CHAPTER 3
NATURAL RESOURCES

Without a doubt the greatest attractions for the residents and visitors to northern Michigan are the area's environment and the rural nature of this portion of the State. Recreational activities such as hunting, fishing, snowmobiling, canoeing and a multitude of other outdoor activities attract people from more urban areas of Michigan and from other states as well. Many long time visitors decide to move to the area upon retirement. Because of the abundant outdoor recreational opportunities, the natural environment is a major economic base and income generator.

At the same time, the environment places constraints upon human activities. Certain critical and sensitive parts of the natural landscape cannot be altered by man without creating problems that are not easily corrected. The filling of wetlands and soil erosion due to the clearing of land for construction are but two examples. It is essential then, that any future development respect the different characteristics of the natural environment. This is important to preserve the attractiveness of this part of the State, prevent potential problems related to undue alteration of the land, and maximize the economic benefits of the tourist and recreation industry.

An analysis of Corwith Township's physical environment can assist local government officials in planning for future land use. Natural resources addressed in this chapter include climate, geology, topography, soils, water, vegetation and wildlife.

Climate

The climate summary describes the general nature of living conditions that affect life's daily activities. Historically, Northern Michigan has offered a climate desired by many visitors and recreational enthusiasts. The moderate summers allow many residents to escape the warmer conditions experienced at locations in Southern Michigan. Winters are generally longer, and the unique location of the Corwith Township area within Northern Michigan allows it to fall within a major snowbelt area. The location of Corwith Township in proximity to the Great Lakes of Michigan provides enhanced snowfall events referred to as lake-effect snowfall. Lake-effect snowfall is caused by cold, arctic air masses traveling across Canada and then passing over the relatively warm Great Lakes. The lower portion of these air masses is quickly warmed and is saturated with moisture creating instability. Soon these air masses form bands of heavy,

localized snowfall, which come ashore. The snowbelts extend further inland in Northern Michigan because of the higher elevations in and around the Corwith Township area forcing air to rise. The further air is forced to rise, the more it must cool. Since cooler air is unable to hold as much moisture, more precipitation is forced to fall over inland areas. Generally speaking, the Great Lakes in Michigan cause the seasons to arrive later than in other areas in the U.S. The Great Lakes tend to cool the air in the spring and early summer, while our fall and early winter tends to be warmed.

It is helpful to know the climate to understand building code requirements, utility depths, planning for growing seasons and energy usage needs.

The Midwest Climate Data Center in Champaign, Illinois has collected weather data from 1960 to 1991 for locations across the central United States. The annual climate summary of the local weather station is summarized in Table 3-1. The climate information was recorded from a station located 11 miles East of Vanderbilt in the Pigeon River Country State Forest in Corwith Township. The average minimum winter temperature is 5.7° F, and the average maximum summer temperature is 77.6° F. Total average annual precipitation measured in liquid water equivalents is 31.06 inches, and the average snowfall is 103.2 inches. The weather service converts snowfall to liquid water in their annual precipitation figures by estimating 17 inches of snow to being equivalent to one inch of liquid water. The National Weather Service Office at Gaylord has the forecast responsibility for the Otsego County area.

The growing season for the area was determined by a 29-year period between 1961 and 1990. According to the Otsego County Soil Survey, 90 percent of the time the season is 117 days with the daily minimum temperature being greater than 28° F. Ninety percent of the time the season was 82 days with the daily minimum temperature being greater than 32° F. The median date of the final frost occurrence in spring (temperature of 30°F) was June 10 and the median date in the fall marking the first occurrence (also 30° F) was September 3.

Table 3-1:
Average Annual Climate Summary
Corwith Township

Average winter minimum temperature	5.7°F
Average winter maximum temperature	26.8°F
Average winter temperature	**16.3°F**
Average summer minimum temperature	47.8°F
Average summer maximum temperature	77.6°F
Average summer temperature	**62.7°F**
Average annual total precipitation	**31.06 inches**
Average annual snowfall **	103.2 inches
Source: Midwestern Climate Center, Champaign Illinois: Recorded data averaged during the years of 1961 through 1990.	

