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ENVIRONMENTAL QUALITY, POLICIES  
AND DECISION-MAKING  
IN MINNESOTA -- 1973. (12 1973)

A report by

The Citizens Advisory Committee  
Governor's Environmental Quality Council

December 1972.

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ENVIRONMENTAL QUALITY,  
POLICIES, AND DECISION-  
MAKING IN MINNESOTA -  
1972

A Report  
Prepared by  
Citizens Advisory Committee  
Governor's Environmental  
Quality Council

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## INTRODUCTION

Information on the environmental quality of Minnesota is widely scattered in the literature; a statewide appraisal of the status and trends in environmental quality does not exist. Environmental problems, issues and possible solutions have not been inventoried on a comprehensive basis. Numerous fragmented governmental agencies and private organizations are experiencing difficulties in making environmental decisions. The Legislature has discovered that formulating environmental policies is no easy task. There is much debate concerning the relationship among population, economic and technology growth and environmental quality degradation.

This report attempts to assess environmental quality, policies and decision-making in Minnesota as of 1972. Available information concerning the following subjects is briefly summarized: environmental quality issues, State environmental policies, environmental education, environmental information system, environmental law, forces influencing environmental quality conditions, land use, energy, solid wastes and recycling, water supply, water pollution, air pollution, recreation, fish and wildlife, flood damages, minerals and mining, transportation, land treatment, drainage, irrigation, and environmental administration. Recommendations are made which hopefully will assist the State in coping with environmental concerns.

This report was prepared by the Citizens Advisory Committee of the Governor's Environmental Quality Council based on a 146-page report prepared by the State Environmental Policy Subcommittee of the Committee and adopted by the Committee on December 21, 1972. Information concerning these organizations and the work of the Subcommittee follows.

### Environmental Quality Council

An Environmental Quality Council was established by Governor Anderson on April 5, 1972. Creation of the Council was a recognition of the necessity in State government to provide continuous, comprehensive evaluation of the impact of social activity and technological change on the human and physical environment. Because of the multitude of institutions, public and private, that variously affect the quality of human life and the natural environment, no single State department or agency exerts a major influence on environmental policy and planning. It was therefore appropriate to establish an inter-departmental structure to consider the policies and planning of the State of Minnesota on matters pertaining to environmental protection and enhancement.

Members of the Environmental Quality Council are the Governor, the Director of the State Planning Agency, the Director of the Pollution Control Agency, the Commissioner of the Department of Natural Resources and the Commissioner of Highways. The Chairman of the Council is the State Planning Agency Director. The Environmental Quality Council has the following purposes: to provide



guidance and recommendations to the Governor and State departments and agencies in policy matters pertaining to the environment, particularly those matters that are inter-departmental in nature; to recommend State policy on significant environment issues; and to provide a forum for governmental bodies and the public to identify and discuss issues of environmental concern.

The Council operates with the following considerations:

1. Any powers of the Council are those vested in the respective State agencies on the Council.
2. The Council's operating agenda is agreed upon by a consensus of its members. Any and all agenda item deliberations are based on the need to:
  - a. identify policy where no policy may exist or where conflicting policies exist, and
  - b. define and recommend policy when such action will be helpful or necessary to enhance and/or protect the quality of human life and the natural environment of Minnesota.
3. The Council assesses those provisions of Minnesota Statutes that tend to affect environmental quality and determine the necessary administrative and substantive revisions or additions and recommends these legislative proposals to the Governor.
4. The Council encourages the involvement of all governmental and community groups in its operations and is structured to be a forum for public discussion of issues being considered by the Council.

The Council's method of operation is determined by a consensus of the members. Research and other operations necessary to serve the Council are conducted by the Council staff at the direction of the members. Members of the Council designate a staff person to coordinate all research and other activities in their department pursuant to the request of the Council. All State departments and agencies designate a Staff person as liaison for the respective department with the Council. The Council is authorized by the Governor to establish single-purpose task forces as the situation warrants.

The Council meets at the call of the chairman. All meetings are open to the public. Discussion and agenda items are limited first to Council members and then open to those in attendance at the meeting. The Council hired an Executive Secretary and other immediate staff. Each member of the Council designated a representative to a Technical Committee. Each department and agency of State government designated a liaison person to the Council. Other governmental agencies are requested to designate a contact person to the Council.



The Council established a system to refer for comment the agenda and minutes of each Council meeting. This system encompasses a current listing of all governmental agencies, interest and citizen groups and individuals. Comments by said organizations or individuals are incorporated into the records of the Council. A reasonable time limit is imposed for those desiring to comment on the Council agenda and minutes.

Those governmental agencies, citizen or other groups, wishing to make presentations to the Environmental Quality Council must request time of the Executive Secretary at least two weeks before a scheduled meeting. Members of the Council determine whether said request will be honored; the Citizens Advisory Committee is asked to hear presentations on occasion and recommend action to the Council.

The Environmental Quality Council, as an inter-departmental advisory body to the Governor, centers its operations on those programs and policies of State government pertinent to more than one department or of long-term consequence to the State of Minnesota. Matters within the province of a single department or other level of government are referred to that organization for its attention.

#### Citizens Advisory Committee

A Citizens Advisory Committee to the Environmental Quality Council was established on April 13, 1972. The Citizens Advisory Committee was appointed by the Governor as a broadly representative group of citizens with a wide range of backgrounds and expertise. The Committee advises the Council regarding its deliberations, suggests items for consideration, reacts to Council proposals, and acts as a communication device with the various geographical interests and professional groups it represents. The Committee meets periodically and receives staff assistance from the Executive Secretary of the Council. The Committee, at the request of the Council, hears presentations by community and interest groups and conducts outstate hearings on questions of environmental concern. When deemed appropriate by the Council and to assist in the investigation of a matter before the Council requiring particular expertise or interest, the Council, in consultation with the Committee, appoints single-purpose task forces to consider a particular matter. Each task force reports to the Council which forwards said reports to the Committee for review and comment. The individual expertise of Committee members are utilized by the Council when appropriate.

The following people are Committee members:

Dean E. Abrahamson - Minneapolis  
Mel Bates - Minneapolis  
John P. Borchert - Scandia  
Harold Butler - Austin  
Lawrence Carlson - Anoka



Richard E. Carman - Wadena  
George Daley - Lewiston  
Charles K. Dayton - Minnetonka  
Janet Garrison - Minneapolis  
Burton Genis - Minneapolis (Chairman)  
Joseph F. Grinnell - Edina  
Lowell Hanson - New Brighton  
James Jack - Mankato  
Sue Meister - Scandia  
Louis Moore - Minneapolis  
Gladys Morton - St. Paul  
Charles Reinert - Garvin  
Russell Schwandt - Sanborn  
Glen A. Sherwood - Pine River  
Barbara Sipson - Moorhead  
Steve Thal - Watertown  
Richard L. Towey - Rochester  
Edward Trevis - Burnsville  
William Walton - Minneapolis  
Dave Zentner - Duluth

#### State Environmental Policy Subcommittee

A State Environmental Policy Subcommittee was established by the Citizens Advisory Committee on August 14, 1972. Members of the Subcommittee are: Glen Sherwood, Harold Butler, Charles Dayton, Janet Garrison, James Jack, and Bill Walton (Chairman). Ron Way, Executive Secretary of the Environmental Quality Council, provided secretariat services for the Subcommittee. The first responsibility of the Subcommittee is to review all available information concerning environmental policies and institutional arrangements in Minnesota and to make recommendations concerning needed environmental policies, improvements in implementing policies, and environmental legislation.

This report was prepared by the Subcommittee for the consideration of the Citizens Advisory Committee and summarizes available environmental quality information and conclusions and recommendations reached by the Subcommittee. Hopefully, the Citizens Advisory Committee, after careful review and possible revision, will adopt this report and widely distribute copies throughout Minnesota.

The Subcommittee held 8 meetings on the following dates: September 14, 28; October 12, 26; November 16, 27, 30; and December 1, 1972. Personnel from State agencies, universities and colleges, and interest groups presented information during the first 6 meetings. This information was summarized in 7 packages involving over 500 pages and distributed to Subcommittee and Committee members. Information scanned by the Subcommittee covered at least 5,000 pages in 10's of documents (see references). Some additional information was received during meetings of the Citizens Advisory Committee and Governor's Environmental Quality Council.



Members of the Subcommittee and Committee were solicited for possible statements which should be considered for inclusion in this report. The Subcommittee prepared this report during the period November 30, December 1, 1972, based on the 7 packages of summarized information and suggested statements. Hopefully, the contents of this report will assist the Legislature in passing meaningful environmental quality legislation during its 1973 session and lead to changes which will make State government more effective in enhancing environmental quality.

Members of the Subcommittee came to meetings with a general understanding of the environmental crisis and an awareness that the degradation of the environment must be checked. The first task of the Subcommittee was to screen the vast amount of information generated by the environmental movement during the late 1960's and early 1970's and set aside for later study information relevant to Minnesota's situation. Although attention was devoted to the relation of Minnesota's problems to world problems, emphasis was placed on topics directly concerning the State's environmental quality. Because of time constraints, the Subcommittee had to concentrate on broad policy matters; it was possible to give detailed policy matters only slight attention.



## ENVIRONMENTAL QUALITY ISSUES

The Committee finds that a significant number of environmental quality issues require action at all levels of government to stop the erosion of the quality of life in Minnesota. The State is indeed "land and water rich" and is fortunate to be tackling environmental quality issues before all natural resources are truly under crisis pressure. In some areas, a crisis already exists.

The Committee recommends that the State address more effectively key environmental quality issues and seek successful resolution of controversies in part by setting and implementing policies. Key environmental quality issues are associated with at least the following matters: multiple use policy of forests; overintensive use of recreation lakes and shorelands; increased demand for exclusive resource use; metropolitan area open space needs; flood plain management; wetland management; fish and wildlife management; water diversions from the State; preservation of unique natural areas; water pollution; air pollution; excessive noise; watershed management; solid waste management and materials recycling; expansion of waterborne navigation; mineral development; transportation facilities; power plant siting and transmission line corridors; pipeline location; energy production, use and conservation; pesticides; fertilizers; chemicals and food additives; information systems; public institutional arrangements; and population and economic growth.

Many of these issues revolve around land use. Decisions about the use of land significantly influence the quality of the environment and the welfare of the inhabitants of the State. State and local institutional arrangements and programs for planning and regulating land use are inadequate. Important ecological, cultural, historic, and aesthetic values in areas of critical environmental concern which are essential to the well-being of all citizens are being irretrievably damaged or lost. Shorelines and wetlands, floodplains, and other lands near or under major bodies or courses of water which possess special natural and scenic characteristics are being damaged by ill-planned development that threatens these values. Certain kinds of land uses such as major airports, highways, power plants and transmission line corridors, major industrial or extractive activities and certain kinds of urban and recreational development, degrade the environment and result in a loss of social, economic, and environmental values of more than local concern.

The development and implementation of plans, standards, and programs for the control of air, water, noise, and other pollution are impeded. A lack of coordination between agencies and levels of government in the regulation of development and in the location of facilities is resulting in conflict and inefficiency in the use of economic and environmental resources. The Committee recommends that the State develop and implement land use and environmental policies, plans, and standards for the State as a whole and for



major regions thereof through a coordinated, unified program of planning, land acquisition and development, and land use and environmental control.

## FORCES INFLUENCING ENVIRONMENTAL QUALITY

The Committee finds that forces which influence environmental quality in Minnesota include population, economic, and technology growth. Similarly, such growth influences the quality of social and political life. The nature of the interactions among aspects of growth and the quality of life and environment is now the subject of considerable and important local, State, national and international debate. At the risk of oversimplifying, major dimensions of this debate were identified by the Committee.

At the core of the debate is the realization that society must shift its mode of thinking and analysis from the traditional lineal approach, characterized by tunnel vision, to a broad and integrative approach, in which society examines complex interactions among multiple factors. It is argued that this approach, often termed "systemic", will enable society to determine which factors block accomplishment of desired goals, and that it will also help society anticipate and avoid undesirable and previously unexpected consequences of specific actions. Three recent or forthcoming books which discuss systemic thinking are: *World Dynamics*, by Jay Forrester of MIT, 1971; *Habit and Habitat*, by Robert Theobald, Prentice Hall, New York, 1972; and *Lifeway Leap*, *The Dynamics of Change in America*, by Luther P. Gerlach and Virginia H. Hine, University of Minnesota Press, February 1973. Each book describes ways of thinking about the manners in which factors interweave in the tapestry of life. The first two books stress the need for systemic thinking, which the latter discusses the probable impact of systemic thinking.

Because of their different backgrounds, different methodologies, and in some cases different ideologies, people using various systemic approaches do not always come up with the same conclusions about the consequences of specific interactions, or they call attention to different types of consequences and stress the dangers of one consequence more than others.

The debate over the impact of growth on environmental quality and society is powered by such differences. Some persons feel that continued exponential economic, technological and population growth is not only undesirable, but is not possible and that if nations persist in attempting to grow, they will not survive. For example, *The Limits to Growth* by D.A. Meadows, D.L. Meadows, J. Randers, and W.W. Behrens, 1972, Universe Books, New York, contains the results of studies conducted by researchers at the Massachusetts Institute of Technology for a group of international industrialists and planners known as The Club of Rome. Their report predicted that: "If the present growth trends in world population, industrialization, pollution, food production, and resource depletion continue unchanged, the limits of growth on this planet will be reached sometime within the next 100 years. The most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity."



In contrast, other people warn about the social, political, psychological and economic consequences of curbing growth significantly. Lester R. Brown, of the Overseas Development Council, (see his review of the Limits to Growth Book in The Saturday Review of Literature, Spring, 1972) for example, warns of the impact of no-growth policies on balance of payments problems and on the ability of the "have" nations to help the poorer nations. The "underdeveloped" nations themselves fear that no-growth policies are merely attempts by the big nations to perpetuate their domination.

Various observers in the nation have explained that no-growth policies will lead to unemployment and that this in turn will lead to serious problems of income distribution. Anthony Wiener and Herman Kahn of the Hudson Institute (see Wall Street Journal, Spring 1972) have not only warned of these difficulties, but have explained that new technologies will provide the nation and other societies with capacity for continued growth, increasingly fairer distribution of affluence, and funds to fight pollution. John Maddox, in his article "The Domsday Syndrome" (Saturday Review of The Society, November 1972, pp. 31-37), complains that the Limits to Growth writers do not seem to understand the way economic forces will lead to development of new resources with less negative environmental impact.

Some people feel that population growth is at the root of all of our problems, and that population growth forces a runaway kind of economic expansion, unwise use of technology, and exploitation of the environment. Paul Ehrlich (see The Population Bomb, Ballantine, New York, 1968) is well known as an exponent of this approach. Another view of the impact of population growth is expressed in the report of the President's Commission on Population Growth and the American Future (1972, Signet, Signet Classics, Signette, Mentor and Plume Books, New York). The Commission covered a wide range of subjects but stressed that "There is hardly a social problem confronting this Nation whose solution would be easier if our population were larger and that a stable population, rather than having any harmful effects, would help solve many public problems." For various reasons persons as diverse as President Nixon and the Reverend Jesse Jackson have either not endorsed the views of the Commission or have criticized them.

While indicating that many factors influence the human "assault" on the ecosystem, Barry Commoner, in his new book The Closing Circle, Bantam Books, New York, 1972, implies that the key factor is a faulty productive technology and the scientific background to such technology. This has brought him sharp criticism from those scholars who feel that technology is more a consequence than a root cause. Predictably, he has been criticized by Paul Ehrlich (and Ehrlich's associate, John Holdren) for not giving due recognition to the primacy of the population factor.

The debate between Commoner and Ehrlich-Holdern has been carried in the Environment Magazine.

All of the publications mentioned above are pioneering in the degree to which they attempt to deal with a large number of interactions relating to environmental quality. The reports are being widely debated throughout the nation. Some of the statements in and about these publications which deserve special attention are provided below.

The Committee recommends that further debate in Minnesota concerning population, economic and technology growth be encouraged so that the consequences and causes of alternative decisions and policies can be better known and understood by the public and its government. In addition to the traditional forums of legislative hearings, citizen commissions and agency procedures, the State should establish or facilitate a formal organization or system to accomplish the above objectives.

#### The Limits to Growth

The Club of Rome report, the Limits to Growth, is based on a computer model of the interactions among five basic factors - population, pollution, industrialization, food availability, and resource availability. Starting from an aggregate description of the world in terms of these five factors, the model traces for about 100 years the implications of the interactions of these factors. The key factor influencing the behavior of the model is the assumed exponential growth of population, pollution, and industrialization as opposed to the assumed linear growth of the availability of food and resources. The Club of Rome model projects that, if current policies are continued, there will be a disastrous future caused either by the exponential increase in population or the failure of resources and food supply to keep pace with population and economic growth.

Two contrasting viewpoints concerning the Club of Rome report are provided below. The first viewpoint is shared by members of the MIT team and the second viewpoint takes the position that the Club of Rome report loses credibility because of its failure to acknowledge man's creative ability to solve problems.

According to the first viewpoint, the initial simulation of the world model, using the best available data describing present global conditions and trends, indicates that the dominant behavior mode of today's world system is pointed toward overshoot and collapse. In this simulation, which assumes no major changes in the physical, economic or social relationships that have governed development of the present world system, population rises until the early 21st century, after which it declines rapidly. The population declines because of rising mortality as stocks of non-renewable resources are depleted, thus reducing the capital base for services, industry and agriculture.



Can technological solutions to these global problems avoid the overshoot and collapse mode and yield a more satisfying, long-term global behavior? Consider, for example, the consumption of nonrenewable resources that led to a declining capital base for the food and service needs of a growing population. One might suggest that this is a problem susceptible of technological solution - that is, greater recycling of materials, greater substitution of new materials for old as the old becomes scarce. Suppose, therefore, that the world system is simulated so that the problem of rapid depletion of nonrenewable resources is technologically "solved" by increasing the available stock of resources twofold and reducing the rate of resource depletion fourfold beginning in 1975. This technological advance pushes the limit to population and capital (industrial) growth back, allowing both to grow to a higher level and farther into the future. However, this advance alone is insufficient to prevent the overshoot-and-collapse behavior - which, again, comes well before the end of the 21st Century. The reason: as capital grows further on its resource base, so also does pollution, until the negative effects of pollution on food production eventually arrest growth.

Suppose, then, that technology also can provide for pollution control by 1975 that is four times as efficient as that known today. Again, the computer simulation shows that the effect of technology is to allow growth to continue even further - perhaps up to the end of the 21st Century. Nevertheless, overshoot and collapse again is reached as population increases to the point that its demands for food cannot be met, and mortality rises. To meet this crisis, assume that agricultural productivity can be doubled. Here the simulation shows that the attempt to achieve a technological solution to one problem (declining food per capita) brings about a new problem: rising pollution from increased use of fertilizers and pesticides. Eventual collapse occurs, once again well before the year 2100.

Finally, in an effort to lift the limits to growth, the MIT team added the availability of effective birth control to the other three technological solutions. The simulation result still is an end to growth before the year 2100. In this case, growth is stopped by three simultaneous crises. Overuse of land leads to erosion, and food production drops. Resources are severely depleted by a prosperous world population whose average income per capita has grown to nearly the present U.S. level. Pollution rises, drops and then rises again dramatically (the result of continued industrial growth), causing a further decrease in food production and a sudden rise in the death rate. Technology, thus, can increase productivity; in the short term, technology can lift the limits to growth. However, technology cannot sustain growth indefinitely.

There may be other viable alternatives to the overshoot-and-collapse behavior characteristic of the present world system. One such alternative is the steady-state world, in which population and capital are constant, fed by small birth and investment

rates. Achievement of such a system cannot be described by technological solutions - by hardware - alone, but by a combination of technological and social solutions - by hardware and software. A computer simulation of the steady-state world indicates the direction. Technological changes include resource conservation and pollution control - but in addition several social changes are implemented. There is an increased demand for services and food, and an increased allocation of capital toward services and agriculture and away from reinvestment and consumption. There is an increase in the lifetime of capital, that is, greater reliance on durability and repairability and less emphasis on turnover and consumption. Finally, desired family size is reduced from four to 2.2 children per couple. The results of this simulation: a strongly rising agricultural service sector, a stable population and a modestly rising industrial output.

What role does technology play in a steady-state or very slowly growing world? When software has brought mankind into balance with his environment, hardware can perpetuate that state. In this state, alternatives made available through new technology can be rationally selected or rejected so as to raise the standard of living. In the growth mode, however, technology is used to avoid the limits to growth. Technological solutions must be implemented too quickly to keep pace with growth, and therefore are often implemented faultily or carelessly, without concern for long-range consequences. In the steady-state mode, technology is not used to meet short-term pressures, but to choose between alternatives which have long-term acceptability.

The second viewpoint takes the widespread position that *The Limits to Growth* is an anti-technology document that loses credibility because of its failure to acknowledge man's enormous facility for finding imaginative approaches to our problems. According to the second viewpoint, in our own generation we have seen a magnificent explosion of new technology which proposes to free mankind from all routine labor and from the limitations of this earth. We stand at the threshold of an age in which want, ignorance and disease can be controlled to the point where they will no longer dominate human history. It is not surprising that the imminence of these great advances has provided a new outpouring of reactionary literature which again seeks to persuade us that man is incapable of these heights. We are given the proposition that the earth is finite and that mankind's future will be increasingly restricted by the exhaustion of the earth's resources and by pollution of the environment.

The future need not be grim if man continues to use his greatest faculty, namely his creativity. People like Malthus or the authors of *The Limits to Growth* are very careful never to mention man's creativity, never to acknowledge his enormous facility for finding imaginative approaches to our problems. If there is anything to be deduced from *The Limits to Growth*, it is that



man's creativity will be as important to his survival as a species in the future as it has been in the past.

There are many good reasons to fear the direct effects of advancing technology. The fear of nuclear weapons is so deep that most people now regard discussion of nuclear weaponry as obscene. The fear that a computerized society will destroy human values is more widespread than it is articulate. Possibilities just beyond the present capabilities of science, such as genetic surgery, offer opportunities and consequences difficult to imagine. Of all the frightening aspects of technology, the most frightening is its unpredictability.

However, there is a second kind of effect, the indirect effect of technology - the side effects, the environment problems, resource exhaustion. There are those who say that these have done more than the direct effects to provoke reactions against advancing technology. Significant changes will be necessary to preserve the environment; these changes are not as large as those necessary to accomodate to the enormous direct effects which new technologies have created and will create in the future. Dealing with the direct problems calls for great social growth. Thus, for example, it will be necessary for mankind to grow to the maturity required to make nuclear war unthinkable. Perhaps part of this growth has been occurring in the last quarter-century. The indirect problems do not represent insuperable challenges as long as we maintain a vigorously growing technology.

The principal difficulty in the way of applying our massive technology to the maintenance of an attractive environment lies in the difficulty of assessing the truth in the presence of highly emotional statements. The growing pollution crisis does indeed raise fundamental questions about technology - its direction, uses and future. But the relationship between technology and the environment is hardly as simple as much antitechnological rhetoric would have us believe.

#### Population Control

The Population Commission report concludes that no substantial benefits will come from the continued growth of U.S. population. The Commission's summary of its findings states that: "the Commission believes that the gradual stabilization of population - bringing births into balance with deaths - would contribute significantly to the Nation's ability to solve its problems, although such problems will not be solved by population stabilization alone. It would, however, enable our society to shift its focus increasingly from quantity to quality. The Commission also finds that population stabilization would reap important economic benefits. Even if immigration from abroad ceased and couples had only two children on the average - just enough to replace themselves - our population would continue to grow for about 70 years. At that time, the U.S. population would be about one-third larger than it is now. In other words, because of the current size and

age composition of the population, there is a minimum time lag of 70 years between initiating a stable population policy and the actual achievement of a stable population level.

"The size of a nation's total population is not literally irreversible. Population could be reduced by war, famine, or disease. But given the undesirability of that trilogy, the level of population is largely irreversible when viewed from a public policy standpoint. Small declines may take place due to natural decreases in birth rates, but there are no examples of a nation experiencing marked declines in overall population because of lowered birth rates. The current rate of world population growth poses the basic issue of rapidly accelerating demand pressing on the limits of a finite planet. But with population, as with so many of the world's basic problems, the planetary distribution of difficulties is very uneven. The population problem in Bangladesh or India differs sharply in degree and impact from the population problem in the United States. The world ecology is overlaid and at the present time largely submerged by political considerations. One of the key uncertainties of the future is the extent to which national boundaries will continue to serve as barriers for maintaining the present uneven distribution of problems and resources.

"The overall implications of urbanization are complex. It is often in urban areas that the most acute social and physical problems exist. Also, pressures on open space and public facilities and the necessity for very stringent local pollution controls are to accompany further urbanization. Nonetheless, at least up to a point, there are increased economic opportunities and economies of scale to be achieved through urbanization.

"Much of the debate about urbanization has centered on the question of density - usually meaning density of resident population. In the United States, national population density is increasing. But in many of the largest cities, the areas of highest residential density, the resident population is decreasing. Resident, or night-time density, however tells only a part of the story. Daytime, or employee, density is also critical to understanding the implications of urbanization. There are large and growing numbers of people who daily commute long distances to jobs in the central cities. The economic and physical forces that produce dense concentrations of jobs, and the resulting commuting, having many environmental implications.

"In the United States there is a Federal policy to slow down the inflow of population into large metropolitan areas. But the difficulty of successfully pursuing such a policy is illustrated by projections which show that population growth will increasingly be concentrated in metropolitan areas. Projected pattern of urbanization obviously will impact heavily on the quality and nature of life in the U.S. industrial activity, transportation, and the like will be centered in large, growing metropolitan areas. The encroachment of development on the countryside will



make it extremely difficult to preserve areas of critical environmental concern, such as wetlands, flood plains, and scenic areas. Given the environmental and other implications of urban growth patterns, and the length of time required to change such patterns, it is essential that we try to anticipate the problems of urbanization and deal with them before they become intractable."

Data on population growth in Minnesota, given below, should be viewed in context with the above statements concerning population growth. The population of Minnesota has been estimated at 3,576,000 in 1966 and 3,804,971 in 1970. The 1966 estimate represents an increase of 14,000 over the 1965 estimate and 162,132 over 1960. Minnesota is one of the most metropolitanized states of the North-Central region with a large portion of the State's population centered in the seven county area in and near the Twin Cities (Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington). Total 1966 population for this metropolitan area was 1,690,798 which represents 47.3 percent of the State's entire population. Population gain in the area was 165,471 or 10.8 percent for the six-year period 1960 to 1966.

Net population changes are the result of natural increase or decrease, i.e., rate of births to deaths, and migration. Beginning early in this century, Minnesota's birth rate has been one of a long-term gradual decrease. This reached and remained under 20 per 1,000 population during the 1930's. In the 1940's it rose to the low 20's and reached 26.1 per 1,000 in 1959. In recent years, an abrupt drop in birth rate has occurred reducing per 1,000 figures to 25.6 in 1960, 25.0 in 1961, 24.3 in 1962 and 22.7 in 1963. This drop appears to be continuing. The death rate for Minnesota shows a long-term gradual decline which has continued below 10 per 1,000 population in 1964. The remaining factor, migration, indicates that outward trends beginning in 1940 to 1950 continued into the 1960's.

Since the turn of the century, the density of Minnesota's population has nearly doubled, increasing from 21.9 people per square mile in 1900 to 42.7 people per square mile in 1960. This is compared to a density of 50.5 people per square mile found for the nation as a whole. Within the State, county populations as of 1960 had densities ranging from 2 per square mile in Cook County to 2,641 people per square mile in Ramsey County. The changing pattern of Minnesota's population includes a substantial rural-urban shift. Within Minnesota, the urban population increased at a rate of 2 percent per year and the rural nonfarm population grew by 1.2 percent annually over the period 1960 to 1965. At the same time, the rural farm population declined at a rate of about 4 percent annually.

#### Ecologically Unsound Technology

The book by Barry Commoner contains a chapter (pp. 138-175) entitled, "The Technological Flaws" which discusses ecologically

unsound technology. Some of the statements in this chapter are quoted below.

"While two factors frequently blamed for the environmental crisis, population and affluence, have intensified after World War II, these increases are much too small to account for the 200 to 2,000 percent rise in pollution levels since 1946. The product of these two factors, which represents the total output of goods (total production equals population times production per capita), is also insufficient to account for the intensification of pollution. Total production - as measured by GNP - has increased by 126 percent since 1946, while most pollution levels have risen by at least several times that rate. Something else besides growth in population and affluence must be deeply involved in the environmental crisis.

"While production for most basic needs - food, clothing, housing - has just about kept up with the 40 to 50 percent or so increase in population (that is, production per capita has been essentially constant), the kinds of goods produced to meet these needs have changed drastically. New production technologies have displaced soap by synthetic detergents; natural fibers (cotton and wool) have been displaced by synthetic ones; steel and lumber have been displaced by aluminum, plastics, and concrete; railroad freight has been displaced by truck freight; returnable bottles have been displaced by nonreturnable ones. On the road, the low-powered automobile engines of the 1920's and 1930's have been displaced by high-powered ones. On the farm, while per capita production has remained about constant, the amount of harvested acreage has decreased; in effect, fertilizer has displaced land. Older methods of insect control have been displaced by synthetic insecticides, such as DDT, and for controlling weeds the cultivator has been displaced by the herbicide spray. Range-feeding of livestock has been displaced by feedlots. In each of these cases, what has changed drastically is the technology of production rather than over-all output of the economic good. Of course, part of the economic growth in the United States since 1946 has been based on some newly introduced goods, air conditioners, television sets, tape recorders, and snowmobiles, all of which have increased absolutely without displacing an older product.

"In general, the growth of the United States economy since 1946 has had a surprisingly small effect on the degree to which individual needs for basic economic goods have been met. That statistical fiction, the 'average American,' now consumes, each year about as many calories, protein, and other foods (although somewhat less of vitamins); uses about the same amount of clothes and cleaners; occupies about the same amount of newly constructed housing; requires about as much freight; and drinks about the same amount of beer (twenty-six gallons per capita!) as he did in 1946. However, his food is now grown on less land with much more fertilizer and pesticides than before; his clothes are more likely to be made of synthetic fibers than of cotton or wool; he launders



with synthetic detergents rather than soap; he lives and works in buildings that depend more heavily on aluminum, concrete, and plastic than on steel and lumber; the goods he uses are increasingly shipped by truck rather than rail; he drinks beer out of nonreturnable bottles or cans rather than out of returnable bottles or at the tavern bar. He is more likely to live and work in air conditioned surroundings than before. He also drives about twice as far as he did in 1946, in a heavier car, on synthetic rather than natural rubber tires, using more gasoline per mile, containing more tetraethyl lead, fed into an engine of increased horsepower and compression ratio.

"Between 1949 and 1968 total United States agricultural production increased by about 45 percent. Since the United States population grew by 34 percent in that time, the over-all increase in production was just about enough to keep up with population; crop production per capita increased 6 percent. In that period, the annual use of fertilizer nitrogen increased by 648 percent, surprisingly larger than the increase in crop production. One reason for this disparity also turns up in the agricultural statistics; between 1949 and 1968 harvested acreage declined by 16 percent. Clearly, more crop was being produced on less land (the yield per acre increased by 77 percent). Intensive use of fertilizer nitrogen is the most important means of achieving this improvement in yield per acres. Thus, the intensive use of fertilizer nitrogen allowed 'agribusiness' to just about meet the population's need for food - and at the same time, to reduce the acreage used for that purpose.

"These same statistics also explain the resulting water pollution problem. In 1949, an average of about 11,000 tons of fertilizer nitrogen were used per USDA unit of crop production, while in 1968 about 57,000 tons of nitrogen were used for the same crop yield. This means that the efficiency with which nitrogen contributes to the growth of the crop declined fivefold. Obviously, a good deal of the fertilizer nitrogen did not enter the crop and must have ended up elsewhere in the ecosystem.

"What the new fertilizer technology has accomplished for the farmer is clear: more crop can be produced on less acreage than before. Since the cost of fertilizer, relative to the resultant gain in crop sales, is lower than that of any other economic input, and since the Land Bank pays the farmer for acreage not in crops, the new technology pays him well. The cost - in environmental degradation - is borne by his neighbors in town who find their water polluted. The new technology is an economic success - but only because it is an ecological failure.

"In marketing terms, detergents are probably one of the most successful of modern technological innovations. In a scant twenty-five years this new invention has captured more than two-thirds of the laundry market from one of man's oldest, best-established, and most useful inventions - soap. This technological displacement is typical of many that have occurred since

World War II, the replacement of a natural organic product by an unnatural synthetic one. In each case, the new technology has worsened the environmental impact of the economic good.

