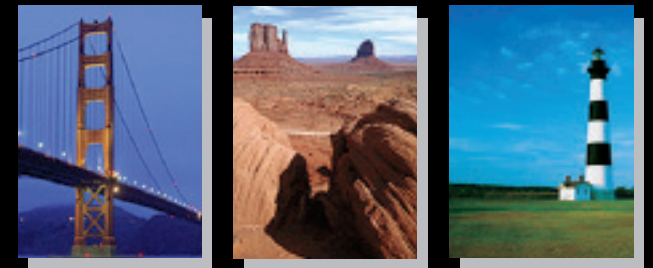
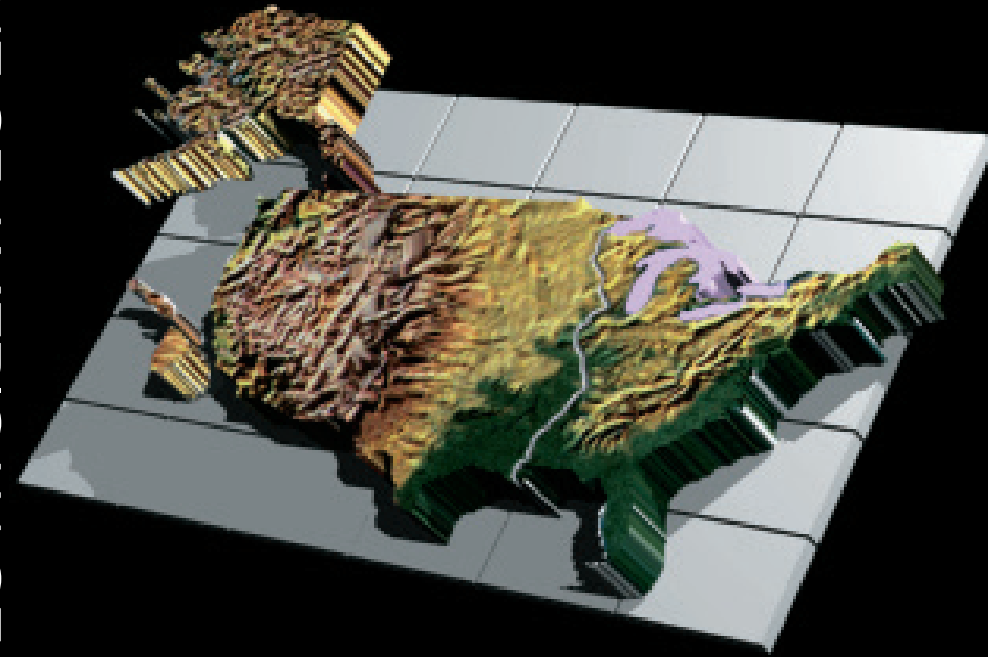


Outline of
**AMERICAN
GEOGRAPHY**



*Regional Landscapes
of the
United States*

OUTLINE OF AMERICAN GEOGRAPHY

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ON THE COVER: (Left to right) The Golden Gate Bridge at the entrance to San Francisco Bay in California; Monument Valley in northern Arizona; and a lighthouse on the coast of Maine.

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This book is about the geography of the United States.

And although we look at the country's physical geography, our central interest is not landforms, climate, soils, or vegetation but the human imprint on the landscape.

This does not mean that the physical environment is ignored. In fact, in some instances it holds a central role since the physical environment often plays a significant role in the pattern of people's activities. One factor in the importance of New York City is certainly its location on one of the world's finest natural harbors. Southern Florida's long growing season and mild winters enable it to be a leader in the production of oranges, lemons, and sugarcane.

Still, Florida's mild climate does not automatically mean that it will be a supplier of oranges, and New York City's harbor is only one of many important reasons for the city's growth. The physical environment helps define human opportunities, but it does not in itself determine human activities. In general,

THEMES AND REGIONS CHAPTER



the more advanced the level of technology, the greater the leeway a population has in dealing with the land.

It is obviously impossible to cover all the material that might fit into a geography of the United States. We have therefore chosen to divide the country into a number of areas, each of which has a special identity developed out of several interacting elements. We use these elements to form the themes around which each regional chapter is organized.

BASIC THEMES

A few general cultural patterns cut across regional and political boundaries and, in many cases, ignore major differences in the physical environment. These themes characterize the ways Americans have organized their country.

Urbanization: Millions of Americans, most of them urbanites, prefer to consider their country as a basically rural place, and they seem to believe that this rurality provides the country with a basic national vigor.

There is no longer much justification for this view of rural dominance. About 70 percent of Americans live in urban areas, and more than 40 percent are in areas of 1 million people or more.

In 1990, the U.S. farm population numbered about 5 million (2 percent of the population), a figure that has declined steadily since the first national census in 1790, when over 90 percent of all Americans were farmers.

Several elements of urbanization are emphasized in our discussion. Cities have a particular form, a particular layout. Most American cities have a rectangular-grid pattern, partly a result of cultural attitudes, partly a result of a desire for efficient transport before the automobile, and partly because that pattern is an easy way to survey the land. Within cities, there is a collection of industrial and commercial centers, residential areas, warehouses, and so on.

Cities exist for many different reasons. They may have an important transportation role. Or they may provide an important administrative function. Perhaps they are a center of recreation or manufacturing. Most cities, certainly all large ones, contain many different urban functions. Nevertheless, many are characterized by certain dominant functions that were the reason for their development and much of their early growth, and that today continue to give them their special character.

The pattern of continuing and often rapid urban growth in the United States during the last 100 years, coupled with the increasing mobility of the urban population, has stimulated a great sprawling pattern of urbanization. In some areas, the result of urban spread is urban coalescence, with the edges of different urban areas meeting and blending.

Industrialization: A substantial part of U.S. employment is related to manufacturing, either directly or indirectly. Most cities were founded and experienced their major periods of growth when manufacturing was the primary factor in urban growth.

Today, there is substantial regional specialization in manufacturing, partly as the result of variations in the availability of industrial raw materials and partly as the result of industrial linkages; manufacturing concerns that produce component parts of some final product are located near each other as well as near the final assembly site to minimize total movement costs.

Other important sources of variation include differences in labor availability or labor skills, in the quality of transportation facilities, and in local political attitudes. Regions tend to specialize in the production of whatever it is that they can best produce. And with this regional specialization has come regional interdependence; few

sections of America are truly self-sufficient in manufacturing, in spite of what local pride might lead us to believe.

High Mobility: America's extensive transportation network is an important element in its high level of economic interaction. Goods and people move freely within and between regions of the country. Regional interdependence is great; it is made possible by these inter-regional flows. Relative isolation is uncommon, but it does exist.

Nearly 20 percent of all Americans change their residence in any one year. Although much of this residential migration is local in nature, it does result in substantial inter-regional population movement.

Until the last decade of the 19th century, there was a strong westward population shift toward frontier agricultural lands. The focus of opportunity then changed and migration shifted to urban areas. More recently, the U.S. economy has entered what some call a post-industrial phase; employment growth is primarily in professions and services rather than primary (extractive) or secondary (manufacturing) sectors. Such employment is much more flexible in its location, and there has been a more rapid growth in such employment in areas that appear to contain greater amenities.

Resources: About 25 percent of the land in row crops in the United States produces exports. Also, the country is able to satisfy much of its gigantic demand for industrial raw materials domestically. The United States has the potential to be a major supplier for a few nonagricultural raw materials internationally and is the world's leading exporter of coal.

Although the U.S. population is predominantly urban, the extraction of natural resources from its abundant base requires a large nonurban labor force. Furthermore, particularly for agriculture, the development of these resources often involves a substantial land area. As a result, the relationship between the physical environment and human adaptations to that environment are clearly visible. Government plays an important role in this relationship by establishing controls on land use and agricultural production and by regulating the development of many resources. It is partly because processes inherent in urbanization and industrialization lead to high demand for raw materials that the

United States has become dependent on imported raw materials in spite of great natural resource abundance.

High Income and High Consumption: The high U.S. national income is achieved through high worker productivity, which requires a significant use of machines. And modern machines are fueled by inanimate energy sources. Mobility also implies heavy use of energy resources. High income spread somewhat evenly among a large share of the population will generate high product demand. All this increases energy consumption.

Americans consume about 25 percent of the world's total energy production. The United States imports half the petroleum it consumes, an increasing share of the iron ore and natural gas used, nearly all of its tin and aluminum, and large quantities of many other mineral ores.

High income also affects diet. Americans eat far more meat products and have a substantially more varied diet than most of the world's population. Beef and dairy production are, therefore, especially important in the agricultural economy.

Environmental Impact: One consequence of high consumption combined with resource abundance and dependence is a strong disruption of the physical environment. Resources seldom can be removed from the natural landscape without

some impact, and the manufacture and use of these resources often harm the air and water. The increased severity of such environmental impacts has enlivened the argument between development and conservation—an argument that has stimulated greater governmental intervention in both processes in an attempt to establish a middle ground. As domestic resources become increasingly scarce and their costs of extraction and production increase, the importance of this conflict will grow.

Political Complexity: The United States has a complex political structure, with jurisdiction over an activity or state divided among many different decision-making bodies, some elected and some appointed.

