

CHAPTER 6

NATURAL RESOURCES AND THE ENVIRONMENT

INTRODUCTION

Few locations within the State of Michigan, or the United States as a whole, are so rich in the quality and variety of natural resources as the Leelanau Peninsula. These resources range from the most common, including summer air breezes and abundant high quality water resources, to more unique and sensitive resources, such as world class dunes, extensive wetlands, rolling hillsides, woodlands, special flora and fauna, and more. (See Working Paper #9 for more background information.)

The natural resources of the peninsula are vitally important in providing a strong and healthy environment. The quantity and quality of natural resources throughout the peninsula are the fundamental reasons for living on the peninsula. Also, they are critically important to the economy as its tourist industry thrives upon the peninsula's natural landscape.

Future growth and development will place increasing pressures upon the quantity, integrity and solitude of the peninsula's natural resources. If the current resources are to be protected for future generations, and yet still be "utilized" for economic benefit, purposeful actions must be taken to assure a healthy balance between growth, development, and the peninsula's natural environment. The **Leelanau General Plan** recognizes that a healthy sustainable economy depends upon a healthy environment. The plan further recognizes that maintaining environmental quality and improving the local economy need not be conflicting objectives, and are in fact, mutually reinforcing.

ISSUES

The principal issues related to natural resources and the environment include:

- air quality
- water quality
- groundwater quality
- woodland and hillside development

- protection of sensitive natural features
- farmland protection
- wildlife protection

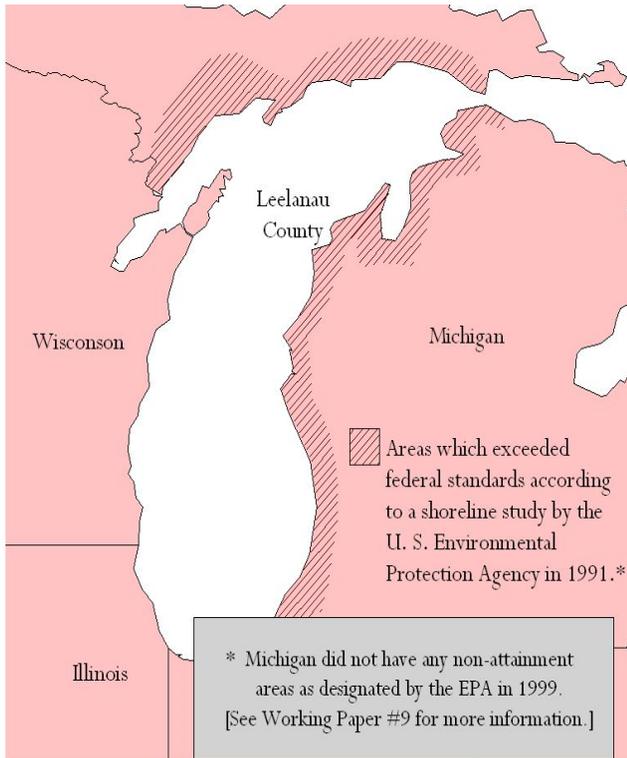
Air Quality

Air quality on the peninsula is quite high, but it is lower than it used to be. This is largely due to ozone pollution. Ozone is a gas formed when certain vehicular and industrial pollutants react in the presence of heat and sunlight. The ozone gas is an irritant and causes respiratory problems in humans. Evidence suggests that it is industrial activities from outside of Michigan which pose the greatest ozone threats. Major concentrations of smog (which heighten ozone levels) cross Lake Michigan from the Greater Chicago Area. See Map 6-1. The regional impacts of air pollutants is further accentuated by the fact that data gathered on Beaver Island shows a nine year average rain pH of 4.2; any-



Sleeping Bear Dunes

**Map 6-1
Ozone Air Quality Standard Exceeded**



MAP FOR REFERENCE PURPOSES ONLY
Information taken from Working Paper #9
Prepared by the Leelanau County Planning Department, Fall 1999

thing less than 5.6 is considered "acid rain." Long term exposure to acid rain has the potential to damage trees and aquatic life.

While future state and federal environmental regulations may assist in the control of smog conditions, air quality on the peninsula could decline by locally generated air pollutants. For example, future growth and development will increase the number of vehicles along the roadways, particularly in and near Traverse City.

Trends and conditions suggest the need for an expanded monitoring system and a regional approach to air quality management. If this is started while air quality is still good, greater options will be available to prevent future degradation. Eventually it may be necessary to base future land use decisions, in part, upon the regional implications of such decisions and upon an appreciation of the sensitive dynamics between land use, air quality, and impacts felt both locally and many miles away. The

federal Clean Air Act is already requiring this in metropolitan areas.

Water Quality

Eight percent of the peninsula's surface cover consists of inland lakes. There are more than eight inland lakes of 175 acres or more in size, the largest being South Lake Leelanau covering nearly 5,400 acres. Seven of the peninsula's largest lakes are classified as oligotrophic, the highest of three lake quality classifications related to water biological productivity. Though the quality of the lakes is generally high, current conditions pose serious challenges to the maintenance of this quality level. Development along inland lake shorelines largely relies on private septic systems for sewage disposal. Dysfunctional systems, as a result of improper location, construction, operation, or maintenance, increases septic effluent leaching directly into area water bodies and decreases water quality. The use of fertilizers and pesticides, from both residential and agricultural land, further challenges the long term quality of the peninsula's inland lakes. Improperly managed construction activities and inappropriate land development locations encourage erosion and sedimentation of the lakes.

Seven of the peninsula's largest lakes are classified as oligotrophic, the highest of three lake quality classifications related to water biological productivity.