"In comparison with soap, the production of detergents is likely to exert a more intense environmental impact. Detergents are synthesized from organic raw materials originally present in petroleum along with a number of other substances. To obtain the raw materials, the petroleum is subjected to distillation and other energy-consuming processes - and the burned fuel pollutes the air. Then the purified raw materials are used in a series of chemical reactions, involving chlorine and high temperatures, finally yielding the active cleaning agent. This is then mixed with a variety of additives, designed to soften hard water, bleach stains, 'brighten' wash (this additive strongly reflects light and dazzles the eye to achieve a simulated whiteness), and otherwise gladden the heart of the advertising copy writer. Suitably boxed, this is the detergent. The total energy used to produce the active agent alone - and therefore the resultant air pollution - is probably three times that needed to produce oil for soap manufacture. And to produce the needed chlorine, mercury is used - and released to the environment as a pollutant. In substituting man-made chemical processes for natural ones, detergent manufacture inevitably produces a greater environmental stress than does the manufacture of soap.

"Textile production reflects another important displacement of natural organic materials by unnatural synthetic ones. Some relevant statistics: in 1950 in the United States about 45 pounds of fiber were used per capita by fabric mills. Of this total, cotton and wool accounted for about 35 pounds per capita, modified cellulose fibers (such as rayon) for about 9 pounds per capita, and wholly man-made synthetic fibers (such as nylon) for about 1 pound per capita. In 1968 total fiber consumption was 49 pounds per capita. However, now, cotton and wool accounted for 22 pounds per capita, modified cellulose fibers for 9 pounds per capita, and synthetic fibers for 18 pounds per capita. 'Affluence' - per capita use of fiber - was essentially unchanged, but natural materials had been considerably displaced by synthetic ones. This technological displacement has intensified the stress on the environment.

"To produce fiber, whether natural or synthetic, both raw materials and a source of energy are required. The molecules that make up a fiber are themselves threadlike polymers - chains of repeated smaller units. In cotton the polymer is cellulose, long molecules composed of hundreds of glucose units linked end to end. Energy is needed to assemble such an elaborate structure - both to form the necessary glucose units and to join them into the molecular thread. The energy required to form the cotton fiber is, of course, taken up by the cotton plant from a free, renewable resource - sunlight. The energy needed to form wool, which is made up of the protein polymer keratin, is obtained from the sheep's food, which is, in turn, derived from sunlight. Once



produced, a synthetic fiber inevitably generates a greater impact on the environment than a natural fiber. Because it is man-made and unnatural, the synthetic fiber is not disposable without stressing the environment. On the other hand, the natural polymers in cotton and wool - cellulose and keratin - are important constituents of the soil ecosystem and therefore cannot accumulate as wastes if returned to the soil.

"Electric power is one of the fast-growing features of the postwar United States economy. This industry is also the source of major pollution problems: sulfur dioxide, nitrogen oxides, and dust emitted by fossil-fuel burning plants; radioactive emissions and the small but enormously catastrophic potential of an accident from the operation of nuclear power plants; and the emission of waste heat to the air and nearby surface waters by both types of plants. This growth in the use of electric power is, justifiably, associated with the modernity of our economy and - with much less cause - to our supposed 'affluence.' The statistics appear to be straightforward enough. In the United States, annual power consumption is about 20,540 kilowatt hours per capita (the United States consumes 34 percent of the world's electric power output), as opposed to about 2,900 kw-h per capita for Chile, 260 kw-h per capita for India, and 230 kw-h per capita for Thailand. However, electric power, unconverted, is not in itself capable of satisfying any known human need, and its contribution to human welfare needs to be measured in terms of the economic goods that power can produce. Here we discover another serious failing - when measured in terms of human welfare - of postwar technology: the new productive technologies are more costly than the technologies they have displaced, in consumption of electric power and other forms of fuel-generated energy per unit economic good. For example, aluminum, which has increasingly displaced steel and lumber as a construction material, requires for its production about 15 times more fuel energy than steel and about 150 times more fuel energy than lumber. Even taking into account that less aluminum, by weight, is needed for a given purpose than steel, the power discrepancy remains. For example, the energy required to produce metal for an aluminum beer can is 6.3 times that needed for a steel can.

"The displacement of natural products by synthetic organic chemicals and of lumber and steel by concrete has a similar effect, for both chemical manufacturing and the production of cement for concrete are intense consumers of electric power. Aluminum and chemical production alone account for about 28 percent of total industrial use of electric power in the United States. Thus the expansion of power production in the United States is not an accurate measure of increased economic good, being badly inflated by the growing tendency to displace power-thrifty goods with power-consumptive ones. The cost of this inefficiency is heavily borne by the environment.

"Another technological displacement is readily visible to the modern householder in the daily acquisition of rubbish, most of it from packaging. It is a useful exercise to examine the statistics relevant to some economic good - beer, let us say - and determine from them the origin of the resultant impact on the environment. We can begin the exercise by recalling that the relevant economic good is chiefly the beer, not the bottle or can in which it is delivered. The relevant pollutant is the nonreturnable bottle or can, for these, when 'disposed of' in rubbish, cannot be assimilated in any natural ecological cycle. Therefore, they either accumulate or must be reprocessed at some expenditure of energy and cost in power-produced pollutants. The exercise consists in determining the relative effects of the three factors that might lead to an increased output of pollution, in this case, in the period from 1950 to 1967. In that time, the total consumption of nonreturnable beer bottles increased by 595 percent and the consumption of beer increased by 37 percent. Since the population increased by 30 percent, the 'affluence' factor, or the amount of beer consumed per capita, remained essentially constant (actually a 5 percent increase). The remainder of the increased output of pollutant - beer bottles - is due to the technological factor - that is, the number of nonreturnable bottles produced per gallon of beer, which increased by 408 percent. The relative importance of the three factors is evident."



## STATE ENVIRONMENTAL POLICY

Until recently, the average citizen regretted the deterioration of the State's environment but accepted it as the necessary price of progress. Now citizens are asking if the kind of progress experienced is all desirable, whether it can be achieved differently, and whether it is worth the sacrifice of environmental assets. Many traditional assumptions are being questioned, and attitudes toward population growth, economic expansion, and the use of natural resources are no exceptions. From this ongoing process of questioning traditional assumptions pertaining to the application of technology and some of the basic concepts of growth per se, new values and attitudes about the meaning of a quality life are emerging. The Committee finds that the State must translate emerging values and attitudes into effective long-range broad policies if it is to achieve the goal of a satisfactory environment in the future.

There is ample evidence that, with greater visibility of goals and associated policies, an increasing number of citizens would desire to constructively debate policy issues. There is a movement towards a more participatory democracy and a greater awareness of the need for environmental quality policies. The 1970's will almost certainly be seen as a period during which the government became more, not less, accessible to outside influences exercised by citizens largely as the result of their greater attention to policy matters.

Because of an absence of clearly stated broad and specific policies by the legislature, State policies are now made by the executive branch and its bureaucracy. The visibility of these policies often is low; the process by which such policies are formulated is not well known to the public. If the legislature is weak in performing its broad and specific policy-making role, the programs of the executive branch also may be weak because the executive branch may fear taking action without clearly stated legislative mandate. On the other hand, it is now possible for the executive branch to assume a primary policy-making role by default of the legislature. Thus, the executive branch and its bureaucracy, under certain conditions, can perpetuate programs with limited knowledge and approval of the public. If the legislature and citizens express apathy towards policy-making, the bureaucracy quite naturally, will assume that it can do what it thinks best until told otherwise.

The Committee finds that if Minnesota is to achieve an equilibrium where people and nature co-exist, not just for the next 100 years but for the life of the planet, the State must now establish some long-term environmental goals and must make a serious commitment to the attainment of those goals. The Committee finds that scant attention has been paid in the past to broad and specific policies and associated long-term impacts on the physical and social environment; most attention has been paid to programs without questioning associated policies. Citizens wish

to more fully understand policies and their implications and to exert greater influence on policy-making decisions. Greater understanding of policies by the public will result if, in the future, policies are clearly stated by the legislature and presented in a highly visible fashion on the State's statutes. The Committee recommends that the State adopt an environmental policy.

At the present, statements of environmental policies are scattered throughout the State's statutes in a "hodgepodge" of confusing, conflicting, often anachronistic, language. Governmental officials, acting as environmental decision-makers, thus have no clear direction from our legislature and must, through some combinations of divine guidance, personal inclination and pressure from special interests, make decisions on an ad hoc basis. Moreover, the number of governmental subdivisions which make environmental decisions is overwhelming.

A review of the State statutes will disclose that Minnesota's Legislature has not to date enunciated a broad environmental policy. There are over 640 pages of statutes pertaining to natural resources; about 65 formal declarations, statements and resolutions scattered in these pages can be classified as specific environmental policies. The Committee recommends that the State review existing specific policy statements as a whole body and eliminate inconsistencies and deficiencies in light of environmental policies. The policy of the State consists not only of formal declarations and statements enunciated by the Legislature, but also consists of the rules and regulations adopted by State and local agencies. The Committee recommends that the State review rules and regulations as a whole body and eliminate inconsistencies and deficiencies in light of the State environmental policy.

#### State Environmental Policy Act Bill

A State Environmental Policy Act Bill (H.F. 2405) passed the House on May 21, 1971, during the 1971 session of the Legislature. A companion bill was introduced in the Senate but never came up for vote. About 415 environmental bills were introduced in the Regular 67th Session of the Legislature; 107 environmental bills considered by both the Senate and the House passed. During the Special Session of the 67th Legislature, 5 environmental bills were initially introduced in the Senate and 12 environmental bills were initially introduced in the House; 4 environmental bills considered by both the Senate and the House passed. The State Soil and Water Conservation Commission was transferred into the Department of Natural Resources. An Environmental Rights Act which was enacted into law provides that a citizen may institute an action for protection of the environment from violators of pollution standards. The burden of proof is on the plaintiff in that he must make a prima facie showing that the conduct of the defendant violates or is likely to violate a pollution standard. Economic considerations alone do not constitute a defense by the defendant.



During 1971 and 1972, several Subcommittees of Committees of the State Senate and House held joint hearings on the State Environmental Policy Act bill and water and related land resources issues. Governor Anderson in April 1972 established an Environmental Quality Council with a Citizens Advisory Committee. These actions could lead to the passage of a State Environmental Policy Act during the 1973 session of the Legislature and to the further improvement of government for environmental quality programs in Minnesota.

A State Environmental Policy Act bill (amended H.F. 2405) was jointly recommended for passage on November 30, 1972, by the House Environmental Preservation Committee, Subcommittee on Environmental Policy and Organization and the Senate Civil Administration Committee, Subcommittee on Department of Natural Resources. The bill is closely modeled after the Federal National Environmental Policy Act of 1969, or NEPA. The contents of the bill are given below.

A bill for an act

establishing a state environmental policy;  
establishing an environmental council and  
and environmental quality commission;  
appropriating money; amending Minnesota  
Statutes 1971, Section 4.12, Subdivision 2;  
40.02; 104.01, Subdivision 3; 115.03,  
Subdivision 1; 116.07, Subdivision 2.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF MINNESOTA:

Section 1. [83B.01] [PURPOSE.] The purposes of this act are: to declare a state policy that will encourage productive and enjoyable harmony between man and his environment; to promote efforts that will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the state and to the nation; to establish an environmental council in the office of the governor; and to establish an environmental quality commission.

Sec. 2. [83B.02] [DECLARATION OF STATE ENVIRONMENTAL POLICY.] Subdivision 1. The legislature, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the over-all welfare and development of man, declares that it is the continuing policy of the state government, in cooperation with federal and local governments, and other concerned public and private organizations, to use all practicable means and measure, including financial and technical assistance, in a manner calculated to foster and promote

the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of the state's people.

Subd. 2. In order to carry out the policy set forth in this act, it is the continuing responsibility of the state government to use all practicable means, consistent with other essential considerations of state policy, to improve and coordinate state plans, functions, programs, and resources to the end that the state may:

(1) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

(2) Assure for all people of the state safe, healthful, productive, and aesthetically and culturally pleasing surroundings;

(3) Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

(4) Preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment that supports diversity, and variety of individual choice;

(5) Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and

(6) Enhance the quality of renewable resources and obtain the maximum attainable recycling of depletable resources.

Subd. 3. The legislature recognizes that each person has a right to a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.

Sec. 3. [83B.03] [ACTION BY STATE AGENCIES.] Subdivision 1. The legislature authorizes and directs that, to the fullest extent possible the policies, regulations and public laws of the state shall be interpreted and administered in accordance with the policies set forth in this act.

Subd. 2. All departments and agencies of the state government shall:

(a) Utilize a systematic, interdisciplinary approach that will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision making which may have an impact on man's environment; for this purpose they shall establish scientific advisory councils or develop other forms of consultation with scientists in appropriate fields of specialization so as to ensure that the latest and most authoritative scientific finds concerning environmental problems and the technology available for dealing with them will be



considered in administrative and regulatory decision making as quickly and as amply as possible;

(b) Identify and develop methods and procedures, in consultation with the environmental council established by sections 9 through 13 of this act, that will ensure that presently unqualified environmental amenities and values may be given equal consideration in decision making along with economic and technical considerations;

(c) Study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources;

(d) Recognize the worldwide and long range character of environmental problems and, where consistent with the policy of the state, lend appropriate support to initiatives, resolutions, and programs designed to maximize interstate, national and international cooperation in anticipating and preventing a decline in the quality of mankind's world environment;

(e) Make available to the federal government, counties, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment, and in meeting the policies of the state as set forth in this act;

(f) Initiate and utilize ecological information in the planning and development of resource oriented projects; and

(g) Assist the environmental council established by sections 9 through 13 of this act.

(h) Undertake, contract for or fund such research as is needed in order to determine and clarify any effects by known or suspected pollutants which may be detrimental to human health or to the environment, as well as to evaluate the feasibility, safety, and environmental effects of various methods of dealing with pollutants, whenever such research is relevant and necessary to the responsibilities of a particular department or agency and where the necessary information is not available from other sources.

Sec. 4. **[83B.04] [ISSUANCE OF PERMITS.]** Subdivision 1. "Permits for natural resources management and development" shall include only permits required by the following sections: 84.415, utility crossings of public lands and waters; 84.45, aircraft operation in wilderness areas; 84.60 and 84.621, underground storage of gas or liquid; 89.17, use of state forest lands; 89.18, roads through state forests; 90.151, cutting and removal of timber; 93.01 to 93.43, exploration and mining of minerals; 104.04, flood plain management ordinances; 105.41, appropriation and use of waters; 105.42, construction of dams, alteration of shorelines and waterways; 105.43, establishment of lake levels; 105.44 and

113.02, irrigation of agricultural lands; 105.485, shoreland conservation ordinances; 93.13 and 105.64, drainage to facilitate mining; 115.03 and 115.43, water pollution; 116.07 and 116.081, air, solid waste, and noise pollution; 117.47, use of state lands for taconite mining; 117.49, condemnation by pipeline companies; 160.20, connecting drains to highway drains; 360.018, subd. 6, airport construction.

Subd. 2. The term "natural resources" has the meaning given it in section 116B.02, subdivision 4.

Subd. 3. "Pollution, impairment or destruction" has the meaning given it in section 116B.02, subdivision 5.

Subd. 4. In issuing and denying permits for natural resources management and development, the responsible department or agency shall consider the following factors:

(1) The environmental impact of the proposed action, including any pollution, impairment, or destruction of the air, water, land, or other natural resources located within the state;

(2) Any adverse environmental effects that cannot be avoided should the proposal be implemented;

(3) Alternatives to the proposed action;

(4) The relationship between local short term uses of a man's environment and the maintenance and enhancement of long term productivity, including the environmental impact of predictable increased future development of an area because of the existence of a proposal, if approved;

(5) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented;

(6) The impact on state government of any federal controls associated with proposed actions; and

(7) The multistate responsibilities associated with proposed actions.

Subd. 5. Prior to making a decision on whether to grant or deny any permit for natural resources management and development, the responsible state official shall consult with and request the comments of all federal, state and local agencies that have jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of the permit application and the comments and views of the appropriate federal, state, and local agencies that are authorized to develop and enforce environmental standards shall be made available to the governor, the environmental council and to the public, and shall accompany the application through the existing agency review processes. The environmental council shall have power to adopt guidelines and regulations to coordinate the processing of permits for natural resources management and development and shall coordinate the processing of



such state permits with the processing of federal environmental impact statements.

Subd. 6. No permit for natural resources management and development shall be granted for conduct that has caused or is likely to cause pollution, impairment, or destruction of the air, water, land or other natural resources located within the state, so long as there is a feasible and prudent alternative consistent with the reasonable requirements of the public health, safety, and welfare and the state's paramount concern for the protection of its air, water, land and other natural resources from pollution, impairment, or destruction. Economic considerations alone shall not justify such conduct.

Subd. 7. The environmental review procedures established by subdivisions 4, 5 and 6 shall also be applied in the case of projects carried out by the state of Minnesota or financed in whole or in part by a grant of state funds whenever it appears that such a project may have significant environmental effects. In the case of projects costing more than one million dollars, such a review shall occur unless there is a specific conclusion by the pertinent department or agency that the environmental impact of the project is likely to be negligible, and such finding is not questioned by the environmental council or by the governor. In the case of projects costing less than one million dollars, such a review shall occur if requested by the environmental council or by the governor.

Sec. 5. [83B.05] [REVIEW OF AUTHORITY, REPORT.] All agencies of the state government shall review their present statutory authority, administrative regulations, and current policies and procedures for the purpose of determining whether there are any deficiencies or inconsistencies therein that prohibit full compliance with the purposes and provisions of this act and shall propose to the governor not later than July 1, 1974, such measures as may be necessary to bring their authority and policies into conformity with the intent, purposes, and procedures set forth in this act.

Sec. 6. [83B.06] [EFFECT ON EXISTING OBLIGATIONS.] Nothing in sections 3, 4 or 5 shall in any way affect the specific statutory obligations of any state agency (1) to comply with criteria or standards of environmental quality, (2) to coordinate or consult with any federal or state agency, or (3) to act, or refrain from acting contingent with the recommendations or certification of any other state agency or federal agency.

Sec. 7. [83B.07] [POLICIES ARE SUPPLEMENTAL.] The policies and goals set forth in this act are supplementary to those set forth in existing authorizations of state agencies.

Sec. 8. [4.30] [GOVERNOR, REPORT REQUIRED.] The governor shall transmit to the legislature biennially by November 15 of each even numbered year an environmental quality report which shall set forth (1) the status and condition of the major natural,

man-made, or altered environmental classes of the state, including, but not limited to, the air, the aquatic, and the terrestrial environment, including, but not limited to, the forest, dryland, wetland, range, urban, suburban, and rural environment; (2) current and foreseeable trends in the quality, management and utilization of such environments and the effects of those trends on the social, economic and other requirements of the state; (3) the adequacy of available natural resources for fulfilling human and economic requirements of the state in the light of expected population pressures; (4) a review of the programs and activities, including regulatory activities, of the federal government in the state, the state and local governments, and nongovernmental entities or individuals, with particular reference to their effect on the environment and on the conservation, development and utilization of natural resources; (5) a program for remedying the deficiencies of existing programs and activities, together with recommendations for legislation; (6) a review of identified potentially feasible programs and projects for solving existing and future natural resources problems; (7) measures as may be necessary to bring state government statutory authority, administrative regulations and current policies into conformity with the intent, purposes, and procedures set forth in this act; (8) the status of statewide natural resources plans; (9) and a statewide inventory of natural resources projects, consisting of a description of all existing and proposed public natural resources works of improvements to be undertaken in the coming biennium by state agencies or with state funds, including a biennial tabulation of initial investment costs and operation and maintenance costs for both existing and proposed projects, and an analysis of the relationship of existing state projects to all existing public natural resources works of improvement undertaken by local, regional, state-federal, and federal agencies with funds other than state funds, and an analysis of the relationship of proposed state projects to local, regional, state-federal, and federal plans, in order to provide the information necessary for the legislature to assess the existing and possible future economic impact on state government of capital investments in and maintenance costs of natural resources works of improvement.

Sec. 9. [4.35] [ENVIRONMENTAL COUNCIL. CREATION.] There is created in the executive office of the governor an environmental council. The environmental council shall consist of a chairman and two members who shall be appointed by the governor with the advice and consent of the senate and who shall have among them qualifications in the following areas: natural resource management, environmental planning and governmental organization. The chairman and the members shall serve on a full-time basis and shall not at the same time hold any other office in state or federal government. The governor may remove the chairman or members at any time at his pleasure. The chairman and members shall be in the unclassified service of the state. The compensation of the chairman and members shall be prescribed by the governor, unless otherwise fixed by law.



Sec. 10. [4.36] [EMPLOYEES, CONSULTANTS.] The council may employ such administrative and clerical employees in the classified service as may be necessary to carry out its functions under this act. In addition, the council may employ and fix the compensation of such experts and consultants as may be necessary for the carrying out of its functions under this act.

Sec. 11. [4.37] [DUTY AND FUNCTIONS.] Subdivision 1. The duties and functions of the council shall be as follows:

Subd. 2. To gather timely and authoritative information concerning the conditions and trends in the quality of the environment both current and prospective, to analyze and interpret such information for the purpose of determining how such conditions and trends affect the policy set forth in sections 2 to 7 of this act, and to compile and submit to the governor studies, reports or advice relating to such conditions and trends.

Subd. 3. To develop and recommend to the governor state policies and to foster and promote the improvement of environmental quality to meet the conservation, social, economic, health, and other requirements and goals of the state.

Subd. 4. To make and furnish such studies, reports thereon, and recommendations with respect to matters of policy and legislation as the governor may request.

Subd. 5. To assist and advise the governor in the preparation of the environmental quality report required by section 8 and all other environmental issues in which action or comment by the governor is required by law or is otherwise appropriate.

Subd. 6. To compile and submit to the governor the biennial inventory of natural resources projects.

Subd. 7. To coordinate the various programs and activities of state agencies as they relate to state environmental policies.

Subd. 8. To review and appraise the various programs and activities of the state government in the light of the policy set forth in sections 2 to 7 and 18 to 24 of this act for the purpose of determining the extent to which such programs and activities are contributing to the achievement of such policy, and to make recommendations to the governor with respect thereto.

Subd. 9. To review programs and projects of individual state agencies and to make recommendations to the governor.

Subd. 10. To review all proposed major rules and regulations prepared by individual state agencies that relate to environmental quality and to make recommendations to the governor.

Subd. 11. To review all proposed major permits by individual state agencies that relate to environmental quality and to make recommendations to the governor.

Subd. 12. To review all major federal-state and state interstate organizations' program and project proposals that

relate to environmental quality and to make recommendations to the governor concerning the acceptability of the proposals.

Subd. 13. To coordinate state agency compliance with National Environmental Policy Act provisions and the Federal Council on Environmental Quality guidelines related to environmental impact statements. The council shall have the following duties and responsibilities: serve as the coordinator for federal agency environmental impact statements; prepare guidelines for state agency compliance with federal guidelines; devise an appropriate early notice system by which the decision to prepare an impact statement is announced as soon as is practicable after that decision is made; devise appropriate methods for publicizing the existence of draft statements; receive and review all state agency comments and views concerning federal impact statements; prepare for presentation to the State Planning Agency unified state positions concerning federal impact statements; collect and assemble public comments on environmental impact statements and bring these comments to the attention of state agencies; monitor federal agency compliance with the National Environmental Policy Act and the Federal Council on Environmental Quality guidelines; prepare documents identifying inadequate federal procedures, and recommend appropriate changes for the consideration of the governor.

Subd. 14. At its discretion, to convene an annual environmental quality congress including, but not limited to, representatives of state, federal and regional agencies, citizen organizations, associations, industries, colleges and universities, and private enterprises who are active in or have a major impact on environmental quality. The purpose of the congress shall be to receive reports and exchange information on progress and activities related to environmental improvement. These reports along with other information available to the council shall be used to assist the governor in the preparation of his biennial environmental quality report.

Subd. 15. To provide the environmental quality commission established in section 14 of this act with such administrative, clerical and technical assistance as may be required by the commission to carry out its function.

Subd. 16. To meet with the environmental quality commission established in section 14 of this act at least four times a year, at approximately three month intervals, to receive advice from the commission and to coordinate the activities of the council and the commission.

Sec. 12. [4.38] [PROCEDURES: COOPERATION.] Subdivision 1. In exercising its powers, functions, and duties under this act, the council shall:

(a) Consult with the environmental quality commission established in section 14 of this act, and with such representatives



of science, industry, agriculture, labor, conservation organizations, federal, state, and local governments and other groups, as it deems advisable; and

(b) Utilize, to the fullest extent possible, the services, facilities, and information, including statistical information, of public and private agencies and organizations, and individuals, in order that duplication of effort and expense may be avoided, thus assuring that the council's activities will not unnecessarily overlap or conflict with similar activities authorized by law and performed by established agencies.

Subd. 2. All state departments and agencies are hereby directed to cooperate with the environmental council and assist them in the performance of their duties, and the environmental council is authorized to cooperate with other departments and agencies of the state, with regional development commissions, counties and municipalities with other states, with the federal government and its agencies and instrumentalities, in the public interest.

Subd. 3. Upon the request of the environmental council the governor may, by order, require any department or agency of the state to furnish such assistance, technical or otherwise, to the council in the performance of its duties or in the exercise of its powers imposed by law.

Sec. 13. [4.39] [FEDERAL FUNDS; DONATIONS.] The environmental council may apply for, receive, and disburse federal funds made available to the state by federal law or rules promulgated thereunder for any purpose related to the powers and duties of the council. The environmental council shall comply with any and all requirements of such federal law or such rules and regulations promulgated thereunder in order to apply for, receive, and disburse such funds. The environmental council is authorized to accept any donations or grants from any public or private concern. All such moneys received by the council shall be deposited in the state treasury and are hereby appropriated to it for the purposes for which they are received.

Sec. 14. [4.45] [ENVIRONMENTAL QUALITY COMMISSION; CREATION.] There is created an environmental quality commission. The commission shall consist of seven members from private life appointed by the governor with the advice and consent of the senate. The terms of office of members shall be for six years in duration, provided that the first council shall have two members appointed for terms ending January 1, 1975, two members appointed for terms ending January 1, 1977, and three members appointed for terms ending January 1, 1979. The chairman of the commission shall be elected by the members. He shall serve as an ex-officio member of the advisory council to the Minnesota resources commission.

The members of the commission shall be paid a per diem of \$35 per day and shall be reimbursed for all reasonable expenses incurred in the performance of their duties.

Sec. 15. [4.46] [DUTY AND FUNCTION.] The duties and functions of the commission shall be as follows:

(a) To review and appraise the various programs and activities of the state government in light of environmental quality concerns for the purpose of determining the extent to which such programs and activities are contributing to state environmental policies and goals;

(b) To hold meetings throughout the state as it deems necessary for the purpose of gathering information on public and private opinions concerning the adequacy of the state's environmental quality policies and the extent to which these policies are being implemented;

(c) To give advice and counsel to the environmental council; and

(d) To make recommendations to the governor, legislature and the public on or before December 31 of each year regarding any needed state policy or program changes to foster and promote the improvement of environmental quality.

Sec. 16. [APPROPRIATION.] There is appropriated from the general fund in the state treasury for the period July 1, 1973, to July 1, 1975, to the environmental council the sum of \$250,000 for the purposes of this act.

Sec. 17. Minnesota Statutes, 1971, Section 4.12, Subdivision 2 is amended to read:

Subd. 2. The state planning officer shall:

(1) Review current programming and future planning of all state departments and agencies.

(2) Report regularly and on or before January 15 of each odd numbered year to the legislature, reviewing in each report the state planning program, and the progress and development thereof. Thereafter, as soon as practicable, he shall make recommendations for desirable legislation and necessary appropriations.

(3) To the extent practicable coordinate with state budgets the items therein relating to and reflecting statewide planning as authorized by the legislature and as recommended for the consideration of the legislature.

(4) Require each state department and agency having planning programs to regularly file copies thereof with him for review.

(5) Make available to the legislature or any authorized committee or commission thereof information concerning statewide development plans and basic research from which the plans have been developed.

(6) Act as the coordinating agency for the planning activities of all state departments and agencies and local levels of government.



(7) Review all plans filed with the federal government by state departments and agencies pursuant to Minnesota Statutes, Section 16.165, or any other law as a part of his duties prescribed by this section. The commissioner of administration shall furnish the state planning officer the information required by this clause.

(8) Encourage the development of planning programs by state departments and agencies and local levels of government.

(9) Act as the final clearinghouse for submission of the environmental impact statements required by the National Environmental Policy Act and the state's comments thereon to the appropriate federal agencies.

Sec. 18. Minnesota Statutes 1971, Section 40.02, is amended to read:

40.02 [PUBLIC POLICY; PURPOSE.] As a guide to the interpretation and application of this chapter, the public policy of the state is declared to be as follows: Improper land-use practices have caused and contributed to serious erosion of farm and grazing lands of this state by wind and water and that thereby topsoil is being washed out of fields and pastures and has speeded up the removal of the absorptive top soil causing exposure of less absorptive and less protective, but more erosive, subsoil; and that land occupiers have failed to cause the discontinuance of such practice as creates this condition, and the consequences thereof have caused the deterioration of soil and its fertility and the deterioration of crops grown thereon, and declining yields therefrom, and diminishing of the underground water reserve, all of which have caused water shortages, intensified periods of drought, and crop failure, and thus brought about suffering, disease, and impoverishment of families and the damage of property from floods and dust storms, and that all of these effects may be prevented by land-use practices contributing to the conservation of top soil by carrying on of engineering operations such as the construction of terraces, check dams, dikes, ponds, ditches, and the utilization of strip cropping, lister furrowing, contour cultivating, land irrigation, seeding and planting of waste, sloping, abandoned, or eroded lands to water-conserving and erosion-preventing plants, trees, and grasses.

It is thereby declared that it is for the public welfare, health, and safety of the people of Minnesota to provide for the conservation of the soil and soil resources of this state, and for the control and prevention of soil erosion, for land resource planning and development, for implementation of land resource-use practices that effectively reduce siltation and loss of the land base through activities associated with farming, mining, construction, forestry, and other activities of man, and for flood prevention or the conservation development, utilization, and disposal of of water, including but not limited to measures for fish and wildlife and recreational development, and thereby preserve natural

resources, control floods, prevent impairment of dams and reservoirs, assist in maintaining the navigability of rivers and harbors, preserve wildlife, protect the tax base, and protect public lands by land-use practices, as herein provided for.

Sec. 19. Minnesota Statutes 1971, Section 104.01, Subd. 3, is amended to read:

Subd. 3. It is the policy of this state and the purpose of sections 104.01 to 104.07, to reduce flood damages through flood plain management, stressing nonstructural measures such as flood plain zoning and flood proofing, and flood warning practices. It is the policy of this state and the purpose of sections 104.01 to 104.07 not to prohibit but to guide development of the flood plains of this state consistent with the enumerated legislative findings to provide state coordination and assistance to local governmental units in flood plain management, to encourage local governmental units to adopt, enforce and administer sound flood plain management ordinances, and to provide the commissioner of natural resources with authority necessary to carry out a flood plain management program for the state to coordinate federal, state, and local flood plain management activities in this state.

Sec. 20. **[105.405] [WATER SUPPLY MANAGEMENT.]**

Subdivision 1. The commissioner shall develop and manage water resources to assure a supply adequate to meet long range seasonal requirements for domestic, municipal, industrial, agricultural, fish and wildlife, recreational, power, navigation, and quality control purposes from surface or ground water sources, or from a combination of these two.

Subd. 2. No permit authorized by sections 105.37 to 105.55 nor any plan for which the commissioner's approval is required or permitted, involving a diversion of any waters of the state, surface or underground, to a place outside of this state shall be granted or approved until after a determination by the commissioner that the water remaining in this state will be adequate to meet the state's water resources needs during the specified life of the diversion project.

Sec. 21. Minnesota Statutes 1971, Section 115.03, Subdivision 1, is amended to read:

115.03 **[POWERS AND DUTIES.]** Subdivision 1. The agency is hereby given and charged with the following powers and duties:

To administer and enforce all laws relating to the pollution of any of the waters of the state;

To investigate the extent, character, and effect of the pollution of the waters of this state and to gather data and information necessary or desirable in the administration or enforcement of pollution laws, and to make such classification of the waters of the state as it may deem advisable;



To establish and alter such reasonable pollution standards for any waters of the state in relation to the public use to which they are or may be put as it shall deem necessary for the purposes of sections 115.01 to 115.09;

To encourage waste treatment, including advanced waste treatment, instead of stream low-flow augmentation for dilution purposes to control and prevent pollution;

To make and alter reasonable orders requiring the discontinuance of the discharge of sewage, industrial waste or other wastes into any waters of the state resulting in pollution in excess of the applicable pollution standard established under this subdivision;

To require to be submitted and to approve plans for disposal systems or any part thereof and to inspect the construction thereof for compliance with the approved plans thereof;

To issue, continue in effect or deny permits, under such conditions as it may prescribe for the prevention of pollution, for the discharge of sewage, industrial waste or other wastes, or for the installation or operation of disposal systems or parts thereof;

To revoke or modify any permit issued under sections 115.01 to 115.09 whenever it is necessary, in the opinion of the agency, to prevent or abate pollution of any waters of the state;

To prescribe and alter rules and regulations, not inconsistent with law, for the conduct of the agency and other matters within the scope of the powers granted to and imposed upon it by sections 115.01 to 115.09, provided that every rule or regulation affecting any other department or agency of the state or any person other than a member or employee of the agency shall be filed with the secretary of state; and

To conduct such investigations and hold such hearings as it may deem advisable and necessary for the discharge of its duties under sections 115.01 to 115.09, and to authorize any member, employee, or agent appointed by it to conduct such investigations or hold such hearings.