Below the state level, the complexity of the political structure can present a major problem in the effective and efficient distribution of governmental services. Counties, townships, cities, and towns are all governed by their own elected officials. Many special administrative units oversee the provision of specific services, such as education, public transportation, and water supply. The resulting administrative pattern is often nearly impossible to

comprehend, because many overlapping jurisdictions may provide one service or another in a given area.

Cultural Origins: The United States has grown from a diverse cultural background. African Americans have made important contributions to the national culture. A distinctive cultural region has developed in the Southwest, with an admixture of Hispanic Americans, American Indians, and European Americans. The Chinese contributed to the life of such cities as San Francisco and New York. This cultural diversity is an important element in the distinctive character of the country.

REGIONS

Geographers use regions as a neat system of categorization, a way of organizing a complex set of facts about places into a more compact, meaningful set of information. As with any categorization, the regions are satisfactory if they identify understandable patterns in the facts and if they help clarify the complex patterns.

To geographers, a region can be either nodal or uniform, single featured or multifeatured. A nodal

region is characterized by a set of places connected to another place by lines of communication or movement. The places in the set are associated with each other because they share a common focus, even though each place may be quite different from the others.

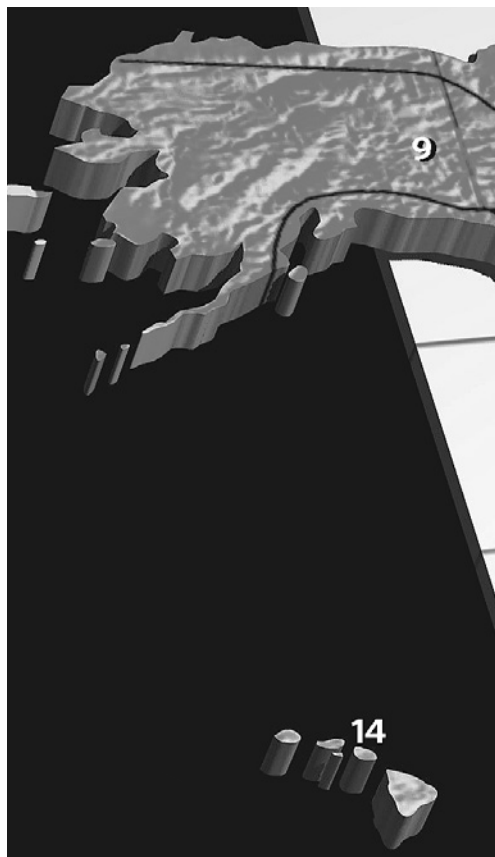
In comparison, a uniform region is a territory with one or more features present throughout and absent or unimportant elsewhere. A uniform region may represent some characterization of the total environment of an area, including both its physical and cultural features. It is this type of region that we use for the general structure of this book.

Our perception of the nature of a region, of the things that together shape its personality, is based on a relatively small group of criteria. In each major section of the United States, we have tried to identify the one or two underlying themes that reflect ways in which the population has interacted (within itself or with the physical environment) to create a distinctive region. The most important identifying themes for a region may vary greatly from one region to another. It is impossible to speak of the American Southwest without a focus on aridity and water erosion, of the North without its cold winters, or of the Northeast without cities and manufacturing. The key element that establishes a total uniform region, then, is not

how that section compares with others on a predetermined set of variables, but how a certain set of conditions blend there.

This scheme has resulted in our division of the United States into 14 regions (map 1), each of which is discussed in its own chapter. These are: Megalopolis, the American Manufacturing Core, the Bypassed East, Appalachia and the Ozarks, the Deep South, the Southern Coastlands, the Agricultural Core, the Great Plains and Prairies, the Empty Interior, the Southwest Border Area, California, the North Pacific Coast, the Northlands, and Hawaii.

Within this book, regions have been presented largely as though they are distinct territorially, even though they are not. The “feeling” of a region we wish to present is a function of place, but it is also a function of the subject theme chosen. Therefore, for example, the intense urban character of Megalopolis is discussed in chapter 4, but the aspects of manufacturing that affect New York, Philadelphia, Boston, and other manufacturing core cities that comprise Megalopolis are presented in chapter 5. There are two important aspects of regional feeling in the region usually called “the Midwest”—the urban-indus-



trial and the rural-agricultural. Both are important enough for us to treat each separately in some detail.

Rigid regional boundaries do not fit the landscape of the United States. A given portion of the country may be occupied by parts of two or more regions, but the boundaries of many regions may also be fairly broad transitional zones that contain many of a region’s characteristics. At times, these zones mark an area where the mix of characteristics is so subtle or complex that it is dif-



1. *Megalopolis*
2. *Manufacturing Core*
3. *Bypassed East*
4. *Appalachia and the Ozarks*
5. *Deep South*
6. *Southern Coastlands*
7. *Agricultural Core*
8. *Great Plains and Prairies*
9. *Empty Interior*
10. *Southwest Border Area*
11. *California*
12. *North Pacific Coast*
13. *Northlands*
14. *Hawaii*

difficult to assign the area to any one region. Parts of the margin between the Agricultural Core and the Great Plains are examples of this, as are sections of the transition between the Agricultural Core and the Deep South.

Regional boundaries and regions themselves are not static. Settlement patterns shift, society develops sig-

nificant new technological abilities, and political patterns are altered; regions reflecting these patterns may expand, contract, appear, or disappear. A regionalization of the United States for the year of its discovery, 1492, would have been quite different from one for 1776, 1865, or 1991. There is no reason to believe that the pattern for 2100 will be similar to that for 2000.

An examination of the regions that we have created for this text indicates a subdivision that should be generally recognizable, although some regions may represent combinations that are normally not expected. For example, consider the Bypassed East, a combination of the Adirondacks of New York and the northeastern portion of the United States known as New England. Most casual observers firmly lump all of New England into one region,

reflecting the long-term identification of the states of New England as a separate region with strong cultural cohesion. But there have been great changes in southern New England in recent decades because of heavy immigration and urbanization.

Several of the regions closely follow political boundaries. The reason for this in Hawaii is obvious. California is separated from most of its adjacent landscape because of its leadership role in changing the culture of America and its statewide political "solutions" to its local resource problems. Megalopolis has been defined traditionally along county lines.

As we mentioned, each of the regional chapters is developed around one or a few basic themes. Most of these themes are drawn at least indirectly from the basic themes of the entire book. In certain regions, the expression of some themes is stronger or clearer than others. The themes are intended to provide an explicit basis for treatment of information about the region, although, in many chapters, it will not be difficult to identify elements of national or continental geography. ■

The dominant topographic features of the United States tend to extend north-south across the country (map 2). The interior of the country is a vast, sprawling lowland that stretches from the Gulf of Mexico to the Canadian border and then on to Alaska.

Geographers with an interest in landform development place this expanse of flat land and gently rolling hills in three different physiographic regions—the Atlantic and Gulf coastal plains, the interior lowland (which some split into the Great Plains and the interior plains), and the Canadian Shield.

The Atlantic and Gulf coastal plains reach north along the east coast of the United States as far as the southern margins of New England. Underlying this area are beds of young, soft, easily eroded rock deposited in recent geologic time as shallow seas lapped back and forth across the land. These low plains extend well out under the ocean surface to form a continental shelf, which in places extends as much as 400 kilometers beyond the shore.

**THE
PHYSICAL
ENVIRONMENT**

CHAPTER

2

Northward, the interior lowland, although noticeably hillier than the coastal plains, has almost no rough terrain. This region is like a saucer, turned up at the edges and covered with a deep series of sedimentary rocks. These sedimentary beds are generally quite flat; most

topographic variation is the result of local erosion or, in the North, of glacial debris deposited during the Ice Age. The geologic structure of the Great Plains differs little from that of the interior plains. The sedimentary beds dominate, although in the north they are broken by some eroded domes, most notably the Black Hills of western South Dakota. While nearly horizontal, the sedimentary beds do dip gently toward the west to a trough at the foot of the Rocky Mountains, where the Colorado cities of Denver and Colorado Springs are located.

The boundary between the Great Plains and the interior plains is marked by a series of low escarpments that indicate the eastern edge of the mantle of loose sediments, eroded from the Rocky Mountains, that covers the plains.

The character of this massive interior lowland area has had a number of important influences on the economic and settlement histo-

ry of the United States. In addition to the vast agricultural potential it provides, fully half the country can be crossed without encountering significant topographic barriers to movement. This facilitated the integration of both this region and the distant West into the economic fabric of the country. Nearly all of the interior lowland is drained by the Mississippi River or its tributaries. This drainage pattern assisted regional integration by providing a transport and economic focus for the land west of the Appalachian Mountains.

North and northeast of the central lowland is the Canadian Shield, where old, hard crystalline rocks lie at the surface. Farther south in the lowlands, similar rocks are covered by the sedimentary beds deposited under the sea that once filled the midsection of the country. Erosion has worn down the surface of the Shield into a lowland of small local relief.

The Shield, more than any other North American physiographic region, has had its landforms remolded and shaped by massive continental glaciers during the last million years. These glaciers covered most of Canada east of the



Rocky Mountains and the Coast Ranges, and they reached southward to approximately the present valleys of the Missouri and Ohio Rivers.

The ice could pluck rocks weighing many tons off the surface and carry them great distances: Massive boulders are strewn across the landscape of the Shield, resting where they were dropped by the glaciers. Ice melt along the peripheries of the glaciers created major rivers and cut broad new pathways to the sea.