Geology

The geology of Corwith Township, as well as the entire northern lower peninsula of Michigan, will be described in terms of surface geology or quaternary geology (materials deposited by continental glaciers) and bedrock geology (sedimentary rocks underlying the glacial deposits).

The sub-surface geology of Corwith Township is sedimentary bedrock that was laid down during the Mississippian and Upper Devonian ages of the Paleozoic Era. Bedrock is covered by glacial deposits and generally, depending upon the thickness of the glacial deposits, is located at depth from 40 to 500 feet below the surface. The bedrock was formed from ancient seas which covered the area some 250-600 million years ago. The shallow marine seas deposited layers of silt, clay, sediments, marine animals, plants, coral and other calcareous materials. These deposits formed shale, limestone, and dolomite bedrock. In recent years, intensive exploration in Otsego County has resulted in numerous producing oil and natural gas wells. However, the density of wells in Corwith Township is much less than the rest of the County. Limited exploration has occurred in the Pigeon River Country State Forest.

The quaternary geology or surface geology of the Township developed 10,000 to 12,000 years ago through continental glacial activity. Numerous advances and retreats by the glaciers resulted in the locally complex pattern of erosion and deposition. Furthermore, many creeks and wetlands in the Township are associated with the glaciers that once covered this region. Ice blocks embedded within the soils eventually melted and left depressions (kettle holes) which are today's inland lakes and associated wetlands. The surface geology on the west side of I-75 consists primarily of end moraines (linear hilly ridges) of coarse-textured glacial till. This area corresponds with the higher elevations as noted on the topographic map, shown as Figure 2. The surface geology for the rest of the Township is a combination of glacial outwash sand and gravel, occurring on present and abandoned drainageways, and coarse textured glacial till.

Topography

Slope is an important development consideration associated with topographic features. Steep roadway grades, septic field failures, soil erosion and excavation costs are some of the difficulties associated with severe grades. Development in areas with severe slopes and ravines should be restricted. If development is permitted, sensitive site planning should be required along these steep slopes to prevent soil erosion. Generally speaking, the elevation for Northeast Michigan increases slightly in a westerly direction away from Lake Huron and easterly away from Lake Michigan. Figure 2 depicts topographic features for reference.

The highest points in the Township are in the southwest portion west of I-75 where an elevation of 1,476 feet above sea level can be found. The higher points are located on glacial moraines, which are essentially rolling hills rising above the level glacial outwash plains. As can be noted from the surface drainage patterns in the Township, these local area topographic trends of higher to lower elevation converge on the Sturgeon River and Pigeon River, before eventually being discharged into Lake Huron. As would be expected, the lowest elevations (885 feet above sea level) are found along the rivers. Elevations for the remainder of the Township range from approximately 1,100 to 950 feet above sea level.

Hold page for Figure 2 Topographic Map

Soils

One important determinant of land use is the soil's suitability for development. Land uses must correspond to the capacity of the soils on which they occur, and soil suitability for each use should be determined before development occurs. Because all development in Corwith Township relies on individual well and on-site waste disposal systems, soil suitability is an essential consideration prior to development. Development on unsuitable soils may result in improperly functioning septic systems, which may contaminate the groundwater aquifer or surface waters. According to the *Aquifer Vulnerability to Surface Contamination in Michigan Map*, prepared by the Center for Remote Sensing and Department of Geography at Michigan State University, nearly all of Otsego County and the entirety of Corwith Township are identified as “highly permeable soils over highly sensitive drift lithology”. Rapid movement of liquid through these soil particles allows for little or no cleansing of effluent, therefore making the aquifer highly vulnerable to contamination from runoff or malfunctioning septic systems.

A soils map, presented as Figure 3, details hydric or wetland type soils, soils with slopes between five and ten percent, and soils with slopes greater than ten percent. Hydric soils generally are noted along the rivers, creeks and streams. A large hydric soil complex is shown northeast of the Village of Vanderbilt. Steep slope areas are noted on the west side of I-75 and generally correspond to the higher elevations noted on the topographic map. Other sloped areas are found near the Sturgeon River, above the wetland areas directly adjacent to the river.