Sec. 22. Minnesota Statutes 1971, Section 116.07, Subdivision 2, is amended to read:

Subd. 2. [ADOPTION OF STANDARDS.] The pollution control agency shall improve air quality by promoting in all ways possible the use of energy sources and waste disposal methods which produce or emit the least air contaminants consistent with the agency's overall goal of reducing all forms of pollution. The agency shall also adopt standards of air quality, including maximum allowable standards of omission of air contaminants from motor vehicles recognizing that due to variable factors, no single standard of purity of air is applicable to all areas of the state. In adopting standards the pollution control agency shall give due recognition to the fact that the quantity or characteristics of air

contaminants or the duration of their presence in the atmosphere, which may cause air pollution in one area of the state, may cause less or not cause any air pollution in another area of the state, and it shall take into consideration in this connection such factors, including others which it may deem proper, as existing physical conditions, zoning classifications, topography, prevailing wind directions and velocities, and the fact that a standard of air quality which may be proper as to an essentially residential area of the state, may not be proper as to a highly developed industrial area of the state. Such standards of air quality shall be premised upon scientific knowledge of causes as well as effects based on technically substantiated criteria and commonly accepted practices. No local government unit shall set standards of air quality which are more stringent than those set by the pollution control agency.

The pollution control agency shall promote solid waste disposal control by encouraging the updating of collection systems, elimination of open dumps, and improvements in incinerator practices. The agency shall also adopt standards for the control of the collection, transportation and disposal of solid waste for the prevention and abatement of water, air and land pollution, recognizing that due to variable factors, no single standard of solid waste control is applicable to all areas of the state. In adopting standards, the pollution control agency shall give due recognition to the fact that elements of control which may be reasonable and proper in densely populated areas of the state may be unreasonable and improper in sparsely populated or remote areas of the state, and it shall take into consideration in this connection such factors, including others which it may deem proper, as existing physical conditions, topography, soils and geology, climate, transportation, and land use. Such standards of solid waste control shall be premised on technical criteria and commonly accepted practices.

The pollution control agency shall also adopt standards describing the maximum levels of noise in terms of sound pressure level which may occur in the outdoor atmosphere, recognizing that due to variable factors no single standard of sound pressure is applicable to all areas of the state. Such standards shall give due consideration to such factors as the intensity of noises, the types of noises, the frequency with which noises recur, the time period for which noises continue, the times of day during which noises occur, and such other factors as could affect the extent to which noises may be injurious to human health or welfare, animal or plant life, or property, or could interfere unreasonably with the enjoyment of life or property. In adopting standards, the pollution control agency shall give due recognition to the fact that the quantity or characteristics of noise or the duration of its presence in the outdoor atmosphere which may cause noise pollution in one area of the state, may cause less or not cause any noise pollution in another area of the state, and it shall take into consideration in this connection such



factors, including others which it may deem proper, as existing physical conditions, zoning classifications, topography, meteorological conditions and the fact that a standard which may be proper in an essentially residential area of the state, may not be proper as to a highly developed industrial area of the state. Such noise standards shall be premised upon scientific knowledge as well as effects based on technically substantiated criteria and commonly accepted practices. No local governing unit shall set standards describing the maximum levels of sound pressure which are more stringent than those set by the pollution control agency.

After carefully reviewing the revised version of the State Environmental Policy Act bill, the Committee finds that although the bill represents a commendable effort by the Legislature to be responsive to environmental concerns, the bill could stand additional revision and expansion.

Some of the major deficiencies are as follows:

1. Environmental policies--the bill fails to state specific State policies to guide decision-making by State agencies in areas in which no such guidelines now exists. The bill should include specific policies concerning land-use, energy conservation, solid waste and recycling, noise, drainage, minerals and mining, transportation, management of State owned land, and land-use planning. Moreover, the bill fails to make provisions for elimination of conflicting and outdated environmental policies which are now on the statute books. Even more confusing is the statement in the bill that "the policies and goals set forth in this act are supplementary to those set forth in existing authorizations of State agencies." Such a statement effectively undercuts the benefit of stating a strong environmental policy in the first section of the bill.

2. Permits and impact statements--the bill requires the acting agency to "consider" the same factors as are required for an impact statement under the National Environmental Policy Act, including the environmental impact, alternatives to the proposed action, irreversible and irretrievable commitments of resources, and other factors. However, unlike the NEPA, the proposed statute does not require that the agency's consideration be documented by the preparation of an environmental impact statement. Thus, the method of consideration of these is left to the whim of the Agency, and that aspect of the bill is unsatisfactory. Either the acting Agency should be required to prepare a written environmental impact statement, or the permit applicant should prepare such a statement, meaning the standards set by the Environmental Council and the Agency itself. Rather than requiring an environmental impact statement only in the case of specific permits, agencies and subdivisions of State governments should be required to prepare such a statement whenever their projects or proposals may have a significant effect upon the quality of

the human environment. It should also be made clear that the Environmental Council has the power to require environmental impact statements whenever it is of the opinion that action by a State agency involves a significant environmental impact. In addition, the Council should be able to review the sufficiency of such impact statements, and to prevent agency action from proceeding until sufficient consideration has been given to the environmental effect and such effects have been fully documented. Moreover, the impact statement should clearly apply to State projects commenced prior to its effective date, when any State policy decisions remain to be made. The Environmental Council should be given power to modify or reverse the decision of the issuing agency permits or other agency action which would significantly affect the environment. Rather than be limited to requiring impact statements on an ad hoc basis for projects costing less than \$1 million (which is apparently the way the bill now stands after November 30) the Council should be given rule-making power to promulgate rules and regulations setting forth the kinds of instances which it determines to have significant environmental effects and to require agencies to prepare impact statements in all such instances.



## WATER RESOURCES LEGISLATIVE REPORT

On August 16, 1972, a report containing recommendations concerning needed water resources legislation and prepared by several Subcommittees of Committees of the State Senate and House was released by the Office of Senate Counsel. As stated by Peter Watson of the Office of Senate Counsel, "the recommendations as finally approved by the three Subcommittees attempt to accomplish several things: first, they tried to resolve conflicts among the State agencies and between State agencies and the general public in the area of water resources; second, they attempt to set a number of new policies with regard to water resources law; third, they establish several new programs for dealing with water resources problems, particularly in the pollution area; fourth, they attempt to improve the administration of the programs related to water resources at the State level; and finally, they attempt to improve the implementation of these various State water resources programs at the local level.

"The Subcommittees recommended that the Department of Natural Resources (DNR) develop standards and criteria for the establishment and improvement of drainage systems as they affect wildlife lands and to require the various county boards to adhere to these standards and criteria in deciding which ditch projects should proceed. The Subcommittees recommended that DNR continue its water quality sampling program as it relates to game and fish, but that it furnish this information to the Pollution Control Agency (PCA) as needed by the PCA for determining whether the waters are polluted and, if polluted, what the sources of the pollutants are. The PCA, on the other hand, is given primary responsibility for gathering water quality information from all kinds of agencies, including the DNR, and for using that information and supplementing it with additional detailed studies of its own to determine sources of pollutants. The Subcommittees recommended that the Department of Agriculture (DA) have primary responsibility for determining the extent to which agricultural uses contribute to water pollution and for determining the extent to which, in particular, chemical fertilizers and pesticides contribute to water pollution. The DA would then make recommendations to the PCA as to what measures should be taken in order to abate any pollution that is being caused by these agricultural uses. Final responsibility for adopting any pollution control regulations, however, would remain with the PCA.

"The Subcommittees' recommendations include a number of new policies for the State in regard to water resources. One of these new policies is that the Pollution Control Agency in its long-range planning for water pollution control should be required to stress advanced waste treatment, rather than stream flow augmentation for dilution of waste discharged into streams. A second new policy recommends that non-structural methods of flood damage reduction be preferred over structural methods. A third new major policy recommended is that the State not approve or endorse

the development of any public waterway for private commercial transportation unless and until it has been determined that no alternative method of transportation can be provided at less public expense. Along with this policy recommendation is one that says that in determining the relative merits of various means of transportation, the State should consider the amount of adverse impact on the environment caused by each one. A fourth major policy recommendation is that the State discontinue leasing of State-owned shoreland for private development.

"The Subcommittees' recommendations include the establishment of a number of new programs - particularly in the pollution control area. An extension of the State's erosion and sedimentation control program, which for many years has been carried out by the soil and water conservation districts under the supervision of the State Soil and Water Conservation Commission is called for. The Subcommittees recommended that erosion and sedimentation control ordinances be adopted by counties and municipalities to control runoff from construction and real estate development projects, as well as from agricultural and forest lands. These ordinances would be in conformity with guidelines established by the State Soil and Water Conservation Commission.

"In addition to resolving conflicts, setting new policies, and establishing some new programs, the Subcommittees attempted to improve the administration of programs related to water resources at the State level. One way in which they did this was to recommend the establishment of a statewide water information system. The recommendations suggest that the Department of Natural Resources take the lead in establishing such a system so that any person, anywhere in the State, can contact one central information place and get all the information that is available on a particular water related problem.

"The second way in which the Subcommittees recommend the improvement of State administration is the development and adoption of a statewide plan for water and related land resources, and the adoption of regional and local plans consistent with this statewide plan. Responsibility for developing the statewide plan would rest with the Department of Natural Resources; responsibility for developing regional plans would lie with the Regional Development Commissions where they have been created. Taking the planning one step further, each county would be required to adopt for each lake within its jurisdiction a water management plan, integrating all the various programs that are now being carried on - such as programs for pollution control, shoreland development regulation, floodplain management, weed control, and boating regulation.

"In order to carry out these statewide, regional and local plans, the Subcommittees recommended that the State departments make a greater use of published rules and regulations to give the public a better knowledge of what their procedures and what their standards are. The Subcommittees hope that by requiring



the Department of Natural Resources, the Pollution Control Agency, and the other State departments to publish their regulations, that the public will be made better aware of the reasons for actions by the State agencies.

"A fourth way in which the Subcommittees recommended an improvement of State administration of water resources program is the streamlining of the present permit procedures, including the provision for issuing of minor permits at the local level. The Subcommittees do not specify which permits should be issued locally, but do indicate that where permits are for water appropriation and use, that permits for a small amount of water could be granted at the local level and that in other cases, minor permits can be granted at the local level. The Subcommittees also recommended that where a permit is required it be accompanied by a fee adequate to cover the cost of administratively processing the permits. Further, the Subcommittees recommended that adequate funds and personnel be provided to enforce permits once they have been granted.

"The final task that the Subcommittees have attempted to carry out is the improvement of administration of programs related to water resources at the local level. This involved two major decisions: first, who would be the local agency assigned to administer State programs, and, second, what powers would be given to the local agency. These were particularly difficult decisions for the Subcommittees to make, but the end result is that they have decided to place primary responsibility for local administration of water programs in the hands of existing general purpose governments such as counties and municipalities. The reasoning behind this decision is that the Subcommittees felt that implementation of water and related land resources plans would require local governmental action in virtually every area of the State. County governments are already organized to operate in all areas of the State, whereas special purpose districts such as watershed districts and sanitary districts are organized only in those areas where a particular need for their existence has been felt. The Subcommittees felt that it would be wiser to try to assign responsibility for implementing these various State programs to the existing units of government rather than creating additional special purpose districts in all parts of the State.

"Implementation of water and related land resources plans would also involve the use of zoning powers to a much greater extent in the future than in the past. Municipalities and counties already have broad zoning powers, whereas special purpose districts such as watersheds and sanitary districts do not have these broad powers. The reason for this restriction on their powers may well be because the officials of special purpose districts generally are not elected by the voters of the district, but are usually appointed by the governing body of the local municipality or county. There has, perhaps, been some reluctance on the part of the Legislature to vest a great deal of broad regulatory authority in the hands of officials that are appointed rather than elected.

"Implementation of water and related land resources plans finally will require substantial expenditures of public funds. Municipalities and counties already have broad taxing and spending powers, whereas special purpose districts do not. Again, this limit on the authority of special purpose districts may be related to the fact that the managers or supervisors of a watershed district or sanitary district are not elected officials but, rather, they are appointed; and, because the managers of a special purpose district are not required to balance competing interests in the same way that members of a county board or city council are required to. The Subcommittees felt that while the managers of a special purpose district might be particularly well qualified to carry out well defined State programs, on the other hand, the county commissioners or city or village council would be better suited to determine the proper level of spending for these projects. The general thrust of the recommendations, then, is to curtail the proliferation of special purpose districts and to strengthen the roles of the general purpose units of government.

"The Subcommittees have relied heavily on the development of guidelines and standards and criteria at the State level, which will be used to guide the actions of the local units of government. The Department of Natural Resources and the Pollution Control Agency have been asked to draw up a great number of sets of these guidelines for use by local governments in implementing the statewide programs. The thought here is that while the State agencies are well suited to setting goals and providing general outlines for programs, they do not have the personnel and local knowledge necessary to apply the general principles that they may come up with to the various localities around the State. The local units of government, then, are assigned the job of filling in the finer points of the various State programs.

"One factor that has limited the ability of county governments in particular to handle water related programs is their inability to finance them on an equitable basis. In the past, counties have been required to finance almost all projects out of general revenue which was generated primarily by an ad valorem property tax levied on all property within the county. Municipalities have been in a somewhat different situation in that for a great many projects they are given authority to assess the cost of the project against the property owners that are benefited by the project.

"The Subcommittees felt that counties would be more willing to undertake water related resources programs if they could develop some kind of a system for assessing the cost of these programs against the benefited property owners. If the voters of a county are assured that only the persons benefited by a project will be required to pay for it, they will, perhaps, be more willing to allow the project to go forward. The system recommended by the Subcommittees for assessing these costs is



the establishment of what are called "subordinate service areas." These areas are the areas surrounding a particular lake or along a particular stream that would be benefited by a project. The cost of the project is then assessed against the owners of the property within the service area on ad valorem basis. The proceeds of the tax would then be spent on the project within the area.

"In the past, where more than one county has been affected by a particular water problem, there has been a great deal of difficulty getting any action because counties are often unwilling to act cooperatively on a joint powers basis. The Subcommittees' solution to this problem has been to recommend a greater degree of State control over these multi-county problems. The Subcommittees recommend giving the Department of Natural Resources the power to define the area affected by a particular problem and to order the counties to take such steps as are necessary to solve the problem, whether it be the abatement of pollution, the repair and improvement of a stream water course, or the establishment of a flood control project.

"The Subcommittees felt that the primary role of watershed districts should be to advise and assist the counties and municipalities in carrying out water resources programs. Watershed districts can offer valuable local knowledge of water problems to the general purpose governments in the area and can also help to provide general overall water management advice and assistance to these governments. In order to assist the counties and the municipalities in carrying out particular water resources programs, the Subcommittees have recommended that: the powers of county boards to administer ditch programs be strengthened and improved; the powers of counties and the municipal governments to provide water supply and sewage disposal systems be strengthened; the powers of county and municipal governments to carry out stream maintenance and lake improvement projects be strengthened; the DNR program for establishing regulations for the use of surface waters by various kinds of watercraft be shifted somewhat from the State level to the local level; existing programs for adoption of shoreland development ordinances be extended to include incorporated as well as unincorporated areas; the program for development of flood plain management ordinances be accelerated; and the powers of county and municipal governments to provide projects for flood damage reduction be strengthened."

After carefully reviewing the August 16, 1972, report released by the Office of Senate Counsel and containing recommended water resource legislation, the Committee has concluded that the report represents a commendable effort by the Legislature to be responsive to water resource policy deficiencies. The Committee particularly concurs with the following recommended policies: water pollution control should be required to stress advanced waste treatment rather than streamflow augmentation for dilution of waste discharged into streams, non-structural methods

of flood damage reduction are preferred over structural methods, and the State should not approve or endorse the development of any public waterway for private commercial transportation unless and until it has been determined that no alternative method of transportation can be provided at less public expense. The report fails to spell out requirements whereby variances from county and municipal ordinances for management of drainage, wetlands, flood plains, and shorelands can be reviewed by State government.



## ENVIRONMENTAL EDUCATION

The Committee finds that the problems observed in the environment today have their origins deep in past and present ways of life. One way to begin a new way of thinking and of living is through environmental education. As stated in a report prepared by the Minnesota Environmental Education Council, "while technology has made life easier in many ways, it has also vastly altered the environment. Not only is the quality of life reduced but life itself is jeopardized. A new life style is being called for, based on the requirements of living within the environment. Enlightened ways of living in harmony with nature, with each other and with the world must be developed.

"Environmental education is a life-long process. It is a way of looking at life, fostering awareness of other life and of inter-relationships, learning to recognize the effects (both good and bad) man has on his physical and biological surroundings, and the responsibilities he must accept for the mere fact of his presence and his activities in the environment. It should enable him to make sound ecological decisions and foresee their consequences; to make value judgments, and act accordingly. Environmental education encourages development of life values and a style of living which minimizes destruction and maximizes those relationships that enhance the quality of life. It is learning how to contribute to the quality of life, and fosters the constructive use, rather than exploitation, of the environment.

"It is more important to understand that environmental education must provide more than a schoolhouse approach to ending the degradation of man-made surroundings and the natural world. It will not simply provide an understanding of pollution problems and provide the nation with skills to meet or solve those problems.

"Environmental education is not merely a course in school or a curriculum combining elements of the natural and physical sciences into a new department or specialty. Nor is it just another name for outdoor education, resource management, or conservation education. Environmental education colors and affects the humanities, languages, social sciences, history, economics, and religion as dramatically as it does the natural sciences. Environmental education provides alternative ways of thinking and ultimately acting.

"It will give an ecological perspective for every aspect of learning and living, including our relationships with other members of the human community. Constructive use of the environment will be possible only when and if we establish honest and open attitudes in our day-to-day dealings with one another. It is not reasonable to expect people to develop concern for the physical environment unless they first develop an understanding and a concern for the well-being of other people."

The Committee finds that achievement of the goals of environmental education will require an intensive effort for at least two decades. The environmental education process must become an integral part of all human learning and behavior. The responsibilities must be shared by national, State and local governmental units. The other segments of society--schools, business, industry, labor, citizen groups, churches and the family--must support and participate in these efforts.

Because these are such diverse groups it is necessary that a comprehensive plan for environmental education be developed, accepted and implemented by and through all segments of Minnesota society. The Minnesota Environmental Education Council has developed a comprehensive plan for environmental education which the Committee believes has many desirable features. That plan involves regional environmental education commissions and the Minnesota Environmental Education Council. The 1973 Minnesota legislature will be asked to enact appropriate legislation to create an organizational structure to plan, promote and implement environmental education activities throughout Minnesota, in accordance with the Minnesota State Plan for Environmental Education. The rationales and recommendations contained in the plan truly represent a massive educational effort, touching all major segments of Minnesota society.

The plan has its foundation at the local and regional level, recognizing the precious differences which exist throughout the State among both human and other natural resources and calling on people at those levels to determine their own priorities and methods for implementing community-wide environmental educational programs. The plan also calls on the State Government--Legislators, Governor and governmental employees--to establish by their example, the attitudinal climate and to provide the organizational and material resources which will allow meaningful environmental education programs to occur.

The necessity for society to become more environmentally conscious and to better prepare itself to make wise decisions on matters affecting the environment is well-established. The plan describes ways in which this can happen. It will require a substantial investment of energies and financial resources, but the potential return makes it the most practical investment society can make to insure its future well-being.

Environmental Education is more than the study of lakes, parks and national areas. The inner city neighborhood is generally omitted, a serious deficit. The Committee recommends that the Minnesota Environmental Education Council adopt a broad definition of environmental studies, which will include consideration of the day-to-day living environment of the people of Minnesota. Membership of the Council and associated commissions must of necessity be drawn from a wide range of vocations. Serious study is merited on backgrounds of those appointed to such bodies. Attempts should be made to reach the adult public to present them



background information and to up-date them on environmental matters through continuing education.

Teachers need a broader understanding of the complex interactions of nature and how technicians are attempting to manage resources. State agency technical reports should be available and circulated to institutions to increase their creditability through a public understanding.

## ENVIRONMENTAL INFORMATION SYSTEM

The people of Minnesota have expressed a great concern with the environmental quality of the State. Gathering timely and authoritative data concerning the conditions and trends in the quality of the environment is one of the keys to effective management for environmental quality. The detection of environmental changes, desirable or undesirable, natural or man-made, is impossible without established base lines and repeated observations. Such measurements are essential for the identification of environmental needs and the establishment of program priorities, as well as for the evaluation of program effectiveness. They provide an early warning system for environmental problems which allows corrective action to be taken before the problem becomes serious.

The measurement of the status and trends in the environment is an exceedingly complex problem. To paint an accurate picture of Minnesota's environment will necessitate deciding upon adequate indicators of environmental quality, determining and evaluating specific information requirements, and improving data collection methods. Federal, State and local agencies and private concerns are all involved in activities to understand, describe, and predict changes in environmental quality. Improved institutional arrangements are necessary to develop an integrated system to provide required information.

The Committee finds that the status and trends in Minnesota's environment are unknown on a comprehensive, detailed basis. The undesirable direction and seriousness of trends are accepted general knowledge, but there exists no well-documented gauge of the State environmental quality conditions. Little attention has been given to deciding upon adequate indicators of environmental quality on a statewide basis, determining and evaluating specific information requirements, and improving data acquisition and handling methods. Data acquisition and handling is not a substitute for action. But, in the long run, action without adequate data programs is more likely to be ineffective.

Recent annual expenditures for environmental data collection, investigations, and comprehensive studies programs in Minnesota total about \$7 million. About 55 percent of these expenditures were Federal funds, 35 percent were State funds, 6 percent were local funds and 4 percent were private funds. In 1970 about \$100 million was expended for all Federal and State environmental programs in Minnesota. Thus, expenditures for environmental data collection, investigations, and comprehensive studies programs constitute about 7 percent of the total expenditures for environmental programs. Recent annual expenditures for environmental data collection, investigations, and comprehensive studies programs were \$3,301,000, \$2,972,000 and \$666,000 respectively. Most environmental data collection and investigation programs of State agencies are appendages to regulatory, enforcement, and



monitoring programs. The Committee finds that State agencies do not have separate and strong environmental data collection and investigation programs. There are no State programs aimed at obtaining information concerning ecological costs and risks associated with population and technology growth.

The Committee recommends that a statewide environmental information system be established to improve the coordination of data acquisition and handling responsibilities, to improve the efficiency of data programs, and to upgrade and fill deficiencies in data programs. State agencies should be funded and required to make available at no cost technical publications to the teaching profession. Institutional arrangements must be devised to design the system. The system is defined as the total statewide activity to acquire, process, store, and disseminate data needed for the evaluation, planning, development and management of Minnesota's environment.

The system should have two main components: a data acquisition subsystem, and a data handling subsystem. Institutional arrangements should be devised to perform the following functions: operate a statewide network for acquiring data; coordinate a statewide network and specialized data activities; and maintain a central catalog of data and on activities being planned or conducted to acquire data.

Coordination should be accomplished with participation of all concerned agencies, by reviewing the data requirements and activities of all agencies and subsequently: identifying common needs for environmental data; establishing and revising as appropriate the statewide network; advising user agencies promptly of the extent to which the statewide network can meet their specialized requirements for data; and achieving optimal coordination of network and specialized data activities in order to meet, effectively and economically, the variety of needs of agencies concerned. The Committee recommends that each year the environmental information system culminate in a plan. That plan should: identify long-range and intermediate agency objectives; relate proposed data acquisition activities to objectives; identify planning assumptions; and call attention to unresolved interagency issues and views of the agencies concerned.

A central catalog could provide information needed in developing the annual plan for use in the budgetary process. An inventory of on-going data-acquisition activities is essential to accomplishing this objective. The concept of the catalog of data is based on the premise that development of such a catalog provides a basis for organizing data-acquisition activities in an orderly fashion. The catalog also would enable data-users to determine if needed data are available and, if so, from whom they can be obtained. The statewide data network activities should be based on identified data needs not being met by existing acquisition activities; identification of future data needs and arranging for their acquisition; the designation of appropriate standards

of data acquisition and processing; the coordination of ongoing and planned data acquisition activities so as to increase the efficiency and economy of these efforts and avoid unnecessary duplication of effort; establishment of mechanisms for continuing review of the network to evaluate its efficiency, economy, and capability of meeting data needs.

Several data systems are presently being developed by State agencies. The Minnesota Pollution Control Agency has initiated data systems for river and air quality data and has access to a more ambitious Federal system, STORET: the State Department of Health has computerized certain vital statistics records of the past decade and has begun a system for dealing with municipal water quality data; and the Minnesota State Planning Agency is sponsoring a data bank for land use information and has completed a lake-shore inventory (Minnesota Land Management Information System). The Committee recommends that over-all coordination through a State agency is necessary to assure maximum compatibility between existing and all future information systems. The Committee finds that investigation into the synergistic effects of environmental contaminants on environmental and human health is among the critical research needs of today. There is considerable speculation that the effect of many poisons and irritants combined is substantially greater than the sum of their individual effects, especially when the individual dosages are well below "safe" levels.

#### Environmental Indices

Accurate and timely information on status and trends in the environment is necessary to shape sound policy and to implement environmental quality programs efficiently. Further, the State's people are entitled to know whether the public and private money being spent to protect the environment returns a commensurate improvement in environmental quality.

The Committee finds that one of the most effective ways to communicate information on environmental trends to policy-makers and the general public is with indices. An index is a quantitative measure which aggregates and summarizes the available data on a particular problem. There are many types and forms of indices. An index can be just a simple ratio, for example, the ratio of average ambient air pollution to a standard, or it can be a complex formulation involving a number of factors and a variety of mathematical manipulations. The nature and complexity of the index used will depend on the subject matter and the purpose the index is to serve. It is important that any index be backed up by more detailed but comprehensible components to allow more specific analysis of environmental trends.

Information on the environment can be presented to the public in a format which lies anywhere along a continuum ranging from the raw data at one extreme to a single index number for the whole environment at the other. The raw data end of the



continuum is the most precise in the sense of providing the details of a particular environmental condition but the least meaningful to policy-makers and the general public. At the other extreme, a single index number representing total environmental quality might seem meaningful to the public but would involve aggregating and summarizing so much diverse data that it would likely be misleading in many important respects. Additionally, the degree of generalization involved would make such an index virtually useless to policy-makers and technical people concerned with specific environmental problems.

On the other hand, the use of a limited number of environmental indices, by aggregating and summarizing available data, could illustrate major trends and highlight the existence of significant environmental conditions. It also could provide the Legislature and the State's people measures of the success of Federal, State, local, and private environmental protection activities. An analogy might be drawn with the economic area, where the Consumer Price Index, Wholesale Price Index, and unemployment rates provide a useful indication of economic trends and of the success of Government policies in dealing with these areas.

The development of environmental indices has been slow. Many useful environmental data, therefore, lie in bulky volumes or on computer tapes and are used only rarely. The Committee recommends that the State develop meaningful environmental indices. A preliminary list of those aspects of the environment which should be measured on a regular basis is provided below.

#### Underlying Factors

##### Population

- Absolute size
- Birth rate
- Death rate
- Age composition
- Lifespan, by sex and race
- Immigration and emigration

##### Economic development

- GNP, absolute and per capita, by sector
- Capital investment, by sector

##### Urbanization

- Percent population in central cities and suburbs
- Percent population, by population size of community

#### Resources

##### Supply and demand - renewable resources

- Timber
- Water, by region and type of use

##### Supply and demand - nonrenewable resources

- Other

## Land

- Amount of land available for food production
- Amount of urbanized land
- Strip-mined land - reclaimed and unreclaimed
- Development in flood plains
- Land devoted to transportation-related activities -
  - urban and non-urban
- Amount of wetlands, by type
- Amount of land used for public works projects
- Wild and natural areas

## Food

- Agricultural productivity
- Food supply vs. demand (including caloric and protein value)
- Fish food harvest and reserves

## Solid waste and recycling

- Amount of municipal (residential and commercial) solid waste, by type of waste
- Amount of industrial solid waste, by source and type
- Amount of agricultural solid waste, by type
- Percent materials recycled, by type

## Energy

- Total BTU's of energy used
- Electric power consumed
- Mix of fuel used for energy supply
- Productivity per energy unit consumed

## Ecological Factors

### Climate

- Solar radiation amount, by type
- Temperature change

### Natural disasters

- Floods - property damage and human injury
- Tornadoes - property damage and human injury

### Wildlife

- Wildlife Quality Index
- Wildlife Management Effectiveness Index
- Wildlife Habitat Index

### Maintenance of major ecocycles

- Nitrogen
- Carbon
- Other

## Pollution

### Air

- Amount of emissions, by type and source (major pollutants:  $\text{SO}_2$ ,  $\text{CO}$ , oxidants,  $\text{NO}_2$ , hydrocarbons, suspended particulates)
- Percent population exposed to levels above primary standards (health index)



Ambient air quality (index of ambient levels for each major pollutant and composite index for all pollutants)

Water

Amount of effluents, by source, type of pollutant (major pollutants: BOD, CCD, or TOD, dissolved oxygen, dissolved solids, suspended solids, phosphorus, ph, salinity, oil, phenols, fecal coliform), and type of water body used for disposal

Number and area of lakes eutrophied

Ambient water quality, by region and type of pollutant

Percent population served by drinking water meeting standards

Subterranean water pollution

Radiation

Major radionuclides present in media

Average human radiation exposure

Number of nuclear accidents

Pesticides

Amounts of pesticides used, by type

Amount of major pesticide types in media, food, and humans

Injuries due to pesticides

Noise

Ambient noise levels, urban and non-urban

Toxic substances

Mercury, in media, food, and humans

Cadmium, in media, food, and humans

Other metals in media, food, and humans

Synthetic organic chemicals (other than pesticides) in media, food, and humans

Manmade Environment

Housing

Percent substandard housing

Housing availability

Density per square mile

Neighborhood quality

Transportation

Journey-to-work time

Aesthetics

Billboards and junkyards per mile

Proportion of urban green space

Occupational environment

Work injuries

Workplace pollution

#### Recreation

- Open space - parks, wilderness
- Cultural facilities
- Work/leisure time ratio

#### Ecological Cost Analysis System

The Committee recommends that the State create a formal system or organization to assess the total costs of various products including resources, energy and pollution costs, and to analyse the effects of alternative policies, practices and solutions upon environmental quality and human welfare. The State would then know, for example, for each point of detergent: how much air pollution is generated by the electric power and fuel burned to manufacture its chemical ingredients; how much water pollution is due to the mercury "loss" by the factory in the course of manufacturing the chlorine needed to produce it; the water pollution due to the detergent and phosphate entering sewage systems; and the ecological effect of fluoride and arsenic (which may contaminate the phosphate), and of mercury, which might contaminate any alkali used to compound the detergent. Such pollution price tags are needed for all major products if the State is to judge their relative social value.

In addition, studies should be conducted on the effect of technological growth or changes on the quality of life in Minnesota. The organization or system should analyze in depth the relations between resource, technology and individual welfare, as they have developed historically and continue to develop, and inform and advise the State and its people of the most effective ways to improve human welfare through technology control. We would then know, for example, the true environmental costs of snow removal by mechanical versus chemical means, by organic farming versus chemical farming.

#### Environmental Impact Statements

Section 102(2)(C) of the National Environmental Policy Act (NEPA) requires that any agency of the Federal Government proposing legislation or planning to undertake an action "significantly affecting the quality of the human environment" file an impact statement with the Federal Council on Environmental Quality. Before filing, the statements must be circulated by that agency to the public and to appropriate Federal, State, and local environmental agencies. Comments received on the draft statement became a part of the public record along with the final statement, which reflects the comments. Over the past 1½ years environmental impact statements for 53 projects in Minnesota have been reviewed - 12 Corps of Engineers projects, 20 Federal Highway Administration projects, 10 FAA projects, 2 Coast Guard projects, 3 Federal Power Commission projects, 2 Atomic Energy Commission projects, 1 HUD project, and 1 GSA project.



The environmental impact statement process was included in NEPA to insure an across-the-board Government response to the Act's policy directives. That process, requiring a public explanation of the environmental consequences of proposed Government actions, compels substantial adjustments in the ways in which many agencies previously did business. Like any major governmental reform, the process has raised a number of thorny problems in its early implementation. The Federal Council on Environmental Quality has issued guidelines instructing the agencies on how to handle many aspects of the 102 process. The Council also gives agencies additional guidance on a more informal basis. Because the guidelines are an interpretation of NEPA by the agency charged with its implementation, a number of courts have acknowledged that they are entitled to great weight under accepted legal principles.

Among the major problems that still persist, three types of issues recur: what procedures agencies must follow in preparing and circulating 102 statements, what the statements must contain, and what role the Federal Council on Environmental Quality plays in the process. Both Federal and State agencies are making progress in solving these problems and in adopting workable rules and regulations and procedures concerning environmental impact statement provisions of NEPA. However, much remains to be accomplished.