Glaciation scoured much of the Shield's surface. Today, the soil



MAP
ABOVE:
2

cover of the region remains thin or nonexistent. The heavily disrupted drainage pattern dammed many streams with debris and led others into the area's labyrinth of lakes and swamps rather than to the sea. Central and northern Minnesota, for example, called the "Land of 10,000 Lakes," is part of the southern lobe of the glaciated shield that extends into the states of Minnesota, Michigan, and Wisconsin.

Southward, where the ice was not as thick and its force correspondingly less, the glaciers were diverted or channeled by higher elevations. For example, the ice was blocked in central New York by the highlands south of the Mohawk River. However, narrow probes did push up the valleys of streams tributary to the Mohawk, gradually broadening and deepening them. Today, the deep, narrow Finger Lakes of New York State fill these glacially enlarged valleys and form one of America's truly beautiful landscapes.

All along and beyond the southern edges of the glaciers, deposition replaced erosion as the prime result of glaciation. Large areas of the interior lowland are covered by a mantle of glacial till (rocks and soil dropped by the glaciers), which covers the land to depths varying from a meter or less to more than 100 meters. Where the glaciers remained stationary for long periods of time, higher hills, called moraines, were created. In the east, Staten Island, Long Island, Martha's Vineyard, Nantucket, and Cape Cod are end moraines that mark the farthest major extension of glaciers toward the southeast. The landscape south of the Great Lakes is laced with long, low, semicircular moraine ridges and other glacial deposits.

One section of the interior low-

land escaped glaciation. The southwestern quarter of Wisconsin and the adjoining 400-kilometer stretch of the Mississippi River valley were apparently spared by the barrier effect on the flowing ice of the Superior upland to the north and by the channeling of the ice by the deep valleys of Lakes Michigan and Superior. The result is the "driftless area" (drift is another name for till), a local landscape that is more angular, with fragile rock formations like natural bridges and arches.

As the ice retreated, massive lakes were created along the glacial margins. On the northern Great Plains, two huge lakes, Agassiz and Regina, together covered an area larger than today's Great Lakes. With continued glacial retreat, these lakes mostly disappeared. Their existence is now marked by the former lake bed, a flat area covering parts of North Dakota and Minnesota.

Sea level was significantly lower during periods of widespread glaciation. This lowered the base level of many rivers and thus fostered increased erosion by those streams. Furthermore, many of these stream valleys extended well into what is today the ocean. Along with many others, the Susquehanna and Hudson Rivers cut much deeper

valleys during this period. As the ice retreated and sea level rose, the ocean filled these deepened valleys. Two of the world's finest harbor areas were formed in this way: New York Bay, with the deep Hudson River and the protective barriers formed by Staten Island and Long Island; and Chesapeake Bay, the drowned valley of the Susquehanna River and some of its major former tributaries, such as the Potomac and James Rivers.

In the East, the coastal plains are gradually squeezed against the coast northward along the ocean by the Appalachian Highlands until the lowland disappears entirely at Cape Cod. From there northeastward, the coastal landscape is a part of the northern extension of the Appalachian Mountain system. The Appalachians—eroded remnants of what were once much higher mountain ranges—separate the seaboard from the interior lowlands along much of the eastern United States.

Soils in most parts of this region are shallow, and the steep slopes, difficult to farm under any circumstances, are totally unsuited to modern agricultural practices that emphasize mechanization. Large-scale urban or industrial growth is cramped by the small,

local lowlands. Early settlers found the Appalachians from the Mohawk River in New York southward to northern Alabama to be a surprisingly effective barrier to western movement; there are few breaks in the mountains' continuity.

The western United States is a land of mountains and of sudden, great changes in elevation. The physiography, again, is arranged in a series of three large north-south trending bands, with the Rocky Mountains on the east separated from the mountains and valleys of the Pacific coastlands by a series of high, heavily dissected plateaus.

Starting in the east, the Rocky Mountains generally present a massive face to the Great Plains, with peaks occasionally rising 2 kilometers or more. Elsewhere, as in south-central Wyoming, the Rockies almost seem not to exist at all. In the northern Rockies in Idaho, the north-south linearity of most of the region's mountains is replaced by massive igneous domes irregularly eroded into a rugged, extensive series of mountain ranges that contain the largest remaining area of wilderness in the United States outside Alaska.

The high plateaus of the interior West are also varied in their origin and appearance. The southernmost subsection, the Colorado Plateau, is a series of thick beds of sedimentary rocks rising more than 1,000 meters

above the lowlands' elevation and tilted upward toward the northeast. The plateau is a land of spectacular canyonlands, volcanic peaks, and sandy deserts.

Farther north, the Columbia-Snake Basin has been filled by repeated lava flows to a depth of more than 1,000 meters. Rivers, both past and present, have eroded into the rock. The resultant landscape is similar to that of the Colorado Plateau, although the stepped appearance resulting from the variable resistance to weathering of the eroded sedimentary rocks of the Colorado Plateau is missing. Volcanic cones also dot portions of the region, especially across south-central Oregon and in the Snake River Valley in Idaho.

The plateaus gradually widen northward, encompassing the valley of the Yukon River in Alaska. In comparison, much of central Alaska is a broad, flat lowland that is poorly drained.

In the conterminous United States (excluding Alaska and Hawaii), the Pacific Coast seems to consist largely of two north-south trending mountain chains separated by a discontinuous lowland. In southern California, the Coast Range is fairly massive, with peaks reaching 3,000 meters.

From there almost to the Oregon border, the mountains are low and linear, seldom rising above 1,000 meters. This also is the major fault zone of the state and a region of frequent earthquake activity. Along the California-Oregon border, the Klamath Mountains are higher, more extensive, and much more rugged and irregular. Except for the Olympic Mountains in northwestern Washington, the Coast Ranges in the rest of Oregon and Washington State are low and hilly rather than mountainous.

The interior lowlands along the coast—the Central Valley of California, the Willamette Valley in Oregon, and the Puget Sound lowland in Washington—are the only extensive lowlands near the West Coast. Filled with relatively good soils, these lowlands have supported much of the Pacific Coast's agriculture.

East of the lowlands are the Sierra Nevada and the Cascade mountain ranges. The Sierra Nevada appears as though a massive section of earth was tilted upward relative to the areas to the east and west in what is called a fault block, with the highest, sharpest exposed face toward the east. Although the western approaches into the Sierra Nevada are reasonably gentle, on the eastern side the mountains rise in some places more than 3,000 meters. Volcanic activity was important in

the formulation of the Cascades. Some of America's best known volcanic peaks, such as Mt. Rainier and Mt. St. Helens in Washington, are found there.

CLIMATE

Climate is the aggregate of day-to-day weather conditions over a period of many years. It is the result of the interaction of many different elements, the most important of which are temperature and precipitation.

Climatic patterns are a result of the interaction of three geographic controls. The first is latitude. The earth is tilted on its axis with reference to the plane of its orbit around the sun. As it makes its annual revolution around the sun, first the Northern Hemisphere and then the Southern are exposed to the more direct rays of the sun. During the Northern Hemisphere's summer, higher latitude locations have longer days, with far northern points experiencing a period of continuous daylight. Daylight periods during the winter months are shorter at higher latitudes, whereas more southerly locations have both longer days and exposure to more direct rays of the sun.

The second control is based on the relationship between land and water. Land tends to heat and cool more rapidly than water. In a tendency called continentality, places

far from large bodies of water experience greater seasonal extremes of temperature than do coastal communities. Parts of the northern Great Plains experience annual temperature ranges close to 65°C; annual differences of as much as 100°C (from 50°C to -50°C) have been recorded in some locations.

The converse effect occurs at maritime locations, especially on the western coast of continents in the mid-latitudes. These locations have smaller temperature ranges as a result of what is called a maritime influence. Summer and winter extremes are moderated by the movement onshore of prevailing westerly wind systems from the ocean. Horizontal and vertical ocean currents minimize seasonal variations in the surface temperature of the water. The moderated water temperature serves to curb temperature extremes in the air mass above the surface.

Proximity to large water bodies also tends to have a positive influence on precipitation levels, with coastal locations receiving generally higher amounts. The reason for this should be obvious; large water bodies provide greater levels of

evaporation and thus increase the amount of moisture in the atmosphere. That, in turn, increases the possibility of precipitation. There are, however, notable exceptions to this rule, including the dry coast of southern California and the Arctic coastline of Alaska.

The third prime geographic influence on climate is topography. Most obvious is the relationship between elevation and temperature, with higher elevations cooler than lower elevations. The influence of topography can be broader, however, because of its effect on wind flow. If a major mountain chain lies astride a normal wind direction, the mountains force the air to rise and cool. As the air mass cools, the amount of moisture that it can hold is reduced. Precipitation results if the cooling causes the relative humidity to reach 100 percent. Moisture falls on the windward side, and the lee is dry. The wettest area in North America is along the Pacific coast from Oregon to southern Alaska, where moisture-laden winds strike mountains along the shore. Average annual precipitation is more than 200 centimeters throughout the area, and in some places exceeds 300 centimeters.

Mountains also can reduce the moderating effects of maritime conditions on temperature, as happens in the interior of the Pacific Northwest. The Western Cordillera

(mountain mass) confines West Coast maritime climatic conditions to that coast. Some of the greatest variations in both precipitation and temperature to be found across a small distance anywhere in America exist between the west and east sides of parts of the Coast Ranges. The aridity of the central and northern interior West is due in large part to the barrier effect of the north-south-trending mountain ranges of the West.

