also required to immediately notify the Minnesota Pollution Control Agency if a serious violation occurs so that appropriate protective action may be taken.

As discharges of wastes shifts to land disposal, the Groundwater Monitoring Program becomes increasingly important to pollution control in the state. Groundwater monitoring capabilities are being established and will be improved accordingly by the Minnesota Pollution Control Agency.

Principal groundwater aquifers will be identified in 1975, based on existing data, and updated as necessary. A statewide groundwater monitoring network will be established to determine baseline conditions and to facilitate early detection of pollution. By April 15, 1976, an inventory of existing wells suitable for inclusion in the groundwater

monitoring network will be developed, and will be up-dated as more wells are selected or installed. Types of wells to be included are those suitable for baseline monitoring, those suitable for routine monitoring in high groundwater use areas and those in the vicinity of pollution sources.

To complement this network, a program of identification and surveillance of existing and potential groundwater pollution sources will be established. An inventory of pollution sources will be developed by April 15, 1976, and will include, but is not limited to, injection wells, sanitary landfills, chemical stockpiles, municipal and industrial waste lagoons, waste holding ponds and sludge drying beds.

Rules and Regulations have been promulgated by the Minnesota Pollution Control Agency (WPC 22 and WPC 14) to prevent any new pollution and to abate existing pollution of groundwater. The groundwater monitoring program will quantitatively support these goals.

Knowledge of existing water quality is obtained through the State's monitoring program. However, in order to identify pollution it is necessary to be able to compare existing water quality with desired water quality. Desired water quality for Minnesota is expressed by Water quality standards promulgated by the Minnesota Pollution Control Agency.

The Minnesota Pollution Control Agency has responsibility for considering the best current uses to which the state's waters may be put, and is responsible for determining the quality of the waters necessary to meet these uses. In accordance with this responsibility, the Minnesota Pollution Control Agency follows six categories of use classifications, and has grouped the state's waters into one or more of these classifications. These classifications, which cover an array of desirable uses for both man and animal, are Domestic Consumption, Fisheries and Recreations, Industrial, Agriculture and Wildlife, Navigations and Others.

Each water use class has assigned to it a listing of substances and characteristics which must be in an assigned limit or range if the water is to be suitable for its designated class. This listing of limits of substances is called the water quality standards for that particular use class.

Permits Program

In general, pollution is most severe where there are large concentrations of people and industry. The primary targets therefore, are the two major sources of water pollution -- industries and communities.

Factories and sewage treatment plants which discharge wastes to streams and lakes are readily identifiable and are called point sources. The 1972 Act defines point sources as any discernible, confined, and discrete conveyance from which pollutants are or may be discharged. The pollution produced by these specific "point" sources can be measured and controlled in a systematic way and the plan is to regulate the pollutants which industries and communities discharge first.

To systematically regulate the discharge from point sources, the Environmental Protection Agency established effluent limitations for dischargers. These are developed for factories, sewage treatment plants, power plants, animal feedlots and other specific sources.

The limitations reflect the degree of cleanup expected to be achieved by using the latest technology for controlling wastes. The initial set of effluent limitations must be met by point sources by July 1, 1977. Then, the dischargers may have to meet a second, more stringent effluent limitation by 1983. The effluent limitations are based on scientific and technical analysis and, they represent goals that are technologically achievable at economically realistic costs. In the case of industries, since the limitations apply equally to all within a particular industrial category, they introduce an economic equity between individual competitors in that industry.

To make sure that all effluent limitations and other requirements are being met, discharge permits are issued to all specific "point" sources of pollution. The 1972 Act makes it illegal to discharge any pollutant without a permit. The permits are called NPDES permits which means National Pollutant Discharge Elimination System. Either the Environmental Protection Agency or the state may issue NPDES permits. In Minnesota, the Minnesota Pollution Control Agency, Water Quality Division, has authority to issue these NPDES permits as of July 1, 1974. The permit program is the key to enforcement of the entire water pollution control effort. Each permit issued is subject to public scrutiny and a possible public hearing. The total number of permits to be issued in Minnesota will be 1,279, and will be completed by July 1, 1975.