#### Environmental Conservation Library

The Environmental Conservation Library (ECOL), Minneapolis Public Library, is a special collection of environmentally-related documents, books, pamphlets, magazines, newsletters, indexes and curricular materials for all Minnesotans. The establishment of this special library, which opened for service in April, 1972, has been made possible by donations and grants from foundations, industries and individuals. The collection is housed in the main public library building in Minneapolis, and is staffed by five persons.

The 1971 Minnesota Legislature designated this library as a State center for environmental information. In so doing, the Legislature recognized "that the quality of the environment is a significant public issue; that environmental deterioration is due in part to poor understanding of the need for ecological balance; that presently there do not exist adequate facilities for informing the public in these areas; that Minnesota has long been in the forefront in developing programs to protect the environment and to provide for the wise use of natural resources...the future of the State depends on citizen knowledge and awareness of the manifold problems associated with environmental management and the proper balancing of the human need for a quality environment and economic development."

In recognizing the imperative need for providing Minnesota's citizens with adequate environmental information, the Legislature

charged the Minneapolis Public Library with the responsibility for "collecting and organizing books and other materials...and with the development of programs of information gathering and dissemination." To fulfill this charge, the Legislature appropriated from the general fund \$25,000 per year for the biennium. This appropriation, with private grants and in kind contributions by the Minneapolis Public Library, has supported the Environmental Conservation Library through its developmental phase.

The Committee finds that the Environmental Conservation Library is now serving adults and children, both specialists and interested laymen, from throughout the State. Services include reference assistance with specific questions; bibliographies on special subjects; books and pamphlets for loan; and environmental education materials for classroom and individual use. Reference assistance and materials are provided in response to mail and telephone requests as well as to those visiting the library. The growing book collection presently totals approximately 3,000, in addition to 150 current periodical subscriptions and several hundred documents.

Acquisition programs are underway which are making the collection of growing value in documenting Minnesota's environmental history. With the approval of the Environmental Quality Council, the State Planning Agency is depositing with ECOL a copy of each environmental impact statement submitted to the agency under the requirements of Section 102(C) of Public Law 91-190. ECOL is also purchasing many other environmental impact statements for projects of interest to Minnesotans.

Documents and reports of the Pollution Control Agency, the Department of Natural Resources, and many other departments, commissions, boards and agencies are collected and organized. In addition, information arising from citizen organizations, local bodies, and industries are also acquired regularly. Many useful materials are donated by groups and organizations.

A special project funded through a one-year grant from the U.S. Office of Education is presently underway. It involves the collecting and assembling of multiple sets of materials from many sources on specific topics of interest to school-age children. These packets will be loaned to schools, libraries and individuals throughout the State.

The Committee recommends that in order to fulfill the mandate of the Legislature and to serve Minnesota's environmental information needs fully, the Environmental Conservation Library should have continuing public funding. As the collection becomes established and begins to serve the entire population of the State, sources of private funding become less available. The provision of adequate and accurate environmental information should be a responsibility of the State government.

Several programs of importance will require increased attention in the coming years. In addition to continued funding,



the library must establish depository status with all appropriate State agencies, as well as regional and municipal bodies. Dissemination procedures, through local libraries and other networks, will be strengthened. Information for environmental education will be provided to schools, organizations, agencies and others throughout the State, in cooperation with the programs of the Minnesota Environmental Education Council. Environmental information is now more freely available to Minnesotans than ever before, and while much remains to be done it is clear that Minnesota can again provide leadership in environmental concerns.

## ENVIRONMENTAL LAW

The Committee recognizes that the rules of law governing environmental quality are weak. They come from two basic sources: 1) written laws - constitutions, statutes, ordinances, and rules and regulations; and 2) decisions of courts. An important step was taken during the 1971 session of the legislature when a Bill was enacted which provides that a citizen may institute a class action for protection of the environment from violators of pollution standards. Efforts to weaken the provisions of the Act should be resisted and steps should be taken to further strengthen environmental rules of law through elimination of exemptions.

The Committee recommends that the State conduct a comprehensive review and analysis of Federal, State and local rules of law with the objective of identifying and remedying deficiencies of rules of laws in coping with environmental problems in Minnesota. Rules of laws should be predicated on the assumption that the objective to enhance economic development has no inherently greater claim on resources than the objective to enhance the quality of the environment.

The Committee recommends that an Environmental Bill of Rights be added to the State Constitution by amendment. This should cover the following points: an inalienable right to a clean environment and the power of redress for a citizen if his environment is adversely affected by the government or any other person.

Consideration should be given to improving environmental rules of law by: empowering PCA to impose civil penalties for violations of agency regulations, allowing treble damages in the event of proof of willful violation of environmental laws, allowing the court to award reasonable attorneys fees where a citizen successfully proves a violation of environmental regulations in an action under the Environmental Rights Act, and where prima facia showing of environmental damage or violation of environmental regulation can be made and placing the burden of proof on the polluter.



## LAND USE

To a very great extent, all environmental quality management decisions are ultimately related to land use decisions. The collective land use decisions which are made today and in the future will dictate society's success in providing the State's people with quality life in quality surroundings. Intelligent land use planning and management can and should be a singularly important process for preserving and enhancing the environment, encouraging beneficial economic development, and maintaining conditions capable of improving the quality of life.

The Committee finds that decisions about the use of land significantly influences environmental quality and the welfare of the inhabitants of the State, and that present State and local institutional arrangement and programs for planning and regulating land-use are grossly inadequate. Important ecological, cultural, historic, and aesthetic values in areas of critical environmental concern which are essential to the well-being of all citizens are being irretrievably damaged or lost. Shorelines and wetlands, flood plains, and other lands near or under major bodies or courses of water which possess special natural and scenic characteristics are being damaged by ill-planned development that threatens these values. Certain kinds of land-uses such as major airports, highway interchanges, power plants, major industrial or extractive activities and certain kinds of urban and recreational development result in the degradation of the environment, and a loss of social, economic, and environmental values of more than local concern.

The development and implementation of plans, standards, and programs for the control of air, water, noise, and other pollution are impeded. Because of a lack of plans and policies, the selection and development of regional and/or State benefit has been delayed or prevented. There is a lack of coordination between agencies and levels of government in the regulation of development and in the use of economic and environmental resources. The Committee finds that there is a need to develop and implement land-use and environmental policies, plans, and standards for the State as a whole and for major regions thereof through a coordinated, unified program of planning, land acquisition and development, and land-use and environmental control.

Chaotic urban sprawl, clashes between citizens and power companies over power plant siting and transmission line location, controversies surrounding highway plans, major airport siting, industrial development near wilderness areas, destruction of ecologically precious wetlands, shoreland development, flood plain development, and the management of public lands are pressing problems which stem from poor land-use planning and controls. The State's laws delegating land-use controls to localities are patterned on models drafted in the U.S. Department of Commerce

under Secretary Herbert Hoover in 1923. These laws are based on assumptions that land is a commodity which should be shielded against value-depreciating uses on nearby land, that "highest and best use" of land was whatever brings top dollar, and that the reasons for regulating land use were to maximize land values and assure potential buyers of resale marketability. Today, however, it has become apparent that local zoning is inadequate when land-use decisions by one locality can set in motion a multitude of environmental and social problems that affect more than one locality. Important legislation is pending in the Congress that would give states the financial and technical assistance they need to develop strong and effective land-use plans.

Governmental control over private land has been reserved for the State which in turn has delegated planning and management of land use to local government. Municipal and county master plans, land zoning and use of property taxes to influence land use patterns are old and accepted practices. Local government usually lacks the ability to collect data, the technical competence to suggest alternatives for development and the will to enforce necessary controls.

Programs with major land-use impact include highway, airport, and recreation plans; water resource development; park systems; housing; etc. An inventory of the State's land resource must be the first step in land-use planning. Some cities have inventories of land uses, but most are not current. No existing inventory includes sufficient geologic, topographic and climatological data to determine the suitability of land for a variety of potential uses.

Major airports, industrial plants, or other developments have particular requirements in terms of physical sites and proximity to fuel and water supplies, transportation, and other services and population centers. No comprehensive inventory of the available sites exists. Reservoirs and channilization projects protect lands from flooding but irreparably change waterways. No comprehensive inventories are available of either the kinds of lands protected or the kinds of streams lost. Critical land resources are being committed with no appreciation of the total needs or the alternatives. As long as this information is unavailable, opponents of any proposal can attack the site chosen and suggest that preferable alternatives exist. Proponents will insist no unique natural qualities are being lost. The public cannot knowledgeably express its preferences, and misallocations will continue. Until statewide land-use planning is undertaken there will be no way to discover emerging conflicts among various levels of government and private interests and no basis for the rational resolution of conflicts.

The Committee recommends that the State legislature consider legislation for a statewide land-use plan. If Federal legislation is enacted, providing financial assistance, nearly all states will



undertake land-resource inventories. This will be followed by planning and control of land-use - at least for critical areas. Land-use planning, however, must not be viewed simply as a means to protect environmentally significant areas. Rather it must become the process in which the full range of society's needs are weighed against their demands on the physical world. Land-use planning can succeed only if an inventory of resources is prepared, an inventory that recognizes the unique characteristics of land resources, both in their natural and fully developed states. It can only succeed if requirements for public services - housing, transportation, energy, water supply, industry, raw material production - are realistically projected.

There are various ways that the State can plan, as well as regulate, for the use of its land surface. The State could adopt an all-inclusive, statewide comprehensive land use plan - allocating all lands to particular uses. An alternative measure would be a proposal to assert State interests through selective regulation of specific areas, with the State's planning responsibility confined to cases where local planning is deemed inadequate. A middle ground between the two above positions would be to require a statewide comprehensive planning process, but to limit the State regulatory controls to selective issues and areas of State or regional concern. Regulation without prior planning makes little sense logically, although it can be argued that the process of zoning in the State has amounted to precisely this. In many cases, certain types of development provide benefits to an area extending well beyond the boundaries of a single local government area. Some mechanism may be needed to deal with a situation where a local government tends to exclude or unduly restrict proposals for development needed by a larger, regional community.

It has been suggested that the State legislature could authorize a statewide land use plan, with suitable implementation. Many land use problems are of local concern only and are best handled locally; the State's concern could be broad. The State could require local governmental units to adopt comprehensive land use plans themselves, and State approval of the local plans could be required. At the same time, existing legislation would have to be changed so that the local administration of land use controls, the granting of variances, the granting of special permits, etc., would be consistent with the local comprehensive plan. The State could have the right to review variances and special use permits, or at least those with substantial environmental significance or impact. It has also been suggested that, if properly done, the formation of a statewide land use planning program can succeed within the present context of State laws and State organizations. This is true for the planning activities, but it might not be true for the implementation phase that will be expected to follow the planning activities.

The Committee recommends that the State define, inventory, and delineate environmentally sensitive areas - such as areas surrounding the Boundary Waters Canoe Area and the Voyageurs National Park, North Shore of Lake Superior, Lower St. Croix River Valley, parts of the Mississippi and Minnesota Rivers Valleys, and unique wildlife sanctuaries likely to be in the path of the Twin Cities' urban expansion - and pending preparation of land-use plans, declare moratoriums on commercial, industrial and highway development in these areas. Plans should include policies, plans, principles, standards, implementation suggestions, and legislation which should be enacted to achieve the objectives of the plans. A fund should be established and operated so that key parcels of land can be purchased where the existing use significantly threatens the area in question.

In 1971, the Legislature created and funded the Experimental City Authority. The Authority is charged with coordinating planning finding an appropriate site for a Minnesota Experimental City to have a population of 250,000 and preparing an implementation plan. Two sites were presently being considered, one in northwestern Douglas County near Evansville and one in northwestern Aitkin County near Swatara. The Committee recommends that the Experimental City Authority in its studies give due consideration to the impact of an Experimental City on the ecology and the general quality of life in the vicinity of selected sites. Studies should be conducted to seek answers to the following questions: Will the experimental city foster decay of present cities? Wouldn't funds be better spent trying to improve environmental conditions in present cities such as Duluth?

#### Pending Federal Land Use Legislation

Both the United States Senate and House of Representatives are presently considering bills that would require the States to adopt land use planning programs. The Senate bill is S.632, authored by Senator Henry Jackson of Washington, which passed the Senate on September 19, 1972. The House bill is H.R. 7211, which is authoired by Representative Wayne Aspinall of Colorado and was reported out of committee on June 14, 1972. The Nixon administration and environmental groups support the Jackson bill, but are opposed to Aspinall's legislation because it groups public lands with private lands in land use planning. Representative Aspinall was defeated in the September 12 Democratic primary, and his defeat and the mounting opposition to H.R. 7211 resulted in no floor action by the House.

According to John Helland of the House Research Staff, "in order to induce States to establish land use planning procedures, both the Senate and House bills provide that a State which fails to adopt an acceptable land use planning program within five fiscal years from enactment would suffer a withholding of Federal funds now granted for development of airports, highways, and land



and water conservation (LAW CON). The reduction would be 7 percent after the fifth year, 14 percent after the sixth year, and 21 percent after the seventh year. This would result in a loss to Minnesota, at 7 percent, of \$2,729,000 under the Senate bill and \$7,676,000 under the House bill. The House bill's withholding provision includes interstate highway funds; the Senate bill does not. Under the Senate bill, funds withheld from a State would be kept by the Treasury Department until the State complied with the act. Under the House bill, withheld funds would go to other States that had already complied. The three Federal programs for which funds would be withheld are deemed to have the most significant long-range and irreversible impacts upon land use patterns because of the exceptional influence they have over public and private development. As an additional inducement to adopt land use programs, the Senate bill provides that where a State has not developed an acceptable land use planning program within five years from enactment, '...any major Federal action significantly affecting the use of non-Federal lands...' in that State must be preceded by a public hearing on the impact of the action on land use, based upon the considerations that would have been included in an acceptable State land use planning program.

"The land use program required by both bills includes the preparation of an inventory of land and natural resources, compilation of data on population and economic development, projections of land use needs, an inventory of land use planning programs, provisions for technical assistance to State and local personnel, methods for coordinating programs of State and local agencies, and provisions for public hearings and participation in the planning. This portion of the land use planning process program must be developed within three years from enactment of the Federal legislation.

"The State land use planning program must also include methods for implementing planning decisions. These must include methods for identifying and exercising 'determinative State authority' over the use and development of land for 'key facilities,' such as airports, major highway interchanges and frontage roads, major recreational facilities, and power plants; for 'regional benefit' development that affect more than one local government; for 'large scale development' that presents issues of more than local significance as determined by the State; and over the use and development of land in 'areas of critical environmental concern,' such as shorelands and flood plains, areas of unstable soils, rare or valuable ecosystems, significant undeveloped agricultural and watershed lands, forests and related lands that require long stability for continuing renewal, scenic or historic areas, and such additional areas for continuing renewal, scenic or historic areas, and such additional areas as the State determines to be of critical environmental concern.

"In addition, the State land use planning program must provide for regulating large-scale subdivisions to insure that the planned maximum beneficial use of land, and for assuring that any source of air, water, noise, or other pollution from regulated land developments shall not be located where it would result in a violation of any applicable air, water, noise, or other pollution standards.

"The Senate bill would require that Federal projects and activities significantly affecting land use, such as mortgage and rent subsidy programs and water and sewer construction programs, be consistent with State land use programs, except in cases of overriding national interest as determined by the President. The House bill would require that a State assure that Federal areas such as national parks and wildlife refuges not be damaged by inconsistent neighboring land uses, and that a State develop a policy for influencing the location of new communities and control the use of land around new communities. The implementation portions of the land use planning program must be effective within five years from enactment.

"In order for a State's land use planning program to be acceptable to the Secretary of the Interior, both bills would require a State to establish a land use planning agency with primary authority and responsibility for the development and administration of the land use program.

"The State land use program can either be implemented directly by State regulation or indirectly by State administrative review of local land use plans, regulations, and implementation. In either case, the State must have authority to prohibit the use of any land in a manner inconsistent with the State land use plan.

"Both bills provide a five-year timetable for development of acceptable land use planning programs, to be financed largely by Federal funds. The Senate bill authorizes \$40,000,000 annually (or about \$800,000 annually for Minnesota at its normal 2 percent share) for five years to pay 90 percent of the State's cost of developing a land use program. The House bill authorizes \$54,000,000 in the first year (or about \$1,080,000 for Minnesota) to pay 90 percent of the State's cost of developing and administering the land use program, \$45,000,000 to pay 75 percent the second and third years, \$39,000,000 to pay 50 percent the fourth and fifth years, and no money for the sixth to eighth years."

The Committee recommends that a State Agency be designated to coordinate programs associated with any emerging National Land Use Policy Legislation. The statewide planning process should include: a statewide inventory of land and natural resources; a data system on economic, population, and environmental conditions and trends; an assessment of land needed and suitable for recreation, agriculture, mineral development, forestry, industry and commerce, transportation, and urban development; an



inventory of environmental geological, and physical conditions for land-use; and inventory of non-Federal requirements for Federal lands; a method for identifying large-scale development; an inventory of and designation of critical environmental areas impacted by key facilities; an intra-state land use information exchange; a method for coordinating statewide land use decisions; methods for exercising decisions; methods for exercising determinative State authority over areas of critical environmental concern, key facilities and major access features and large-scale development; and methods for implementing plans. Statewide planning for critical areas associated with wetlands, potential copper-nickel industry, power plant sites, major airports, scenic areas, highways, and recreational areas should be emphasized.

Six program elements are suggested to accomplish the objectives of land-use and environmental quality programs. These include: strengthening the State data and information system, establishing authority and funding for land acquisition and management, designating and acting on specific areas of critical State concern, protecting groundwater resources, initiating a land-use and environmental policy and plan, and establishing a system for policy conformance and review. The first four program elements address subject areas which warrant immediate concern. The fifth and sixth begin the development of an ongoing State land-use and environmental program leading to the preparation of a State plan made up on policy, two-dimensional plans, programs, principles, standards, and criteria; some originating at the State level and at the regional and local level where adopted by the State at its discretion.

## ENERGY

The past use of energy in Minnesota has been characterized by enormous growth, major shifts in the relative importance of competing energy sources, and significant changes in the patterns of energy consumption most notably the increasing use of electric power. New uses for energy have stimulated growth and, in turn, been stimulated by it. Rising demand has prompted innovation to provide a matching supply, and innovation and competition have kept costs falling, which stimulated still further increases in demand. The Committee finds that recent trends indicate doublings of energy consumption approximately every fifteen years. Although electric power accounts for less than 25 percent of total energy consumption, doublings of electric power consumption are occurring every eleven years, and by the year 2020 electric power consumption may constitute about 50 percent of total energy use.

Questions are being asked concerning whether the use of fuels can safely persist with present trends. There is considerable controversy over whether or not the world is running out of fuel. Most people agree that the environmental quality costs of getting fuel, moving it and burning it are reaching unacceptable levels. Recent power shortages or near shortages in the nation, resulting voltage reduction, and threats of more serious "brown-outs" and "blackouts", particularly in large urban areas, evidence the need for better planning, an aggressive energy conservation program, and timely construction of electric power facilities that are found to be needed.

Electric power generation for all purposes accounts for about 23 percent of total energy consumption, non-electric household and commercial use accounts for about 22 percent, non-electric transportation use accounts for about 24 percent, and non-electric industrial use accounts for about 31 percent. Residential space heating accounts for about 12 percent of total energy consumption. Experts suggest that this amount could be reduced by one-third to one-half if homes were provided with proper floor, wall and ceiling insulation.

About 16 percent of the energy consumed annually feeds the internal combustion engines of passenger cars, and another 2 percent is consumed manufacturing these vehicles. Yet, the automobile is one of the least efficient forms of transportation and use of energy. The extraction and processing of metals, paper and glass account for more than 10 percent of energy use and almost 15 percent of electric power use. All of these materials are recyclable, yet today only a small fraction of consumption comes from recycling. The list of present wasteful uses of energy is much longer than this, but the examples given should be enough to suggest that energy consumption per capita could be substantially reduced.



Questions concerning the relative merits of alternative energy sources, the desirability of various patterns of energy consumption, and the precise economic and social repercussions of changes in energy prices and regulation are being debated. The Committee recommends that the State foster and encourage studies aimed at resolving the conflict between energy's central role in environmental quality degradation and its necessity in our technological society.

The fossil fuels that supply most energy today, and the uranium-235 that fuels existing nuclear reactors, are finite in supply. Yet, questions of public health, environmental deterioration, and exploiting the cheap energy resources of the poor countries are more important in the short term than resource exhaustion. Problems of electric power demand and the proliferation of power plants cannot be considered in isolation from the rest of the energy crisis. Electric power is only one form of energy consumption; often it can replace or be replaced by other forms. No means of providing energy, electrical or otherwise, is entirely free of environmental liabilities, and no form of pollution control is 100 percent effective. Thus, there will always be some environmental impact associated with energy production. In general, a crisis in supply and demand can be met by increasing supply or by stabilizing demand. Additional attention should be given to the second possibility.

Much energy is now being wasted. Per capita consumption can be greatly reduced without crippling the economy or the standard of living. Preoccupation with the cheapness of energy no longer serves the State well. Bringing environmental costs into the balance sheets will raise the price of energy, which will have many beneficial effects. Policies to counter the adverse effect on the poor are necessary and attainable. Rising costs of energy, and other policies to stabilize per capita demand, will ultimately be of no avail if the number of consumers increases without limit. After a point, population growth requires a disproportionate increase in energy consumption just to keep per capita affluence constant, because of diminishing returns.

The Committee recommends that the State adopt the following proposed actions for solving the energy-environmental quality conflict: support stiffer fines for oil spills and tighten regulations on emissions from fossil fuel power plants; oppose the deployment of breeder reactors and the rapid proliferation of conventional fission reactors until questions of accident insurance, radioactive waste disposal, independent setting and enforcement of standards, and control of bombgrade material are satisfactorily resolved; support Federal legislation requiring that all land that has been strip mined be reclaimed, that uranium mine tailings and acid drainage from coal wastes be controlled, and that additional measures to protect the health of coal and uranium miners be implemented; initiate studies to determine the environmental and economic implications of reversing



the promotional aspects of energy rate structures; urge that the promotional advertising by utilities be prohibited, urge that the Federal Power Act be amended to give first priority to minimizing environmental impact of generating electric power and to direct the Federal Power Commission to investigate ways to diminish demand; support greatly increased Federal support for research on techniques that promise to minimize the environmental impact of energy production and/or increase the efficiency of conversion to electric power including land based solar energy, controlled fusion, Magnet-hydrodynamics and fuel cells; and offer support for a comprehensive national energy policy, incorporating all energy sources and continuously reevaluating options for the short and long term.

### Electric Power

In 1970 the electric power utilities serving the State provided approximately 23.5 billion kilowatt-hours of power and they supplied a peak demand of 4,175 megawatts. Unless past and current trends are altered, it is not unreasonable to project annual electric power consumption approaching 69 billion kilowatt-hours by the year 1985, 187 billion kilowatt-hours by the year 2000, and a staggering 497 billion kilowatt-hours by the year 2020 - only fifty years from now. Peak demands are projected to increase from 4,175 megawatts in the year 1970 to 76,932 megawatts in the year 2020. Electric power consumption may continue to double approximately every eleven years. If present trends continue, industry could foreseeably consume 50 percent of the State's electric power by the year 2020.

If unlimited expansion of electrical energy is to continue, many new generation and transmission facilities will have to be constructed in Minnesota or adjacent areas. In the next fifteen years the construction of 15 new generation facilities is a possibility in the State; beyond 1985, plant construction may continue to accelerate. And, the megawatt capacity of newer units promises to increase. Larger units could exceed 1,000 megawatts in capacity by 1985 as compared to the present unit capacity of 550 megawatts. Only 10 years ago units were being constructed with less than 100 megawatts of capacity and units of 2,000 megawatts are on the drawing boards.

To transport electrical energy from power plants to the population centers and industrial areas of the State and to provide interconnections necessary for the importation of energy from outside the State, a 10,400-mile network of extrahigh voltage transmission lines is being constructed by the Mid-Continent Area Power Planners utilities. Direct current transmission lines are being considered for use in long-distance applications and numerous transmission lines of lower voltage capacity will be constructed.

Investments for power plant construction are enormous. For example, the Allen S. King power plant near Stillwater on



the St. Croix River with a capacity of 550 megawatts cost about \$76 million and the United Power Association of Elk River has announced its interest in constructing a new 550 megawatt nuclear unit, costing \$160 million, at an undisclosed site in central Minnesota.

The size and number of possible new power facilities pose serious potential threats to the environmental quality of Minnesota. Cumulative air pollution, water pollution, solid waste disposal, transportation of fuel, land use, and radiation hazards and risks could accelerate even with stringent controls. The Committee finds that although the State is making rapid progress in abating pollution created by existing power plants, much remains to be accomplished. Thus, the State is faced with serious catch-up as well as possible future environmental degradation problems associated with continuing rapid growth of electric power demand. In addition, power plant and transmission line proliferation will have profound impacts on land values, taxes, industrial development, jobs, life styles, community growth and development, local government problems and State regulation.

Most power plant sites are being planned to eventually handle several large generation units. This practice, which has been called clustering, allows scale economies to be realized in the construction of new transmission lines and other supporting facilities; it also reduces the number of local units of government that must be involved in plant location, construction, and taxation. Air pollution standards that strictly limit the discharge of pollutants from a single source may not be adequate where clustering of power plants occurs.

The magnitude of potential threats to the State's environmental quality can be appreciated by considering the following facts: equipment has been developed to reduce fly-ash and other particulate discharge from power plant smoke stacks. All new fossil-fuel installations will have equipment to lower such discharges; yet a 3,000 megawatt installation with electro-static precipitators of 99 percent efficiency would still discharge 7,500 tons of fine particulate matter to the atmosphere annually. Ash waste from coal burning units in a 3,000 megawatt installation would cover 400 acres of land to a depth of 25 feet over the thirty-year life of the installation. If sulfur and nitrogen oxides were removed by certain recovery methods using additives such as limestone, the amount of solid waste material would more than double.

A modern 1,000 megawatt power plant operating at full capacity will burn eight to ten thousand tons of coal daily. A modern coal train consisting of 100 cars can deliver ten thousand tons of coal. Thus, sufficient railroad cars, rail lines and switching facilities must be available to accommodate the equivalent of one coal train per day of full operation. Similarly, if the coal is to be barged to such power plants, docking

and unloading facilities capable of handling three to seven barges per day must be provided.

Power generating complexes planned for the immediate future require enormous amounts of land. A nuclear power plant with relatively small needs for fuel storage and waste disposal requires almost 400 acres. A similar fossil-fuel plant with its accompanying fuel storage and waste disposal problem can require 1,200 acres.

The large transmission lines that bring electric power from generating stations to the consumer also pose a serious threat to land management. Transmission lines utilize land at the rate of fifteen to twenty acres per mile in some areas.

In the past, electric power generating units have required large quantities of water for once-through cooling purposes. Future units and those under construction will be capable of closed-cycle operation using cooling towers and/or cooling ponds. These units could require sizable dependable water supplies and cooling ponds can require 1,000 acres or more.

Nuclear power production poses a number of public health risks that must be taken into consideration. The long-term health risks of radiation exposure from nuclear power and generating facilities even in small doses, are of three kinds: general life-shortening, production of cancer, and genetic damage. Operations associated with the extraction, processing, reprocessing of spent fuel and the handling of reprocessed radioactive wastes are hazardous. There are very serious problems associated with the disposal of fuel wastes that will remain active for thousands of years. On the other hand, the implications of an accident at a modern-day fission reactor are considered to be serious to the extent that the western hemisphere's largest insurance companies have refused, even as a coalition, to underwrite more than about 1 percent of the potential liability for the "maximum hypothetical accident" described for nuclear power plants in an AEC report.

The massive production and use of electric power involves public health, resource conservation, technology, economic growth, international trade and politics, national security, aesthetics, consumer protection and social equity. Consumption has been accompanied by serious and accelerating degradation of the physical environmental, as well as a rapidly dwindling supply of low-cost and less-polluting fuels.

The Committee recommends that the State adopt, as part of an energy policy, a goal of thrift in the use of electric power. That goal should be reflected in State policy to maximize the use of energy efficient systems for the production and utilization of energy, and to minimize the environmental impact from energy production and use. The State, as an indication of its support for and commitment to the aforementioned goal, should adopt laws and regulations to: establish an annual advertising



licensing fee for neon or incandescent lighting based upon BTU's of energy consumed per sign; initiate energy conservation programs to, among other things: develop energy efficiency standards for State building codes, and highway and residential street lighting, and investigate and propose short- and long-term programs for use or development of energy-efficient systems (e.g. mass transit); ban the use of natural gas for decorative lighting purposes; eliminate the use of pilot lights for new gas appliances; require all new State passenger vehicles to meet a minimum standard of efficiency; require conspicuous labeling, for the benefit of the consumer, on the energy efficiency of major electrical and gas appliances and heating and cooling systems, and adopt minimum efficiency standards for those appliances and systems; and establish standards for refrigeration and freezer units in food stores to encourage the elimination of open units.

The Committee recommends that comprehensive planning should be pursued to minimize the intrusions of transmission lines upon the landscape of Minnesota. A consolidation of rights-of-way involving railroads, highways, telephone and electricity lines, and pipelines are suggested as possible solutions.

Even if though the State adopts a goal of thrift in the consumption of electric power, additional power plants and transmission lines will have to be constructed. The sheer size and extent of facilities which unavoidably may have to be constructed and potential serious threats to environmental quality indicates that the siting of major power plants and transmission lines should be treated as a significant aspect of environmental quality planning and in particular, land use planning. The Committee recommends that a statewide electric energy plan be prepared by the State as an integral part of a statewide land use plan.

In preparing the plan, the State should give consideration to at least the following list of environmental and electric power factors: electric energy needs - growth in demand and projections of need, availability and desirability of nonelectric alternative sources of energy, availability and desirability of alternative sources of electric power in lieu of the proposed facility, socially beneficial uses of the output of this facility including its uses to protect or enhance environmental quality, conservation activities which could reduce the need for more power, and research activities of the electric entity or new technology available to it which might minimize environmental impact; land use impacts - area of land required and ultimate use, consistency with areawide state and regional land use plans, consistency with existing and projected nearby land use, alternative uses of the site, impact on population already in the area, population attracted by construction or operation of the facility itself, impact of availability of power from facility on growth patterns and population dispersal, geologic suitability of the site or route, seismologic characteristics, construction practices,

extent of erosion, scouring, wasting of land both at site and as a result of fossil fuel demands of the facility, corridor design and construction precautions for transmission lines, scenic impacts, effects on natural systems, wildlife, plant life, impacts on important historic architectural, archaeological, and cultural areas and features, extent of recreation opportunities and related compatible uses, public recreation plan for the project, public facilities and accommodation, opportunities for joint use with energy intensive industries, or other activities to utilize the waste heat from power plants; water resources impacts - hydrologic studies of adequacy of water supply and impact of facility on stream flow, lakes and reservoirs, hydrologic studies of impact of facilities on groundwater, cooling system evaluation including consideration of alternatives, inventory of effluents including physical, chemical, biological, and radiological characteristics, hydrologic studies of effects of effluents on receiving waters, including mixing characteristics of receiving waters, changed evaporation due to temperature differentials, and effect of discharge on bottom sediments, relationship to water quality standards, effects of changes in quantity and quality on water use by others, including both withdrawal and in situ uses, relationship to projected uses, relationship to water rights, effects on plant and animal life, including algae, macroinvertebrates, and fish population, effects on unique or otherwise significant ecosystems; e.g., wetlands, monitoring programs; air quality impacts - meteorology, wind direction and velocity, ambient temperature ranges, precipitation values, inversion occurrence, other effects on dispersion, topography, factors affecting dispersion, standards in effect and projected for emissions, design capability to meet standards, emissions and controls, stack design, particulates, sulfur oxides, oxides of nitrogen, relationship to present and projected air quality of the area, monitoring program; solid wastes impact - solid waste inventory, disposal program, relationship of disposal practices to environmental quality criteria, capacity of disposal sites to accept projected waste loadings; radiation impacts - land use controls over development and population, wastes and associated disposal program for solid, liquid, and gaseous wastes - criteria set by AEC and EPA, analyses and studies of the adequacy of engineering safeguards and operating procedures - determined by AEC, monitoring, adequacy of devices and sampling techniques; noise impacts - construction period levels, operational levels, relationship of present and projected noise levels to existing and potential stricter noise standards, monitoring, and adequacy of devices and methods.

The legitimate concerns of many citizens for the enhancement of the environment in areas surrounding new power plant facilities, and the inability of the existing institutional framework to take into account these concerns at an early enough point in time, have resulted in decisions often unsatisfactory from an environmental as well as an energy viewpoint. The lack of timely



opportunities to raise important environmental issues and the absence of public knowledge well in advance of the utility companies plans, point to the need for a more understandable certification process and early disclosure for public comment on plans for specific generation and transmission facilities. This is particularly important when considering that it is estimated to take 8 to 12 years respectively from the planning stage to operation for the construction of fossil fuel and nuclear electric power systems.