East of the Rockies, the topographic effect on precipitation eventually disappears, partly because the eastern mountains are lower and thus pose less of a barrier to moving air, and partly because much of the weather of the interior is a result of conflict between two huge air masses that are unimpeded, one flowing northward from the Gulf of Mexico, and the other flowing southward out of Canada. The contact of these air masses creates what are often violent displays of weather in the region.

This illustrates a fourth major and complex influence on climate, the impact of air mass characteris-

tics and wind systems. America's weather is affected markedly by the confrontation between polar continental air masses (usually cold, dry, and stable) and tropical maritime air masses (warm, moist, and unstable). The former push farthest south in winter, whereas the latter extend farthest north in summer. Most parts of America are subject to a generally westerly wind flow that tends to move weather systems eastward. The continental climate of the interior is thus pushed onto the East Coast.

The interaction of these climatic controls creates a pattern of climatic regionalization. In the East, the principal element in climatic variation is temperature; in the West, it is precipitation. In the East, the divisions between the climate regions are based largely on the length of the growing season—the period from the average date of the last frost in spring to the first frost in fall—and on the average summer maximum temperature or winter minimum temperature. In the West, average annual precipitation is the key, although moderated temperatures are an important aspect of the marine West Coast climate. In the East, the more northerly areas are generally drier; in the West, they are colder. In the East, the major influence on climatic variation is latitude; in the West, it is topography.

VEGETATION

Botanists speak of something called climax vegetation, which is defined as the assemblage that would grow and reproduce indefinitely at a place given a stable climate and average conditions of soil and drainage. For most of the inhabited portions of America today, that concept has little meaning. The "natural" vegetation, if it ever existed, has been so substantially removed, rearranged, and replaced that it seldom is found now. In the Southeast, for example, the original mixed broadleaf and needleleaf forests were cut and replaced by the economically more important needleleaf forests. The grasses of the plains and prairies are mostly European imports. Their native American predecessors are gone either because they offered an inferior browse for farm animals or because they could not withstand the onslaught of modern humanity and its imported weeds. Most of what climax vegetation remains is in the West and North.

There are several ways of creating vegetation regions. Perhaps the simplest is to divide the United States into three broad categories—forest, grasslands, and scrublands. Forests once covered most of the

East, the central and northern Pacific Coast, the higher elevations of the West, and a broad band across the interior North. Forests of the Pacific coast, the interior West, the North, and a narrow belt in the Deep South were all needleleaf and composed of many different trees. Much of the Ohio and lower Mississippi River Valleys and the middle Great Lakes region was covered by a deciduous broadleaf forest.

Grasslands covered much of the interior lowlands, including nearly all of the Great Plains from Texas and New Mexico to the Canadian border. This is an area of generally subhumid climate where precipitation amounts are not adequate to support tree growth. An eastward extension of the grasslands, the Prairie Wedge, reached across Illinois to the western edge of Indiana, where precipitation is clearly adequate to support tree growth.

Scrublands usually develop under dry conditions. They are concentrated in the lowlands of the interior West. Actual vegetation varies from the cacti of the Southwest to the dense, brushy chaparral of southern California and the mesquite of

Texas.

The tundra of the far North is the result of a climate that is too cold and too dry for the growth of vegetation other than grasses, lichens, and mosses. Tundra exists in small areas far southward into the United States, where climatic conditions at high elevations are inhospitable to tree growth. Northward, the altitudinal tree line is found at lower elevations until, eventually, the latitudinal tree line is reached.

SOILS

The soil of a place owes its characteristics to such things as the parent rock material, climate, topography, and decaying plants and animals. Hundreds of different types of soil result from the interaction of these elements. Any particular soil is unique because of its mix of properties (such as color and texture) and composition (including organic content and the action of soil colloids).

Colloids are small soil particles. Their properties and influences on soil are complex and often important. Soil acidity (or alkalinity), for example, is a result of the alteration and integration of soil colloids. Acid soils are characteristic of cold, moist climates; alkaline soils typically are found in dry areas. Most soils of the major agricultural zones of the eastern United States are moderately to strongly acidic. Lime

must be added periodically to neutralize that acidity before these soils can be used to produce most row crops.

Color is perhaps the most obvious soil property. A dark color usually indicates an abundance of organic materials, and red, the presence of iron compounds. Generally, however, color is a result of the soil-forming processes. For example, the pale-gray soil of the northern needleleaf forest results from the leaching of organic matter and minerals from the soil's surface layer.

Soil texture, which determines a soil's ability to retain and transmit water, refers to the proportion of particles of different size in the soil. Sand is the coarsest measure of soil texture, silt is intermediate, and clay is the finest. Soils called "loams" contain substantial proportions of each of the three particle grades and are considered best. They are fine enough to hold moisture yet are not so fine that they cannot easily take up water.

The U.S. Department of Agriculture has developed a soil classification system that indicates the most important soil types for an area of the country. Aridisols, found mostly in the Southwest, gain their name from arid. These soils of dry climates are low in organic content and have little agricultural value. Spodosols generally develop

in cool, moist climates, although they are found in northern Florida. They are quite acidic and low in nutrients, and are of agricultural value only for acid-loving crops. Tundra soils, which also have little agricultural value, are associated with a cold, moist climate such as Alaska. The soil is shallow, frequently water saturated, and with a subsurface of perennially frozen ground. Highland soils, found in West Virginia, Utah, and Alaska, are little developed and agriculturally worthless.

Mollisols are grassland soils of the semiarid and subhumid climates of the Central, North Central, and Pacific Northwest sections of the country. They are thick dark brown to black and have a loose texture and high-nutrient content. They are among the most naturally fertile soils in the world and produce most of America's cereals.

Alfisols are second only to mollisols in agricultural value. They are soils of the mid-latitude forest and the forest-grassland boundaries. They are very much "middle" soils in a climatic sense. They are located in areas moist enough to allow for

the accumulation of clay particles but not so moist as to create a heavily leached or weathered soil.

Alfisols are divided into three categories, each with its own characteristic climatic association. Udalfs are soils of the deciduous forests of the Middle West. Somewhat acidic, they are nevertheless highly productive when lime is used to reduce the acidity. Ustalfs, found in warmer areas with a strong seasonal variation in precipitation, are most common in Texas and Oklahoma. They are highly productive if irrigated. Xeralfs are soils of cool, moist winters and hot, dry summers. Found in central and southern California, they too are highly productive.

Ultisols represent the ultimate stage of weathering and soil formation in the United States. They develop in areas with abundant precipitation and a long frost-free period, such as the South. Particle size is small, and much of the soluble material and clay has been carried downward. These soils can be productive, but high acidity, leaching, and erosion are often problems.

Entisols are recent soils, too young to show the modifying effects of their surroundings. They are widely scattered and of many types, from the Sand Hills of Nebraska to the alluvial floodplains of the Mississippi River Valley. The agricultural potential of entisols

varies, but the alluvial floodplain soils, drawn from the rich upper layers of upstream soils, are among America's most productive.

MINERAL RESOURCES

There is a distinct association between the location of minerals that meet the needs of heavy manufacturing and the land's subsurface rock structure. Each of the three major forms of rock—sedimentary, metamorphic, and igneous—is capable of containing a type of mineral economically useful to humans. Sedimentary and metamorphic rocks are the most prevalent rock substructure and are more likely to contain minerals of broad utility than are igneous rocks.

Sedimentary rock is the result of the gradual settling of small solid particles in stationary water. For example, if a shallow sea were located adjacent to an arid landscape subject to occasional rainstorms, sand particles would be washed into the sea and spread across its bottom by water currents and the force of gravity. As this process continued, each layer of sand would press down on the layers beneath it, squeezing and solidifying the sandy mass that had been deposited only a few thousand years before. When

this seabed was raised and folded into mountains by shifts in the earth's crust, the method by which at least some of the rocks were formed was betrayed by the presence of layers of sandstone.

About 300 million years ago during what earth historians call the Carboniferous period of the Paleozoic Era, conditions present in most existing land areas were such that unusual sedimentary sequences were created. Heavily vegetated and thick, swampy regions were drowned and covered with another layer of sediment. In some cases, the organic matter came to be represented in liquid form, trapped between folds of impermeable rock and eventually drawn off as petroleum. Most of these petroleum deposits are found in conjunction with another by-product of the period—natural gas. In other cases, the organic matter became solid layers of coal that were sometimes only centimeters thick but occasionally found dozens of meters thick.

In North America, vast regions are underlaid by sediments formed during the Carboniferous period. These areas where coal, oil, or natural gas might be found are located in the interior and Great Plains, sections of the Gulf coastal plain, portions of the Pacific mountains and valleys, the Arctic rimland, and in folded and broken form along the western margins of the Appalachian

Highlands and into the eastern Rockies.

Large deposits of mineral fuels have been identified across extensive portions of these sedimentary lowlands. The most important coal deposits in America have been mined in the more rugged Appalachian field. Mines throughout this nearly continuous field in eastern Kentucky, West Virginia, and western Pennsylvania were the earliest to be brought into production, and they continue to supply over half of America's coal needs.