More than two dozen creeks and rivers assist in collecting stormwater runoff and carrying it to inland lakes as well as to Lake Michigan and Grand Traverse Bay. These creeks and rivers reflect a far wider quality range than do the lakes of the peninsula, though it can be said that the rivers and streams are of relatively very high quality. With two small exceptions, all water courses in the peninsula are designated trout streams, an indication of their high water quality level. There are, however, portions of major water courses, including Houdek Creek, which are currently showing the negative impacts of land use and development activities. Sedimentation and agricultural chemicals are principal threats facing streams today. Best management practices to minimize the

negative impacts of stormwater runoff are needed. Additional monitoring is also needed.

All water courses in the peninsula are designated trout streams, an indication of their high water quality level.

Groundwater Quality

Groundwater is the unseen water resource and one which nearly the entire peninsula is dependent upon for potable water. This reliance for basic human health rests on a fragile resource at best. Approximately 60% of the mainland portion of the peninsula rests upon "sensitive" aquifers. These underground water resources are overlain by highly permeable soils and thus easily susceptible to contaminants leaching down from the land surface (septic system leachate, petroleum spills, other hazardous spills, etc.). See Map 6-2. Even those aquifers which are somewhat better protected by being situated below low permeable clay soils or rock are vulnerable to contamination if adjacent aquifers become contaminated as underground water often flows freely between aquifers. Currently, there are 42 state designated "201 sites" on the peninsula where serious surface and groundwater contamination has been discovered. A 201 site is a single location within a list of surface and groundwater contamination sites in Michigan, as annually published by the Michigan Department of Environmental Quality (DEQ). One of the sites, the former Grand Traverse Overall Supply, is included in the Environmental Protection Agency's National Priorities List, which identifies the contaminated sites that are most dangerous to human health. New sites are being discovered yearly throughout Michigan. While attention is being focused on uncovering and cleaning up contaminated sites on the peninsula, it is equally important that steps be taken to prevent the creation of new contamination sites.

If current trends continue, future growth and development on the peninsula will further jeopardize groundwater and surface water resources. The lack of uniform stormwater management techniques to control erosion and

sedimentation leads to further degradation of lakes and streams as does the practice of inappropriate application of fertilizers and pesticides. The lack of a comprehensive septic system monitoring and of an improvement program continues to allow inadequately treated human waste to enter the peninsula's lakes and groundwater resources. In most areas, the lack of a well established monitoring program to provide baseline data and benchmarks of current water quality conditions makes future water quality data that much more difficult to decipher. The collection and compilation of well records and other water quality data into the county's GIS system will be a major step forward.

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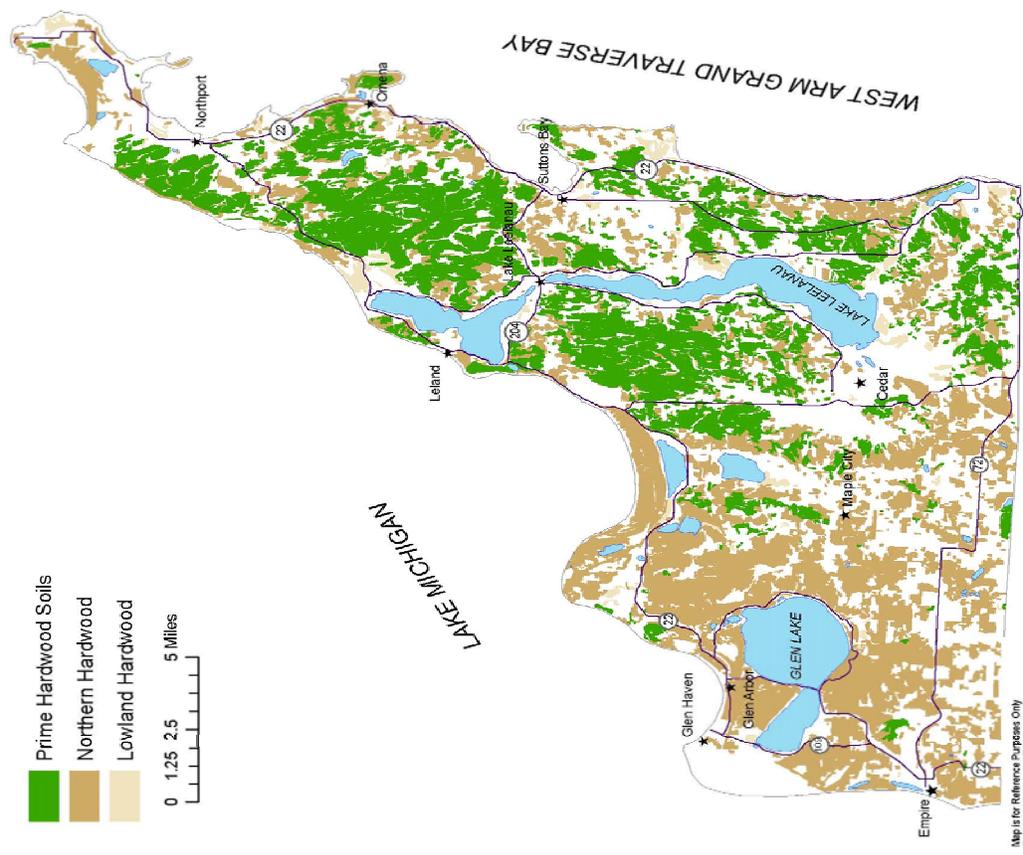
Woodlands and Hillsides

Woodlands and hillsides are abundant natural resources throughout the peninsula. Shaping the rural character of the peninsula, woodland stands are often found covering the peninsula's rolling terrain. See Maps 6-3 and 6-4. The hillsides, at times in combination with the woodlands, are the focus of many dramatic vistas and define many of the visual corridors throughout the peninsula. The woodlands provide habitats for much of the peninsula's animal and plant life and provide economic returns through harvesting and regeneration. These resources will also become increasingly threatened as growth and development continue. Market conditions and consumer preferences often make woodlands and hillsides attractive home sites. As increased residential development occurs, incremental encroachment upon the hillsides and woodlands can be anticipated. At present only very limited county and local programs effectively preserve the functional and aesthetic values of these resources.