The Committee recommends that the State establish review procedures to formalize the bulk power facilities certification process. The State should require publicly open, long-range planning by all electric utilities in the State. The Committee recommends that an authority be established in Minnesota to institutionalize, in government, a process for selecting power plant sites. Further, an authority should have the responsibility and duty to critically examine the need for each electrical generating facility, including an examination of alternatives to any facility or system that is proposed, and to select sites for the proposed construction.

Consideration should be given to the following matters: legislation setting forth energy policy and enforcement that would conserve energy resources by the elimination of inefficient, wasteful and unnecessary production and consumption with the goal of limiting the total rate of energy conversion to a level that would produce minimal damage to the natural environment; legislation implementing regulations on advertising and other promotion of energy consumption; legislation giving economic incentives including taxes and price structures that promote the conservation of fuels and of energy and of the abatement of pollution, existing economic incentives tend to promote energy consumption and waste; legislation to develop new, efficient, and environmentally less harmful energy facilities and conversion methods and to increase their safety and reliability and to devise means for safe and environmentally acceptable disposal of all wastes; and legislation for the education and promotion that engenders an ethic of energy conservation.

The Committee recommends that a moratorium on the construction of new nuclear power plants in Minnesota be established. The moratorium should be of indefinite duration under appropriate legislative standards, until undue risks have been eliminated and new development can safely begin.

## SOLID WASTES AND RECYCLING

Solid waste collection and disposal constitutes an increasingly serious burden on city and State governments. Refuse collected in urban areas has increased from an average of 2.75 pounds per person per day in 1920 to five pounds per person per day in 1970. It is expected to reach eight pounds per person per day by 1980, if present "throw away" habits continue. Solid wastes collected include tons of paper and paper products, plastics, tires, bottles, cans, miscellaneous debris, grass and tree trimmings, food wastes, sewage sludge, discarded automobiles, refrigerators, washing machines, stoves, TVs, and other appliances.

Packaging accounts for about two-thirds of the household wastes which are collected. Minnesota per capita consumption of packaging is expected to rise from 575 pounds in 1966 to 661 pounds in 1976. Abandoned automobiles constitute one of the conspicuous and perplexing solid waste disposal problems. The throwaway container is almost as vexing a problem as abandoned automobiles.

Among the obvious effects of solid wastes are the esthetics problem and the air and water pollution caused by unsatisfactory means of disposal. Solid wastes can prevent or control the use of the land they occupy and diminish the value of nearby land. They contain useful materials and energy, although in a form that makes their recovery difficult.

The State has all of the usual solid waste problems and some special ones as well. Included in the special problems are remote or isolate areas, extreme climatic conditions, and mining wastes. In the past, the usual way to dispose of solid wastes, as practiced in Minnesota, is to burn the combustible portion in an incinerator. Unfortunately, town dumps were usually unregulated and unplanned, as a result they were unsanitary, smoky, odorous, and probable sources of water pollution. The disposal of solid wastes in incinerators was not much better than town dumps. These facilities were usually old and obsolete and not equipped with modern burning and air pollution control devices.

The Committee finds that from surveys taken to date, there appear to be more than 1,000 land waste disposal sites in Minnesota. Many of these 1,000-plus sites will be closed as either inadequate or uneconomical now that regulations are effective. Sanitary landfills should be considered only as a temporary means of waste disposal because of the pollution associated with hazardous and toxic wastes, and waste resources should ultimately be recycled. Seventy-two percent of communities operate a collection system and 75 percent operate a disposal facility. 98 percent reported they exercised jurisdiction over collection and 91 percent over disposal. A general survey of Minnesota's land disposal sites is given below.



Estimate total number of sites	1000
Surveys as of September 1972	841
Burning	87%
Fly or rodent control problem	90%
Salvaging practiced	85%
Water pollution problem	23%
Daily earth cover	3%
Operate as a sanitary landfill	1%
Land Use Plan	1%
Sites closed (since February 1970)	100 (10%)

The Committee recommends that the State provide financial incentives to assist local governments in closing open dumps. The State should establish a groundwater quality monitoring system in connection with solid waste disposal practices.

The 1969 legislature charged the Pollution Control Agency with responsibility for all aspects of solid waste management. The agency has adopted regulations which cover all aspects of solid waste disposal, livestock and poultry feedlots, and abandoned autos. The activities of the agency have emphasized these major areas: approval and permit issuance to all disposal sites within the State; evaluation and approval of county solid waste management system plans; registration of livestock and poultry feedlots with the intention of planning a time schedule for construction of pollution control devices on those feedlots not now in compliance with regulations; and inventory of all abandoned autos, and setting up regional collection centers to facilitate recovery and reuse of the scrap metal. The Committee finds that the PCA's enforcement program for feedlot regulations is extremely weak. The Committee recommends that the PCA be given funds and authority to accelerate that program. Authorization should be provided by the legislature to provide funds in those cases where construction of pollution control devices for feedlots would cause undue hardship, even with Federal funds available.

Registration of livestock and poultry feedlots should be completed within a year and an assessment made of the need for pollution control devices, with a timetable for compliance with 5 years. Estimates by PCA staff are that 10,000 out of 19,000 feedlots will probably need control devices; last year only 73 were constructed.

Toxic and hazardous waste materials represent a real danger in handling and disposal. All phases of handling this waste should be regulated and another means of disposal, possibly incineration, should probably be considered by the State.

The Committee finds that the State of Minnesota along with the entire nation has not yet come to grips with exponential mineral and energy consumption growth rates that threaten to deplete our domestic natural resources before substitutes can

be developed. Continued unchecked growth in consumption also accentuates current environmental quality problems including solid waste problems. The single use and discard systems for packaging materials, the overpackaging of products, and the short life-time of the products themselves are symptomatic of public lack of awareness of the true cost of depleting petroleum resources, the risks of increasing potential environmental quality hazard, and the actual costs of disposing of final products.

Since environmental quality effects are very closely tied to production of energy, a careful assessment of the energy used in manufacturing, transporting, operating, and maintaining products, whether these be automobiles, aspirin, or aluminum cans, is a fairly accurate indicator of true environmental quality costs. In addition, the potential environmental quality impacts of disposing of each of the materials under consideration should be established and the actual costs of collection, transportation, and disposal of the different materials which enter the solid stream should be determined.

Once this information is available, programs can be selected which best satisfy the following criteria: minimize depletion of natural resources, especially energy resources (e.g. recycling should not save one material, for example, glass, at the expense of another that is in shorter supply, for example, natural gas); minimize pollution of the environment (e.g. recycling should not replace a solid waste problem with a water, air, or noise pollution problem having greater impact on the State); minimize economic cost to the people of the State.

Developing the information that will allow alternatives to be rated against these criteria is obviously much more difficult than identifying the criteria. However, unless the full breadth of factors and impacts is considered, there is substantial risk of exchanging problems instead of solving them. This risk can not be entirely eliminated, but it can be reduced significantly.

Reduction in the depletion of non-renewable resources and volume of solid wastes can be accomplished by: increasing energy efficiencies in manufacturing, operating and maintaining products and equipment; recycling materials and designing materials to increase their recyclability; discouraging "nonessential" uses such as the extra box around the bottle of shampoo, and the oversized automobile; and extending product lifetime.

Because of the strong correlation between energy production and environmental quality impact, the energy requirements for various components of solid waste have been determined. These findings suggest "throw-away" containers should not be made of aluminum and recycling of paper should be preferred over incineration to generate power.

Energy requirements have been determined for plastic and paper meat trays and egg cartons. Taking into account the fact that plastic meat trays and egg cartons are petroleum products



and therefore "nonrenewable" and that plastic has a greater potential for interfering with biological and geological systems because of its synthetic nature, paper meat trays and egg cartons are to be preferred over plastic trays and egg cartons (despite the apparent similarity of their energy requirements for manufacture and similar environmental effects). This relationship appears to hold only when paper vs. plastic products are compared with approximately the same life span.

Energy requirements have also been determined for beverage containers. Those of the "throwaway" variety include glass, plastic, and can containers. Both glass and can "single use" containers have essentially the same energy requirements. Paper packaging of all sorts is preferred over plastic packaging, unless the plastic packaging is used several times. The desirability of plastic returnables is more difficult to assess against the use of glass returnable bottles. While the plastic returnable is likely to be filled many more times than the glass returnables, the ultimate impact of plastic containers on the environmental quality may be potentially more serious. However, the life of the glass container system can be extended through the "returnable" system so that a soft drink bottle, if made of slightly thicker glass than the throwaway, can be expected on the national average to endure 15 returns and a beer bottle 19 returns. The resulting energy saving over the throwaway can and bottle is on the order of 3 or 4:1. Plastic throwaways vs. plastic returnable probably would show similar energy savings to that for milk containers. The Committee finds that there is a significant energy saving and a reduced environmental quality impact associated with the use of returnable containers vs. the use of nonreturnables, regardless of whether nonreturnables are recycled.

The energy requirement for recycling nonreturnable glass bottles has been calculated at 5,977 BTU's/gallon, while the energy requirement for mining and transporting an equivalent amount of natural resources for new glass is given as 1,755 BTU's/gallon. These figures indicate that recycling throwaway bottles is presently undesirable from an energy standpoint by the ratio of 3:4:1. This ratio may eventually become more favorable with improved technology. The energy ratio for using waste glass instead of crushed stone for asphalt is 60:1. The use of waste glass for "glasphalt", therefore, is considered clearly undesirable in terms of the quality of energy consumed. Total 1970 energy used in the U.S. beverage container system accounted for 0.34 percent of the total U.S. energy demand. If the beverage industry were converted to all returnables, the total energy used by the beverage container industry could be reduced by 55 percent.

The aerosol can is highly undesirable from an energy standpoint. The container is nonreturnable and virtually impossible to recycle, and the container system requires additional energy for the compressed gas propellant that produces the aerosol. In

the last eight years, aerosols have grown at the rate of 20 percent per year, doubling every four to five years. About 95 percent of all aerosols are cylindrical tinplate containers. Industry predicts a value of 4 billion units by 1976. Aerosol cans have the following disadvantages in addition to the high energy requirements for their manufacture. The Medical Association links a disorder called pulmonary granulomatosis to freon - the gas most commonly used as an aerosol propellant, released normally when the can is nearly empty. The can represents an explosive hazard and therefore is dangerous to children and can not be incinerated or recycled safely. The consumer receives much less product and pays much more per volume of package than for any other type of container. Because the aerosol represents a highly energy-consumptive package, a health hazard, an explosive hazard, and a package that cannot be recycled, the Committee recommends that its use be severely restricted.

Aluminum companies made their entrance into the market in the middle to late fifties with the introduction of the all-aluminum beer can. By 1965 aluminum containers represented 3.6 percent of the metal container market by base box units and by 1970 they represented 10.2 percent. Because of the high energy requirement and the adverse environmental effects of aluminum smelting and refining (relative to the steel production which is much less energy intensive) aluminum should not be used in making food or beverage containers but restricted to use in products where lightness and extension of product lifetime increase overall energy efficiency. The Committee recommends that the State prohibit the sale and manufacture of aluminum containers in the State, excluding frozen dinner trays for which no feasible alternative currently exists.

The Committee finds that a wasteful practice involving energy use in industry and solid wastes is the lack of planning for reuse and recycling of materials. In the case of nonferrous metals, the amount of energy required to recycle scrap is less than 20 percent of the energy required to refine the metal originally. Clearly energy could be conserved by carefully designing equipment to facilitate recycling, or especially reusing, of component parts and materials. A recent study of the container industry indicated that, in general, the total resource system energy use is significantly higher for the throw-away system, varying from 4.1 times as much for soft drinks in bottles to 1.6 times as much for milk in paper throwaways. The study included dollar costs which showed the soft drink glass throwaway container system to be about twice as expensive as the returnable system. Thus throwaway containers are uneconomical as well as inefficient in energy use.

Another specific area ripe for design for recycling is the auto industry. A significant amount of metals and other materials could be recovered from junked cars if the cars were properly designed for recycling. The Institute of Scrap Iron and



Steel reviews and suggests relevant legislation regarding automobile recycling, among other activities. Approximately 27 million BTU (about 22 percent of the energy required to produce the car without recycling) could be saved over current practices by optimal recycling.

Original design would seem to have a direct bearing on the practicability and economics of recycling, and should be more frequently considered. While there are potential energy savings in recycling, the savings through reuse (as with refillable containers) or through extending the life of a product is much greater. Imaginative design and standardization of product components could facilitate reuse without requiring recycling of the constituent materials.

The Committee finds that product manufacture requires large quantities of mineral and energy resources which are lost when products are discarded. This loss could be minimized by extending the lifetime of the products and by recycling materials from spent products. The Committee recommends that legislation be enacted to: require a deposit on all nonreturnable beverage containers to encourage reuse and avoid litter; standardize the size, shape and color of all beer and soft drink containers to promote recycling and reuse; ban all aluminum cans and cans with aluminum tops; establish regulations on product design to aid recyclability (e.g. insuring that automobile upholstery can be removed easily, establishing limits on coated papers and bi-metallic containers); constrain retailers to sell and accept all appropriate containers and provide proper refunds; and curtail advertising of throwaway beverage containers.

## WATER SUPPLY

All public water supply systems in the State of Minnesota have been evaluated in relation to the chemical characteristics of new water supplies serving communities within the State, insofar as these are known at the present time and contained in the report entitled "Public Water Supply Data - 1971, State of Minnesota," published by the Division of Environmental Health, Minnesota Department of Health. In several instances data are given on the finished water supplies, and treatment processes employed are characterized. An examination of these data show that when compared to water quality parameters identified by the Task Group on Water Quality of the American Water Works Association and the Drinking Water Standards, marked deficiencies in the quality of the supply are noted. These deficiencies help characterize the degree of treatment required to meet these proposed parameters. This is particularly important in this State because a greater portion of water supply systems utilize the ground water as the source of supply. However, in terms of population served by ground or surface supplies, the numbers are about equal and slightly in favor of surface water supplies.

Chemical characteristics related to health effects reported include nitrate nitrogen, sodium, and fluorides. Additionally other chemical characters affecting the aesthetic properties of a water (taste, color, odor) include iron, manganese, chloride, sulfates, and total solids as well as hardness. Since many of the supplies currently do not meet the recommended Drinking Water Standards, with respect to one or more of these parameters and even more of them will fail to meet the goals proposed by the American Water Works Association for water quality, the adequacy of current treatment, if it exists, can be seriously questioned.

In some instances present methods of water treatment are not responsive to the removal of some of these contaminants. The Committee finds that it will be necessary to examine the validity and usefulness of some of the procedures under current investigation for the treatment of public water supplies if the people of Minnesota are to be supplied with the quality to which they are entitled.

In 1965, the amounts of water withdrawn for public supplies, rural supplies, irrigation supplies, and self-supplied industrial supplies were 260, 120, 6 and 1,400 million gallons per day (mgd). The State's average per capita use of water was about 107 gallons per day. Of the 1,786 mgd withdrawn for the above mentioned supplies, about 276 mgd was consumed. Although all basins in the State will experience substantial growths in withdrawals, the greatest withdrawal increases will occur in the Upper Mississippi river basin. The largest single areas of withdrawals of water will occur in the Lake Superior watershed



and the Twin Cities Metropolitan Area. Total water withdrawals, except for thermoelectric and hydroelectric power uses, in the State are projected to increase from 1,159 mgd in 1960 to 3,290 mgd in 2020 or about 2.8 times. Consumption is projected to increase from 162 mgd in 1960 to 287 mgd in 2020 or about 1.8 times. Total water withdrawals in the Twin City Metropolitan area are projected to increase from about 230 mgd in 1960 to 760 mgd in 2020. Per capita municipal water use in the State is projected to rise to 118 gallons per day in the year 2020.

Projected water supply demands, data on extended dry-weather low-stream flow, and data on the availability of groundwater were utilized to make judgments as to the need for future development of new water supply sources in various areas of the State and to identify potential water supply problems. Major water supply problems are projected for the following places: Minneapolis-St. Paul, starting approximately 1980; Marshall, starting approximately 2020; New Ulm, starting approximately 2000; Worthington, starting approximately 1980; and Iron Range area, starting approximately 1980. The water supply demands of the rest of the State can be met by more fully utilizing developed sources and by expanding water supply capabilities. Water supply problems can be solved by impounding available surface waters and/or, locating new groundwater sources. A few long pipelines to sources may need to be provided. The greatest potential water supply problems are projected to occur at Minneapolis-St. Paul and the Iron Range area. Properly developed, the State has adequate water supplies, even during extended dry periods, to meet all foreseeable domestic, municipal, industrial and irrigation demands.

One important water problem in Minnesota concerns water supplies for the Minneapolis-St. Paul metropolitan area and the Iron Range area. The water supply withdrawals at Minneapolis-St. Paul may exceed streamflow in the Mississippi River during extended dry periods sometime within the next 20 years. The possible viable solutions to this problem are: reduced withdrawals of water, greater use of groundwater resources, importation of surface water from the St. Croix River or Mississippi River below Minneapolis-St. Paul, impoundment and release of surface waters behind one or more dams on the Minnesota River or its tributaries, impoundment and release of surface waters behind one or more dams on the Mississippi River or its tributaries above Minneapolis-St. Paul, and a combination of two or more of these solutions. The relative merits of these alternate solutions from a State-local point of view have not been evaluated. Little attention has been given to the statewide and regional implications of solutions. Environmental, economic and political aspects of solutions are not documented. The Committee recommends that the State prepare by 1975 a report summarizing the pros and cons of possible viable solutions to emerging water supply problems in the Twin Cities area and recommending an optimum solution.

As the result of the expanding taconite industry, water-supply problems in the Iron Range area are anticipated during extended dry periods within the next 20 years. The possible viable solutions to this problem are: reduction in withdrawals of water, greater use of groundwater resources, importation from Lake Superior or from the Rainy River, and a combination of two or more of these solutions. The Committee recommends that the State prepare by 1975 a report summarizing the pros and cons of possible solutions to emerging water supply problems in the Iron Range area and recommending an optimum solution.



## WATER POLLUTION

The Committee finds that despite the fact that upgrading of treatment works and construction of facilities for untreated wastes has been proceeding at a rapid rate as approved water quality standards are being enforced, in 1972 Minnesota still has serious and undesirable water quality problems. Recent progress in the construction of waste treatment plants has prevented much serious deterioration in water quality in the face of significant increases in population and industrial production. Trends in many areas are promising, but available data is not sufficient to answer the question whether overall water quality is getting better or worse. Information deficiencies are particularly acute concerning industrial waste sources and estimates of waste loading on waters.

The Federal Environmental Protection Agency estimates that, except for some watersheds in northeastern and eastern Minnesota, streams in the State in 1970 were locally polluted (10-19.9 percent stream miles violate Federal water quality criteria), extensively polluted (20-49.9 percent stream miles violate Federal water quality criteria), or predominantly polluted (50 percent stream miles violate Federal water quality criteria). Streams in much of the State were locally polluted. Pollution conditions were most serious in watersheds in northwestern Minnesota.

The sources of harmful substances which enter streams and make them less desirable for other uses are many and varied. The most common is the discharge of organic matter with high bacterial content from municipal sewer systems, carrying wastes from homes and other human habitations and from industrial plants. Food processing industries, such as canneries, sugar refineries, packing plants, and creameries, have large volumes of organic wastes which must be disposed. Pulp and paper mills have both chemical and fiber wastes, the disposal of which is difficult. Stream-electric generating plants raise the temperatures of reaches of streams and cause thermal pollution. Nuclear power plants may discharge minute but harmful radioactive materials into streams. Agricultural runoff with sediment, pesticides, herbicides, and feed lot wastes cause problems. Harmful oil spills sometimes occur. Minnesota has a special pollution problem resulting from the increased mining of ores which require beneficiation or separation of the valuable mineral from the worthless rock. Large volumes of water are used to transport the tailings in disposal areas. Disposal of taconite tailings in Lake Superior is a problem. Solid waste disposal and septic tanks are polluting water resources.

Polluting problems such as low dissolved oxygen levels; high total coliform bacteria densities, and degradation of aesthetics result in damages to the legitimate water uses for recreation, municipal and industrial water supply, irrigation, and fish and wildlife propagation. Pollution is a problem below most principal river communities and industries.

Many lakes have problems of pollution. Urbanization, industrialization and agricultural activities have unbalanced nature's delicate system. The use of lakes for human, industrial, and boat waste disposal is only one of the many influences. Agricultural drainage, increased sedimentation resulting from poor land development practices and even waste water treatment itself also contribute to lake problems.

Little is known about past or possible future costs for water quality improvement in Minnesota. Costs of controlling all water pollutants or sources have not been estimated. Decisions concerning water quality programs need to take into account the benefits to be attained. Benefits of water pollution control have not been assessed taking into account alternative ways of attaining standards. An accounting of direct damage attributable to water pollution is not available. Information concerning impacts of water quality improvement costs on local and State population growth, industries, firms, employment, consumers and taxpayers, trade; and incidence of costs of improvement is not documented.

In the seven-county Metropolitan area in April 1971, only 5 of the Metropolitan Sewer Board's 33 treatment plants met State water quality standards. The Metropolitan Wastewater Treatment Plant met all standards except the one for suspended solids. There were 2,644 identified waste sources in the outstate portion of Minnesota (i.e. outside the seven county Metropolitan area); of these sources 728 were municipal and 1,916 were industrial. Treatment facilities serving about 894,000 people or about 85 percent of the outstate sewered community population required significant facility improvement prior to 1980.

Future water quality problems will occur because of population and economic growth when waste loads, even after secondary treatment, exceed the assimilative capacities of streams. Projected major water quality problem areas include: South Fork Crow River near Hutchinson, starting in the year 1980; Mississippi River at Minneapolis-St. Paul, starting in the year 1980; Cannon River near Faribault, starting in the year 1980; Straight River near Owatonna, starting in the year 1980; Minnesota River near Mankato, starting in the year 2000; Minnesota River near New Ulm, starting in the year 2020; headwaters of small streams in the Iron Mining Range urban areas, starting in the year 1980; and Ada, Barnesville, and Detroit Lakes, in the Red River Basin, starting in the year 1975. Future return flows from irrigation projects in North Dakota will cause water quality problems along the Red River. Alternatives for solving future water quality problems are: advanced waste treatment; low streamflow augmentation; and holding ponds with regulated discharges.

The percentage of total population of sewered municipalities served by sewage treatment was 85.2 in 1945, 91.7 in 1957, 98.3 in 1963, 99.2 in 1967, 99.4 in 1969, and 99.6 in 1971. The percentage of total population of sewered municipalities served by



secondary treatment was 65.2 in 1957, 89.4 in 1967, 90.3 in 1969, and 92.5 in 1971. In 1968, the urban population with adequate municipal treatment works totaled 769,000; the urban population with less than adequate municipal treatment works was 1,324,000. An urban population of 277,000 had no municipal treatment works.

The number of industries discharging wastes through separate outlets were estimated to be 700 in 1945, 717 in 1948, 1,124 in 1957, 935 in 1962, and 732 in 1967. The estimated numbers of these for which some forms of treatment was provided are: 230 in 1945, 247 in 1948, 503 in 1957, 479 in 1962, and 453 in 1967. The estimated numbers of these for which no treatment was provided are: 470 in 1948, 621 in 1957, 456 in 1962, and 279 in 1967. Thus, the number of industries discharging through separate outlets was the same in 1967 as it was in 1948; the number of these industries providing some form of treatment in 1967 was about twice that in 1948. Since 1948, there has been a substantial increase in the percentage of industries with separate outlets providing some form of waste treatment. In addition, there have been substantial improvements in methods of treatment. However, industrial loading of municipal treatment systems has increased.

The total State population (1970 census) was 3,805,069. As of January 1, 1971, there were 854 municipalities in the State with a total population of 2,914,669. There were 232 municipalities without sewer systems with a total population of 153,570; 532 municipalities with sewer systems served a total population of 2,761,099; 23 municipalities had a sewer system without treatment with a total population of 11,693; 508 municipalities had a sewer system with treatment (451 treatment plants) serving a total population of 2,749,406; 458 municipalities had secondary treatment (403 treatment plants) serving a total population of 2,553,962; and 15 municipalities had tertiary treatment facilities serving a total population of 58,763.

The Committee finds that the PCA needs greater legal strength and much more funds for legal, administrative and technical staff and monitoring equipment and staff.

#### Groundwater

Groundwater is an unseen but vital reservoir of fresh water for the State. Over 90 percent of the communities in Minnesota are dependent upon groundwater for municipal use. Groundwater provides a high quality water requiring little or no treatment for over 2,500,000 people or about 66 percent of the State's population. The Committee finds that the protection of groundwater from intentional or non-intentional man-made hazardous and toxic wastes as an expedient method of disposal cannot be over-emphasized. The time to rehabilitate a contaminated aquifer may range from years to thousands of years.

Groundwater pollution generally is not known until contaminated water is detected from a well. By this time, the water

quality of an entire aquifer can be destroyed or substantially impaired before any corrective action can be taken. Treatment for individual domestic use of this contaminated or polluted water is usually expensive and may be impractical for individual homeowners thus depriving them of a potable source of water.

The Committee finds that a number of examples of contamination of groundwater have been documented by the State Health Department and the Pollution Control Agency. A majority of the groundwater pollution problems can be grouped into classes. There are problems resulting from individual sewage disposal systems, from agricultural practices and from municipal waste disposal practices. Other problems are caused by industrial waste disposal practices, petroleum products spills and leaks and from the use of disposal wells. In some of the instances cited, there is data to show that pollution of the groundwater has taken place. In other situations the disposal practice may have been stopped before any reported contamination because of the high potential of pollution which existed.

One of Minnesota's largest industries, agriculture, is contributing to groundwater contamination. Uncontrolled feed lots produce large amounts of high strength run-off and leachates. The high organic loading causes large amounts of nitrates to be carried into the water table. The Minnesota Pollution Control Agency has recently adopted feedlot regulations to control the pollutants produced by these operations. It is hoped that the education and enforcement programs initiated under these regulations will curb the pollution from this recently adopted method of livestock production.

The problem receiving the greatest attention is the use of artificial fertilizers. In the last two decades, use of artificial fertilizer has increased many fold. Its relatively low cost and ease of application make it an extremely desirable if not a mandatory practice. Much work has been done to determine application rates for maximum yields, but little work has been done to measure the effect that these practices have on groundwater quality. In 1968, a program was started at the University of Minnesota to gather information on this subject. Farm tile drains and drainage ditches in several southern Minnesota counties were sampled periodically. Water contained in tile lines is water that would normally be available for groundwater recharge. The results of the first 30 months of sampling demonstrates that there definitely is a problem. Over 400 samples have been analyzed with 70 percent containing over 10 ppm nitrate nitrogen. The study does not identify the nitrogen source but it can be assumed the fertilizers are a factor. A great deal of immediate research is needed on this problem. The complete spectrum of fertilizer usage must be reviewed. Other factors besides profit maximization must be considered.

Municipal waste disposal practices are possible groundwater pollution sources. Sewage, storm water and solid waste disposal



have created past problems. Most municipal sewage systems in Minnesota have their final disposal in surface waters. There is little chance of groundwater pollution from this type of disposal practice because of the hydrologic conditions that exist. Where the soil is used for the final disposal the danger is greatly increased. In the past, for economic reasons, seepage basins have been used to dispose of the final effluent in some cases. These function similarly to septic tank soil absorption systems and could result in problems. The same problem could result from sewage stabilization lagoons which are not properly sealed.

Solid waste disposal has either directly or indirectly been under local control in the past. In almost every case, it has been mishandled, endangering both surface and groundwater quality. The typical dump was located in a low swampy area or an abandoned gravel pit or quarry. In 1970, approximately 250 dump sites had water pollution problems. Many of these were contaminating groundwater either through actual disposal in the water table or from contaminants leaching from the fill into the water table. A typical operation had been conducted at an old abandoned limestone quarry on Johnson Street in Minneapolis. This quarry had been excavated to a depth many feet below the water table. When the quarry operation ceased, it was decided to fill the site with solid wastes. For many years all types of refuse were deposited in the quarry. In later years complaints from the residents forced the operation to be changed to a demolition debris site until the area was completely filled.

Minnesota has had a number of groundwater pollution problems due to industrial waste disposal practices. The most recently investigated case of industrial pollution of the groundwater has been at Pine Bend, south of St. Paul on the Mississippi River. Three principal industries operate in this area. These are a petroleum refinery, a company which produces ammonium nitrate fertilizers, and a company which refines spent sulfuric acid from sulfur and aluminum sulfate from bauxite. In October 1971, a joint investigation was undertaken by the Pollution Control Agency and the Department of Health. In all, close to 70 water samples were analyzed, the majority being well water supplies. The water quality of some of the wells was greatly deteriorated.

The Committee finds that the Pollution Control Agency is making substantial progress in adopting statewide groundwater quality standards. The Committee strongly urges that Agency to take appropriate actions to insure adequate citizen participation in hearings concerning groundwater standards. Possible provisions of the standards which prohibit any waste disposal in injection wells require the best practicable treatment of wastes before they are disposed of on the ground, and prohibit degradation of groundwaters are endorsed in principle by the Committee.

Recommendations of the Groundwater Subcommittee, Citizens Advisory Committee, Governor's Environmental Quality Council should be implemented immediately.

Unless a well is properly constructed it can serve as a passageway for pollution to enter the groundwater system. One of the most important environmental protection acts passed during the 1969 legislative session was the law requiring registration of well drillers and developing of rules and regulations to guide their operation. This will aid in protecting the public health, serve as a consumer protection, provide much valuable information on the geologic and groundwater resources through the collection of well logs. These are all important aspects of the law, but most significantly at this time it will provide the State with an additional tool to protect groundwater quality. A well will receive about as much fluid as it will yield. With the implementation of the strict water quality laws to improve the streams and lakes of the State and nation, there is increasing use of wells for the discharge of highly toxic wastes. These wastes move slowly through the groundwater aquifers, but for all practical purposes, in time, they can permanently destroy the quality of the groundwater for human use. Registration of drillers will help to insure that wells are not drilled for this purpose.

Approximately 320 Water Well Contractors will be licensed and regulated in the construction of from 7,000 to 10,000 water wells per year. Procedures, forms, rules and regulations are being developed for the administration of the program. Well records for each well drilled will be obtained for the Departments of Health and Natural Resources and the Geological Survey.

A bill for an act relating to licensing and regulation of water well contractors, amending Minnesota Statutes 1971, Sections 156A.01 through 156A.08 will be proposed as part of the 1973 health legislation. The bill would amend existing statutes governing the licensing and inspection of water well contractors, defining water well contractor, pump installer, limited license exemptions from licensing, local licensing and permits, annual renewal fees, reciprocity with other states, and well drilling cuttings for the Geological Survey.

The law for licensing and regulation of water well contractors was passed during the 1971 extra legislative session. Administration of this law has shown where some clarification of intent is necessary. In the interim the Attorney General has been consulted for his opinion with respect to licensing fees, public hearings, decal fees, local licensing and ordinances, and reciprocity with other States. These issues will require amendments to the present law. Additional amendments may be requested by the Minnesota Geological Survey and the Water Well Association.

#### Water Quality Basin Planning

The Committee finds that available water quality information is inadequate. The more significant areas of planning information deficiency are: up-dated and reliable projections for population, employment, income and other applicable social and economic factors for the municipalities and counties within each basin; complete compilation of industrial waste sources within each



basin; comprehensive, up-to-date estimates of 5-day BOD loading and discharge volume for all municipal and industrial sources within each basin; complete, authoritative estimates of nutrient loadings (i.e. phosphorus and nitrogen); detailed information regarding sewer collection systems for municipalities within each basin; distribution and magnitude of waste loadings contributed by agricultural and other non-point sources; estimates of low-flow probabilities and assimilative capacities for minor streams in each basin; comprehensive, organized information on Minnesota's lakes; estimates of adequacy of on-site disposal systems (e.g. cesspools, drain fields) within smaller communities; and organized, consistent, up-to-date information for expanded or new treatment facilities.

Sediment resulting from soil erosion is the State's major water pollutant by volume and often carries other harmful pollutants such as nutrients and pesticides. Farm and forest lands needing erosion control are still the primary sediment sources, but other sediment sources - such as residential, industrial, commercial, and institutional construction in urbanizing areas, highway and road building, and surface mining - present growing problems.

The prevention of erosion and the control of sediment have been prime objectives of soil and water conservation districts since their inception. Conservation plans developed for rural landowners give first priority to erosion control. Also, in some areas where highways, commercial developments, and urban housing are being concentrated, creating major sediment problems, districts have developed land use, erosion prevention, and sediment control programs with counties, towns, and cities. Most district work has been carried on with landowners on a voluntary basis. There is a growing recognition, however, that some form of regulatory authority is needed to control sediment.