Until recently, much of the remaining coal mined in the United States has been obtained from the Eastern Interior Field, which underlies most of Illinois and extends into western Indiana and western Kentucky. Although some of the Eastern Interior Field's coal has been used in iron and steel production, its higher sulfur content has restricted most use to heating and electric-power generation.

The Western Interior Field is also large, located under Iowa and Missouri with a narrowing extension southward into eastern Oklahoma. The coal found in this field is of slightly poorer quality than that found in the eastern fields

and has only recently begun to be mined.

There are many small and a few large bituminous deposits scattered through and along the eastern margins of the Rocky Mountains. Extensive deposits in Wyoming and Montana have come into production in the last two decades. There are also several extensive fields of lignite (brown coal) in the northern Great Plains.

Scattered deposits of petroleum and natural gas are found throughout the Appalachian coal field. Southern Illinois and south-central Michigan produce some petroleum, as do scattered sites across the northern Great Plains and the northern Rockies.

Easily the most important petroleum fields, however, have been those in the southern plains, along the Gulf coast, and in southern California. One great arc of producing wells is located along the full length of the Texas and Louisiana coasts. Another slightly broken arc

extends from central Kansas south through Oklahoma and westward across central Texas to New Mexico. Between and beyond these two large areas lie two more fields of great importance, the East Texas field and the Panhandle field in northwest Texas. Separate from these fields but also of major importance are those located in southern California. In the mid-1960s, exploitation of deposits of petroleum and natural gas was begun along the north Alaska slope.

Metamorphic rock is formed in a quite different manner than sedimentary rock. Under the tremendous pressure exerted through the gradual deformation of the earth's crust, the internal structure of previously formed rocks can be metamorphosed, or changed. So great is the pressure exerted over thousands of years and so great is the heat generated that the very molecular structure of the rock is altered. This transformation indicates why metallic minerals in economically extractable quantities are located most often in areas of metamorphic rock.

Many of the mining sites for early exploitation of the metallic minerals were located near the margins of the Canadian Shield. The pattern of mineral production follows a long arc extending from the North Atlantic and St. Lawrence River estuary across the Great Lakes and

northward through Canada to the Arctic Ocean. The arc continues on both sides of Lake Superior: in northern Michigan, Wisconsin, and Minnesota with copper and iron.

A second zone of metamorphic rock is located along the eastern Appalachian Mountains. Copper and iron were important minerals found locally by New England colonists.

A third and extensive region of metallic minerals is formed by the western mountains. Scatter deposits of gold and silver, a few of them rich, drew prospectors and mining companies to isolated locations from south of the Mexican border

to central Alaska. Of great industrial importance are the large deposits of copper, zinc, lead, molybdenum, and uranium found in this western region, as well as smaller deposits of tungsten, chromite, manganese, and other minerals.

It should not be assumed that America's industrial requirements are met fully by the tremendous variety of minerals found in these three zones of metamorphic rock. A few minerals needed by modern industry (for example, tin, manganese, and high-grade bauxite for aluminum) have not been located in America in sufficient quantities to satisfy domestic needs. In addition, the growth of industrial capacity has been matched by a growth in demand for many minerals. Nevertheless, few countries have equaled or even approached the original quantity and diversity of metallic minerals and mineral fuels located in the United States.

This abundance of minerals has been critical in assisting the development of the immense American manufacturing-industrial complex. ■

The country that came to be the United States had a small, dispersed native population at the time of initial European discovery, totaling perhaps 800,000 people, most organized in small tribal units.

There was great diversity among American Indian cultures. Several hundred dialects were spoken along the coast of California alone. The Pueblo, who lived in what is now New Mexico and who were probably influenced culturally by the Aztecs to the south, resided in permanent towns and constructed extensive irrigation systems. The Piutes of the Great Basin lived in temporary thatch dwellings and pursued a seminomadic existence based on available wild edible vegetation and small game. The Inuit, or Eskimos, who were the most recent of the pre-European arrivals, shared close cultural ties with Inuits in Greenland and Siberia.

Although American Indians represented a barrier to the expansion of European settlement at times, for the most part their impact was minimal. Many died of imported infectious diseases such as smallpox and measles before they experienced

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direct contact with the Europeans. The Indians made important contributions to the arriving Europeans, especially during the first decades of settlement. But most often they were killed or shunted off to reservations in the West. As the settlement frontier moved westward, so did the

American Indians and their reservations.

SETTLEMENT PATTERNS

Although it is impossible to state precisely how many people entered what is now the United States from Europe and, to a lesser extent, from Africa, a reasonable estimate would place the figure at close to 60 million.

Most early immigrants came from northwestern Europe. At the time of the first national census of the United States in 1790, more than two-thirds of the white population was of British origin, with Germans and Dutch next in importance.

Emigration to North America slowed between 1760 and 1815. This was a time of intermittent warfare in Europe and North America, as well as on the Atlantic Ocean. Between about 1815 and the start of World War I in 1914, immigration tended to increase with each passing decade.

For the first half of the 1815-1913 period, most migrants continued to come from northwestern Europe. They were followed in subsequent decades by streams of people from southern and eastern Europe. By 1913, well over four-fifths of all immigrants were from these areas of Europe, especially Italy, Austria-Hungary, and Russia.

The reasons for this shift are based on the impact of the Industrial Revolution. Beginning in the British Isles and the Low Countries in the 18th century, it spread southeastward during the following 150 years or so. With industrialization came a rapid rise in population as mortality declined. The economy shifted to manufacturing, urbanization increased, and there was a proportional decline in the agricultural population. The growth in the demand for urban labor did not match the increase in the potential labor force, and thus there were many willing emigrants.

It has been suggested repeatedly that migrants to the United States chose areas that were environmentally similar to their European homes. The substan-

tial Scandinavian settlement in Minnesota and the Dakotas is indicated as a case in point. There may be some small truth in this, but it was more important that those states represented the principal settlement frontier at the time of major Scandinavian immigration. For the most part, the mosaic of ethnic patterns in America is the result of a movement toward opportunity—opportunity first found most often on the agricultural settlement frontier and then in the cities.

The major exception to the immigrant settlement pattern was black settlement in the American South. Forced to move as slave labor for the region's plantations, this was a small part of the large movement of Africans to the Caribbean Basin, the northeast coast of South America, and the American Southeast. Next to the European exodus, this was probably the second largest long-distance movement in human history. Perhaps 20 million left Africa. It is believed that fewer than 500,000 blacks came into the United States. Most probably arrived from the Caribbean rather than coming directly from Africa. The 1790 census indicated that 20 percent of the American population was of African origin. There was little African immigration after that date, and the percentage of the population that was black declined.

The United States passed its

first major legislation to restrict immigration in the 1920s. This limitation, coupled with the Great Depression of the 1930s and World War II in the 1940s, cut immigration to a fraction of its annual high in 1913. Since 1945, the number of arrivals has increased somewhat. Far more liberal immigration laws were passed in the 1960s. In the late 1980s, Mexico, the Philippines, and the West Indies provided the greatest number of migrants to the United States. Today, the United States typically receives roughly 700,000 legal immigrants annually. About 275,000 illegal aliens also enter the country each year.

The first immigrant settlements were small, clinging to the ocean and looking more toward Europe than toward the land that crowded in about them. When settlement pushed tentatively away from the oceans, it still followed the waterways, for they offered trade pathways to the coast and an important link to Europe. Thus, the British settled the indented coastline of the Chesapeake Bay and its tributaries, and they spread a thin band of settlement along the rugged coastline of New England. The Dutch moved up the Hudson River from New Amsterdam (New York), and the French gradually settled the banks

of the upper St. Lawrence River.

During the first 150 years after the beginnings of permanent European settlement—until about 1765—Europeans moved westward only as far as the eastern flanks of the Appalachian Mountains. Within a century after that, the frontier reached the Pacific Ocean, and by 1890, the U.S. Bureau of the Census was able to announce that the American settlement frontier was gone entirely.

This increasingly rapid settlement expansion resulted from a reorientation in attitude away from Europe. By the early 19th century, an increasing number of Americans viewed the occupation of the continent as their manifest destiny. The land laws of the country became increasingly pro-expansionist. Also, as the population grew, there were more people who hoped to improve their lot by moving westward.

In the eastern half of the United States, about as far west as Kansas and Nebraska, settlement expanded westward in a generally orderly fashion. To be sure, advances were more rapid along certain transportation routes, such as the Ohio River, and slower in other places.

Settlement moved rapidly westward onto the interior grasslands. The Mississippi River and its many tributaries offered easy routes to the interior, and settlers found an

expanse of excellent agricultural land with a generally good climate for crop production that stretched from the western margins of the Appalachians well into the Great Plains.

From the Rocky Mountains westward and in Alaska, however, an even pattern of settlement expansion did not occur. Much of this broad area was either too dry, too hot, or too cold for farming. Rugged topography hampered transportation and further limited agricultural development. Settlement congregated in areas that offered an identifiable economic potential. The result was a pattern of point settlement scattered across an otherwise nearly unpopulated landscape.

In 1990, the United States had a population approaching 250 million, with a density of roughly 235 people per square kilometer. Three principal zones of population can be identified. First, a primary zone fills a quadrant defined approximately by the cities of Boston (Massachusetts), Chicago (Illinois), St. Louis (Missouri), and Washington, D.C.: 7 of the 12 most populous U.S. states are here. It is the area of earliest growth and long the country's most advanced section economically. Fine natural routes and many excellent harbors along the Atlantic shore have been augmented by a dense transporta-

tion net. Some of the country's best agricultural lands plus rich mineral resources are either within the region or nearby.