Sensitive Natural Features

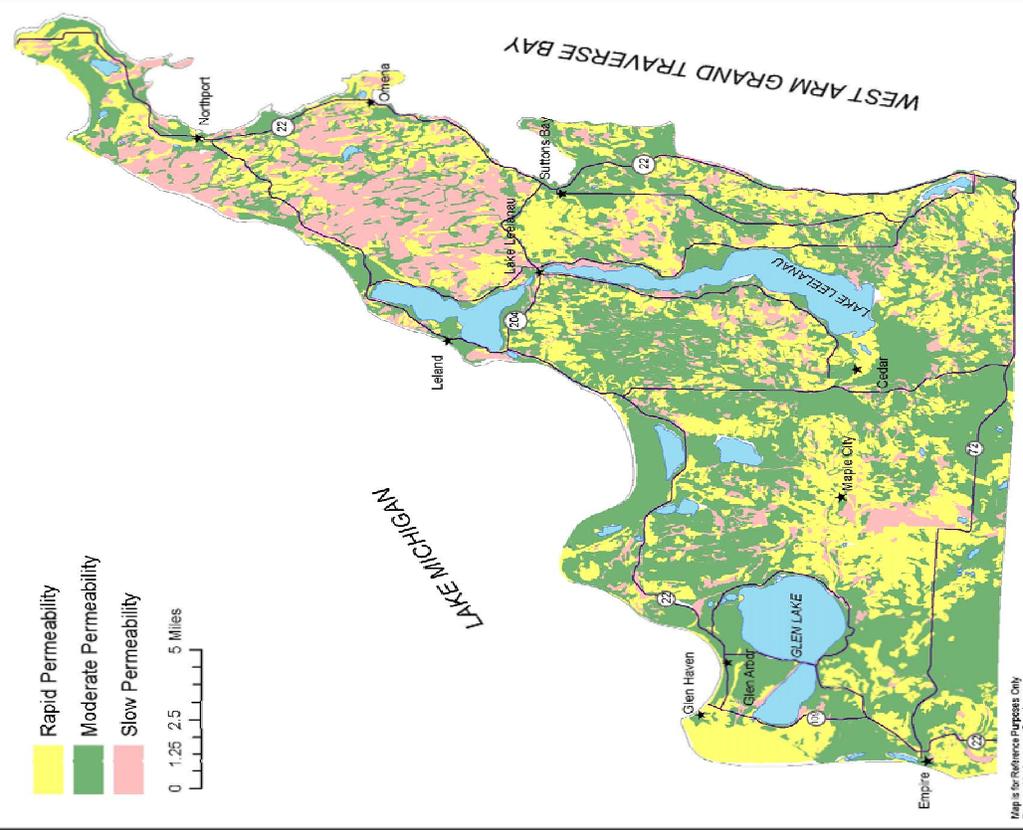
The abundance of the peninsula's more common resources, including clean air, water, woodlands, and hillsides, is nearly matched by

Map 6-3
Prime Hardwood Forestlands
Prime Hardwood Soils



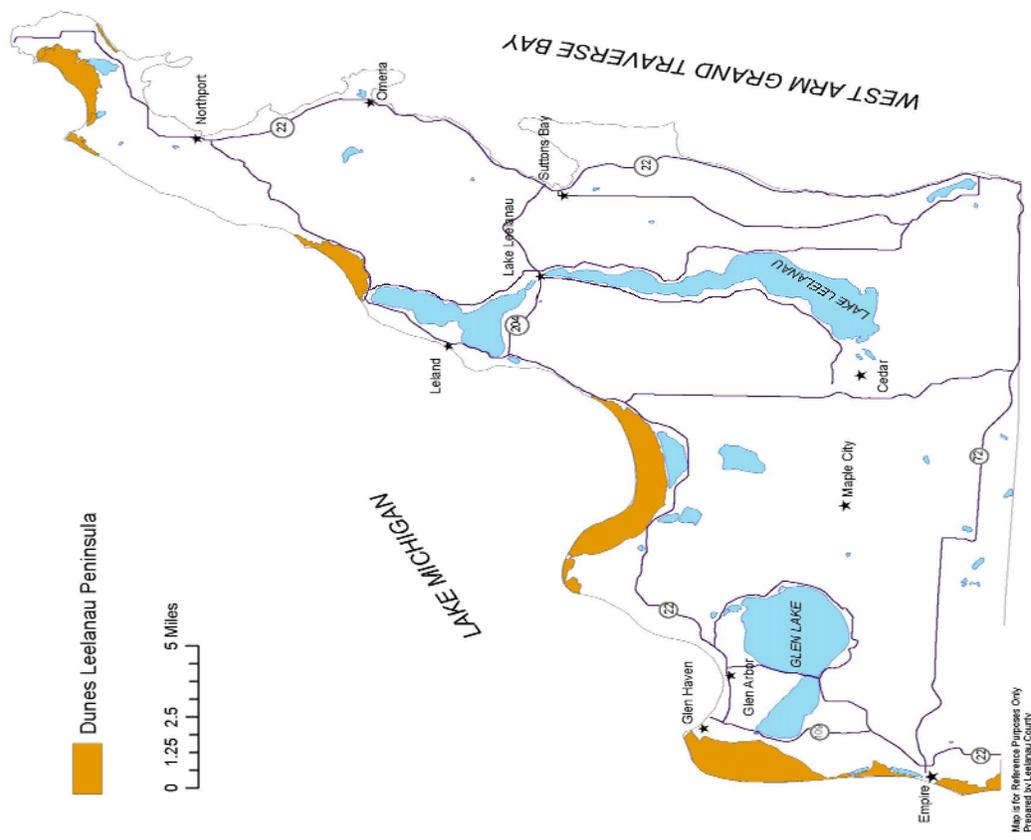
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Map 6-2
Soil Permeability