Estimates of waste loadings (municipal, industrial and agricultural) of streams are incomplete and available data is not sufficient to quantify the status and trends in water quality. Costs of controlling all water pollutants or sources have not been estimated. An accounting of direct damage attributable to water pollution is not available. The statewide magnitude of lake eutrophication problems and possible viable solutions have not been evaluated. The status and trends in groundwater quality are unknown on a comprehensive statewide basis. The extent of agricultural pollution and possible viable solutions is not documented. Present waste treatment facility needs to meet water quality standards based in general on secondary treatment have been evaluated. However, within 20 years, wastes at many locations even after secondary treatment may exceed the assimilative capacities of streams during extended dry periods. Future overloading of streams may be prevented by advanced waste treatment, using holding ponds, augmenting streamflow impounding and releasing surface water behind dams, or a combination of two or more of

these solutions. Little attention has been given to the viability of these possible solutions.

Federal Water Pollution Control Act  
Amendments of 1972

Federal Legislation has been passed and contains new funding and requirements for substate district-areawide planning for water quality management. At the level of authorization for planning money, Minnesota can expect to get on the order of \$5 million for areawide water quality management planning. A single State planning application, putting together budgets and programs from all regions, will be honored.

Areawide water quality planning must be geared to the following levels of waste water treatment: by July 1, 1983, best available pollution control technology will be required to be in place; by July 1, 1977, best practicable pollution control technology will be required to be in place. Planning funds would be available to Minnesota by July 1, 1973, if not earlier. Within 90 days after the enactment of the bill, the Administrator of EPA will issue guidelines for the identification of those areas which, as a result of urban-industrial concentrations or other factors, have substantial water quality control problems. The Governors of each State, within 60 days of the Administrator's action, will issue their own guidelines for regional organization and will identify each area within their State which, as a result of urban-industrial concentrations or other facits, have substantial water quality control problems. Within 120 days of the above action, and after consultation with the chief elected officials of the local governments having jurisdiction with such designated areas, the Governor will designate: the boundaries of each water quality planning area, and an organization composed of elected officials from the general purpose local governments in the area and other appropriate individuals capable of developing an areawide waste treatment management plan for such area.

Should a designated area of urban-industrial concentration with substantial water quality control problems be located in two or more States, the Governors of the States involved will consult and cooperate with a view of designating the boundaries of the interstate area. The Governors will have 180 days following the issuance of the Administrator's guidelines to designate a single representative organization capable of developing an effective waste treatment management plan for the area. If the Governor or Governors do not act as outlined above, the chief elected officials of local governments may, by agreement, designate planning district boundaries and the organization of elected officials of local general government to develop the areawide water quality management plan. Existing regional planning agencies may be designated as the organization to develop water quality managment plans. The Governor will designate a planning agency for all



areas of the State not designated above. Presumably this would be a State agency.

Areawide water quality management plans are to be developed no later than two years following designation of the planning agency and its boundaries. Governor Anderson must issue guidelines for organization or areawide water quality management planning and designate such organizations and their boundaries as outlined above.

## AIR POLLUTION

The amount of pollution in the atmosphere has been increasing over the past several decades since it is directly related to the growth in population, industrial expansion, and continuing improvements in the standard of living. The Committee finds that better control of air quality is absolutely necessary in Minnesota. The air quality in Minnesota does leave a lot to be desired and should be improved for better enjoyment of life. Air pollution problems do exist in the State, in small as well as large communities. In 1959-60 survey conducted by the State Board of Health, more than half of the State's communities with populations over 1,000 reported noticeable sources of air pollution.

Many of Minnesota's cities are located in the valleys of such rivers as the Minnesota, the Mississippi (below its juncture with the Minnesota), the St. Croix, the Root, the Zumbro, the upper and lower branches of the Cannon and the Red. Where the valleys are steep, as in the case of much of the Minnesota and lower Mississippi river valleys, surface winds may be slower than they are above the valley's rims, and air flow may be limited mostly to up and down the valley. On clear nights with ground inversion, pollutants may accumulate near sources to unusually high levels, for lack of winds strong enough to disperse them under the inversion lid. Where the valleys are shallow, surrounded by generally level land, as they are along the Red River, heavy cold air will drain into them at night from the surrounding plains, increasing the depth and strength of inversions which are above the level of the tops of most smokestacks. Problems in river valleys are accentuated by the attractiveness of rivershipping along parts of the Mississippi, the Minnesota and the St. Croix. The availability of cheap water transport, water for cooling processes, and the proximity of major rail lines in parts of these river valleys make them ideal for heavy industry, materials handling operations (such as of coal, grain and cement), and power generating plants, all of which have tendencies to produce gaseous and particulate (dusts) emissions.

Other problems can, and in some places already do, arise where cities are spread out over an extended area, and pollutants from one edge of town are deposited on built-up areas across town. Such problems resulting from urban sprawl are already present in the Twin Cities. They are accentuated by the tendency of high buildings to break up and slow down cross winds, and by the attractiveness of low-lying areas along the two rivers for industrial development. The problems will increase here if industrialization of the lower Minnesota River valley continues to increase between Mendota Heights and Chaska.

Still other problems are incipient in northeastern Minnesota in the iron and taconite regions. Some parts of this area have considerable topographical relief, which results in cold air



drainage down the slopes of the Giants Range, particularly near Virginia. In other parts of the region, heavy forests and numerous lakes reduce pollutant-dispersing wind turbulence, though they also tend to decrease diurnal temperature variations (and thus the incidence of ground-based inversions).

Minnesota, with its cold winters and often severe winter winds, has unusually high space-heating needs. Minnesotans average 1.4 times as much fuel per person for space heating as Chicagoans and 1.7 times as much as residents of New York City. Wherever fuels other than natural or LP gas are used for this, generalized pollution problems can develop during periods of cold weather, especially where coal is the principal fuel.

The replacement of coal with natural gas is increasing as natural gas becomes available in more and more parts of the State. But in many areas the replacement is with fuel oils that may contain sulfur. In such cases, smoke and soot become less troublesome, but sulfur dioxide levels remain quite high. In much of the Minneapolis-St. Paul area, for instance, much of the oil-burning equipment installed during the 1930's and 1940's remains in use. That natural-gas burning equipment will become most common in years to come is slightly problematical, for in some cases oil heat is cheaper, natural gas supplies are limited, and purveyors of heating oil are active in promoting its use.

Man-made air pollution sources can be conveniently grouped under single or point sources, multiple or area sources, and line sources. Point sources such as steel mills, power plants, oil refineries, and pulp and paper mills, etc., with their tall stacks are usually identified as major contributors to air pollution. Equally bad because of sheer quantity and low levels of emissions are the area sources; residential areas, apartments, office buildings, hospitals, and schools are the greatest contributors. Line sources consist of expressways, arterials and streets. In the narrow, canyon-like streets of the cities the automobile constitutes a great health hazard to the general public, because it emits not only the largest tonnage of pollutants of any of source, but also because it emits the poisons at breathing level.

Major sources of air pollution emissions and their tonnage contributions to total pollution are as follows: motor vehicles - 60 percent, industry - 17 percent, power plants - 14 percent, space heating - 6 percent, and refuse disposal - 3 percent. Major types of air pollutants are oxides of sulfur and nitrogen, carbon monoxide, hydrocarbons, photochemical oxidants, and particulate matter. Nobody denies that the atmosphere consists of irritant pollutants which can cause acute eye, throat, and nose irritation. It is furthermore recognized that air pollutants are a paramount factor in the development of the chronic diseases of asthma, emphysema, and lung cancer.

With limited exceptions, air quality control at the State level is exclusively the province of the Air Quality Division of the Pollution Control Agency (PCA). The Air Quality Division of the agency has made several positive moves to control air pollution since May 1968 when the first staff member was hired. Air quality standards have been set and air pollution regulations have been adopted for the State. With assistance from the U.S. Environmental Protection Agency the State's PCA has set up seven air pollution control regions in Minnesota: Minneapolis-St. Paul, Duluth-Superior, Fargo-Moorhead and Southeastern Minnesota-LaCrosse, Wisconsin. Currently these regions are in various stages of being formed and much further work is necessary to make them successful.

The great bulk of air emissions regulation is accomplished through an operation and installation permit system. The Agency regulations require specified information about emission types, effects, etc. for use in permit decisions. New industrial installations are required to submit environmental impact statements, although no specific format has been developed for such statements to date; the effectiveness of the impact statements could seemingly be improved if definite guidelines were established. The Agency processes but has not utilized the statutory authority to require emission source self-monitoring with approved procedures and equipment. This type of monitoring can be greatly beneficial in air quality control, but budgetary and technological constraints have retarded the Agency's program. A comprehensive program of self-monitoring could be advantageous.

The enabling statute of the Agency grants the agency various enforcement powers, including injunctions, emergency and abatement orders, and criminal misdemeanor sanctions. Variances, stipulations, and inspection powers are enforcement tools. The Committee finds that the Pollution Control Agency needs more legal "clout" to be truly effective. The Committee recommends that the Agency be given civil law powers and misdemeanor fines be increased to a maximum of \$10,000 per day.

At present, the criminal misdemeanor carries a maximum penalty of only \$300 per day, and more importantly, the action must be maintained by prosecuting attorneys (municipal or county) who are not always interested or available. The Agency needs a "ticketing" power for legal versatility. Most local pollution control agencies have more power in this respect than does the agency-local units which can write tickets like traffic policemen.

As a practical matter, injunctive powers of the Agency may be limited simply because judges are hesitant to order abatements, which entail total cessation of an industrial activity. A further, and perhaps most fundamental reform in Agency "clout" was before the 1971 session of the Legislature, only to be tabled in the House. Senate bill 572, authored by Senator Dosland et. al., would give the PCA civil law powers; penalties of up to \$10,000



per day would be more effective and accessible than present misdemeanor fines.

The principal air pollutants in the United States have been identified by the U.S. Environmental Protection Agency (EPA) as: Carbon monoxide, hydrocarbons, nitrogen oxides, particulates (i.e., dust) and sulfur oxides. Motor vehicles presently contribute the major portions of the first three pollutants in this list. An EPA study for 1968 indicates that motor vehicle emissions on a weight basis constitute 60 percent of the carbon monoxide, 49 percent of the hydrocarbons, and 33 percent of the nitrogen oxides. On the basis of the EPA statistics applied to Minnesota, motor vehicles contributed 1,150,000 tons of carbon monoxide, 308,000 tons of hydrocarbons and 139,000 tons of nitrogen oxides to the Minnesota atmosphere in the year 1968. 2,058,414 vehicles were registered in Minnesota in 1968. EPA projections predict 1975 levels of emissions 25 percent higher than those of 1968, with no corrective action.

The Committee finds that there is an obvious need to greatly reduce the deleterious impact on air quality due to emissions from the motor vehicle, particularly in urbanized areas.

The Minnesota Pollution Control Agency has investigated means of controlling automotive emissions. They plan the following four-point program:

1. Increased express bus system to the downtown Minneapolis and St. Paul Central Business Districts (CBD's)
2. Fringe parking facilities along the periphery of the CBD's and interrupt incoming traffic.
3. Automated people-mover transit systems within the CBD's, connected with an expanded skyway pedestrian system.
4. Computerized traffic management system within CBD's to optimally control traffic flow by manipulation of traffic signals.

All of these measures fall into the category of transportation technology and services.

A vehicle inspection program is also being considered by some interest groups as a method for reducing air pollution.

The Committee recommends that the State examine the economic and environmental implications of proposals to reduce air pollution from the motor vehicle and actively support a program that is deemed appropriate.

## RECREATION, FISH AND WILDLIFE

Today, when the majority of people live and work in large industrialized urban surroundings, quality of life must often be sought away from the din of machines and traffic; out of the smoke-filled atmosphere blanketing metropolitan areas; and away from cold concrete and asphalt. Just as man must preserve the environment or habitat for each species of wildlife lest it become rare or extinct so must man take heed of his own human habitat. Although man is adaptable to many changes, the physical and mental therapeutic powers of our natural environmental resources are genuine and difficult to duplicate. The Committee finds that Minnesota, like other states, has the major problem of distribution of its recreational resources in relation to its population centers. It is a problem compounded by increasing demands on open space near metropolitan centers.

The recreation resources of the State are mainly the lakes. The lake resource is enhanced for recreation where it is associated with rough terrain, northern hardwood or pine forests, or sandy soil for prime beaches. In some areas, noticeably around Brainerd, density of lake homes equals that of some Twin City suburbs, without adequate sewer provisions. Lakeshore property is being purchased faster than homes are being built, indicating speculators are buying up such land. About one-fourth of all out-door recreation is and will continue to be dependent on water. Land next to water is essential for access to and full enjoyment of water-oriented recreation.

The amount of recreation participation on an average Sunday during the warm weather season was developed into a demand figure in terms of activity occasions - participation in any activity for more than a half hour in one day. The Committee finds that recreation activity is projected to increase at a much faster rate than the population increases; the need for additional recreation facilities is great. In 1967, boating, canoeing, swimming, waterskiing, and sailing demands on an average summer Sunday totaled 373,956; 32,739; 1,119,598; 102,137; and 655,433 activity occasions, respectively. Corresponding projections for 1985 are 904,183; 81,719; 2,987,713; 323,649; and 1,538,929 activity occasions, respectively. The fishing participation rate per capita in 1967 was 7.8 activity occasions and is projected to increase slightly in the future. There were 285,482 big-game hunters in 1966. Projections indicate that in 1980 there will be approximately 340,000 big-game hunters. Small-game hunters totaled 233,156 in 1965 and are projected to total 325,000 in 1980. The projected 1980 demands for recreation in Minnesota will be 1.87 times the 1960 demand. Thereafter, demand is expected to increase to 3.06 times the 1960 demand by the year 2000, and to 4.25 times by the year 2020.

The anticipated statewide recreation facilities needs for 1980 include: 262,336 acres of developed recreation lands, 2,000 acres of land for swimming facilities, 43,000 spaces for boat launching. The greatest need for recreation land will occur in



the Twin City Metropolitan area. Potential for new State parks and the potential developments of existing State park lands will help to meet recreation needs. Wetland acquisitions as of July 1, 1968, and needs through the year 2000 are 476,213 acres and 607,217 acres, respectively. By 1975, 44,360 acres of new park land should be purchased. Approximately 2,713 acres should be developed for special purposes such as swimming, camping, picnicking, access and trails. There is a need for the purchase of an additional 28,822 acres of land by 1975 within or adjacent to existing State parks. New forest land for primitive-type campgrounds should be purchased in the Memorial Hardwood Forest by 1975. The total deficiency for new public-access acreage by 1980 is 913 acres of land. By 1975, purchase of 690 acres should be completed, and 450 of these acres should be developed by providing parking spaces, boat ramps, and sanitary facilities. Easement or acquisition should be completed on 1,200 miles of new trails involving 4,000 acres of land. About 190 acres of land should be acquired for wayside rest and picnic stops along highways by 1975. About 233,080 acres of land should be developed by 1975 for wildlife management.

Many lakes have problems of pollution; weed growth; algae; sedimentation; lake level fluctuations; undesirable lake shore development; limited public access and facilities for the public; inadequate small boat harbors; water supply and sanitation; excessive boating; preservation of scenic values; inadequate fish management, including fish production and fish control; inadequate beaches and poor beach conditions; preservation of wildlife habitats; dredging and disposal of dredged materials; unknown ownership of lake shore property; lack of variety of recreational facilities; preservation of historic sites; erosion of lake shores; inadequate resort facilities; short resort season; and use for water supply. Wetlands needed for wildlife management are being lost at a rapid rate due to draining and other practices. Many of the State's lake problems have been intensified by man's economic progress.

Swimming is the number one water oriented recreation activity in the State. The concentrated use of the swimming beaches in urban areas is contributing to the pollution of the waters, thus creating a health problem. The littering of some beaches and swimming areas with debris constitutes a safety hazard. There are also localized deficits in water-oriented recreational opportunities. Although the greatest demand for swimming is in the metropolitan areas, there are many communities throughout the State to which swimming facilities are remote.

The Committee finds that because of the changes in land use such as clean farming, mass reforestation, etc., there is a declining trend in Minnesota's available wildlife habitat. This trend threatens the continuation of certain forms of hunting. The problem is accentuated by the fact that most game production

lies on privately owned lands and the neglect of game habitat of those lands, drainage of wetlands, the declining reproduction rate of certain species and conflicting conservation programs. Public acquisition of adequate habitat has not been capable of retaining the original range of such species as pheasant or ducks.

The Committee finds that the landscape of Minnesota is becoming greatly altered by modern man. Unless plans are developed to preserve some portions in essentially undisturbed condition, natural values will be destroyed before there is time to appraise them. The present distribution and protection of natural areas needs to be expanded. Although it may seem Minnesota is already well provided with protected natural areas and recreational facilities, the fact is that the total number in many cases is inadequate. The chances of adding more decrease as cities expand and as farms, roads, and industry use more land. The Committee finds that Minnesota needs and should have under protection sufficient areas of all types of natural habitats as well as opportunities for a wide variety of recreational activities.

The immediate, urgent recreation needs are to develop existing public areas and to set aside additional land and water for recreation purposes in and around the metropolitan areas, along the Federal and State highway systems and in more remote sections of the State. In all cases this involves the preservation of wilderness, natural features and scenery, and the preservation of significant historic sites and buildings. A wide variety of public recreation areas are needed ranging from wilderness, usually in the remote northern and northeastern regions, to highly developed recreation areas near the densely populated metropolitan area. There is a need to provide all segments of the present and future population with adequate outdoor recreation areas near enough to their homes for frequent day and weekend use, as well as more remote areas for vacation use.

Land use controls through land zoning ordinances, easements, and where necessary, fee title purchase, are needed to protect flood plain, unique shorelands, steep and erodable topography, and key scenic, historic and natural areas. Land use controls should complement public programs to protect public investments from encroachments of incompatible developments in prime recreational resources areas. Historic Site Preservation is lagging and because of limited financing must be incorporated in all open space programs. There are 1,100 known archaeological sites, but less than 200 have been tested or excavated. Mining in some areas of the State has changed the original landscape. Efforts are now being made to explore ways of enhancing the landscape by preplanning and renovating excavated mineral areas. Innovation of new uses of these areas is needed. The Committee recommends that long range plans be prepared by the State for protection of valuable recreational rivers against intrusions and to complement the proposed nation-wide scenic and wild river system with appropriate legislation.



Water quality standards must be enforced and research accelerated on lake eutrophication to preserve the natural lakes and rivers and their recreational qualities. Wetlands are disappearing at a rapid rate from drainage and by sedimentation and other pollutants. The Committee recommends that the State determine the amount of wetland acreage that must be preserved, to identify these areas, and to provide for their permanent protection. Undeveloped islands in some lakes and rivers are the only remaining natural vestiges on our lakes. Zoning controls or acquisition of such islands should receive high priority.

The Committee finds that designation, acquisition and protection of natural areas is a vital need of the State. Proper legislation, financing and administration can insure the protection of a system of natural areas. Placement and design of the State's highways should preserve and enhance the natural environment. Overnight rest and camp facilities are lacking for road travelers along some of our major highways. The private sector should be encouraged to supply such facilities and the State should assist with technical aid.

Minnesota's natural resources are varied and many are yet abundant. They provide unique recreational opportunities but it remains for the public agencies responsible to encourage and direct the best use of the resources for such purposes. The most immediate statewide recreational needs are to develop the existing opportunities of public areas and to set aside additional land and water for recreational purposes accessible to major population centers and which will provide for a choice of recreation activity in a quality setting. In many cases this involves the preservation of wild areas, natural features, scenery, and significant historic sites and buildings.

The Department of Natural Resources' Division of Lands and Forestry administers nearly 3,000,000 acres of State forest land. About 500,000 acres are within a three-hour drive of the center of the Twin Cities Metropolitan Area. These forest areas will be of particular importance in helping the State fulfill its share of the obligation to the recreation demand. Potential new State parks and in some parks, development on existing lands, can offer much opportunity for future recreation. The Department of Natural Resources is planning a statewide network of more than 3,000 miles of recreational trails primarily for snowmobiles. The system will tie in with trails planned by communities and cities along the system and with the potential National North Country Scenic Trail.

The Committee recommends that increased emphasis be placed upon development of trails for bicycling, hiking, horseback riding, snowshoeing, and cross country skiing, especially in the urban and southern parts of the State. River trails hold great potential, particularly for canoeing; Water Development projects in some instances are designed and built in such a way that they replace some of the natural values of rivers and flood plains.

Some are not suitable for on-the-water recreation but, because of their wild and scenic qualities, should remain as they are, and be protected through a State recreational rivers system. The Committee recommends the enactment of a Statewide wild and scenic law. The recreational opportunities of the northern lakes and their shorelines, as would be encompassed in the proposed Voyageurs National Park, are unexcelled. The protection of this area as a significant portion of Minnesota's lake country landscape is vital.

The management of private land must consider wildlife as a part of total land management if hunting is to remain a major recreational activity for a large segment of the population. Lesser-known species such as woodcock, jacksnipe and rail along with small mammals such as squirrels and rabbits, continue to offer what might be termed an "untapped resource" for the hunter who is willing to divert from Minnesota's "Big Four" (ducks, grouse, pheasants, and deer). An accelerated effort in fisheries management would help restore fish habitat. Because the expansion of the fisheries resource is limited, an intensified protection of fish spawning grounds, increased fish population control and experiments with exotic species are opportunities that should be explored. As in hunting, there are numerous species of sport fish (such as perch, white bass and bullheads) which are overlooked by the fisherman. Anglers pass up fine fishing opportunities by not recognizing the potential of these and other species.

Additional opportunities for winter recreation are relatively unexplored and unpublished - ice sailing, cross-country skiing, snowshoeing, bob-sledding, tobogganing and sleigh-riding, for example.

Every Minnesotan should have an opportunity to enjoy outdoor recreation activities. The development of outdoor recreation facilities for the aged and handicapped would offer many opportunities to enrich the lives of these people in Minnesota.

Undesirable developments on shorelands of rivers or lakes where such encroachments will increase pollution of the lake, cause soil erosion, or destroy natural fish and wildlife habitat or the aesthetic values should be prevented. Existing programs of acquisition of natural fish spawning areas to include acquisition of selected, undeveloped shorelands best suited for conservation purposes should be extended. This includes fish and wildlife habitat, protection of highly erodable soils, and protection of lands of prime scenic quality. The State must adopt rigid policies for protecting state-owned lands bordering recreational lakes or streams from encroachments of power lines, roads, dumping grounds and timber cuttings, and encourage local governments to do likewise.

Minnesota has many sites of outstanding scenic beauty such as the rock shores of Lake Superior, the bluffs along the Mississippi River valley, and waterfalls of unique quality such as the Pigeon River Falls on the Minnesota-Canadian border. These are just a



few samples of the natural landscape, its geology, botany and wildlife that need preservation. Minnesota is also rich in history - Indian explorations and pioneer settlements, for example. The most unique historic sites must be preserved if the memorials are to be recognized now and in the future.

The Committee finds that the protection of rare and endangered species of plants, wildlife and fish through the acquisition of lands or regulation of the take should be considered a part of any natural area preservation program and particular attention should be directed to the timber wolf, greater prairie chicken, lynx, bob cat, greater sandhill crane, bald eagle, and osprey. Promotion of conservation in public schools and to the public in general is vital to the future of our resources. And understanding of the principles upon which the protection of our human environment depends and the relationship of natural environment is necessary to the welfare of Minnesota's resources and its citizens.

Much of the State's natural values, particularly wildlife, are yet under control of private landowners. Many of these owners exercise wise management but pressure from developers or other interests contrary to the preservation of the natural environment result in losses of these resources. The Committee finds that both legal and financial assistance is needed to give private landowners incentive to retain needed open space lands and to protect those environmental habitat needs as required for preservation of natural and recreational values, particularly for wildlife.

#### Project 80

In 1969 the Legislature appropriated funds to the State Planning Agency and the Department of Natural Resources for a joint "Study of the Total Environment" called Project 80. The primary purpose of this appropriation was the preparation of a document to guide the Legislature hereafter in the review of requests for appropriations for land acquisition, development, and maintenance of State-owned lands for state parks, campgrounds, public access, rivers, and trails. A current inventory, future demands, land acquisition costs, anticipated revenues, etc., must result from this expenditure. The plan will include a detailed analysis of the role of private enterprise and regional and sub-regional responsibilities of the local units of government.

Some of the progress made to date concerning Project 80 is summarized below. The entire State of Minnesota was inventoried to locate remaining outstanding natural and historical features, regardless of their current ownership or protection status. A total of 84 sites were found eligible for further Project 80 analysis.

The State Planning Agency identified two major objectives which define the State's role in outdoor recreation. One deals with preservation, while the other deals with recreational activities. These objectives guided the development of a classified

"State Outdoor Recreation System." The Outdoor Recreation System is comprised of 11 "components" to be administered by various State agencies. The components are simply different kinds of areas which are established, developed, used, and managed to provide different facets of outdoor recreation. One component is a State Park, another is a State Recreation Area, another is a State Forest, etc. All management areas having recreational potential are incorporated in the Outdoor Recreation System to take full advantage of the State's diverse recreational opportunities and to assure program coordination. The Outdoor Recreation System provides a means for evaluating existing and proposed recreational areas and allows the selection of management principles which are most appropriate to the characteristics of a site.

The State Outdoor Recreation System is comprised of 11 different recreational components. Each component provides for a recreational experience which is best suited to its resources. The current designation of existing State recreational units is not necessarily the most suitable from a resource or recreational standpoint. Using the functional classification system as a base, all existing and potential State recreational units were objectively analyzed to determine the component for which they were best suited and the relative ranking of each unit within each component. Only four of the 11 possible components were given consideration. A portion of the study involved the delineation of 29 criteria to measure the value of any site for outdoor recreation. The general criteria categories were: accessibility, relative cost and availability, quality of the surrounding environment, availability of essential services, site characteristics, and significance. One hundred and thirty-three sites were ranked against the criteria.

The Bureau of Planning, Department of Natural Resources, conducted a 1970 User Survey of selected State Parks throughout the State. This survey provided information on the origin of State Park users from both Minnesota and other states, measured their participation rates in various outdoor recreational activities, and provided information on user characteristics and attitudes.

Some existing State Parks and Recreation Areas are experiencing excess use during the peak summer season. These existing State facilities were analyzed by the Bureau of Planning and the Division of Parks and Recreation to determine which areas could be further developed or expanded to accommodate additional swimming areas, campsites, picnic sites, water access sites, and trails.

The forecasts of regional outdoor recreational needs by 1980, as published in the 1968 Minnesota Outdoor Recreation Plan, required review and revision. There was a special need to reevaluate campsite, picnic site, public access site, and swimming area requirements. The Bureau of Planning reviewed and revised the future requirements for these recreational facilities.



The information gained through parts of Project 80 was analyzed and synthesized to develop priorities for land acquisition. In addition the Department of Natural Resources and the Department of Administration estimated the cost of completing the land acquisition of existing facilities and the cost of acquiring proposed areas. These priorities and costs are intended to aid the Legislature in determining the extent and application of future appropriations.

The recommendations of Project 80 will become only as effective as the Legislature allows. The Project 80 team has developed a number of general and administrative policies which require legislative action. If adopted, these policies will implement the findings of this study and assist in developing Minnesota's full recreational potential. The Committee finds that Project 80 is one of the first comprehensive attempts to systematically analyze potential and existing recreational facilities throughout the State. The Committee recommends that the legislature give due attention to the recommendations of Project 80. An inventory of unique natural sites should be maintained and updated periodically by the Department of Natural Resources. The inventory of historic sites should be maintained and updated periodically by the Minnesota Historical Society. Data should be made readily available to all agencies involved in land use planning by incorporating it into the Minnesota Land Management Information System. Existing and proposed State recreational units should be classified in accordance with the components of the Outdoor Recreation System. Classification should achieve the best match between the resource potential of the units and the management and recreational use objectives of the components. Evaluation of future additions to the State Outdoor Recreation System should be made in an objective manner, utilizing 29 criteria and weighting of each, thus making it possible to compare existing and proposed sites. Should major changes in the criteria or weighting be needed, the entire system should be re-analyzed using these new factors. User surveys should be conducted periodically in Parks, Recreation Areas, and Forest Campgrounds and Day Use Areas to verify the significance of the areas from the standpoint of use, to evaluate use attitudes toward recreational development, crowding, and activity participation, and to aid in the design and development of recreational areas. Accurate inventories of existing recreational facilities and lands dedicated for such purposes should be maintained and updated at regular intervals to serve as a basis for determining future facility requirements.

Hiking, swimming, and picnicking were the three most popular activities participated in, according to the 1970 Park User Survey. Priority should be given to the development of facilities for these activities where they are consistent with the primary purpose of establishment and the natural characteristics of the site. Priority should also be given to the interpretation of the State's natural and historical heritage and to programs which will further man's understanding and appreciation of his co-existence

with nature. Development of outdoor recreational facilities should be based on a master plan. Until a master plan is prepared, development should be limited to the most basic facilities needed for the health and safety of the visitor. Funds should be made available for master planning existing units of the Outdoor Recreation System. Initial appropriations for new recreational units should include adequate funds for master planning. Funds should be appropriated to the Department of Natural Resources to enable comprehensive land use management plans to be completed for all State Forests and major Wildlife Management Areas as soon as possible.

The 1973 Legislature should give serious consideration to relaxing the restrictions on the use of eminent domain in units of the Outdoor Recreation System. Administration agencies should be permitted to acquire a certain percentage of the total statutory acreage of a unit by condemnation where negotiations for purchase are unsuccessful. A review board, comprised of administrative or legislative personnel, could review such requests. Those recreational units which are currently under the administrative jurisdiction of the State but are determined to be of regional significance shall be retained and managed by the State for a reasonable length of time. These units should be transferred without cost to any unit of government that indicates a willingness and ability to utilize them for its recreational needs.

The State should continue to provide financial assistance to local units of government for acquisition and development of recreational facilities which meet local requirements and sites which preserve natural or historical resources of local significance. The State shall encourage private enterprise to invest in the development and operation of recreational facilities which supplement the Outdoor Recreation System, broaden the dimension of recreational opportunity in the State, and provide a suitable economic return to the investor. Further analysis is needed of existing and potential Forest Campground and Day Use Areas, Scientific and Natural Areas, Wilderness Areas, Waterways, Trails, Rest Areas, and Water Access Sites. Long-range plans, including priorities and finance needs, are needed to complete the plans for the State Outdoor Recreation System. The Legislature and the Administration should review existing policies relating to outdoor recreation and consider implementing policies to assist in developing Minnesota's full recreational potential.



## NOISE

The Committee finds that the level of noise pollution in many areas of the State, particularly in metropolitan areas, is excessive and undesirable and should be abated. Noise pollution is increasing the risk of hearing impairment; interferes with conversation, sleep, recreation, and the general quality of life; and possible induced lasting physiological effects in people exposed to high levels over a long-term period. For many city residents, noise may be the single most pervasive environmental pollutant. Excessive noise pollution is being generated by: airplanes and airports, vehicles, construction, industrial and commercial activities, household appliances, and internal building noise. Both people and property should be protected from excessive noise pollution. In the past, there has been a common public acceptance of noise as an inevitable concomitant of urban life. Only recently has there been a broadening public recognition that much of the noise we have tolerated is unnecessary.

The Pollution Control Agency is making substantial progress in adopting statewide standards describing the maximum levels of noise in terms of sound pressure level which may occur in the outdoor atmosphere. The Committee recommends that the Pollution Control Agency take whatever actions are necessary to secure adequate citizen participation in hearings concerning noise quality standards. Special attention should be given to noise quality standards for wilderness areas in the State. Man-made noise levels in wilderness areas should be maintained at absolute minimums. The Department of Natural Resources has made substantial progress in setting snowmobile noise standards. The Department should complete its task at an early date.

Little is known on a statewide basis concerning noise problems, impacts, and alternative solutions. Information on the status and trends in noise pollution is scant and noise pollution monitoring is practically non-existent. The Committee recommends that the Pollution Control Agency be directed to prepare annually a statewide noise quality report and that Agency should be provided with adequate manpower and financial resources to properly monitor noise pollution and its abatement.

The Committee recommends that efforts by local governments to curb noise be accelerated. Ordinances should be made more comprehensive in consonance with expanding State and Federal programs. Penalties for noise violations should be substantially increased. Regulations should be expanded to adequately cover noise from jack hammers, bells, sirens, whistles, chain saws, horns, signals, automobiles, trucks, motorcycles, power boats, lawnmowers, dune buggies, go-carts, farm machinery, aircraft, buses, off-road vehicles, snowmobiles, compressors, etc. Attention should be given to the need for requiring labeling of household products and appliances, such as air conditioners, garbage grinders, and vacuum cleaners; discouraging construction of

dwelling units on sites that have or are projected to have unacceptable noise exposure; and implementing land use planning to exclude residences and certain other uses from the noisiest areas. Steps should be taken to provide training for officials responsible for enforcing noise standards and technical assistance including advice on ambient noise standards and techniques for noise measurement and control.