While soil information presented in this section can be used as a general guide for management of large tracts of undeveloped land, it should not be used for development of specific sites. For specific sites, the Otsego County Soil Survey should be consulted.

Hold page for Figure 3 Soils Map

Water Resources

One of the most valuable natural resources of Corwith Township is water. Both groundwater and surface water are vital resources within the Township. Because there is no central water distribution system, residents must rely upon individual wells for drinking water. As noted in the soils section, the vulnerability of drinking water aquifers to surface contamination is high in the Township due to the highly permeable sandy soils.

Corwith Township is located within the larger system of the Cheboygan River Watershed. The Sturgeon River Sub-watershed is generally on the west half of the Township, the Pigeon River Sub-watershed is the east-central region, and the Black River Sub-watershed is on the far eastern side of the Township. The Sturgeon and Pigeon flow through Burt and Mullet lakes before flowing into Lake Huron through the Cheboygan River. Black River flows through Black Lake on its way to Lake Huron. These rivers are important for recreational activities such as sport fishing and canoeing/kayaking. While there are no large lakes in Corwith Township, several small lakes exist, including Reardon Lake, Fleming Lake, Lake Eighteen, Woodin Lake, Berry Lake, Pickerel Lake, Mud Lake, Grass Lake, Lansing Club Pond, Round Lake and Hardwood Lake.

Surface water resources are noted on the environmental resources map, Figure 4. The combined lake and river surface water resources offer scenic and recreational amenities to Township residents and visitors. It is extremely important that the quality of these surface waters be protected from the negative impacts of development, such as pollution and loss of scenic views to open water. Lakes, rivers and associated wetlands are important for surface drainage, groundwater recharge and wildlife habitat. Alterations to the water features can contribute to flooding, poor water quality, insufficient water supply and loss of valuable wildlife habitat. Corwith Township residents feel the protection of water quality is necessary, as noted in the 2002 Citizen Survey (attached as Appendix A). Nearly 90 percent said good water quality is “very important”.

While the current quality of surface waters in Corwith Township is good, the threat of potential water pollution from point and non-point sources is always a major concern. Proper land use management can help control water quality conditions. Some methods to maintain and improve water quality include: minimizing fertilizer/ pesticide application near surface water, implementation and enforcement of septic system regulations, soil erosion and sedimentation regulations and lake/stream greenbelt regulations.

Hold page for Figure 4, Environmental Resources Map

Wetlands and Woodlands

A wetland is land where water is found, either on the surface or near the surface, at any time during the year. Poorly drained soils and water-loving vegetation also may be present. Wetlands are often referred to as marshes, swamps or bogs. Residents of Michigan are becoming increasingly more aware of the value of wetlands. Beyond their aesthetic value, wetlands protect water quality of lakes and streams by filtering polluting nutrients, organic chemicals and toxic heavy metals. Wetlands are closely related to high groundwater tables and serve to discharge or recharge aquifers. Additionally, wetlands support wildlife, and wetland vegetation protects shorelines from erosion. In the 2002 Citizen Survey, 62 percent of Township respondents felt wetlands were "very important", while nearly 30 percent felt they were "important".

Wetland areas in Corwith Township are typically associated with old glacial outwash plains. Wetland complexes are found adjacent to Club Stream, Stewart Creek, Sturgeon River, Pigeon River and Black River. For reference purposes, wetland areas are mapped on the environmental resources map, Figure 4.

In addition to scenic characteristics, woodlands provide habitat for wildlife and protect the soil from erosion. The Pigeon River Country State Forest land encompasses approximately one-half of Corwith Township or nearly 52 square miles. The State Forest land is located in the eastern two-thirds of the Township. Forested areas are shown on the environmental resources map, Figure 4.