Permits specify minimum effluent quality which, when discharged to surface waters will not cause a violation of water quality standards. Permits are written for up to five years, and must be re-applied for, in order to continue discharging. Permits can be modified or revoked if conditions change or if the specified conditions are violated.

Permits describe the quantities, concentrations and rates of discharge which may go to surface water. One of the requirements is that dischargers must monitor their discharges and report to the Minnesota Pollution Control Agency.

In effect, a NPDES permit is an agreement between a discharger and the government that sets specific limits on the concentration, volume and temperature of what may be discharged into the surface waters of the state. If a power plant, factory or treatment plant is unable to comply immediately with applicable effluent limitations, the permit sets a series of firm, intermediate targets through which the final goal can be reached by a specified compliance date. A first round of permits is aimed at attaining a certain level of improvement by July 1, 1977; a second round of permits will follow to insure compliance with the tighter requirements of 1983.

In keeping with the principle of hitting pollution where it is most serious, principal dischargers are issued NPDES permits first. All Principal dischargers will be issued permits by January 1, 1975, unless a public hearing is scheduled or in progress. If a discharger violates the terms of the permit, or discharges without a permit, he may be fined up to $10,000 a day. Repeated violations carry larger fines. Criminal penalties may go to $25,000 and/or imprisonment for 1 year. These provisions put real "teeth" into the law. Since most municipal improvements are dependent upon Federal and State grant monies, they will not be required to meet necessary effluent limitations until grant monies become available. However, the NPDES permit is written to require the best possible treatment from the existing facility.

Priority System and Grants

To help communities plan and build facilities needed to meet the discharge standards, construction grant monies are available from the Federal government and the State. Federal grants to cover 75% of the cost and State grants for 15% of the cost may be applied for.

Since federal dollars are limited, they therefore must be dispensed on a priority basis. Based on a 1974 Survey, states have estimated that the total needs for construction of facilities is over $60 billion. Minnesota maintains a current priority list which ranks projects in terms of their anticipated effect on improving water quality.

Perhaps the priority system needs more explanation. After the major river basins were established, they were further divided into segments. There are 44 segments in Minnesota and all were given priority and ranked on the following criteria:

1) Severity of Pollution problems
2) Population
3) Need for preservation of high quality
4) National Priorities

Segment priority points are used as an input in the development of priority listing of individual dischargers for the state. These priority lists are the Municipal Discharge Inventory (MDI) the Municipal Needs List (MNL) and the Industrial Discharge Inventory (IDI).

The Municipal Discharge Inventory is a priority listing of all communities in the state which discharges to waterways. Position on the list is determined by assigning priority points to each municipality, including the priority points of the segment to which the municipality discharges.

The Municipal Needs List is a listing of all communities that have inadequate sewage treatment facilities, and are being considered for state and federal grant monies. Communities on the MNL receive the same number of points as they had on the MDI plus additional points from 10 to 40 for the type of project needed. The list is separated into Metro Area and Outstate Area. Federal and State money is similarly divided -- the current split is 62% for the metro Area and 38% outstate.

The Industrial Discharge Inventory is a listing of all industries in the state believed to be discharging to surface waters, priority points are assigned and the ranking indicated the importance of the industry relative to others in the state for water quality management purposes. Industrial dischargers must provide their own financing for improvement of their discharge.

The most important concept of this segment, municipal and industrial priority ranking system is that it directs the limited funds for water pollution control efforts toward the higher priorities. Construction grant funds are allocated according to the priority system.

Existing publicly-owned treatment plants must, if necessary, modify their treatment techniques to enable them to have secondary treatment by July 1, 1977. They may have to improve treatment even further to advanced treatment by July 1, 1983. Municipalities, may apply to the Environmental Protection Agency for a federal grant of 75% and a state grant of 15% to cover eligible costs of their wastewater treatment improvement needs. Eligible costs are those for treatment plants or major sewer interceptors. However, in Minnesota in FY 1975, there are 450 communities which need improvement, but there is only enough money available to build the first 12 projects on the Municipal Needs List.