## FLOOD DAMAGES

Major floods have occurred from 7 to 11 times during the past 100 years in the Minnesota River valley; upper Mississippi River valley; Cannon, Zumbro and Root River valleys; and Red River valley. About 4 million acres in the State are subject to inundation. The Committee finds that without extensive flood plain zoning or new flood control and protection works, total average annual flood damage potential for Minnesota is projected to increase from \$22 million in 1966 to about \$88 million in 2020. About 53 potentially feasible flood control projects in the State have been identified by the U.S. Army Corps of Engineers. The U.S. Soil Conservation Service has identified 684 potentially feasible multipurpose P.L. 566 flood prevention projects in all parts of the State, except the northeast part. These projects encourage much additional flood plain development, and favor regional flood damage reduction. An alternative program stressing flood plain zoning, discouraging additional flood plain development, stressing local protection works, and encouraging other States to stress flood plain zoning has not received adequate attention.

There are two schools of thought concerning the problem of flooding. One school of thought involves the following attitudes. It is reasonable to assume that future rates of development of flood plain areas, both urban and rural, will and should be equal to or greater than in past rates. Existing and future developments on flood plain areas should be protected against floods chiefly through structural measures (large dams and reservoirs supplemented by small dams and reservoirs). Future development of flood plain areas should provide protection not only for lands in Minnesota but also for lands downstream from the State. Local protection works and flood plain zoning offer no regional out-of-State benefits. Structural measures provide benefits in the form of dilution of wastes discharged into streams and recreational opportunities in addition to flood damage reduction. Adverse environmental impacts associated with dams and reservoirs are offset by recreational and other improvements and economic benefits.

The other school of thought involves the following attitudes. Future development of flood plain areas (both urban and rural) should be discouraged. Flood problems should be solved by protecting existing and limited future development chiefly through local protection works and by restricting future development through extensive flood plain zoning. Flood plain management should stress nonstructural measures, and Minnesota should encourage downstream States to emphasize flood plain zoning by refusing to accept regional flood damage reduction responsibilities. In the long run, it is unwise to encourage future development of flood plains based on protection afforded by dams and reservoirs. Because of siltation, after about 100 years dams and reservoirs

will be able to offer little or no flood protection. Thus, dams and reservoirs offer only temporary protection, whereas flood plain management stressing zoning is a permanent solution to flood problems. There are more disadvantages than advantages associated with the vast environmental impacts of dams and reservoirs.

The flood problem issue revolves around the following questions: what should be done to reduce damages to existing flood plain development? How much additional flood plain development is needed and is desirable? What should be done to protect any additional flood plain development? Should Minnesota assist downstream states in reducing their flood damages partly through structural measures in Minnesota? Unfortunately, plans formulated to date stress dams and reservoirs, encourage much additional flood plain development, and favor regional flood damage reduction. Alternative plans stressing flood plain zoning, discouraging additional flood plain development, stressing local protection works, and encouraging other States to stress flood plain zoning does not exist. The Committee recommends that the State prepare alternative plans stressing flood plain (urban and rural) zoning and local protection works and discouraging additional flood plain development. The plan should provide data concerning environmental impacts and economic, social, and political ramifications. The pros and cons of the alternative framework plan and the existing plans should be compared and discussed.

The Committee recommends that the State conduct a feasibility study on flood plain management through an amortization program that includes a consideration of tax credits and life tenancy rights. The Committee recommends that structural alternatives to flood control be considered only after flood plain management benefits have been maximized. The State should address itself to the problems associated with the temporary emergency levees constructed during the last major flood. The Committee recommends that river basin commissions give due consideration to the findings contained in the "Proposed Report of the National Water Commission," November 1972.



## MINERALS AND MINING

Land disturbed by strip and surface mining in Minnesota as of January 1, 1965, was as follows: for clay mining - 600 acres, for stone mining - 3,900 acres, for sand and gravel mining - 41,600 acres, for iron ore mining - 67,700 acres, and for all other mining - 1,603 acres. The Committee finds that approximately 115,403 acres in the State have been disturbed by mining and plans are being made to disturb much additional land. The Committee recommends that the State adopt legislation imposing tightened controls on strip mining and providing for reclamation of mined lands.

There are two geologic environments in northern Minnesota that have potential for commercial deposits of copper, nickel and related materials. One is the greenstone belts in northern Minnesota and the second is the Duluth Complex in northeastern Minnesota. The greenstone belts have been investigated by private industry during the past 4 or 5 years as a potential source of base metal sulfide (copper, zinc) ore deposits. To date, no discoveries of significant mineral deposits have been made. There are good possibilities, however, that one or more discoveries will be made in the near or intermediate future. A discovery could be made at almost any place within the wide expanse in northern Minnesota underlain by greenstone. Any mineral deposits that might be discovered would be relatively small in size but of high quality and value. The mine life for a single mine probably would be on the order of 20 to 25 years. The number of people that might be employed probably would be in the range of 100 to 200. Undoubtedly, the ores or beneficiated products would be shipped out of the State for smelting elsewhere.

The second geologic environment is quite another story. This is the Duluth Complex, a large body of mafic rock that extends from Duluth in a great arc to the northeastern point of the State. Copper and nickel were discovered in this body along the South Kawishiwi River, southeast of Ely, in 1948. An area between the South Kawishiwi River and Hoyt Lakes was explored by 2 mining companies during the 1950's. Exploration ceased at that time largely because of the discovery by the International Nickel Company (INCO) of large quantities of good grade nickel ore near Thompson, Manitoba. In 1966, INCO resumed exploration and development of the copper-nickel mineralization in the South Kawishiwi River area, and at about the same time several other mining companies started exploration in an area between the South Kawishiwi River and Boulder Lake, north of Duluth. Concurrently with the early phases of the exploration, the State offered selected lands for mineral leasing and mining of copper and nickel. Several lease sales have been held since that time.

As a result of the intensive exploration, large quantities of marginal and low grade copper-nickel material have been discovered in the area between Hoyt Lakes and the South Kawishiwi

River. This area is about 35 miles long and approximately a mile wide.

The Minnesota Geological Survey has accumulated sufficient information to make a realistic estimate of the copper-nickel resources in the area between Hoyt Lakes and the South Kawishiwi River. The survey estimates that there are a minimum of 6.5 billion tons of copper-nickel mineralization that is possibly economic at today's mineral prices in the area between Hoyt Lakes and the South Kawishiwi River. This material contains an estimated 14 million tons of nickel, which at the current price of \$1.53 per pound would be worth about \$40 billion. With respect to copper, the mineralized material would contain about 40 million tons of copper, which at a price of 50¢ per pound would have a value of about \$40 billion. To place this in perspective with present day consumption rates, the nickel resource would supply the world's entire needs for about 20 years or the United States' needs for about 70 years. The copper in this area would supply the United States' needs for about 20 years.

The Committee finds that three separate aspects of copper-nickel mining in northeastern Minnesota - mining, beneficiation or upgrading of the material, and smelting - need to be carefully considered with respect to environmental quality. At least in the beginning stages, the companies probably will mine some of the ore-bearing material by open pit operations because of the relatively low grade of the mineralization. Later, mining would be done underground, through vertical shafts. Because of the large quantities of material and the low grade of the ore, large volumes of waste rock, which must be dumped will be generated. There is ample space for the dumps, however, there is controversy over whether the dumps on the southern side of the belt would create any serious environmental problems; beneficiation may have little impact on the environment, relatively small amounts of water would be required, and the tailings from the operation could be confined to prevent pollution of surface and ground waters in the region. Smelting would create air pollution problems if present day technology were used. However, smelting techniques are rapidly evolving, there are experts that claim smelters can be built that will not have any appreciable detrimental effect on the environment. Recommendations are being made that smelting of the copper-nickel ores be done within Minnesota, and that standards be established by the State prior to construction, which the operators must meet.

There is much controversy over whether mining, beneficiating, and smelting of copper-nickel ores can be carried out harmoniously with the environment of this part of northeastern Minnesota. Some people advocate that the area between Hoyt Lakes and the South Kawishiwi River, which is in part adjacent to current open pit mining operations on the eastern end of the Mesabi range, should in effect be zoned to permit mining and related operations under controlled conditions.



In 1969, the State for the first time passed a mine land reclamation law. However, the provisions of this legislation are so weak that to this date the Department of Natural Resources has not issued regulations under the statute and there is no requirement for mine land reclamation in the State of Minnesota. The poignancy of this omission in the protection of our natural environment is increased by the substantial likelihood that there will be major copper-nickel mining development in the northeastern part of the State, and this is associated with far greater environmental degradation than is iron mining. In order to assure that mining is done in a manner compatible with environmental protection and that areas are returned as nearly as practicable to the natural state following mining, a much stronger mined land reclamation law is necessary.

The Committee recommends that legislation be passed which will be more effective in assuring reclamation of mined land. In order to assure compliance with the mined land reclamation law, it should provide for mandatory posting of bonds by all mine operators in an amount sufficient to assure complete reclamation.

## TRANSPORTATION

The State Planning Agency, in cooperation with other State agencies and as part of a statewide transportation study, has drafted a bill for an Act dated October 25, 1972, creating a State department of transportation. This bill is presently being reviewed by various levels of government. The Committee endorses in principle several provisions of the State Department of Transportation bill under a consideration, however, the Committee recommends that some provisions be amended to reflect more adequately environmental concerns associated with transportation policies. The provisions of the bill which have merit are given below.

"In order that the general welfare, the economic growth, job mobility, convenience and the enjoyment of recreational, health and educational facilities, stability and well-being of the citizens of the State of Minnesota can be better served, a State Department of Transportation is hereby created to develop programs to assure adequate, safe and efficient transportation facilities and services at reasonable cost to the citizens of the State of Minnesota. It is intended that the planning and development of such facilities and services shall be coordinated by the creation of such department with over-all responsibility for the development of a coordinated multi-modal transportation policy, research, planning and development. The establishment of said department is necessary and in the public interest to assure the coordinated effective administration of the transportation programs of the State, to facilitate the development and improvement of coordinated transportation service by local government and private enterprise to the maximum extent possible. The department will encourage the cooperation of federal, state and local governments, carriers, labor and other interested parties toward the achievement of providing needed facilities for movement of people and goods; to stimulate technological advances in transportation problems. The department will develop multi-modal transportation policies and programs to accomplish these objectives with full and appropriate consideration of the economic, social and environmental needs of the public, users, carriers, commerce, industry, labor, agriculture, tourism and social development.

"The department of transportation will:

- (a) Develop, revise and maintain a comprehensive multi-modal transportation plan;
- (b) Give full consideration to all relevant factors such as transportation systems and subsystems, intermodal coordination, transportation, transportation safety, and existing and planned land use, financing, and their attendant economic, environmental and social effects;
- (c) Develop priorities in the field of transportation consistent with statewide comprehensive planning goals, objectives and policies;



(d) Program capital improvement and other transportation expenditures, based upon statewide transportation plan priorities, and revenues available;

(e) Construct and maintain statewide transportation facilities as authorized by this or subsequent acts;

(f) Cooperate and participate with regional agencies in the development of transportation related components of comprehensive regional development plans;

(g) Provide technical and financial assistance to regional continuing transportation planning programs;

(h) Review transportation - related federal assistance applications of local and regional agencies.

"The department shall, in the performance of its responsibilities, utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in plans and decisions which may have an impact on man's environment. To enhance the economic and social benefits of the facility and the adjacent community, continuing efforts shall be made to mitigate economic, social and ecological detriments resulting from transportation facility construction and operation. The several concerns herein expressed shall be fully and completely reflected in the organization of the department of transportation.

"The commissioner of transportation shall maintain close liaison, coordination and cooperation with the various private sectors of transportation so as to facilitate the development of a unified and coordinated statewide transportation system, in which the various public and private modes serve complimentary roles."

Provisions of the bill about which the Committee has reservations are given below.

"The Director of the Pollution Control Agency shall inform the Commissioner of Transportation of all activities of the Pollution Control Agency which are directed toward the adoption, revision or rescission of any standards or regulations concerning transportation pursuant to Minnesota Statutes Section 116.07 (1971).

"Upon notification by the Director of the Pollution Control Agency, the Commissioner of Transportation shall participate in the development and formulation of such regulations or standards. Such participation may include, but is not limited to, access to all pertinent information collected or compiled by the Pollution Control Agency and providing information and expert opinions to the Pollution Control Agency regarding the capabilities of affected modes of transportation to accomplish desired objectives and the impact which alternative methods of attaining those objectives would have on present or planned transportation systems in the State of Minnesota.

"Prior to public hearings on any proposed regulations and standards of the Pollution Control Agency, the Commissioner of

Transportation shall submit to the Director of the Pollution Control Agency a written report specifically detailing the impact which such proposed regulations and standards would have upon present or planned transportation systems in the State of Minnesota and may submit alternative proposals which he determines may more reasonably balance the environmental and transportation needs of the population. Such report shall be made part of the record of such hearings.

"Upon the adoption, revision or rescission of any regulations as standards, the Director of the Pollution Control Agency shall publish a written report setting forth the manner in which the adopted regulations or standards reflect due considerations of the factors required by Minnesota Statutes Section 116.07 subd. 6 (1971) and specifically the issues raised in the report of the Commissioner of Transportation, if any."

The Committee recommends that the environmental impacts of the State Highway "Backbone" plan be given additional attention, and that waterborne transportation plans of Federal-State planning organization be carefully reviewed in light of comprehensive transportation plans and environmental concerns.

Because of the importance of Federal aid and the strings attached to it, congressional policy is crucial in shaping State and local transportation decisions. Yet these decisions are of immeasurable importance to a community's residents, because transportation consumes vast amounts of the public's resources, both financial and natural. It shapes the physical environment in terms of both land use and aesthetics. It affects health because of safety, air pollution and noise pollution. And it helps determine one's way of life - how much mobility and choice one has; how much time and money one spends for access to places of need and pleasure; and how much one is physically and physiologically inconvenienced.

A House bill envisions a new "national scenic and recreational highway program," designed to make park and recreation areas "accessible...to the motoring public." The purpose of the provision would be to "develop highways throughout the nation to satisfy such needs...." To inaugurate the program, the House proposed development of a "prototype" - the Great River Road. This would be a scenic highway running on both sides of the Mississippi River from the Gulf of Mexico to Lake Itasca in Minnesota, a distance of some 2,000 miles. Such a highway has been in various stages of planning and construction, utilizing many existing highways, for decades. The House would authorize \$30 million for 1974. Is the Great River Road a good idea? Would it really be a prototype of a scenic highway system? Is such a system a good idea? It's hard to tell - there was no testimony on the subject in the House committee hearings, and no debate on the House floor.

The Committee strongly recommends full and open committee hearings on the proposed Great River Road bill, both in Washington



and the affected states to prevent the "one foot in the door" syndrome whereby highway proposals once funded, become impervious to meaningful public review. The Committee urges that an environmental impact statement be prepared, pursuant to section 102C of the National Environmental Policy Act of 1969, on the proposed national scenic and recreational highway program, of which the Great River Road is considered to be a prototype for the program.

The Committee recommends repeal of an article of the Minnesota Constitution requiring that highway user funds be spent for "highway purposes." Repealing the article would clear the way for the Legislature to appropriate revenues from gasoline taxes and other highway-user fees for mass transit. The Committee recommends that legislation be passed which encourages and fosters mass transit programs.

## LAND TREATMENT, DRAINAGE, IRRIGATION

In the 1950-59 period, 205 open-ditch projects were completed in the State to drain lands for agricultural purposes. Projects involved 2,333 miles of open ditches. In addition, 47 closed or tile projects were constructed, involving 936 miles of tile for improved drainage. The affected agricultural area was about 11 million acres. About 10 million acres had been affected by previous drainage. Areas drained are concentrated in the Red River basin, Minnesota River basin, and in southern counties in the State.

The U.S. Soil Conservation Service has identified the following land areas as having a drainage problem with respect to agriculture: lands suitable for crop land having excess water as a major problem, 17,754,900 acres and lands suitable for cropland having excess water as a secondary problem, 1,013,000 acres. Studies indicate that of the 46,210,397 acres inventoried in the State by the U.S. Soil Conservation Service 40 percent have erosion problems. Protection by treatment is appreciable in the southeastern part of the State. There are about 15,143,500 acres of cropland, 2,489,400 acres of pasture and 16,075,434 acres of forest and woodland that require conservation treatment and that would be feasible to treat in the State. The U.S. Soil Conservation Service has identified 8,304,200 acres that require watershed project action. About 35,004 farmers or 25.2 percent of all farmers have been assisted in completing a plan for soil and water conservation for their farms.

The use of water for irrigation in Minnesota has grown from a minimum number of acres in the 1930's to about 17,000 acres in 1964. Supplemental irrigation may increase substantially in the future, especially in the field of speciality crops as potatoes and vegetables.

An inventory was made by the U.S. Bureau of Reclamation of arable lands in the Souris-Red-Rainy River basin to determine their irrigability. Potential irrigable lands with surface water supplies total 1,065,500 acres in North Dakota, 285,000 acres in Minnesota, and 3,500 acres in South Dakota. Potential irrigable lands with groundwater supplies total 138,000 acres in North Dakota and 58,000 acres in Minnesota. With no large supplies of surface water available for potentially irrigable lands in North and South Dakota, development of these lands depends upon the importation of water. The potentially irrigable lands are in addition to the lands to be irrigated through the Garrison Divison Unit that utilizes Missouri River water importation.

North Dakota is searching for water to irrigate its lands, since additional Missouri River water is not likely to be made available for State use. The Rainy River or Lake of the Woods in Minnesota is a source that could provide the quantity and quality of water for irrigation in Minnesota and North and South



Dakota, as well as water for diluting return irrigation flows in the Red River. To serve the potential irrigable lands 1,500,000 acre-feet of water would have to be imported annually from the Lake of the Woods (International waters). The U.S. Bureau of Reclamation has conceived a plan to serve potential irrigable lands utilizing the Rainy River. A complex system costing about \$300 million would import Rainy River water to lands in North Dakota and Minnesota. The immense development plan would involve gravity diversion of Rainy River water from the natural storage of the Lake of the Woods.

Wetlands and marshes are a little recognized but highly important natural resource in the State. In addition to providing wildlife habitat, marshy and wetlands retain flood waters to prevent overflow of downstream lands and destruction and damage to downstream property, entraps and retains nutrient-rich water, thus aiding water quality and helps to recharge groundwater aquifers which are the source of most of the drinking water of the State. The major threat to this resource is through drainage to produce more land for agricultural production. There are now more than 35,000 miles of open ditches in Minnesota, exclusive of drained tile, and about 23 percent of the land in Minnesota is now drained. At the same time, public funds are being expended both for keeping land out of agricultural production and for the purchase of wetlands because of their environmental value.

The Committee recommends that the definition of public waters be expanded to include wetlands which are of substantial benefit for wildlife habitat, flood control, erosion control and water quality. In addition, the State should be directed to develop standards and criteria governing the establishment and improvement of drainage systems, whether or not they involve State waters. These should be based upon hearings in the rural areas to insure those concerned with drainage an adequate opportunity to participate in the development of the standards. The Committee recommends that the State develop a coordinated program of tax incentives, subsidies and purchases to make wetland preservation and restoration economically feasible to land owners.

The effect of drainage systems on the environment can be devastating. Drainage systems have lowered groundwater tables throughout many areas of the State. Ditching adversely affects water qualities in the receiving waters through sedimentation. Many lakes and lake levels have been affected by drainage systems, and fish and wildlife habitats have been destroyed as have the life support systems for small game. Drainage systems have increased soil erosion problems and have contributed to downstream flooding potentials. Such effects have resulted through poor planning and failure to consider environmental effects of proposed drainage systems. Moreover, drainage to produce more land for agriculture has greatly changed the face of the land in Minnesota. The Committee recommends that the State be required to develop standards and criteria governing the establishment and

improvement of drainage systems as they affect lakes, wetlands, wildlife lands, related natural resources and erosion and flood control by January 1, 1974.



## ENVIRONMENTAL ADMINISTRATION

The Committee finds that in addition to special-purpose districts, county boards, port authorities and municipal agencies, there are about 122 organization with environmentally oriented programs in Minnesota as follows: State organizations - 21, International organizations - 5, Regional organizations - 5, Interstate organizations - 4, Federal-State organizations - 4, Federal organizations - 30, and Interest groups - 53. There are 87 counties, 91 soil and water conservation districts, 32 watershed districts and 4 conservancy districts besides several lake conservation districts, sanitary districts, port authorities, and district courts in the planning, development and management of the State's natural resources.

Environmental problem solving is attacked on a piecemeal highly fragmented basis. Only limited progress is being made in providing a basic institutional framework for environmental decision-making. The Governor's Environmental Quality Council is making some progress in coordinating environmental programs, but to date it has been preoccupied with matters concerning power plant siting and energy policies.

### State Organizations

State organizations concerned with environmental planning, development, and management in Minnesota are: Department of Natural Resources, Pollution Control Agency, Water Resources Board, Iron Range Resources and Rehabilitation Commission, Department of Economic Development, Department of Agriculture, Department of Administration, Department of Highways, State Board of Health, Geological Survey, Executive Council, Land Exchange Commission, State Geographic Board, State Historical Society, State Planning Agency, Department of Civil Defense, State College Board, Board of Regents - University of Minnesota, Minnesota Committee on Interstate Cooperation, Minnesota Resources Commission, and Governor's Environmental Quality Council.

The most active State organizations are: Department of Natural Resources, Pollution Control Agency, Water Resources Board, State Planning Agency, State Board of Health, and Minnesota Resources Commission. Major functional areas and associated State agencies are: Water Supply - State Board of Health and Department of Natural Resources; Water Pollution - Pollution Control Agency; Recreation, Fish and Wildlife - Department of Natural Resources; Water Resources - Department of Natural Resources; Flood Control - Department of Natural Resources and Water Resources Board; Waterborne Transportation - Department of Natural Resources and Water Resources Board; Land Drainage, Treatment and Irrigation - Department of Natural Resources and Water Resources Board; Forestry and Minerals - Department of Natural Resources; Power - Department of Natural Resources; and Comprehensive Water and Related Land Resources Planning - State Planning Agency.

Expenditures by State agencies associated with environmental programs increased from \$5.7 million in 1950 to \$31.9 million in 1970. About 89 percent of expenditures in 1950 were made by the Department of Natural Resources. 86 percent of expenditures in 1970 were made by the Department of Natural Resources. In 1950, about 91 percent of expenditures consisted of State funds; in 1970 about 83 percent of expenditures consisted of State funds. Total State agency staff complements associated with environmental programs increased from 1,100 in 1960 to 1,400 in 1970. About 84 percent of the total staff complement was in the Department of Natural Resources in 1970; about 54 percent of the staff consisted of professional, administrative and management personnel and about 46 percent consisted of clerical, technicians, laborers, etc. employees.

#### International Organizations

Several international organizations are concerned with environmental programs in Minnesota. Included among these are: International Joint Commission, Great Lakes Study Group, Great Lakes Fishery Commission, Coordinating Committee on Great Lakes Basic Hydraulic and Hydrologic Data, and International St. Lawrence River Board of Control.

#### Regional Organizations

Minnesota participates in the activities of several regional organizations which are concerned with environmental programs. Included among these are: Upper Great Lakes Regional Commission, Northern Great Lakes Area Council, Great Lakes Task Force, Conference of Great Lakes Congressmen, and St. Lawrence Seaway Development Corporation. In addition, Minnesota has been requested to become a member of two midwest environmental groups: Midwest Nuclear Compact and Midwest Legislative Environmental Conference.

#### Interstate Compacts and Commissions

Minnesota has entered into four Interstate Compacts involving the creation of four Interstate Commissions which are concerned with environmental planning, development and management in the State. These Commissions are: Great Lakes Commission, Minnesota-Wisconsin Boundary Area Commission, South Dakota-Minnesota Boundary Waters Commission and Tri-State Waters Commission. Current meetings are underway to consider the creation of the Great Lakes Management Compact.

#### Federal-State Organizations

In the last two decades, the water and related land resources planning programs of Federal agencies have expanded greatly and new Federal agencies have been brought into the planning field. Institutional arrangements for coordinating Federal planning efforts with the planning activities of the State, local and private organizations have improved. Federal-State planning



organizations are conducting, or will be conducting, studies whose geographic major river basin and sub-river basin areas will essentially blanket the Nation. There are four Federal-State planning organizations concerned with water and related land resources planning, development and management in Minnesota. They are: Souris-Red-Rainy River Basins Commission, Great Lakes Basin Commission, Upper Mississippi River Basin Commission and Missouri River Basin Commission.

#### Federal Executive Branch Agencies

Federal responsibilities in environmental planning, development and management in Minnesota are divided among 30 units in 8 Executive Departments and Agencies: 6 Independent Agencies; 6 units in the Executive Office of the President; 9 other Boards, Committees, Councils and Commissions; and 1 Quasi-Official Agency. Federal Executive Branch agencies concerned with environmental planning, development and management in Minnesota are: Executive Office of the President--Office of Management and Budget, Domestic Council, Office of Emergency Preparedness, Office of Science and Technology, National Council on Marine Resources and Engineering Development, Council on Environmental Quality; Executive Departments--Department of the Interior including: Office of Saline Water, Environmental Planning Staff, Office of Water Resources Research, United States Fish and Wildlife Service - Bureau of Sport Fisheries and Wildlife, National Park Service, Bureau of Mines, Geological Survey, Bureau of Land Management, Bureau of Indian Affairs, Bureau of Outdoor Recreation, Bureau of Reclamation; Department of Agriculture including: Farmers Home Administration, Forest Service, Soil Conservation Service, Economic Research Service, Agricultural Research Service, Cooperative State Research Service, Extension Service, Agricultural Stabilization and Conservation Service; Department of Commerce including: Office of Business Economics, Economic Development Administration, National Oceanic and Atmospheric Administration; Department of Defense - Army Corps of Engineers; Department of Health, Education and Welfare; Department of Housing and Urban Development; Department of Transportation including: Federal Highway Administration and Coast Guard; and Department of Justice; Independent agencies - Atomic Energy Commission, Federal Power Commission, Interstate Commerce Commission, National Science Foundation, Water Resources Council, Environmental Protection Agency; other Boards, Committees, Councils and Commissions--Citizen's Council for Environmental Quality; National Water Commission; Advisory Board on National Parks, Historic Sites, Buildings, and Monuments; Federal Advisory Council on Regional Economic Development; Federal Council for Science and Technology; Federal Radiation Council; Migratory Bird Commission; National Forest Reservation Commission; National Park Foundation; President's Science Advisory Committee, Quasi-Official Agency--National Academy of Engineering - National Research Council; and Twin Cities Federal Executive Board.

In fiscal year 1970, there were about 1,300 Federal employees residing in Minnesota with assignments pertaining to the planning, development and management of the environment. In fiscal year 1967, there were about 1,200 such Federal employees. The distribution of Federal employees according to Departments in fiscal year 1970 were approximately as follows: Department of Agriculture - 466, Army Corps of Engineers - 437, Department of the Interior - 289, Department of Commerce - 73, and others 35. In the Department of Agriculture, the largest number of Federal employees were with the Soil Conservation Service, Forest Service and Agricultural Research Service, in that order. The largest number of Federal employees in the Department of Interior were with the Bureau of Sport Fisheries and Wildlife, Geological Survey, and others in that order. Most of the Federal employees in the Department of Commerce were with the National Weather Service. Most Federal employees were located in the Twin Cities and at Duluth.

#### Interest Groups

In 1970, there were at least 49 interest groups in Minnesota with major environmental programs, 4 leagues and associations with minor environmental programs, at least 80 organizations that tend to have a continuing interest in environmental issues, and at least 150 national organizations concerned with environmental programs which have or could have members in the State. Some of the more active interest groups were: American Camping Association, Minnesota Section; Association of Minnesota Counties; Citizens League; Clear Air, Clear Water, Unlimited; Ducks Unlimited, Minnesota Chapter; Ecological Society of America, Minnesota Chapter; Environmental Science Center; Fort Snelling State Park Association; Friends of the Wilderness; Izaak Walton League; League of Women Voters of Minnesota; League of Minnesota Municipalities; Minnesota Academy of Science; Minnesota Association of Commerce and Industry; Minnesota Association for Conservation Education; Minnesota Association of Soil and Water Conservation Districts; Minnesota Association of Watershed Districts, Inc.; Minnesota Chapter, the Nature Conservancy; Minnesota Council of State Parks; Minnesota Committee for Environmental Information; Minnesota Conservation Federation; Minnesota Environmental Defense Council; Minnesota Public Interest Research Group; Minnesota Environmental Control Citizens Association; Minnesota Waterfowl Association, Inc.; Nine Mile Creek Citizens' Committee, Inc.; Quentico Superior Foundation; Northern Environmental Council; Red River Valley Development Association; Red Lake River Planning Commission; Riverbend Association; Sierra Club (North Star Chapter); Save Lake Superior Association; Society of American Foresters (Upper Mississippi River Section); The Wildlife Society (Minnesota Chapter); Upper Midwest Research and Development Council; and Upper Mississippi Waterway Association.

Of the 53 interest groups (49 interest groups and 4 leagues and associations mentioned above), 40 were conservation-preservation oriented, 8 had the word environmental in their name, and 5



were development and management oriented. Taking into consideration multiple memberships, it is estimated that approximately 25,000 citizens in Minnesota were members of the 53 interest groups in 1970. Membership in individual interest groups ranged from 13 to 12,000. Expenditures in 1970 for environmental programs of the 53 interest groups probably totaled in excess of \$250,000. Annual expenditures by individual interest groups ranged from \$100 to in excess of \$35,000. These figures do not include the thousands of hours of volunteer time by members. The source of income were dues, contributions, donations and grants. It is estimated that the number of interest groups increased from about 16 in 1950 to 25 in 1960 to 33 in 1965 to 53 in 1970. Some of the interest groups with large numbers of members and expenditures in 1970 were: Minnesota Environmental Control Citizens Association, Minnesota Public Interest Research Group, Minnesota Conservation Federation, Minnesota Association of Commerce and Industry, and Sierra Club.

#### Expenditures for Environmentally Oriented Programs

The Committee finds that annual State outlays for all environmentally oriented programs total about \$30 million; annual Federal outlays for environmentally oriented programs in Minnesota total about \$85 million. Thus, approximately \$115 million per year are being expended by State and Federal agencies for programs directly related to the environmental quality of the State. These expenditures constitute only about 2.3 percent of total State and Federal annual expenditures and outlays in Minnesota. In light of the urgent need for environmental quality improvement and the widespread and persistent interest of citizens in cleaning up the State's environment, expenditures and outlays for environmentally oriented programs seem disproportionally small in comparison to other expenditures and outlays. The Committee recommends that the 1973 Legislature take steps to improve the efficiency in the use of environmental program funds and to appropriate additional funds for implementing environmental quality improvement programs. The Minnesota Congressional delegation should be encouraged to seek appropriate additional Federal outlays for environmental quality improvement programs in Minnesota.

Considering total annual State and Federal expenditures and outlays for environmentally oriented programs in Minnesota, the percentages of total expenditures and outlays for functional activities are approximately as follows: works of improvement and development of resources - 43 percent; operation, maintenance, and management of resources - 30 percent; technical assistance - 8 percent; loans - 7 percent; data collection, investigations, planning, and information systems - 7 percent; regulation, enforcement and surveillance - 3 percent; and research - 2 percent. Whereas the efficiency in the use of funds should be increased and additional funds are urgently needed for all functional activities, efficiency improvement and financial support for data collection, investigations, planning, information systems, regulation, enforcement, surveillance, and research activities should be greatly increased.



## Improvement of State Government

The Committee finds that the Governor's and Legislature's control of the State's administrative apparatus for environmental programs is hampered through fragmented organization. No formal State mechanism exists for effectively coordinating the activities of Departments, Agencies, Boards, Commissions and Committees. More than one State agency has responsibilities in most functional areas and responsibilities of State agencies overlap. Mandatory coordination and cooperation statements in the State's statutes are, for the most part, weak expressions describing piecemeal cooperation, often on a voluntary basis.

The patchwork quilt of environmental government leads to general confusion and makes it difficult for the citizen, legislator, and State employee and executive to comprehend his State government. The citizen finds it difficult to know where to go for information, help and service or how to influence policy; the legislator must spend months and possibly years in mastering the intricacies of the Executive Branch and the competing claims for support from its agencies; a State executive finds it difficult to learn of other agencies and officials concerned with activities related to his own; and an ordinary State employee may never fathom other than the immediate organization in which he works.

The deficiencies in Minnesota's environmental government result in needless inefficiency and slow response to changing public needs. Over-all organizational dispersion and fragmentation in the government impose serious limitations upon the internal organizations and operations of environmental agencies.

There are many who feel that no reorganization of environmental State agencies is necessary; coordination of existing agencies should be strengthened. On the other hand, several organizations, such as the Citizens League, have studied State Government for environmental programs and have prepared reports recommending reorganization. It should be recognized that there are as many potentially feasible plans for reorganization as there are viewpoints concerning government. No reorganization plan could possibly meet with everyone's approval and there will be great opposition to any major change.

The Committee finds that there is a great need to improve the relationship between State, regional, local, and Federal-State environmental planning, development, and management activities, and to improve the responsiveness of all levels of government to environmental concerns.