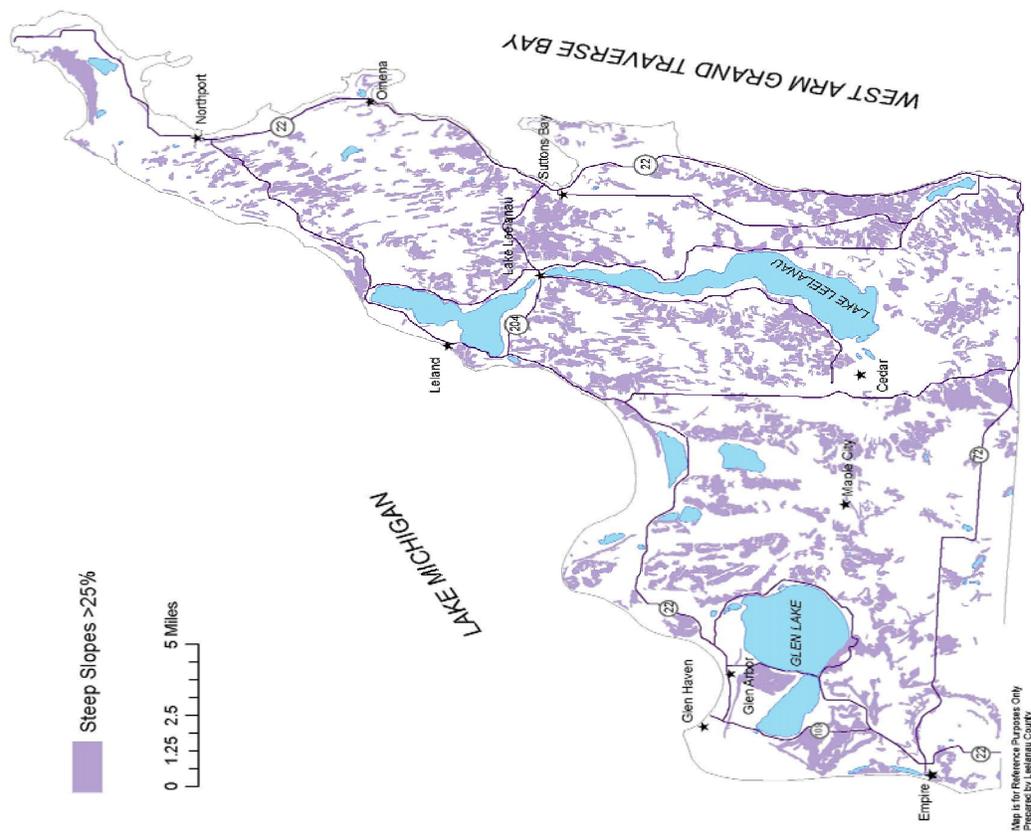


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**Map 6-5
Critical Dunes**



**Map 6-4
Steep Slopes**



abundant sensitive environmental resources. Floodplain areas provide for the retention of runoff associated with heavier rains. In accommodating periodic heavy runoff flows, the floodplains of the peninsula support special plant and animal ecosystems dependent upon the floodplain environment. While floodplain areas on the peninsula are few due to the limited number of major rivers, abundant lake waters, and the sandy soils, they are particularly vulnerable to changes in land use.

Wetlands include marshes, swamps, and other usually low areas between dry land and open water. Wetlands provide a multitude of vital benefits. They serve as filters which minimize the amount of organic materials and sediments discharged into streams and lakes while at the same time they retain stormwater runoff and limit flood impacts. Wetlands also provide ideal habitat for wildlife and are vital links in the peninsula's overall ecosystem. The sensitivity of this resource is perhaps best illustrated by the fact that even minor changes in the water levels of marshes, swamps, and other wetland environments can dramatically impact the quality of the wetland resources and their long term viability.

Lake Michigan shorelines (including Grand Traverse Bay) and dunes are also sensitive and unique environmental resources. See Map 6-5. Seemingly endless shorelines and monumental dunal formations epitomize the grandeur of the area. While these resources serve as critical components of the peninsula's tourism and recreation industry, they are particularly vulnerable to wind and wave action, as well as to any land use and development activities which disturb the stability of the dunes. The clearing of vegetation along the shorelines and dunes seriously increases their susceptibility to erosion, shifting, and demise. Disturbance of their natural character by land use activities heightens their vulnerability to winds and waves, and other climatic forces. Many of the peninsula's shoreline areas and dunal formations are considered "high risk erosion areas." See Map 6-6. The significance of these shoreline areas is highlighted by their inclusion for protection under the Michigan Natural Resources Act (Act 451). This Act serves to protect designated "critical dune areas", including Sleeping Bear Dunes and the Empire Bluffs as well as less prominent dune areas.

The Lake Michigan shoreline and dunal formations harbor yet another sensitive environmental resource - threatened and endangered plant and animal species. Inventories by the Michigan Department of Natural Resources have identified numerous unique plant and animal species on the Peninsula which rely largely upon shoreline and dune areas for their survival. Other threatened species which rely upon a more inland environment have also been identified. The fact that these plant and animal species are already considered unique due to their threatened survival emphasizes the need to prevent disturbances in the ecosystem in which they thrive.