Non-Point

Preliminary work is being done on other problems affecting water quality, and in the future these areas will receive greater emphasis. Briefly, these problems are:

Area sources of pollution. These are sources that are difficult to pinpoint; and are hard to measure and control. They are often called "Non-Point" sources of pollution, which distinguishes them from "point sources". Some common examples of "Non-Point" pollution are farms and orchards which use fertilizers and pesticides that eventually wash into waterways; farms, construction sites and burned-out or improperly managed forests which cause sedimentation through erosion of the soil. Mining and oilfields contribute acids and other chemical compounds. Areas that rely on septic tanks also yield nutrients which seep into lakes and streams.

At the present time, knowledge is lacking for "Non-Point" water pollution. After 1977, when the preliminary goal of controlling pollution from "point sources" is progressing, attention to non-point sources will become greater. Non-point sources must eventually be controlled due to the effect they have in contaminating surface and groundwater and clogging lakes with excessive plant growth. The Environmental Protection Agency is now researching different techniques of restoring lakes and preserving essential groundwater supplies.

The Minnesota Pollution Control Agency is in the process of classifying lakes in Minnesota as to eutrophic conditions through its Clean Lakes Program.

Public Participation and M.A.P. Program

The 1972 Act requires that the public has the opportunity to participate in all aspects of the water program. Public participation is guided by one principle: the earlier people get involved the better. If ideas are received during the initial planning process, the outcome will more directly reflect the preferences of the citizens involved. Citizens can also become involved in water pollution cleanup by working on a particular problem important to their own community. They can check on the progress made by local industries and treatment plants in cleaning up their discharges. And, of course, they can pass their knowledge on to others who are less well-informed.

This past summer, several environmental groups and public interest groups in the state decided to help in this clean-up and they sponsored a project called Minnesotans Against Pollution (M.A.P.). They are hoping to involve interested citizens in every part of the state in this program.

Briefly, any local citizens or groups who want to participate will receive a segment map and advice on how to use the map to check the rivers and lakes of the area. Known dischargers will be located on the map.

If you are interested in more information, write to MPIRG, The Minnesota Public Interest Research Group, who is serving as the clearinghouse for requests for the environmental groups.

PHYSICAL ENVIRONMENT/MINNESOTA HORIZONS

By

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Water Resources Planning

One element of the physical environment which has received less attention lately, but which will become increasing critical as the state continues to grow and develop, is water. Unlike its land, the waters of Minnesota belong to the state, and are subject to its control, and you have just heard the representatives of several state agencies. Water rights in the state are riparian rights to reasonable use only, as may be specified by court decision or statute. The public ownership of water resources places a great responsibility on those in state government, as trustees, to provide for the wise management of this resource.

Minnesota, as you have no doubt been reminded on many occasions, is a water-rich state. Its 15,291 lake basins of greater than 10 acres cover 4.8% of the state's area. If our streams and rivers, which include the headwaters of the Mississippi, were laid end to end, they would circle the globe. And the potential yield of our groundwater resources has not even been fully determined yet. In the midst of such abundance, accompanied until recently by the relatively low level of demand for water resources generated by a small population and a moderate standard of living, there is always a temptation to believe that systematic management of the resource is a luxury rather than a necessity. As long ago as 1947, the Legislature directed the preparation of a plan for the development, use and conservation of the state's water resources; today, nearly 28 years later, we are still without one.

In the intervening years, the state's population has increased by about 27%, the water-intensive sectors of the economy--agriculture, mining and manufacturing-- have expanded and we have attained a much higher standard of living. Such economic and population growth translates into sharply increased demands on our water resources, demands which will continue to grow with the state. We face no overall shortage of water to meet our demands in the forseeable future. However, an uneven distribution of usable water and the emerging settlement pattern in the state create a competitive situation among potential uses, resulting in shortages, or overuse which manifests itself in the deterioration of water quality. This becomes inevitable in some areas, unless actions are taken either to meet or modify demand. Such conflicts, pointing to shortages, may develop in the Twin Cities, Iron Range and Worthington areas by 1980. Deterioration of water quality, from overuse of surface and ground waters for the dilution of waste materials, is already a

serious problem, and one which we are thus far treating only symptomatically. Earlier, we discussed the possible expansion of natural resource based industries to provide jobs and incomes. The stepping up of agricultural production, particularly by irrigation, will require water and, incidentially, energy--energy which most likely will be generated at a water-cooled power plant. The expansion of the taconite industry, and the development of copper-nickel mining, should it prove feasible, will require large amounts of water. Moreover, the nation may decide that the worldwide food and energy shortages should be remedied in part by development of Western coal reserves and acceleration of irrigation developments in the Dakotas. Minnesota would then be under strong pressure to provide water, directly or indirectly, to cover deficiencies in Missouri Basin supplies which such simultaneous agricultural and energy production requirements would cause. And this list of new and potentially conflicting demands on our water resources could be continued.