Wrapping around the southern and western margins of the primary zone and extending westward to the eastern sections of the Great Plains, there is a secondary zone of population. Much of America's best agricultural land is in this zone, and the greatest part of its potential agricultural lands are farmed. Most of the area is populated, although densities are generally much lower than those found in the core. Cities are spaced more widely and more evenly in this zone than in the core, and they are primarily service and manufacturing centers for the region.

Finally, a peripheral population zone fills the land from the central Great Plains westward. A pattern of population and economic growth at locations of special potential in an otherwise limited region continues to dominate. Although some areas are now densely populated—notably California's San Francisco Bay area and Los Angeles Basin, as well as the Puget Sound Lowland in Washington State—most of the land remains sparsely populated.

The mobility history of the

United States can be divided into three periods. First came the period of east to west movement, then one from rural to urban areas, and, finally, the present period, when most long-distance movement is between metropolitan areas. If the country's population has moved westward with every decade, it has urbanized in an equally unvarying fashion. Whereas less than 10 percent of the population could even loosely be defined as urban in 1790, over three-quarters was urbanized by 1990.

These statistics reflect not only a relative decline in rural population, but also an absolute decline in farm population. Between 1960 and 1987, for example, the farm population fell from more than 15 million to under 6 million.

The movements from east to west and from rural to urban America were both clearly in response to the perception of economic opportunity. First, more and more farmlands became available as the settlement frontier pushed westward. Then there was a tremendous surge in urban employment generated by the Industrial Revolution. Once Americans were predominantly urbanites and economic opportunities were also urban based, variations in these opportunities ensured that most subsequent population migration would occur between metropolitan areas.

U.S. population statistics for the 1970s and 1980s suggest that a fourth major mobility period is at hand. Areas that had long experienced no change or even declining population size are growing. Much of the South is a prime example.

Many observers have suggested that the United States has become a post-industrial country. That is, the major growth areas are in occupations that provide services and that manipulate and create information. The number of Americans employed in manufacturing has increased only slightly during the past two decades, whereas tertiary and quaternary employment has boomed. Much of what increase there has been in manufacturing employment has been in the production of high-value, lightweight products, such as electronic components, which can presumably be located almost anywhere. Thus, more and more people can live where they want.

URBANIZATION

Most of America possesses urban areas that have grown in population and extent. In a few instances, the growth has been so great and the size of the core cities has become so large that major urban areas

have merged and formed clusters of cities. The group of large cities extending from Boston (Massachusetts) to Washington, D.C., along the northeastern U.S. coast, is the clearest example. Another group of urban areas—more widely dispersed and containing smaller central cities—is found along the southern margin of the Great Lakes. Milwaukee (Wisconsin) and Chicago (Illinois) anchor this region in the west, and Buffalo (New York) and Pittsburgh (Pennsylvania) do the same in the east. Southern California, from San Diego to San Francisco, is offered by some observers as yet another set of urban areas that will be merged by the end of the 20th century, as is much of east coastal and central Florida.

Most large urban places have developed where transportation routes connect with each other. Quite often it is the land-water connection that is important. Some urban centers are on a seacoast or large estuary. Others are on naturally navigable waterways. Still others are on rivers or channels that have been modified extensively just to give the cities water access. Other factors matter, of course: hinterland quality, proximity to alternative transportation, security, and even

healthfulness of the local environment. However, where goods and people must transfer from one form of transportation to another, there are opportunities to process, exchange, manufacture, repackage, sell, and buy goods.

There are exceptions to this water orientation, such as Atlanta (Georgia), Denver (Colorado), and Dallas-Ft. Worth (Texas), but these, too, were on early transport routes of some kind. Atlanta, for example, located at the southern tip of the Appalachian Mountains, had become a key inland center for railroad transportation in the South by the 1860s.

PATTERNS OF REGIONAL CULTURE

Some argue that one of the great strengths of the United States is that it is the world's largest and most populous country joined geographically and socially by a common language. Nevertheless, most of the regions identified in this text are at least in part culture regions.

Regional variation in culture may be expressed in many different ways. Indiana, Kentucky, Ohio, and Illinois produce far more big-time college basketball players per capita than the national average. The vast majority of early country music singers were from the upper South.

The landscape of an area is a blending of the natural environ-

ment and a cultural imprint. The land survey system used widely in the United States during the 19th century created a striking grid rectangularity to the landscape of much of the Middle West. The German and English farmers of southeastern Pennsylvania built large cattle and hay storage barns with a second story extension over the first on one side. While students of folk architecture may argue its origins, most agree that this “Pennsylvania barn” is a key identifying element in the landscape of the state’s culture area. Ethnic areas in many cities can be located simply by looking at the names on small neighborhood stores and restaurants.

While many aspects of culture are conservative and consistent, change is nevertheless a constant part of American culture. Many of the alterations result from changes in technology and economic conditions. Migration is another key ingredient.

Of the individual elements of American culture, one of the most interesting and telling is religion. A number of the larger Christian churches were brought to America

by European migrants. The distribution of these denominations closely matches the areas where those migrant groups and their descendants form a large part of the population. For example, German and Scandinavian settlers carried their Lutheran church to the northern Great Plains and the northwest portion of the Agricultural Core. Hispanics in the Southwest, southern and eastern Europeans in the Northeast, the Middle West, and most large cities outside the South, and French Acadians who migrated to southern Louisiana—all help explain the widespread distribution of Roman Catholicism in America.

The United States has also been a place of active denominational creation. Several denominations, such as the Episcopalians (formerly part of the English Anglican church), were created at the end of the American Revolution in the late 1700s. Presbyterianism in the United States is divided into several denominations as a result of a post-Civil War split.

Another explanation has been the creativity of American religion. Individuals established their own churches—or congregations or groups of congregations left a denomination to form a new one—because of disagreements over such questions as biblical interpretation or church administration.

One native American church is

the Church of Jesus Christ of Latter-Day Saints, commonly known as the Mormon church. Founded in upstate New York in the mid-19th century, it was gradually carried westward by its followers in search of an isolated place to settle and follow their beliefs. They eventually chose Utah. Today, most residents of Utah are Mormons.

Southern Baptists are an interest-

ing joining of several of the above explanations. Baptism was brought to America by early European migrants as a non-established church seeking freedom of worship. During the last third of the 19th century, it was almost the religious expression of Southern culture and became the dominant regional church. One measure of whether a community is culturally part of the South surely must be the existence in it of at least one Southern Baptist church. ■

In 1961, a French geographer published a monumental study of the highly urbanized region located in the northeastern United States. Professor Jean Gottmann spent 20 years researching the area extending from southern New Hampshire and northern Massachusetts to Washington, D.C. (map 3). He argued that this was a “very special region,” and he named it Megalopolis.

Megalopolis was formed along the northeastern coast of the United States by the gradual coalescence of large, independent metropolitan areas. As the populations of these cities grew, the effects of growth spilled over into the surrounding rings of smaller places. Larger suburbs in these rings made their own contributions to the total urban sprawl. The outer fringes of the resultant metropolitan regions eventually began to merge with each other to form an extensive urbanized region.

The dominant theme of Megalopolis is “urban-ness.” In varying degrees, urban services provide for the millions who live in this region, and urban forms are never far away. There are office and apartment buildings, small shops and mammoth shopping centers, factories, refineries, residential areas, gas

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stations, and hamburger stands by the thousands—interspersed with warehouses to store temporarily the goods brought by ship, rail, and truck—all this along the region’s 800-kilometer route.

But Megalopolis also contains many green spaces. Some are parks or other land available for recreation; well over 3 million hectares are devoted to farming.

In spite of the mixed character of Megalopolis, it is its massive urban presence that makes this region so important in the United States. Ten of the country’s 46 metropolitan areas exceeding 1 million population in 1990 were located in Megalopolis. The region holds 17 percent of the total U.S. population—in only 1.5 percent of the area of the country.

Average per capita income is high, and a higher than average proportion of its residents work in white-collar and professional occupations. Transportation and communication activities are prominent, partly a result of the region’s coastal position. Approximately 40 percent of all commercial international air-passenger departures have



Megalopolitan centers as their origin. And almost 30 percent of American export trade passes through its six main ports.

THE LOCATION OF MEGALOPOLIS

Why has this particular portion of the United States developed as it has? Whenever a geographer is asked such a question, the first aspect of the region considered is usually its location. And, indeed, in the case of Megalopolis, the site and the situation of this vast urban



region hold clues to its origins and growth.

Many of the site characteristics are visible in the region's outline. Occupying a coastal position, the eastern margin of Megalopolis is deeply convoluted. Peninsulas jut into the Atlantic Ocean. Islands are scattered along the coast, some large enough to support communities. Bays and river estuaries penetrate the landmass in a kind of mirror

image of the land's penetration of the ocean. This interpenetrated coastline brings more land area close to the ocean and, in this way, provides greater opportunity for access to cheap water transportation than would a straighter coast.