The dominant forest associations in Corwith Township are northern hardwoods, central hardwoods, aspen/birch and pine in the upland areas. Wetland forest species include lowland hardwoods such as black ash, slippery elm and red maple and lowland conifers such as northern white cedar, black spruce and eastern tamarack.

Forests provide the raw materials for a growing number of industries, such as pulpwood, fuel chips, saw logs, firewood, fence posts, cabin logs, Christmas boughs and sap for maple syrup. But, most importantly they provide resources for recreational activities such as hunting, snowmobiling. More than 84 percent of respondents to the 2002 Citizen Survey felt woodland and timber resources were "very important". When asked to list natural features worth preserving, most respondents stated woodlands, forests or Pigeon River County State forest.

Fish and Wildlife

According to the 2002 Citizen Survey, hunting and fishing were the most important recreational activities noted by respondents. The Sturgeon, Pigeon and Black rivers are designated trout streams. The designation means these streams either support resident populations of trout during some part of the year or provide the habitat which could support trout. The DNR supports a state-wide fish stocking program, and have recorded plants of trout in Corwith Township waters.

According to the web site for the fisheries programs of the DNR, fish plants occur regularly each spring at Pickerel Lake with 2,500 to 3,000 rainbow trout fingerlings being planted. Pickerel Lake feeds into the Sturgeon River. Private plants of brook and rainbow trout under DNR permits occur regularly into Club Creek. Other irregular and smaller State plants include brown trout in Ford Lake, brook trout in Lost Lake, brown trout in North Twin Lake, brook trout in Pigeon River, brook trout in Section Four Lake, brown trout in South Twin Lake, brook and rainbow trout in West Lost Lake, and a 1992 steelhead research plant in West Lost Lake.

The forested and wetland regions of the Township provide habitat for several game and non-game species of wildlife common to northern Michigan. Game species found in the Township include white-tailed deer, elk, bobcat, ruffed grouse, woodcock, wild turkey, squirrel, black bear, raccoon, snowshoe hares and cottontail rabbit. The Pigeon River Country State Forest is home to the only resident elk herd east of the Mississippi River. Other non-game species common to the area include fox, woodchuck, beaver, porcupine, opossum, skunk, coyote and waterfowl.

Large deer populations, combined with indiscriminate feeding practices, were contributing factors to the spread of Bovine Tuberculosis (TB) across northern Michigan. TB is a serious disease caused by bacteria attacking the respiratory system. There are three main types of TB: human, avian, and bovine. Human TB is rarely transmitted to non-humans, and avian TB is typically restricted to birds. Bovine TB, also known as 'cattle TB', is the most infectious of the three and is capable of infecting most mammals.

Although the State of Michigan attained Bovine TB accredited-free state status in 1979, it is now thought that during earlier periods of high TB reactor rates there was spillover of Bovine TB from infected cows into Michigan's white-tailed deer population, a result of shared pastures. In 1994, a TB infected deer was killed by a hunter in Alpena County, and in 1998 Bovine TB was confirmed in a beef cow in Alpena County. Between 1995 and 2001 nearly 65,000 deer have been tested in Northeast Michigan with 341 testing positive of having the disease. Although primarily found in hoofed animals and not considered a health risk to humans, humans can and have contracted Bovine TB. The disease has been found in coyotes, raccoons, black bear, bobcat, red fox and opossum, and in captive deer herds as well as beef and dairy cattle.

The effort to eradicate the disease has led to an aggressive TB testing campaign and the creation of a surveillance zone and Deer Management Unit (DMU) 452. Hunters in the surveillance area are asked to submit deer heads for testing. Otsego County is not in DMU 452, and the disease is not prevalent in the County. However, Otsego County is closed to the feeding and baiting of deer. Efforts to eradicate the disease have led to changes in deer feeding rules, deer harvest increases, extension of the number of hunting days, and the banning of new deer or elk farms. As the eradication effort continues, more changes in hunting and feeding rules may occur.

