



Geography and Natural Resources in Ohio

Explore the diversity of Ohio's landscape and settlement, including natural features such as mountains, natural divisions such as rivers, and natural resources such as minerals.

Introduction

Geography is the science concerned with describing natural and man-made features of the earth's surface. It is closely related to geology, which is the study of the earth, its 4.5 billion-year history, and the processes that act upon it. Another closely related scientific field is paleontology, which deals with fossils. Natural resources are materials and capacities supplied by nature that have industrial uses or cultural value. Examples include fossil fuels, minerals, forests, and water.

Ohio's Geography

Ohio occupies 41,330 square miles, making it the 35th largest state in the union. Of that area, 41,004 square miles are land, while 325 are water. Eighty percent of the state's land area drains into the Ohio River, which forms its southern boundary and for which the state was named. The river, in turn, got its name from an Iroquois word meaning beautiful river. The rest of the state watershed drains into Lake Erie, one of the Great Lakes. The main tributaries of the Ohio River are the Muskingum, Hocking, Scioto, Great Miami, and Little Miami Rivers. Bodies that flow into Lake Erie include the Maumee, Sandusky, and Cuyahoga Rivers.

Campbell Hill in Logan County, at an elevation of 1,549 feet above sea level, is the highest point in the state. At the opposite extreme, the Ohio River is the lowest point in the state at an elevation of 455 feet. Five states surround Ohio: Michigan, Pennsylvania, West Virginia, Kentucky, and Indiana. In addition, the Canadian border runs through Lake Erie. Columbus was named the state capital in 1816, the fourth and last city to claim that honor. Chillicothe was the first and third capital city (1803-1809 and 1812-1816) and Zanesville the second (1810-1812). Ohio has 88 counties. Washington County, the first to be formed, was established in 1788, fifteen years before Ohio became a state. The last county to be established, Noble, was formed in 1851.

Major cities include: Akron (Summit County), incorporated in 1865; Canton (Stark County), incorporated in 1854; Cincinnati (Hamilton County), incorporated in 1819; Cleveland (Cuyahoga County), incorporated in 1836; Columbus (Franklin County), incorporated in 1834; Dayton (Montgomery County), incorporated in 1805; Toledo (Lucas County), incorporated in 1837; and Youngstown (Mahoning County), incorporated in 1868.

Ohio's Geology

In the early 19th century, knowledge about Ohio's geology and natural resources was limited. Individuals and corporations made investigations, especially to find valuable commodities such as coal and iron, but their efforts were not coordinated. In 1835, Governor Robert Lucas called for launching a geological survey. Not until a year later, however, did the legislature pass a bill providing for the state's first survey, which was to be accomplished by a state geologist, William Williams Mather, and assistants appointed by the governor. Little was



accomplished by their efforts, as the survey was cut short due to financial difficulties. Government-sponsored exploration and documentation of the state's geology did not resume until 1868, during the term of Governor Rutherford B. Hayes. The founding of Ohio Agricultural and Mechanical College in 1870, renamed the Ohio State University eight years later, also contributed greatly to the advancement of geological study in the state.

Geologic Time

Geologists study the earth for clues about past events by studying layers of rock laid down over the billions of years of its history, which is divided into segments of descending size called eons, eras, periods, epochs, and ages. Three eras make up the Phanerozoic Eon, each characterized by the type of life that dominated.

The Paleozoic Era, known as the age of fishes, began 540 million years ago. It is divided into seven periods based on major disturbances that changed the earth's surface. Those periods are called Cambrian, Ordovician, Silurian, Devonian, Mississippian, Pennsylvanian, and Permian. The age of dinosaurs, the Mesozoic Era, began 245 million years ago. It has three periods: the Triassic, Jurassic, and Cretaceous. Most recent is the Cenozoic Era, the age of mammals, which began 65 million years ago and extends into the present. Divisions of this era are the Tertiary and Quaternary Periods. During each of these segments of geologic time, the earth experienced great changes. Rocks and minerals formed, glaciers advanced and receded, and plants and animals appeared and became extinct.

Rocks

There are three kinds of rocks: igneous, sedimentary, or metamorphic. Igneous rocks, such as granite, form when molten rock material cools. Particles such as sand, salt, or gravel become sedimentary rocks when they are subjected to extreme pressure or chemical action. An example is limestone. Metamorphic rocks are those that are changed by temperature or pressure. Marble, for instance, is metamorphosed limestone. Ohio's bedrock is primarily made up of sedimentary rocks—sandstone, shale, and limestone—that date from the Paleozoic era. The state has no rocks formed in the more recent Mesozoic or Cenozoic eras.