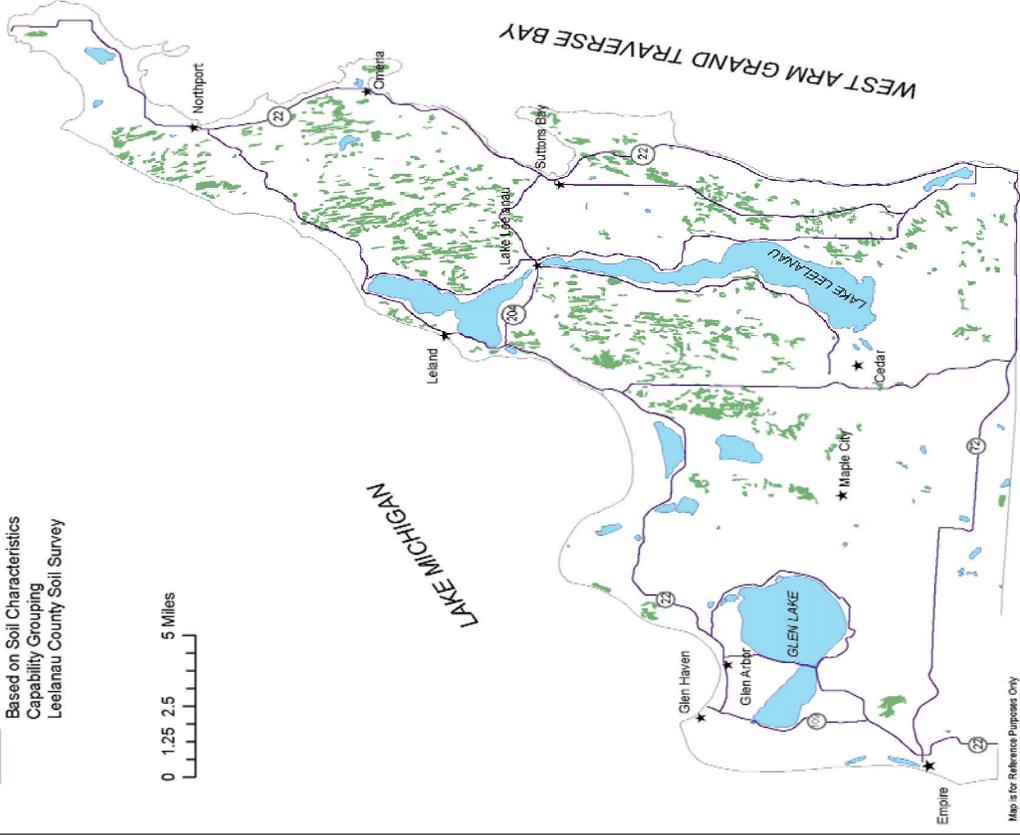
Shorelines of inland lakes are also sensitive natural resources. The calmer waters and areas of interface between the land and water are particularly important habitats for wildlife and plant life. Understandably, these areas are also actively sought for development and recreational use. The resulting threat to these environments through soil erosion and sedimentation, disturbance of the natural shoreline and vegetation, and leachate from faulty septic systems is a concern today and will become more significant as the peninsula population grows.

Reliance upon state and federal regulatory programs may not be adequate to assure the integrity of the peninsula's sensitive environmental resources.

The incremental consumption of land for residential and other intensive land uses can be expected to encroach directly upon the Peninsula's natural resources or the ecosystems within which these resources are found. Reliance upon state and federal regulatory programs may not be adequate to assure the integrity of the peninsula's sensitive environmental resources. While local programs have been put in place to help protect the quality of the Peninsula's sensitive natural resources, local governments and other organizations still encounter difficulty in evaluating conditions and effectively enforcing regulations. The lack of resource base-line data, monitoring, and evaluation of the effectiveness of protection

Map 6-7 Cropland Suitability

Land best suited for field crops
Based on Soil Characteristics
Capability Grouping
Leelanau County Soil Survey

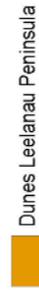


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Map 6-6 High Risk Erosion Areas