Threatened and Endangered Species

Otsego County is home to a number of plants and animals that are threatened, endangered or are of special concern as identified in Michigan Natural Features Inventory (MNFI) database which is maintained by the Michigan Department of Natural Resources, Wildlife Division, Natural Heritage Program. The following list presents the endangered or threatened plant and animal species of Otsego County, which are protected under the Natural Resources and Environmental Protection Act of the State of Michigan (Part 365 of Public Act 451 of 1994, as amended). This list also includes plant and animal species of special concern. While not afforded legal protection under the act, many of these species are of concern because of declining or relict populations in the State. Should these species continue to decline, they would be recommended for threatened or endangered status. Protection of special concern species before they reach dangerously low population levels would prevent the need to list them in the future by maintaining adequate numbers of self-sustaining populations.

Table 3-2: Otsego County Threatened and Endangered Species

Scientific Name	Common Name	Type	Federal Status*	State Status**
Accipiter gentilis	Northern Goshawk	Bird		SC
Agoseris glauca	Prairie or Pale Agoseris	Vascular Plant		T
Appalachia arcana	Secretive locust	Invertebrate		SC
Appalachina sayanus	Spike-lip Crater	Invertebrate		SC
Atrytonopsis hainna	Dusted Skipper	Invertebrate		T
Botrychium mormo	Goblin Moonwort	Vascular Plant		T
Brachionychaborealis	Boreal Brachionyncha	Invertebrate		SC
Buteo lineatus	Red-shouldered hawk	Bird		T
Cirsium hillii	Hill's thistle	Vascular Plant		SC
Cypripedium arietinum	Ram's head lady's-slipper	Vascular Plant		SC
Dendroica kirtlandi	Kirtland's Warbler	Bird	LE	E
Festuca scabrella	Rough Fescue	Vascular Plant		T
Gavia immer	Common loon	Bird		T
Glyptemys insculpta	Wood Turtle	Reptile		SC
Haliaeetus leucocephalus	Bald eagle	Bird	(PS:LT,PDL)	T
Karst	Geographical feature	Geologic		
Merolonche dolli	Doll's Merolonche	Invertebrate		SC
Moraine	Geographic Feature	Community		
Northern shrub thicket	Wet Scrubland, Upper Midwest	Community		
Pachypolia atricornis	Three-horned Moth	Invertebrate		SC
Papaipema beeriana	Blazing Star Borer	Invertebrate		SC
Pine barrens	Barrens, Upper Midwest	Community		
Potomogeton hilli	Hill's Pondweed	Vascular Plant		T
Prosapia ignipectus	Red-legged Spittlebug	Invertebrate		SC
Prunus alleghaniensis	Alleghany or Sloe Plum	Vascular Plant		SC
Pyrgus wyandot	Grizzled Skipper	Invertebrate		SC
Rich conifer swamp		Community		
Sarracenia purpureau	Yellow Pitcher-plant	Vascular Plant		T

Source: Michigan Natural Feature Inventory, Michigan Department of Natural Resources, Wildlife Division
*LE = Listed endangered, LT = Listed threatened, PDL = Proposed de-list, PS = Partial status (federally listed in only part of its range), C = Species being considered for federal status.
** E = Endangered, T = Threatened, SC = Special concern.

Scenic Features

Approximately 78 percent of the Township's land area is forested. Tree-lined roadways offer short range forested views. Occasional breaks in the forest cover resulting from harvesting operations or natural openings do offer some distant views of the landscape. Glacial moraines on the west side of I-75 have created a rolling topography which is covered with a visually pleasing mix of woodlands and wetlands. These hills and valleys offer some excellent vistas of the pleasant rural forest landscape, especially while driving north on I-75. Pockets of vegetated wetlands and drainageways accent this rural landscape. Due to the predominately forested nature of the Township, views of the creeks, rivers and lakes are limited to road crossings and from residences bordering the waterways. In general, undeveloped forestlands offer a pleasant rural and scenic character appreciated by residents and visitors alike.

Summary

A review of the natural resources in Corwith Township indicates the environment is currently in good shape. However these resources are extremely vulnerable to change. Residents and visitors highly value the natural resources and scenic features of the Township. The environmental features of Township are an important asset to the community and need continued protection.