Through the periods of the Paleozoic, Ohio was alternately underwater and dry. Plants and animals flourished and died, and rivers carried rock materials to the sea. Millions of years later, these sediments formed layers of rock, called strata. According to the law of superposition, one of the fundamental principles of geology, in undisturbed sedimentary rocks older strata are found beneath layers that formed later.

Minerals

There are two types of minerals found in Ohio. Industrial minerals, like limestone, sand and gravel, sandstone, salt, shale, and clay, are found throughout state. Energy minerals—coal, natural gas, and oil—are mainly found in the eastern part of Ohio. Limestone is one of the most important mineral products, and is used in many types of industry and as a building material. The Ohio Statehouse, for instance, prominently features locally-quarried Columbus limestone. Sand and gravel, found primarily in western and northeastern Ohio, are used in the building industry. Salt is the oldest mineral industry in Ohio. It is obtained from both rock salt and natural brine, most commonly found in the eastern part of the state. In addition to use as



a food additive and preservative, salt has many industrial uses. Lorain County is an important source of sandstone, although it is also found in other eastern counties. It is used primarily for construction.

Fossils

Some rock strata contain fossils, which are the remains of ancient plants and animals preserved in stone. In particular, Cincinnati-area limestone contains many fossilized marine invertebrates, such as the state fossil, the trilobite, dating from the Ordovician Period 440 million years ago. More than 1,000 species have been found there, making it one of the best places in the country to study such fossils. Fossils of giant fish are found in rocks dating from the Devonian Period, especially along the eastern shores of Lake Erie.

Coal

Millions of years ago, during the Mississippian and Pennsylvanian Periods (known collectively as the Carboniferous Period), sedges, reeds, and large ferns grew in Ohio. Over time, these plants died. Many layers of these plant materials built up, and after a very long time, heat and pressure exerted on the sediments formed coal. Layers of coal, which are generally discovered between layers of other rocks, are called beds or seams. Coal is found in the southeast part of the state, encompassing Belmont, Harrison, Jefferson, Perry, Athens, Tuscarawas, Guernsey, Muskingum, Meigs, and Noble counties. A portion of the Appalachian Coal Fields extends into that region of Ohio.

Coal fueled Ohio's economic rise, both literally and figuratively. In 1800, 100 tons mined from Jefferson County became the first recorded production of coal in the state. Over the course of the 19th century, Ohio became one of the largest coal producers in the nation, as well as one of the largest consumers. Coal generated steam power and electricity for industries and was the favored fuel for home cooking and heating. Canals, and later the railroads, created expanded markets for Ohio coal. Railroads both burned coal and carried it to other states for sale. In the 19th century, coal mining was done underground by hand, unlike modern above-ground machine-powered strip mining. Electric power was introduced in coal mines around the turn of the 20th century. Many Ohio miners immigrated from England, Scotland, and Wales. Mining was a hazardous occupation. Flooding and poor ventilation were two of the major hazards.

Glaciers

Glaciers are large, thickened ice masses that move like slow rivers, changing the surface of the earth as they advance and recede by removing material or depositing sediment, and by diverting or creating rivers and lakes. During an ice age, temperatures drop. Heavy snows over many years produce glaciers that spread from the Polar Regions into other land areas. Water freezes and becomes part of the growing glaciers, causing sea levels to drop.

There have been eight ice age cycles within the past 750,000 years, each separated by warmer interglacial periods. Four ice advances are recognized in North America, each named for a state in which there is significant evidence of its presence. With each advance, evidence of previous ice advances was obliterated. The most recent glacial period in North America, the Wisconsin glaciation, lasted from about 115,000 years ago until 10,000 years ago. Ice



covered much of the Upper Midwest and Canada, and numerous other areas of the world. Of the advances, the Wisconsin had the greatest effect on Ohio, where glacial deposits completely covered 56 and partially covered 14 of 88 counties. Before glaciers, Ohio streams flowed northwest, but as ice blocked existing streams and deposited drift in the old valleys, rivers cut new channels. When the glaciers melted, Lake Erie overflowed southward to the stream that became the Ohio River.

There are three geologically distinct areas of Ohio that reflect glacial action or absence of glaciers. The flat, western portion of the state is part of the Central Plains, which are further subdivided into the Lake Plains and the Till Plains. The Lake Plains area, also known as the Great Black Swamp, was once a glacial lake. As a result, it has fertile soil but poor drainage. The Till Plains are south of the Lake Plains, and the area takes its name from the till, rocks and other material carried away by glaciers and deposited along their paths. The southeastern quarter of the state belongs to the Appalachian Plateau. A large part of this area was not affected by glaciers, which change the land by processes of erosion and deposition. As a result, the region has high hills and deep valleys. A small area in southern Ohio is part of the Interior Low Plateau, also known as the Lexington Plain and Bluegrass Region.

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