You will now be expecting me to say that what we need is a plan. That is true, but, as in land use planning, we must first define and adopt a comprehensive and consistent set of water resources planning policies to guide our operational water management programs. Water management responsibilities are dispersed among a multiplicity of agencies at all levels of government. A recent study of water resources administration in Minnesota, conducted by the Water Resources Research Center at the University of Minnesota, revealed that in 1970, in addition to Special-Purpose Districts, County Boards, District Courts, Port Authorities and Municipal Agencies, there were 21 state, 5 international, 5 regional, 4 interstate, 4 federal-state and 30 federal organizations with water and related land resources programs, not to mention 53 interest groups. Annual state and local outlays were about $26 million, and staff complements associated with these programs totaled 1400. Federal outlays were $75 million a year, and about 1300 federal employees with assignments pertaining to the planning, development and management of water and related land resources were stationed in Minnesota.[1/] Thus, the resources--in dollars, time, and skills--available for water resources management through existing state programs alone are sizable. The authorities provided state agencies with major roles are in most cases adequate. Each participant ought to play a part in shaping as well as carrying out a comprehensive state water resources plan; like the football team, however, their best efforts will be ineffective, if not actually counter-productive, without clearly-signalled, well-understood plays--or planning policies.

Several years ago in an effort to foster public and legislative debate, the Water Resources Coordinating Committee--whose functions have been taken over by the Minnesota Water Resources Council--composed a list of 10 major water resources policy issues requiring resolution prior to completion of a comprehensive water resources management plan. In question form, the issues are as follows:

1/ William C. Walton, Water Resources Administration in Minnesota, 1972, WRRC Bulletin 49, Minneapolis, 1972, p. 5.

Should the state endorse and promote federal-state regional framework water and related land resources plans which have been prepared largely to date by federal agencies acting as representatives of the Souris-Red-Rainy River Basins Commission, Great Lakes Basin Commission, Upper Mississippi River Comprehensive Basin Study Coordinating Committee, [illegible], and Missouri River Inter-Agency Committee?

Should the state endorse federal-state plans in which the impacts of programs and projects on the state's environment have not been adequately identified and analyzed?

Should the state endorse federal-state plans which are predicated on the planning policy that further development of both urban and rural flood plain areas is to be encouraged by installing dams and other structures to reduce existing and potential flood plain damages?

Should the state endorse federal-state plans which are predicated on the planning policy that Minnesota will store flood waters behind a series of large dams on the Mississippi and Minnesota Rivers in part thereby:

- Permitting further development of flood plain areas along the mainstem of the Mississippi River downstream from the state.

- Providing low-streamflow augmentation for pollution control along the mainstem of the Mississippi River downstream from the state.

- Providing low-streamflow augmentation for navigation purposes on the Mississippi River and Missouri River beyond the border of the state?

Should the state endorse federal-state plans which are predicated on the planning policy that the U.S. Bureau of Reclamation should divert large quantities of water from Minnesota and the Rainy River to irrigate large tracts of land in North Dakota and to dilute return flows from authorized irrigation projects in North Dakota which will cause a serious water-quality problem when they discharge into the Red River?

Should the state endorse federal-state plans which are predicated on the planning policy that secondary treatment of wastes will be deemed adequate during the next 50 years and that most future water-quality problems will be solved by providing low-streamflow augmentation through dams and reservoirs constructed by the U.S. Army Corps of Engineers and U.S. Soil Conservation Service?

Should the state endorse federal-state plans which are predicated on the planning policy that water-borne transportation should be further fostered subsidized and expanded in part by deepening the navigation channel to 12 in the Upper Mississippi River grom 9 to 12 or possibly 15 feet at and extending the navigation channel with a 9-foot depth up the Minnesota River to Mankato?

Should the state endorse federal-state plans which are predicated on the planning policy that most future water supply problems will be solved by utilizing surface water impounded behind federal dams?