Quality harbors must also be present, and Megalopolis straddles some of the best natural harbors in America. The northern half of Megalopolis was covered by ice during the most recent of the continental glaciers. As the ice cover began to melt, large river spillways were formed. The erosive power of the rivers cut deeply into the flat coastal plain. As sea level rose, the lower river valleys were "drowned" to form estuaries, and the ocean margin was shifted toward the land's interior. These glacial river valleys formed some of the harbors that later proved useful in the development of Megalopolis.

The other major contribution of the glacial period is more specific to one or two locations. The large amounts of soil, stone, and other debris scraped up by the expanding glaciers were deposited as moraines when the ice front retreated. One series of ridges was left by retreating glaciers just south of what is now the coast of Connecticut. These moraines developed as an island when the seas rose, and it was widened by deposition from the ocean. The island was

not made so wide, however, that it could be called anything except Long Island.

Long Island has enhanced the quality of New York's harbor in two major ways. First, the length of coastline available for port facilities, already significant along the Hudson River, is increased considerably. Second, when an urban area grows around a large, fully developed harbor, the growth creates a demand for more space. Good land to accommodate the New York area's urban growth was restricted to the west of the Hudson River in New Jersey by tidal marshes and the erosion-resistant ridge of the Palisades. To the east of the Hudson lies only a narrow finger of land, Manhattan Island. But beyond the East River is Long Island, a flat to slightly rolling land without the barrier marshes of New Jersey. New York's boroughs of Brooklyn and Queens developed early at the western tip of Long Island, and the island offered a great deal of room for further urban expansion toward the east.

Although Megalopolis possesses many high-quality harbors, there are few other site characteristics

that contributed so positively to the region's urban economic development. The climate is not exceptionally mild, although the summers are generally of sufficient length and wetness to support farming. Soils are variable, with the soils inland from Baltimore, Maryland, and Philadelphia, Pennsylvania, better than most found closer to New York.

The general topographic features of Megalopolis south of New York do provide additional urban site benefits. Traveling inland from the Atlantic Coast, a very flat coastal plain is succeeded by a rolling, frequently hilly landscape called the Piedmont. The irregularly rolling relief of the Piedmont is underlain by very old, very hard rocks. This surface is resistant to erosion, and the level of the Piedmont is maintained above that of the coastal plain. Wherever rivers flow off the Piedmont, therefore, a series of rapids and small waterfalls are formed along a line tracing the physiographic boundary—a boundary known as the fall line.

Early settlers found the fall line to be a hindrance to water navigation but an obvious source of water power. Settlements developed along the fall line, locations as far inland as possible but still possessing access to ocean shipping. In addition, because the fall line was often the head of navigation,

goods brought inland or those to be exported had to be unloaded at fall line locations for transfer to another mode of transport. These sites also benefited from goods moving for export from the interior to the head of river navigation. In many cases, manufacturing processes could be applied here as well.

This portion of North America was also on or near the most direct sea route between Europe and the productive plantations of the Caribbean colonies and southern America, at least on the homeward voyage. The ports around which Megalopolis later grew, therefore, were convenient stopping places and contributed actively to the transoceanic trade that expanded rapidly during the 18th and 19th centuries.

Also critical to this growth was the location of the core cities relative to the country's interior. Philadelphia and Baltimore grew rapidly because each was the focus of a relatively good-sized and good-quality agricultural region. Access routes to the interior were constructed early and helped support the growth of the trading functions of these cities. Inland from Boston, the soils were (and are) too shallow and rocky and the terrain too rolling for good farming, but the New

England hills were covered with hardwood and pine forests nearly ideal for ship construction. Also accessible were the very productive fishing banks off the New England coast and farther south in the rich Chesapeake Bay area.

The importance of accessibility in evaluating a city's situation, however, is most apparent in the case of New York, whose chief advantage lay in its position at the head of the best natural route through the Appalachian Mountains. The Hudson-Mohawk River system, later amplified by the Erie Canal, railroads, and highways, provides access to the Great Lakes to the west, which, in turn, provide access to the broad interior of the country. As settlement density and economic activity on the interior plains increased, large amounts of the goods produced were carried to the urban cores of Megalopolis. The city that benefited most from this growing trade was the one with the greatest natural access to the interior: New York.

During America's colonial period, as trade grew between Europe, the

Caribbean area, and the American mainland, small-scale manufacturing began to appear in the larger port cities from Baltimore northward. As urban industry grew, the demand for labor increased, drawing immigrants from northwestern Europe or diverting large numbers of workers from farming, thus swelling the populations of these cities. Banks and other financial institutions underwrote investments in local manufacturing and shipping. Service activities, wholesale and retail businesses, centers of information and control all grew and supported further urban expansion, with the greatest growth occurring in New York, Philadelphia, Boston, and Baltimore.

The most unusual feature of this region is not the fact that these cities grew, but that four such large cities (later to become five with the addition of Washington) continued to grow in close proximity to one another. Washington is unique, of course, because even though it, too, is located on the fall line, its growth has followed directly from expansion of the national government structure. The other four cities, along with many smaller ones along the Megalopolitan axis, depended largely on economic stimulation. So great was national growth during the 19th century, and so strong were the linkages between the interior and these four ports, that none of

the four could wholly absorb the flow of goods to any of its neighbors and competitors. By the turn of the 20th century, the combined economic resources of these cities' hinterlands had reached continental proportions.

THE URBAN ENVIRONMENT

Throughout Megalopolis, it is the urban forms and urban functions that provide the most significant regional unity to the territory. Tall buildings, busy streets, crowded housing, and industrial plants accompany an array of cultural opportunities—theaters, symphony orchestras, art museums, and large libraries. Also sometimes apparent are deterioration—dilapidated structures, traffic congestion, and air pollution. All of these and more are present in the metropolitan areas of Megalopolis.

These characteristics are also found in most large cities around the world. What distinguishes Megalopolis is that the urban characteristics in this region have spread out so far from their core cities that these urban regions have begun to merge with one another in a process of metropolitan coalescence. Megalopolis became in this way a kind of gigantic laboratory in which intensively urban patterns and peculiarly urban problems could be observed developing at a very large

scale.

Population densities in Megalopolis are high, averaging about 305 persons per square kilometer in 1987. Of course, some peripheral counties have populations that are only 10 to 20 percent of the region's overall average density. Settlement density increases as a city is approached, until very high densities are reached near the city core. In New York City, for example, 1987 densities exceeded an average of 226 persons per square hectare, which amounts to more than 22,660 persons per square kilometer.

What other features of city organization are associated with this density pattern? Modern cities result basically from the locational consequences of economic activities. When someone decides to move or to relocate a business into a city, the economic advantages of such a choice fundamentally dominate the decision. So pervasive are these advantages that large numbers of people live close to one another, often closer than they would prefer, and tolerate many negative consequences to participate

in the benefits of city organization.

An increasing number of urbanites, however, have minimized some disadvantages of city living by moving their residences to suburban locations. Others have moved even farther, into a zone referred to as exurbia. From small towns, areas of converted vacation homes, and rural estates, exurban commuters travel to distant workplaces. But this spread of population has not eliminated the disadvantages of clustering, only shifted the population facing them. It has also spread the workplaces for those living in the region; a smaller proportion of a sprawling metropolitan population than previously still finds it necessary to enter the central city for work.

A key component of the urban landscape is interaction. In general, the cost of moving something is directly proportional to the distance it must be moved. Activities therefore cluster in cities so that movement costs are minimized. The importance of the ability to move from one place to another in urban regions is evident from the high proportion of urban land devoted to facilitating interaction. The lines of interaction for human movement are visible in streets, subways, bridges, tunnels, sidewalks, and parking lots. In older cities such as those in Megalopolis, the downtowns were laid out when travel was by foot and horse-drawn carriage; there-

fore, these cities have only about 35 percent of their total central areas devoted to landscape features that support human interaction. In newer cities, developed largely after the rise of the automobile, the proportion is much higher.

Other forms of interaction may be equally important but less visible. The easy movement of information and ideas is supported in cities by the intensively developed telephone, telegraph, teletype, and other communications systems. Ninety years ago, the central business districts of all large cities were crowded with spiderweb networks of telephone lines, testifying to the intensity of communication demands; today, telephone lines are wound into cables and placed underground.

Perhaps the prime motivation for interaction is the geographic separation of supply and demand. Economically, if an item or service is needed at a location that cannot meet that need, the good or service must be obtained at another location. Interaction may occur as a result.

The implications of all this for city landscapes should be clear. There are a great many different kinds of activities in a relatively small area. Some functions tend to

cluster together, while others are scattered across the urban region. Since a variety of activities are carried on in a city, interaction is stimulated between functions or within zones of the same function. When the activities are mapped, the result is a greatly mixed pattern of land use.

The concentration of population and urban activities requires supporting functions as well. Traditionally organized and operated as various branches of city government, these public service functions are only indirectly productive in an economic sense, but they are necessary for commerce and industry.

In addition to such services as water, electricity, and sewage and garbage collection, cities provide police and fire protection, construction and maintenance of public movement facilities, health care, documentation of vital population statistics, and educational facilities, among others.

So pervasive did these services become in large cities that immense governmental structures developed to administer them. In the New York metropolitan region, to take the extreme case, more than 1,550 administrative agencies were in operation in 1982.

Yet another major component of the urban landscape is its level of accessibility. Easy access between

most sections of an urban area has not always been a dominant consideration in city organization and structure. The original street plans of most cities in Megalopolis, for example, followed the simple square or rectangular grid pattern popular in the 17th and 18th centuries.