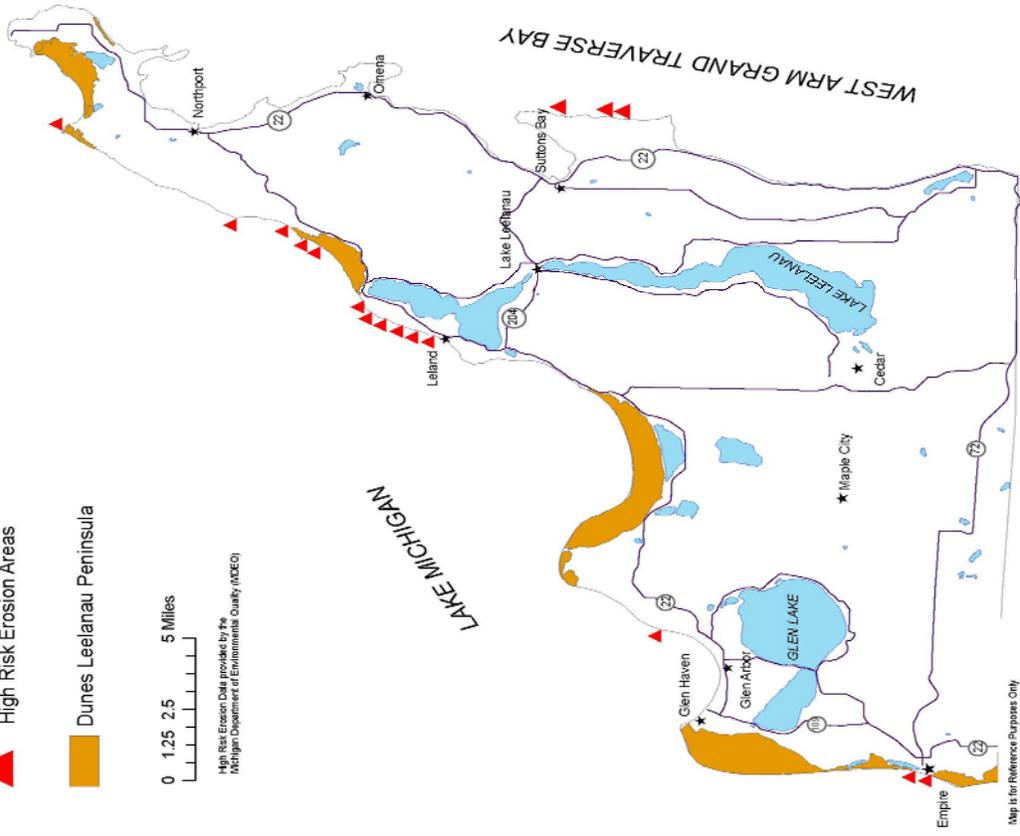
High Risk Erosion Areas



Dunes Leelanau Peninsula



High Risk Erosion Data provided by the
Michigan Department of Environmental Quality (MDEQ)



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programs prevents wise future decisions regarding natural resource management initiatives and policies. At particular risk are the sensitive environmental areas at the edge of the extensive peninsula acreage in public ownership including the Sleeping Bear Dunes National Lakeshore, Leelanau State Park, and Pere Marquette State Forest.

While local programs have been put in place to help protect the quality of the Peninsula's sensitive natural resources, local governments and other organizations still encounter difficulty in evaluating conditions and effectively enforcing regulations.

Farmland

Farmland is a special natural resource of the peninsula. See Map 6-7. Orchards are the dominant land cover. See Map 6-8. They contribute greatly to the economic well being of the peninsula as well as to its beauty and pastoral character. As important as this renewable natural resource is, there has been a decline in the number of acres devoted to farming over the past several decades. Typically, once farmland is converted to another use, it rarely reverts to agriculture. Fragmentation of farmland through the splitting of large farmland parcels for residential use resulted in farmland loss as much or more than the farmland converted to actual residences, yards, and roads. The increasingly dispersed settlement pattern across the peninsula is the reason why this irreplaceable resource is being chipped away. (See Working Papers #5 and #10). Map 6-9 shows the location of all new residences constructed in the county from 1990-2000 overlain on a farmland base map (composite of maps 6-7 and 6-8).

Under present conditions, this pattern can be expected to continue. We must acknowledge the conflicts which will arise when farmers and other large landowners try to "capitalize" on development potential by subdividing. For many, this land is their retirement plan, and farming has not been very profitable in recent years. However, if most of the farmland and open space in Leelanau County are converted

to residential use (as current trends illustrate), much of the scenic beauty of the Peninsula will be lost for existing residents and tourists. The maps prepared as a part of this **General Plan**, can be used to help establish the basis for a realistic and defensible farmland protection program.

A FRAMEWORK FOR FUTURE POLICY

Trends and current conditions negatively affecting the peninsula's natural resources have resulted from the lack of a focused resource protection program throughout the peninsula. Residents are realizing that the resources are critical to their future welfare, and they are recognizing the immediate need for a more responsible approach to resource protection. The **Leelanau General Plan** recognizes the critical link between economic, social, and healthful well-being and protection of its natural resources. The plan seeks to establish a far more proactive approach, recognizing that long term protection must originate from a purposeful, strategic, and comprehensive conservation program.

The future of the peninsula depends on how its people manage its abundant natural resources.

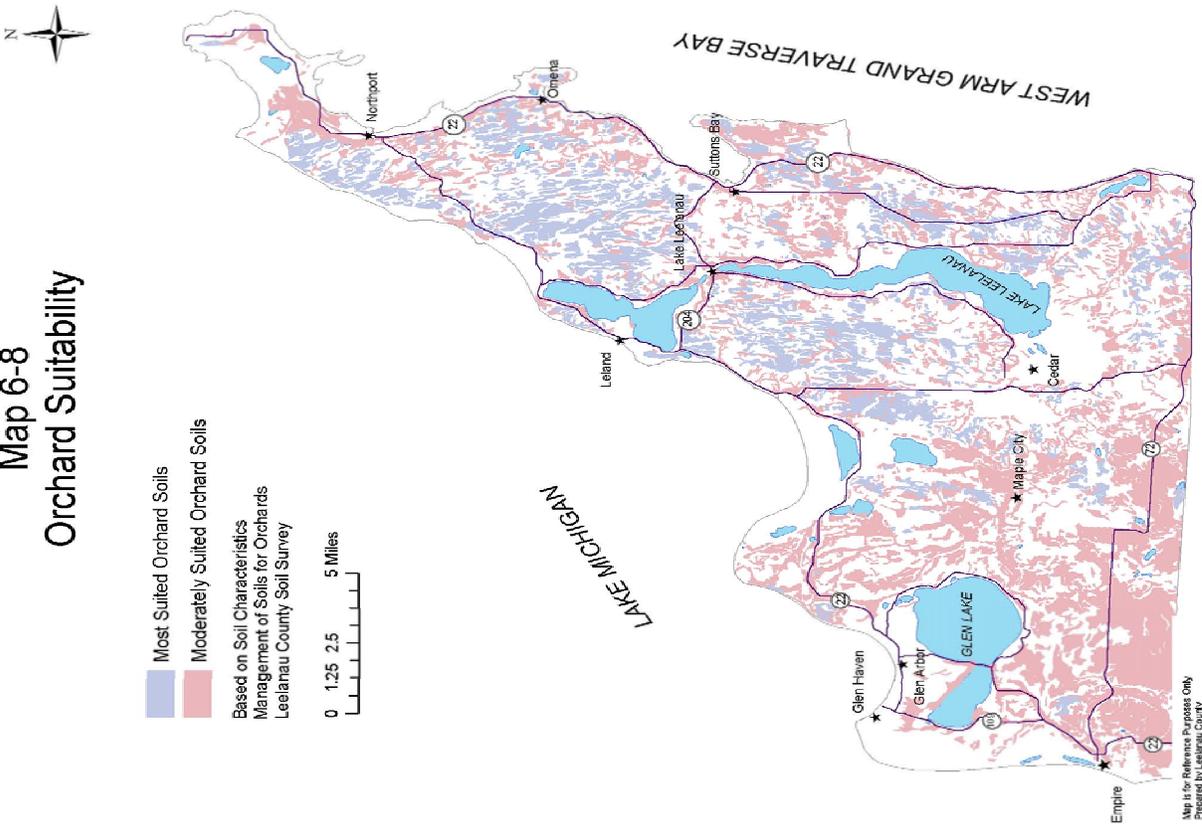
At the heart of this program is the adoption of a land and water stewardship ethic by all populations of the peninsula including local government officials, residents, real estate brokers, farmers, students, and land developers. The future of the peninsula depends on how its people manage its abundant natural resources. The widespread adoption of a land and water stewardship ethic requires broad public understanding of the dynamics of ecosystems, the relationship and impacts between natural resources and land use, and the peninsula's economy as it relates to the natural environment. This understanding must be strengthened by continued research and evaluation of the dynamic relationships between environmental costs and economic gains.