Should the state postpone acceptance or rejection of federal-state plans until impacts on the environment of recommended programs and projects are carefully analyzed and the state decides what regional responsibilities are reasonable for Minnesota to accept?

Should the statewide framework water and related land resources plan be predicated on the following planning policies?

- Declare environmental quality and protection as the number 1 priority in selecting programs and projects.

- Keep impacts on the environment to a minimum in selecting programs and projects.

- Keep federal influence on state policies to a minimum in selecting programs and projects.

- Do not fully accept regional responsibilities associated with reducing by structural means flood damages beyond the boundaries of the state, providing low-stream flow augmentation for pollution control and navigation purposes beyond the boundaries of the state, and diverting water from the state to irrigate lands in North Dakota.

- Solve existing and future flood damage problems chiefly through non-structural measures, such as reasonable flood plain zoning, flood proofing, etc., and by constructing local protection works such as levees, floodways, and channel improvements.

- Solve existing and future pollution problems chiefly through construction of advanced waste treatment plants and limited low-streamflow augmentation.

- Restrict navigation improvements within the state on the Upper Mississippi River to maintenance and improvement of existing 9-foot channel and associated structures.

- Select recreation programs and projects tailored to the state's landscape regions.

These policy questions, unfortunately, elicited little response, and no legislative action, for which water resources planners in the Executive Branch must bear most of the blame. The questions were premature; we failed to provide an indication of the alternative sets of possible answers, and to spell out their significance for the future of the state. Nor did we adequately illustrate the effects of future growth and development decisions on the demand for water resources, the problems that would be created, and therefore the urgency of the questions posed.

Over the next year, the Minnesota Water Resources Council will be preparing an extended policy options paper for presentation to the Governor and Legislature. It will be an attempt, in less than 100 pages of non-technical language, to provide a coherent and useful framework within which the significance and urgency of the questions posed earlier will become clear, and informed debate among the public and governmental officials arise. Specifically, the topics to be addressed are:

1. The possibilities and limitations of our water resources supply;

2. Probable future imbalances in supply and demand (used here in a broad sense, to include a quality factor) for water resources under varying assumptions about settlement patterns, and the relative priorities which the citizens of Minnesota will assign when the objectives of economic development and environmental quality are in conflict.

3. The broad policy options--adjustment of water supply and management of demand--available to the state to correct or prevent supply/demand imbalances, and the range of water resources management "tools" for implementing the desired options;

4. The areas in which data is lacking or unreliable to permit understanding of the consequences of the resource management policies we may adopt.

The analytic technique we will be using to illuminate the relationship between water resources policy options and the future they will help to shape, is the projection of several "possible futures." "Possible futures," as we define the term, are broadbrush descriptions of the future conditions which possible levels and directions of economic and population growth could bring about. Each future is based on a different set of assumptions about the settlement pattern which will prevail--dispersed or concentrated--and the relative importance of economic development and environmental quality to Minnesotans. The points at which the future conditions created by these assumptions will be examined are 1985 and 2000. In the definition of these possible futures, we will be working closely with the Commission on Minnesota's Future.

One point should be borne in mind about the nature of these possible futures; they are not goals or prescriptions; rather they are aids in assessing potential future demands on our water and related land resources and benchmarks against which to measure the future effects of the policies we may choose now to guide us in solving our water resources problems. The future toward which Minnesota may actually move as a result of these actions of its citizenry, individual and collective, may be quite different than any described in the policy framework. These possible futures are like harbor bouys--markers, not determinants, of our course.

Through examination, then, of the water resources problems--the conflicts between demand and supply of water resources--which would be created by each future, and those common to all, we hope to define alternative sets of water planning policies appropriate to various views of the future. Each set of policies will represent a different set of answers to the questions posed by the coordinating committee.

For the time being, we ask your patience while we develop our policy framework. When it is completed, it is the hope of the Minnesota Water Resources Council that you, and every other interested citizen or public official in the state, will be able to review water resources policy issues presented, select planning policies consistent with his or her desires for the future of Minnesota, and debate intelligently a neighbor's choice. Indeed, we hope there will be widespread and vigorous debate, out of which a consensus on major issues, embodied in a legislative policy statement, will emerge.