The Committee recommends the adoption of the establishment of an Environmental Council and an Environmental Quality Commission as set forth in the State Environmental Policy Act bill which was jointly recommended for passage on November 30, 1972, by the House Environmental Preservation Committee, Subcommittee on Environmental Policy and Organization and the Senate Civil Administration Committee, Subcommittee on Department of Natural Resources; with the



following changes or additions in the structure, duties and functions of the Environmental Council:

1. The council should be specifically charged with the function of resolving conflicts in policies and actions among State agencies.
2. Rather than an immediate and massive reorganization of State government agencies or the creation of a super department, the Committee recommends that the Environmental Council be specifically charged with reviewing the statutory authority and administrative structure of existing agencies dealing with environmental quality, and to report to the Governor by July 1, 1974, and in preparing such review, making such recommendations as it deems advisable to improving environmental administration.

The Committee recommends the establishment of the three-person Council rather than a body made up of the heads of some or all of the existing environmental agencies for the following reasons: Agency heads have little time to fulfill such a function outside of their duties of administering their own agencies; the Council should be independent; Agencies, like corporations and people, have special interests which could tend to get in the way of the policy making functions and conflict-resolving role to be performed by the Council; the Council should be charged with the duty of reviewing the statutory charge and the administrative structure of the varying agencies and to propose possible revisions to the Governor, in view of the self-interest of agencies, this would be an impossible task for agency heads; one of the functions of the Council is to review actions of agencies themselves and agency heads and cannot be expected to be completely independent in reviewing actions of or permits issued by their own agencies; the Council should provide a highly visible forum for the resolution of public policy issues concerning the environment, traditionally, discussions of Agency heads concerning matters where agency policies conflict have not been public.

## SUMMARY OF FINDINGS AND

### RECOMMENDATIONS

#### ENVIRONMENTAL QUALITY ISSUES

A significant number of environmental quality issues require action at all levels of government to stop the erosion of the quality of life in Minnesota. Key environmental quality issues are associated with at least the following matters: multiple use policy of forests; overintensive use of recreation lakes and shorelands; increased demand for exclusive resource use; metropolitan area open space needs; flood plain management; wetland management; fish and wildlife management; water diversions from the State; preservation of unique natural areas; water pollution; air pollution; excessive noise; watershed management; solid waste management and materials recycling; expansion of waterborne navigation; mineral development; transportation facilities; power plant siting and transmission line corridors; pipeline location; energy production, use and conservation; pesticides; fertilizers; chemicals and food additives; information systems; environmental institutional arrangements; and population and economic growth.



The State should address more effectively key environmental quality issues and seek successful resolution of controversies in part by setting and implementing policies. The State must translate emerging values and attitudes into effective long-range broad policies if it is to achieve the goal of a satisfactory environment in the future. The State should develop and implement land-use and environmental policies, plans, and standards for the State as a whole and for major regions thereof through a coordinated, unified program of planning, land acquisition and development, and land-use and environmental control.

#### FORCES INFLUENCING ENVIRONMENTAL QUALITY

The forces which influence environmental quality in Minnesota include population, economic, and technology growth. Similarly, such growth influences the quality of social and political life. The nature of the interactions among aspects of growth and the quality of life and environment is now the subject of considerable and important local, State, national and international debate. Further debate in Minnesota concerning population, economic and technology growth should be encouraged so that the consequences and causes of alternative decisions and policies can be better known and understood by the public and its government. In addition to the traditional forums of legislative hearings, citizen commissions and agency procedures, the State should establish or facilitate a formal organization or system to accomplish the above objectives.

#### STATE ENVIRONMENTAL POLICY

If Minnesota is to achieve an equilibrium where people and nature coexist, not just for the next 100 years but for the life of the planet, the State must now establish some long-term environmental goals and must make a serious commitment to the attainment of those goals. Scant attention has been paid in the past to broad and specific policies and associated long-term impacts on the physical and social environment; most attention has been paid to programs without questioning associated policies. The State should adopt an environmental policy. The State should review existing specific policy statements as a whole body and eliminate inconsistencies and deficiencies in light of the State environmental policy. In addition, the State should review rules and regulations as a whole body and eliminate inconsistencies and deficiencies in light of the State environmental policy.

The State Environmental Policy Act bill represents a commendable effort by the Legislature to be responsive to environmental concerns, however, the bill could stand additional revision and expansion. Some of the major deficiencies are as follows:

1. Environmental policies--the bill fails to state specific State policies to guide decision-making by State agencies in areas in which no such guidelines now exists. The bill should include specific policies concerning land-use, energy conservation, solid

waste and recycling, noise, drainage, minerals and mining, transportation, and management of State-owned land. Moreover, the bill fails to make provisions for elimination of conflicting and outdated environmental policies which are now on the statute books. Even more confusing is the statement in the bill that "the policies and goals set forth in this act are supplementary to those set forth in existing authorizations of State agencies." Such a statement effectively undercuts the benefit of stating a strong environmental policy in the first section of the bill.

2. Permits and impact statements--the bill requires the acting agency to "consider" the same factors as are required for an impact statement under the National Environmental Policy Act, including the environmental impact, alternatives to the proposed action, irreversible and irretrievable commitments of resources, and other factors. However, unlike the NEPA, the proposed statute does not require that the agency's consideration be documented by the preparation of an environmental impact statement. Thus, the method of consideration of these is left to the whim of the agency, and that aspect of the bill is unsatisfactory. Either the acting agency should be required to prepare a written environmental impact statement, or the permit applicant should prepare such a statement, meaning the standards set by the Environmental Council and the agency itself. Rather than requiring an Environmental impact statement only in the case of specific permits, agencies and subdivisions of State governments should be required to prepare such a statement whenever their projects or proposals may have a significant effect upon the quality of the human environment. It should also be made clear that the Environmental Council has the power to require environmental impact statements whenever it is of the opinion that action by a State agency involves a significant environmental impact. In addition, the Council should be able to review the sufficiency of such impact statements, and to prevent agency action from proceeding until sufficient consideration has been given to the environmental effect and such effects have been fully documented. Moreover, the impact statement should clearly apply to State projects commenced prior to its effective date, when any State policy decisions remain to be made. The Environmental Council should be given power to modify or reverse the decision of the issuing agency permits or other agency action which would significantly affect the environment. Rather than be limited to requiring impact statements on an ad hoc basis for projects costing less than \$1 million the Council should be given rule-making power to promulgate rules and regulations setting forth the kinds of instances which it determines to have significant environmental effects and to require agencies to prepare impact statements in all such instances.

#### WATER RESOURCES LEGISLATIVE REPORT

The August 16, 1972, report released by the Office of Senate Counsel and containing recommended water resources legislation represents a commendable effort by the Legislature to be responsive



to water resources policy deficiencies. The following recommended policies are particularly appropriate: water pollution control should be required to stress advanced waste treatment rather than streamflow augmentation for dilution of waste discharged into streams, non-structural methods of flood damage reduction are preferred over structural methods, and the State should not approve or endorse the development of any public waterway for private commercial transportation unless and until it has been determined that no alternative method of transportation can be provided at less public expense. The report fails to spell out requirements whereby variances from county and municipal ordinances for management of drainage, wetlands, flood plains, and shorelands can be reviewed by State government.

#### ENVIRONMENTAL EDUCATION

The problems observed in the environment today have their origins deep in past and present ways of life. One way to begin a new way of thinking and of living is through environmental education. Achievement of the goals of environmental education will require an intensive effort for at least two decades. The environmental education process must become an integral part of all human learning and behavior. The Minnesota Environmental Education Council has developed a comprehensive plan for environmental education which has many desirable features. The Minnesota Environmental Education Council should adopt a broad definition of environmental studies, which will include consideration of the day-to-day living environment of the people of Minnesota.

#### ENVIRONMENTAL INFORMATION SYSTEM

The status and trends in Minnesota's environment are unknown on a comprehensive, detailed basis. The undersirable direction and seriousness of trends are accepted general knowledge, but there exists no well-documented gauge of the State environmental quality conditions. State agencies do not have separate and strong environmental data collection and investigation programs. There are no State programs aimed at obtaining information concerning ecological costs and risks associated with population and technology growth. A statewide environmental information system should be established to improve the coordination of data acquisition and handling responsibilities, to improve the efficiency of data programs, and to upgrade and fill deficiencies in data programs. State agencies should be funded and required to make available at no cost technical publications to the teaching profession.

Each year the environmental information system should culminate in a plan. That plan should: identify long-range and intermediate agency objectives; relate proposed data acquisition activities to objectives; identify planning assumptions; and call attention to unresolved interagency issues and views of the agencies concerned.

Over-all coordination through a State agency is necessary to assure maximum compatibility between existing and all future information systems. Investigation into the synergistic effects of



environmental contaminants on environmental and human health is among the critical research needs of today. One of the most effective ways to communicate information on environmental trends to policy makers and the general public is with indices. The State should develop meaningful environmental indices. The State should create a formal system or organization to assess the total costs of various products including resources, energy, and pollution costs, and to analyze the effects of alternative policies, practices and solutions upon environmental quality and human welfare.

The Environmental Conservation Library is now serving adults and children, both specialists and interested laymen, from throughout the State. In order to fulfill the mandate of the Legislature and to serve Minnesota's environmental information needs fully, the Environmental Conservation Library should have continuing public fundings.

#### ENVIRONMENTAL LAW

The rules of law governing environmental quality are weak. The State should conduct a comprehensive review and analysis of Federal, State and local rules of law with the objective of identifying and remedying deficiencies of rules of law in coping with environmental problems in Minnesota. Rules of law should be predicated on the assumption that the objective to enhance economic development has no inherently greater claim on resources than the objective to enhance the quality of the environment. An Environmental Bill of Rights should be added to the State Constitution by amendment.

#### LAND USE

Decisions about the use of land significantly influence environmental quality and the welfare of the inhabitants of the State, and present State and local institutional arrangements and programs for planning and regulating land use are grossly inadequate. There is a need to develop and implement land-use and environmental policies, plans, and standards for the State as a whole and for major regions thereof through a coordinated, unified program of planning, land acquisition and development, and land-use and environmental control. The State Legislature should consider legislation for a statewide land-use plan. The State should define, inventory, and delineate environmentally sensitive areas--such as areas surrounding the Boundary Waters Canoe Area and the Voyageurs National Park, North Shore of Lake Superior, Lower St. Croix River Valley, parts of the Mississippi and Minnesota Rivers Valleys, and unique wildlife sanctuaries likely to be in the path of the Twin Cities' urban expansion--and pending preparation of land-use plans, declare moratoriums on commercial, industrial and highway development in these areas.

The Experimental City Authority in its studies should give due consideration to the impact of an experimental city on the ecology and the general quality of life in the vicinity of selected sites. Studies should be conducted to seek answers to the following questions: Will the experimental city foster decay of present cities?



Wouldn't funds be better spent trying to improve environmental conditions in present cities such as Duluth? A State agency should be designated to coordinate programs associated with any emerging National Land Use Policy Legislation.

### ENERGY

Recent trends indicate doublings of energy consumption approximately every fifteen years. Although electric power accounts for less than 25 percent of total energy consumption, doublings of electric power consumption are occurring every eleven years, and by the year 2020 electric power consumption may constitute about 50 percent of total energy use.

The State should adopt the following proposed actions for solving the energy-environmental quality conflict: support stiffer fines for oil spills and tighten regulations on emissions from fossil fuel power plants; oppose the deployment of breeder reactors and the rapid proliferation of conventional fission reactors until questions of accident insurance, radioactive waste disposal, independent setting and enforcement of standards, and control of bombgrade material are satisfactorily resolved; support Federal legislation requiring that all land that has been strip mined be reclaimed, that uranium mine tailings and acid drainage from coal wastes be controlled, and that additional measures to protect the coal and uranium miners be implemented; initiate studies to determine the environmental and economic implications of reversing the promotional aspects of energy rate structures; urge that the promotional advertising by utilities be prohibited; urge that the Federal Power Act be amended to give first priority to minimizing environmental impact of generating electric power and to direct the Federal Power Commission to investigate ways to diminish demand; support greatly increased Federal support for research on techniques that promise to minimize the environmental impact of energy production and/or increase the efficiency of conversion to electric power including land based solar energy, controlled fusion, Magneto hydrodynamics and fuel cells; and offer support for a comprehensive national energy policy, incorporating all energy sources and continuously reevaluating options for the short and long term.

The State should adopt, as part of an energy policy, a goal of thrift in the use of electric power. That goal should be reflected in State policy to maximize the use of energy efficient systems for the production and utilization of energy, and to minimize the environmental impact from energy production and use. Comprehensive planning should be pursued to minimize the intrusions of transmission lines upon the landscape of Minnesota. A statewide electric energy plan should be prepared by the State as an integral part of a statewide land use plan.

The State should establish review procedures to formalize the bulk power facilities certification process. An authority should be established in Minnesota to institutionalize, in government, a

process for selecting power plant sites. Further, an authority should have the responsibility and duty to critically examine the need for each electrical generating facility, including an examination of alternatives to any facility of a system that is proposed, and to select sites for the proposed construction.

A moratorium on the construction of new nuclear power plants in Minnesota should be established. The moratorium should be of indefinite duration, under appropriate legislative standards, until undue risks have been eliminated and new development can safely begin.

#### SOLID WASTES AND RECYCLING

From surveys taken to date, there appear to be more than 1,000 land waste disposal sites in Minnesota. Many of these 1,000-plus sites will be closed as either inadequate or uneconomical now that regulations are effective. Sanitary landfills should be considered only as a temporary means of waste disposal because of the pollution associated with hazardous and toxic wastes, and waste resources should ultimately be recycled. The State should provide financial incentives to assist local governments in closing open dumps. The State should establish a groundwater quality monitoring system in connection with solid waste disposal practices. The PCA's enforcement program for feedlot regulations is extremely weak. The PCA should be given funds and authority to accelerate that program. Authorization should be provided by the Legislature to provide funds in those cases where construction of pollution control devices for feedlots would cause undue hardship, even with Federal funds available.

The State of Minnesota, along with the entire nation, has not yet come to grips with exponential mineral and energy consumption growth rates that threaten to deplete domestic natural resources before substitutes can be developed. Continued unchecked growth in consumption also accentuates current environmental quality problems. The single use and discard systems for packaging materials, the over-packaging of materials and products, and the short life-time of the products themselves are symptomatic of public lack of awareness of the true cost of depleting petroleum resources, the risks of increasing potential environmental quality hazards, and the actual costs of disposing of final products.

There is significant energy saving and a reduced environmental quality impact associated with the use of returnable containers vs. the use of nonreturnables, regardless of whether nonreturnables are recycled. Because the aerosol represents a highly energy consumptive package, a health hazard, an explosive hazard, and a package that cannot be recycled, its use should be severely restricted. The State should prohibit the sale and manufacture of aluminum containers in the State, excluding frozen dinner trays for which no feasible alternative currently exists. A wasteful practice involving energy use in industry and solid wastes is the lack of planning for reuse and recycling of materials.



Product manufacture requires large quantities of mineral and energy resources which are lost when products are discarded. This loss could be minimized by extending the lifetime of the products and by recycling materials from spent products. Legislation should be enacted to: require a deposit on all nonreturnable beverage containers to encourage reuse and avoid litter; standardize the size, shape and color of all beer and soft drink containers to promote recycling and reuse; ban all aluminum cans and cans with aluminum tops; and establish regulations on product design to aid recyclability.

#### WATER SUPPLY

It will be necessary to examine the validity and usefulness of some of the procedures under current investigation for the treatment of public water supplies if the people of Minnesota are to be supplied with the drinking water quality to which they are entitled. The State should prepare a report summarizing the pros and cons of possible viable solutions to emerging water supply problems in the Twin Cities area and recommending an optimum solution. The State should prepare a report summarizing the pros and cons of possible solutions to emerging water supply problems in the Iron Range area and recommending an optimum solution.

#### WATER POLLUTION

Despite the fact that upgrading of treatment works and construction of facilities for untreated wastes has been proceeding at a rapid rate as approved water quality standards are being enforced, in 1972 Minnesota still has serious and undesirable water quality problems. The Pollution Control Agency needs greater legal strength and more funds for legal, administrative and technical staff and monitoring equipment and staff.

A number of examples of contamination of groundwater have been documented by the State Health Department and the Pollution Control Agency. The Pollution Control Agency is making substantial progress in adopting statewide groundwater quality standards. That agency should take appropriate actions to insure adequate citizen participation in hearings concerning groundwater quality standards. Possible provisions of the standards which prohibit any waste disposal in injection wells, require the best practicable treatment of wastes before they are disposed of on the ground, and prohibit degradation of groundwaters are appropriate. The recommendations of the Groundwater Subcommittee, Citizens Advisory Committee, Governor's Environmental Quality Council should be implemented immediately.

#### AIR POLLUTION

Better control of air quality is absolutely necessary in Minnesota. The Pollution Control Agency needs more legal "clout" to be truly effective in abating air pollution. The agency should be given civil law powers and misdemeanor fines should be increased to a maximum of \$10,000 per day. There is an obvious need to greatly reduce the deleterious impact on air quality due to emissions from the motor

vehicle, particularly in urbanized areas. The State should examine the economic and environmental implications of proposals to reduce air pollution from the motor vehicle and actively support a program that is deemed appropriate.

#### RECREATION, FISH AND WILDLIFE

Minnesota, like other states, has the major problem of distribution of its recreational resources in relation to its population centers. It is a problem compounded by increasing demands on open space near metropolitan centers. Recreation activity is projected to increase at a much faster rate than population rate increases; the need for additional recreational facilities is great. Because of the changes in land use such as clean farming, mass reforestation, etc., there is a declining trend in Minnesota's available wildlife habitat. This trend threatens the continuation of certain forms of hunting. The landscape of Minnesota is becoming greatly altered by modern man. Unless plans are developed to preserve some portions in essentially undisturbed condition, natural values will be destroyed before there is time to appraise them. The present distribution and protection of natural areas needs to be expanded. Minnesota needs and should have under protection sufficient areas of all types of natural habitats as well as opportunities for a wide variety of recreational activities.

Long-range plans should be prepared by the State for protection of valuable recreational rivers against intrusions and to complement the proposed nation-wide scenic and wild river system with appropriate legislation. The State should determine the amount of wetland acreage that must be preserved, identify these areas, and provide for their permanent protection. Designation, acquisition and protection of natural areas of the State is a vital need. Increased emphasis should be placed upon development of trails for bicycling, hiking, horseback riding, snowshoeing, and cross country skiing, especially in the urban and southern parts of the State. A state-wide wild and scenic rivers law should be enacted.

The protection of rare and endangered species of plants, wildlife and fish through the acquisition of lands or regulation of the take should be considered a part of any natural area preservation program, and particular attention should be directed to the timber wolf, greater prairie chicken, lynx, bob cat, greater sandhill crane, bald eagle, and osprey. Both legal and financial assistance is needed to give private landowners incentive to retain needed open space lands and to protect those environmental habitat needs as required for the preservation of natural and recreational values, particularly for wildlife. Project 80 is one of the first comprehensive attempts to systematically analyze potential and existing recreational facilities throughout the State. The Legislature should give due attention to the recommendations of Project 80.



### NOISE

The level of noise pollution in many areas of the State, particularly in metropolitan areas, is excessive and undesirable and should be abated. The Pollution Control Agency should take whatever actions are necessary to secure adequate citizen participation in hearings concerning noise quality standards. Special attention should be given to noise quality standards for wilderness areas in the State. The Pollution Control Agency should be directed to prepare annually a statewide noise quality report and that agency should be provided with adequate manpower and financial resources to properly monitor noise pollution and its abatement. Efforts by local governments to curb noise should be accelerated. Ordinances should be made more comprehensive in consonance with expanding State and Federal programs.

### FLOOD DAMAGES

Without extensive flood plain zoning or new flood control and protection works, total average annual flood damage potential for Minnesota is projected to increase from \$22 million in 1966 to about \$88 million in 2020. The State should prepare alternative plans stressing flood plain (urban and rural) zoning and local protection works and discouraging additional flood plain development. The State should conduct a feasibility study on flood plain management through an amortization program that includes a consideration of tax credits and life tenancy rights. River basin commissions should give due consideration to the findings contained in the "Proposed Report of the National Water Commission," November 1972.

### MINERALS AND MINING

Approximately 113,403 acres in the State have been disturbed by mining and plans are being made to disturb much additional land. The State should adopt legislation imposing tightened controls on strip mining and providing for reclamation of mined lands. Legislation should be passed which will be more effective in assuring reclamation of mined land. In order to assure compliance with the mined land reclamation law, it should provide for mandatory posting of bonds by all mine operators in an amount sufficient to assure complete reclamation.

The present state of knowledge regarding the implications of a new Minnesota base metal industry is seriously incomplete. The State policy to encourage mineral development should be reviewed, and a moratorium should be declared on copper-nickel development (but not on further exploration and surveys) until such time as the review of policy is completed, and the State is satisfied that it is fully equipped to deal with the ramifications of a new mining industry, and the State has adopted a comprehensive land-use policy. The magnitude and composition of the demand for copper and nickel have not been fully analyzed nor have the assumptions underlying the current demand forecasts been adequately examined. The State should examine fully the demand for copper and nickel as a part of its review of the copper-nickel situation in the State.

### TRANSPORTATION

Several provisions of the State Department of Transportation bill under consideration are appropriate, however, some provisions should be amended to reflect more adequately environmental concerns associated with transportation policies. The environmental impacts of the State Highway "Backbone" plan should be given additional consideration, and waterborne transportation plans of Federal-State planning organizations should be carefully reviewed in light of comprehensive transportation plans and environmental concerns. Full and open committee hearings should be held on the proposed Great River Road bill, both in Washington and in the states. An environmental impact statement should be prepared, pursuant to section 102c of the National Environmental Policy Act of 1969, on the proposed national scenic and recreational highway program, of which the Great River Road is considered to be a prototype for the program. The article of the Minnesota Constitution requiring that highway user funds be spent for "highway purposes" should be repealed. Legislation should be passed which encourages and fosters mass transit programs.

### LAND TREATMENT, DRAINAGE AND IRRIGATION

The definition of public waters should be expanded to include wetlands which are of substantial benefit for wildlife habitat, flood control, erosion control and water quality. In addition, the State should be directed to develop standards and criteria governing the establishment and improvement of drainage systems, whether or not they involve State waters. The State should develop a coordinated program of tax incentives, subsidies and purchases to make wetland preservation and restoration economically feasible to land owners. The State should be required to develop standards and criteria governing the establishment and improvement of drainage systems as they affect lakes, wetlands, wildlife lands and related natural resources erosion and flood control by January 1, 1974.

### ENVIRONMENTAL ADMINISTRATION

In addition to special-purpose districts, county boards, port authorities and municipal agencies, there are about 122 organizations with environmentally oriented programs in Minnesota as follows: State organizations-21, International organizations-5, Regional organizations-5, Interstate organizations-4, Federal-State organizations-4, Federal organizations-30, and Interest groups-53. Annual State outlays for all environmentally oriented programs total about \$30 million; annual Federal outlays for environmentally oriented programs in Minnesota total about \$85 million. Thus, approximately \$115 million per year are being expended by State and Federal agencies for programs directly related to the environmental quality of the State.

The 1973 Legislature should take steps to improve the efficiency in the use of environmental program funds and to appropriate additional funds for implementing environmental quality improvement



programs. The Governor's and Legislature's control of the State's administrative apparatus for environmental programs is hampered through fragmented organization. There is need to improve the relationship between State, regional, local and Federal-State environmental planning, development and management activities, and to improve the responsiveness of all levels of government to environmental concerns.

Eight alternative administrative structures for implementing environmental quality policies were considered. Briefly, these are as follows: abolish existing Environmental Quality Council and Citizens Advisory Committee and legislatively charge the Governor with the responsibility of chairing frequent meetings of department and agency heads; 2) legitimize, through legislation, the existing Environmental Quality Council and Citizens Advisory Committee (status quo); 3) create in the executive office of the Governor an Environmental Council consisting of three citizens and an Environmental Quality Commission consisting of seven citizens; 4) legitimize, through legislation, the existing Environmental Council but create an independent Environmental Quality Commission; 5) create in the executive office of the Governor an Environmental Quality Council consisting of seven citizens and six department heads with a citizen chairman; 6) consolidate the Department of Natural Resources, Pollution Control Agency and Water Resources Board into a new Department of Environmental Control and abolish existing Environmental Quality Council and Citizens Advisory Committee; 7) legislatively charge the State Planning Agency with the responsibility of coordinating the implementation of environmental quality policies and abolish existing Environmental Quality Council and Citizens Advisory Committee; and 8) establish a legislative commission to further study alternative administrative structures before legitimizing or changing existing organizational arrangements. The strongest support was for alternative 3; there was no support for alternatives 5, 6 and 8. There was appreciable support for alternatives 2, 4 and 7 and little support for alternative 1.

The adoption of the establishment of an Environmental Council and an Environmental Quality Commission is recommended as set forth in the State Environmental Policy Act bill which was jointly recommended for passage by the House Environmental Preservation Committee, Subcommittee on Environmental Policy and Organization and the Senate Civil Administration Committee, Subcommittee on Department of Natural Resources on November 30, 1972, with the following changes or additions in the structure, duties and functions of the Environmental Council: 1) The Council should be specifically charged with the function of resolving conflicts in policies and actions among State agencies; 2) Rather than an immediate and massive reorganization of State governmental agencies or the creation of a super agency or department, the Environmental Council should be specifically charged with reviewing the statutory authority and administration structure of existing agencies dealing with environmental quality, and to report to the Governor by July 1, 1974, and in preparing such a report, making such recommendations as it deems advisable to improve environmental administration.



### PRIORITY OF RECOMMENDATIONS

The Committee realizes that economic factors and labor concerns must be given due consideration in assigning priorities to its recommendations, and that it may be impossible to implement all recommendations during the 1973 session of the Legislature. The highest priority is assigned to the enactment of a State Environmental Policy and the creation of an Environmental Council and an Environmental Quality Commission. It is most important that all recommendations be considered in context with a State Environmental Policy, and that undue attention is not focused on sub-policies. Effective remedies for minimizing economic impacts associated with recommendations should be established before any legislative action is taken. The priorities of 40 recommendations other than the State Environmental Policy and associated Institutional arrangements recommendations are given below.

#### High Priority

Further debate in Minnesota concerning population, economic and technology growth should be encouraged so that the consequences and causes of alternative decisions and policies can be better known and understood by the public and its government. In addition to the traditional forums of legislative hearings, citizen commissions and agency procedures, the State should establish or facilitate a formal organization or system to accomplish the above objectives.

The State should define, inventory, and delineate environmentally sensitive areas - such as areas surrounding the Boundary Waters Canoe Area and the Voyageurs National Park, North Shore of Lake Superior, Lower St. Croix River Valley, parts of the Mississippi and Minnesota River Valleys, and unique wildlife sanctuaries likely to be in the path of the 'Twin Cities' urban expansion and pending preparation of land-use plans, declare moratoriums on commercial, industrial and highway development in these areas.

The State should adopt, as part of an energy policy, a goal of thrift in the use of electric power. That goal should be reflected in State policy to maximize the use of energy efficient systems for the production and utilization of energy, and to minimize the environmental impact from energy production and use. Comprehensive planning should be pursued to minimize the intrusions of transmission lines upon the landscape of Minnesota. A state-wide electric energy plan should be prepared by the State as an integral part of a statewide land use plan.

The State should establish review procedures to formalize the bulk power facilities certification process. An authority should be established in Minnesota to institutionalize, in government, a process for selecting power plant sites. Further, an authority should have the responsibility and duty to critically examine the need for each electrical generating facility, including an examination of alternatives to any facility of a system that is proposed, and to select sites for the proposed construction.



Legislation should be passed which encourages and fosters mass transit programs.

The recommendations of the Groundwater Subcommittee, Citizens Advisory Committee, Governor's Environmental Quality Council, should be implemented immediately.

The State Legislature should consider legislation for a statewide land-use plan.

The State should establish a groundwater quality monitoring system in connection with solid waste disposal practices.

The State should conduct a comprehensive review and analysis of Federal, State and local rules of law with the objective of identifying and remedying deficiencies of rules of law in coping with environmental problems in Minnesota.

The State should review existing specific policy statements as a whole body and eliminate inconsistencies and deficiencies in light of a State environmental policy. In addition, the State should review rules and regulations as a whole body and eliminate inconsistencies and deficiencies in light of a State environmental policy.

An Environmental Bill of Rights should be added to the State Constitution by amendment.

The State should develop a coordinated program of tax incentives, subsidies and purchases to make wetland preservation and restoration economically feasible to land owners.

The State should determine the amount of wetland acreage that must be preserved, identify these areas, and provide for their permanent protection.

A moratorium on the construction of new nuclear power plants in Minnesota should be established. The Moratorium should be of indefinite duration, under appropriate legislative standards, until undue risks have been eliminated and new development can safely begin.

The Pollution Control Agency needs greater legal strength and more funds for legal, administrative and technical staff and monitoring equipment and staff.

The magnitude and composition of the demand for copper and nickel have not been fully analyzed nor have the assumptions underlying the current demand forecasts been adequately examined. The State should examine fully the demand for copper and nickel as a part of its review of the copper-nickel situation in the State.

Full and open committee hearings should be held on the proposed Great River Road bill, both in Washington and in the states. An environmental impact statement should be prepared, pursuant to section 102c of the National Environmental Policy Act of 1969, on

the proposed national scenic and recreational highway program, of which the Great River Road is considered to be a prototype for the program.

The definition of public waters should be expanded to include wetlands which are of substantial benefit for wildlife habitat, flood control, erosion control and water quality. In addition, the State should be directed to develop standards and criteria governing the establishment and improvement of drainage systems, whether or not they involve State waters.

The protection of rare and endangered species of plants, wildlife and fish through the acquisition of lands or regulation of the take should be considered a part of any natural area preservation program, and particular attention should be directed to the timber wolf, greater prairie chicken, lynx, bob cat, greater sandhill crane, bald eagle, and osprey.

Long-range plans should be prepared by the State for protection of valuable recreational rivers against intrusions and to complement the proposed nationwide scenic and wild river system with appropriate legislation.

The State should prepare a report summarizing the pros and cons of possible viable solutions to emerging water supply problems in the Twin Cities area and recommending an optimum solution. The State should prepare a report summarizing the pros and cons of possible solutions to emerging water supply problems in the Iron Range area and recommending an optimum solution.

#### Medium Priority

The Pollution Control Agency needs more legal "clout" to be truly effective in abating air pollution. The agency should be given civil law powers and misdemeanor fines should be increased to a maximum of \$10,000 per day.

The State policy to encourage mineral development should be reviewed, and a moratorium should be declared on copper-nickel development (but not on further exploration and surveys) until such time as the review of policy is completed, and the State is satisfied that it is fully equipped to deal with the ramifications of a new mining industry, and the State has adopted a comprehensive land-use policy.

Legislation should be passed which will be more effective in assuring reclamation of mined land. In order to assure compliance with the mined land reclamation law, it should provide for mandatory posting of bonds by all mine operators in an amount sufficient to assure complete reclamation.

The State should be required to develop standards and criteria governing the establishment and improvement of drainage systems as they affect lakes, wetlands, wildlife lands and related natural resources erosion and flood control by January 1, 1974.



The environmental impacts of the State Highway "Backbone" plan should be given additional consideration, and waterborne transportation plans of Federal-State planning organizations should be carefully reviewed in light of comprehensive transportation plans and environmental concerns.

The article of the Minnesota Constitution requiring that highway user funds be spent for "highway purposes" should be repealed.

The State should examine the economic and environmental implications of proposals to reduce air pollution from the motor vehicle and actively support a program that is deemed appropriate.

The Experimental City Authority in its studies should give due consideration to the impact of an experimental city on the ecology and the general quality of life in the vicinity of selected sites.

A statewide wild and scenic rivers law should be enacted.

In order to fulfill the mandate of the Legislature and to serve Minnesota's environmental information needs fully, the Environmental Conservation Library should have continuing public funding.

The State should prepare alternative plans stressing flood plain (rural and urban) zoning and local protection works and discouraging additional flood plain development.

Legislation should be enacted to: require a deposit on all non-returnable beverage containers to encourage reuse and avoid litter; standardize the size, shape and color of all beer and soft drink containers to promote recycling and reuse; ban all aluminum cans and cans with aluminum tops; and establish regulations on product design to aid recyclability.

#### Low Priority

The State should provide financial incentives to assist local governments in closing open dumps.

The Legislature should give due attention to the recommendations of Project 80.

Because the aerosol represents a highly energy consumptive package, a health hazard, an explosive hazard, and a package that cannot be recycled, its use should be severely restricted.

The State should prohibit the sale and manufacture of aluminum containers in the State, excluding frozen dinner trays for which no feasible alternative currently exists.

The Pollution Control Agency should be directed to prepare annually a statewide noise quality report and that agency should be provided with adequate manpower and financial resources to properly monitor noise pollution and its abatement.

Authorization should be provided by the Legislature to provide funds in those cases where construction of pollution control devices for feedlots would cause undue hardship, even with Federal funds available.

The State should conduct a feasibility study on flood plain management through an amortization program that includes a consideration of tax credits and life tenancy rights.



### ACKNOWLEDGMENTS

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