The **General Plan** recognizes that the quality of a single natural resource may vary across a township, and that the plan must respect the

Map 6-8 Orchard Suitability

Most Suited Orchard Soils
 Moderately Suited Orchard Soils
 Based on Soil Characteristics
 Management of Soils for Orchards
 Leelanau County Soil Survey

0 1.25 2.5 5 Miles

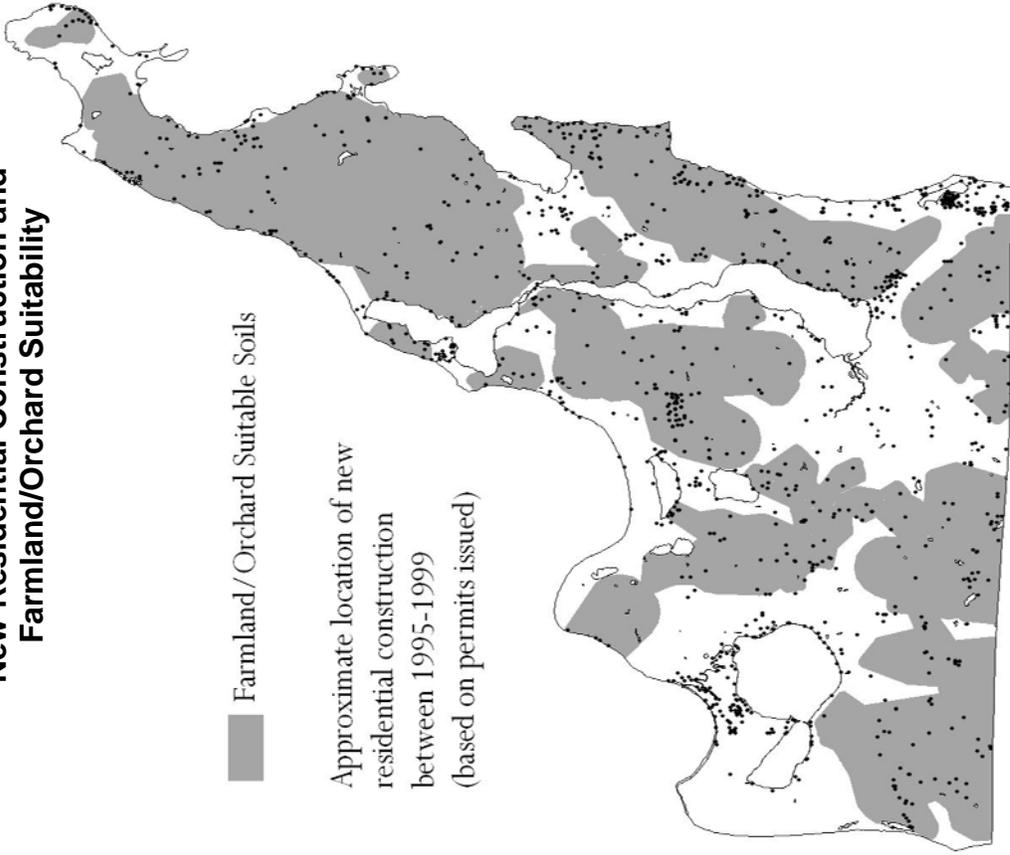


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 Prepared by Leelanau County
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Map 6-9 New Residential Construction and Farmland/Orchard Suitability

Farmland/Orchard Suitable Soils

Approximate location of new
 residential construction
 between 1995-1999
 (based on permits issued)



MAP FOR REFERENCE PURPOSES ONLY
 Data from Leelanau County Inspections
 and County Soil Survey
 Prepared by Leelanau County Planning Department, 1999

practical opportunities and constraints associated with resources of varying values. To this end, the plan calls for the identification of those resource areas of the peninsula which are characterized by particularly high productivity and provide the basis for long term economic viability and protection. This is especially applicable to prime agricultural (and especially orchard) lands, but should also be extended to include forestlands, mineral deposits, and other resources of economic and natural ecosystems importance.

These and other resource areas such as wetlands, dunes, shorelands, and wildlife corridors must be provided with increased protection through better coordinated local stewardship. This stewardship should be implemented through a number of strategic initiatives including: 1) preparation of model ordinances for local environmental protection, including development of environmental overlay zoning districts and anti-land fragmentation provisions; 2) inclusion of flexible site design standards within local zoning ordinances to permit increased preservation of natural resources while still meeting the intent of the ordinances; 3) development of incentive programs for landowners to protect sensitive and productive natural resources; and 4) support for statewide legislation to provide for the use of purchase and transfer of development rights (TDR). TDR permits landowners of special resources the mechanism to sell their development rights to another landowner located outside of a special resource area thereby capturing the development value of the land without converting it to another use. This stewardship should in-

clude special programs for the responsible management of resources for economic use including agriculture, timber harvesting, fishing and fisheries, solar and wind access, and mineral extraction. The development guidelines in the **New Designs for Growth** Guidebook should be widely followed.

Large and contiguous open spaces should be recognized for their multi-functional values, including wildlife habitats and rural vistas, and be afforded the same protection emphasis as the peninsula's more sensitive resources. This is not to suggest no development should occur in these areas, but that it is more desirable that it be designed to relate to, rather than against nature.

The stewardship ethic should extend to the protection of the peninsula's air and water resources, through continuous air, groundwater and surface water quality monitoring, establishment of base line data and benchmarks, and long term management initiatives, including a peninsula-wide water quality protection program. This program should include specific provisions to assure the adequacy of existing and future private septic systems and wells and standards for underground storage tank operations and activities. All agencies with an interest in the quality of these resources should be included in the development and implementation of the program.

The **General Plan** recognizes that these and other related natural resource protection initiatives would naturally occur within a framework of interjurisdictional coordination and cooperation to assure that the initiatives are peninsula-wide, that they achieve a heightened level of consistency across the peninsula, and that permitting processes are streamlined among the various levels of government.

NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION OBJECTIVES AND ACTION STATEMENTS

The following objectives and action statements are intended to establish the blueprint of the **General Plan's** vision for sustaining the peninsula's natural resources. It should be noted here, as throughout, that the positions taken in the following policy and action statements were supplied directly by the citizens of



Lake Leelanau Narrows

the county and not drawn up by a single board, however representative and concerned.

VISION: The vision of this General Plan regarding the counties Natural Resources and Environment is to include such goals, objectives and actions that will result, to the greatest extent possible, in the protection of air and water quality, the protection of Farmlands and open spaces, and the protection of environmentally sensitive areas that maintain and enhance the rural and scenic character of the County for current and future generations.

Goal:

To Balance long-term economic gain and environmental protection concerns in county and local government policies and programs.

Objective:

County and local policies and programs should be drafted toward ensuring environmental protection while encouraging appropriate local economic development.

Action Statement:

County and local policy-makers shall document both the environmental and economic effects of policies under consideration.

Goal: To protect air and water quality

Objective:

County and local governments should initiate proactive measures to monitor and protect air, groundwater, and surface waters.

Action Statement:

Use relevant air and water quality data to establish benchmark standards in Leelanau County. Such standards shall serve as a reference against which future data will be evaluated.

Action Statement:

Continue to maintain and update a well log and septic system database as part of the GIS system.

Action Statement:

Adopt programs and regulations to ensure safer and more effective on-site sewage disposal and potable water.

Action Statement:

Establish a countywide Water Quality Strategy Plan.

Action Statement:

Provide GIS and other relevant data to local governments and lake associations in the development of watershed management plans as the first step to prioritizing efforts to protect water quality of inland lakes and streams.

Action Statement:

County government should provide model ordinances for local governments to adopt to protect air and water quality such as lake access and road end access.

Action Statement:

Encourage township use of the DEQ's "County and State Environmental permits checklist" to ensure environmental issues are adequately considered in the local zoning process.

Objective: On-site sewage disposal and potable water.

Action Statement:

Develop, in concert with other county and local organizations, a program for water quality testing of inland lakes and streams to identify water quality change and the source of any contaminants.

Objective:

To insure an adequate knowledge and information base for County and Local policy makers in areas related to Air and Water Quality.

Action Statement:

Continuously assess, develop and promulgate educational material related to the maintenance of air and water quality.

Goal:

Protect environmentally sensitive areas, including wetlands, dunes, steep slopes, shorelands, and wildlife corridors.

Objective:

To initiate proactive measures to protect and enhance environmentally sensitive areas.

Action Statement:

Distribute information identified on the Geo-

graphic Information System (GIS) for farmland and environmentally sensitive areas, to various county agencies and local governments, and interested parties such as developers and landowners.

Action Statement:

Establish overlay zoning districts for environmentally sensitive areas through the coordinated actions of county and local government. Additionally, encourage use of incentive programs to protect environmentally sensitive areas, as well as areas with significant open space and/or scenic vistas. These incentives programs would include the including acquisition of fee simple or conservation easements by non-profit organizations. The incentive program should place an emphasis on "filling gaps" between existing preservation holdings to increase ownership of contiguous areas.

Action Statement:

Initiate efforts to establish common protective measures for environmentally sensitive areas that fall within multiple jurisdictions.

Action Statement:

Develop and enact model flexible site development standards to minimize topographic changes, reduce the extent of paved areas, and avoid environmentally sensitive areas wherever possible.

Goal:

Protect Farmland and open space protection, including scenic vistas/corridors.

Objective:

Minimize consumption of open space, including scenic vistas and corridors.

Action Statement:

Provide model ordinances for local governments in developing regulations to encourage clustering of new residential development in order to minimize consumption of open space and scenic vistas.

Action Statement:

Provide information and materials to educate citizens and local governments about farmland protection options and prepare model ordinances that protect farmland while permitting farmers to capture the development value of their land.

Action Statement:

Establish future Land Use Plans that focus development in or immediately adjacent to the existing villages.