As these cities grew, the inadequate access provided by this street system became apparent. A square grid, for example, possesses frequent, right-angle intersections. Because the traffic flow is interrupted at each intersection, a greater traffic volume leads to longer pauses at each intersection. By 1900, Baltimore and Boston had each exceeded populations of 500,000, Philadelphia had reached nearly 1.3 million, and New York was approaching 3.5 million. The main impact of the automobile was then still in the future, but serious congestion was already present in these cities' centers.

Beginning in the 1950s, changes occurred that led to the rapid areal expansion of cities and the increased use of automobiles for travel. An increasing proportion of the work force in the cities began to live at distances and in residential densities that made it uneconomical for mass transit to reach them. Economically, the speed and flex-

ibility of truck transport accelerated the diversion of short-haul freight from rail to road carriers. Traffic planners responded by recommending construction of peripheral circumferential, or ring, highways and high-volume, limited-access expressways to separate local movement from cross-town and through traffic. Partly successful, these changes, plus others, also increased demand for access within the city center, between the center and the periphery, and eventually between sections of the periphery. The entire pattern of accessibility became more complex and difficult to manage.

All of this accentuates another component of the urban landscape. This is a landscape of change. Tens of thousands of new residents enter a large city like Philadelphia or New York each year. Even greater numbers have been leaving, some to distant cities and some only into the metropolitan fringes. Structures are destroyed, new ones built. Street patterns are altered, the pattern of functions is changed, and flows of people, goods, and ideas are shifted to fit these new patterns.

Such changes may be observed in any major region in America, but, in some ways, they actually created Megalopolis.

MEGALOPOLIS

Perhaps the most fundamental and far-reaching change in Megalopolis during the last 40 years has been the great areal expansion of major metropolitan areas. Greater New York clearly has extended its population the farthest, but the Boston, Philadelphia, Baltimore, and Washington areas have also grown greatly. New York had both the largest initial population and the most intensive economic concentration, but the other three port cities possessed firm foundations for growth as well. At the same time, the federal government rapidly expanded its operations. The District of Columbia (Washington and the District of Columbia are coextensive) was no longer large enough to absorb the burgeoning civil service population and the growing number of people needed to feed, clothe, and otherwise serve them. Urban development spilled into the neighboring states of Virginia and Maryland.

The spread of urban population far beyond city limits also had a strong impact on rural activities in Megalopolis. As city populations grew, a greater number of people had to be fed by foodstuffs shipped in from rural areas. The tens of mil-

CHANGING PATTERNS IN

lions of people in urban Megalopolis consume agricultural products from across America and beyond. Many of those farming the agricultural land close to the cities, however, chose to specialize in higher-priced foods and in products with high perishability. Dairy products, tomatoes, lettuce, apples, and a variety of other intensively produced “table crops” came to dominate farm production in sections of rural Megalopolis.

Also, as land on the margins of urban areas was approached by dense settlement and intense economic activity, the price of land was driven up. A 60-hectare farm purchased decades ago for \$20,000 as agricultural land might eventually be sold to a real estate developer for \$1 million. The developer, in turn, might subdivide the land into 250 home lots of 0.2 hectares each and then, after putting in utilities and streets, sell each lot for \$25,000, or a total \$6.25 million.

Even if a farm family could resist the profitability of such a sale, the taxes on the land rose sharply toward urban levels as nearby areas begin to be used for urban activities. Until land use controls were put in place to keep land in agriculture, the only way for a family to remain in farming was to pursue intensive agricultural production devoted to high-value products.

Urban sprawl and the cor-

responding shifts in agricultural practices in Megalopolis were pulled along the main lines of interurban access between the major urban nodes. Strong flows of traffic developed early between the cities of Megalopolis. When people who continued to work within the major cities relocated their residences, it was only natural that a high proportion chose sites that allowed them easy access to the main cluster of workplaces. The arterial highways and, to a lesser extent, the interurban railroads and main feeder roads became the seams along which metropolitan populations spread first and farthest. As a consequence, the urbanized areas merged first along these main interurban connections. And the demand for increased accessibility generated the construction of even better interurban movement facilities.

As the populations of the separate urban areas grew, the composition of the populations also changed. Prior to 1910, the cities of Megalopolis absorbed large numbers of immigrants from Europe. These migrants passed through one or another of the large Megapolitan ports, usually New York.

Those who did not continue westward into the farming areas or urban centers of the Midwest and Great Plains settled in dense clusters within Megalopolis's cities, usually forming communities of each nationality.

When World War I broke out in Europe, the flow of emigrants stopped, and a new set of migration flows began to filter into Megalopolis. What had been a slow trickle of black migration from southern states began to grow. Black migrants and groups of rural whites from the region repeated the patterns of settlement used by migrant groups from Europe. Most blacks settled within the cities in areas that were already occupied by small black populations.

As the black migration continued through mid-century, population densities increased and generated outward expansion from the original core areas. Often, after many decades of population increase within a city, black densities began to increase in outlying regions of black settlement as well.

Two entirely new aspects of urban change appeared during recent years—a change that may be national in scope but is most dramatic in the largest and oldest cities such as Megalopolis's ports.

First, during the late 1960s, for the first time in U.S. history, people began to leave the largest metro-

politan regions—considering both central city and suburbs together—in greater numbers than those who moved in. Smaller cities and towns and the rural areas between them in general have been the primary recipients of these population shifts.

Second, there has been an eruption of high-rise office clusters at various locations in metropolitan areas. The appearance of new metal and glass office skyscrapers has transformed the downtown skyline of many American cities since the mid-1970s. But this feature is no longer limited to the old city cores. Massive office clusters have emerged within the suburban rings surrounding the central cities—many exceeding the square footage of office space of a major city downtown. This change is one that appears to affect most significantly the location of jobs and the pattern of travel to them, rather than the location of residences.

Clearly, urban areas are landscapes of change, and the changes in Megalopolis suit the unusual character of the region. The changes there have been continuous, they have been drastic, and they have occurred on a scale unmatched anywhere else in the world. ■

Manufacturing is an important economic activity in the United States. The evidence of this is everywhere—in articles of clothing, items of preserved food, residential structures, means of transport and communication, and many other things.

In spite of the presence of items manufactured outside the country, domestic industry remains paramount, and it is rare for any medium-sized U.S. town to be without at least some local employment in manufacturing.

The northeastern United States, excluding northern New England, is the country's single most significant region of manufacturing (map 4). This region is loosely defined on three sides by the Ohio River Valley, Megalopolis, and the southern Great Lakes. The western margin of the region is less clear; it blends gradually with agriculture-dominant landscapes across southern Indiana, Illinois, and beyond.

In spite of the region's moderate extent and the growth of manufacturing elsewhere, the Manufacturing Core continues to be of tremendous economic significance in American geography. Its factories produce most of the country's steel, as well as a significant percentage of its motor vehicles and motor vehicle

THE MANUFACTURING CORE

CHAPTER

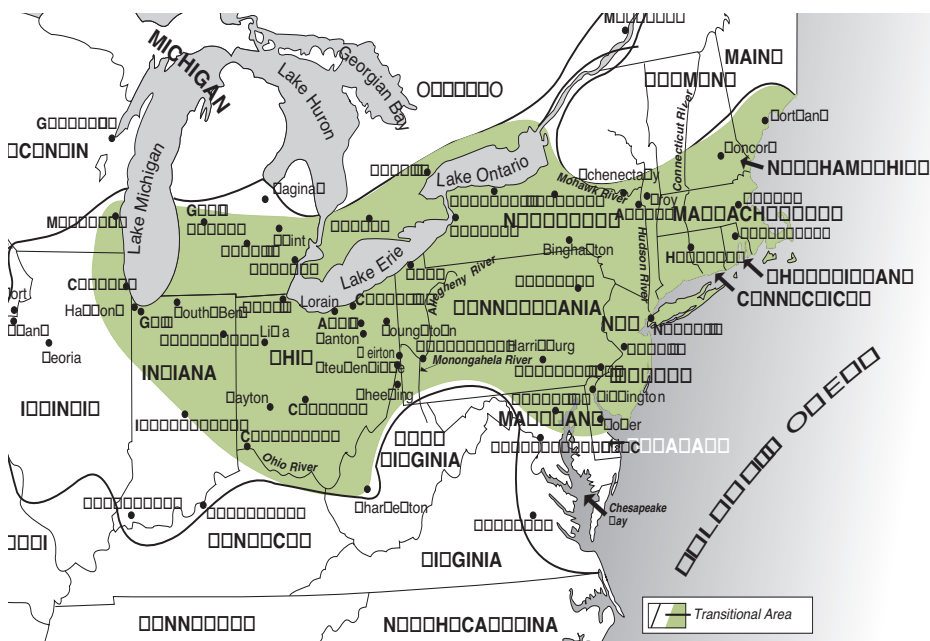
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parts. Most of the important ports, the main centers of communication, and the primary financial centers are within or near the region, and the country's political capital is on the immediate margins.

The region includes the two largest clusters of coalescing metropolitan areas: Megalopolis, and

the group of large urban regions between Milwaukee (Wisconsin) and Chicago (Illinois) on the west, and Cleveland (Ohio) and Pittsburgh (Pennsylvania) on the east.

Understanding America's Manufacturing Core is made difficult by its strongly dual character. In many respects, it was the vitality and productivity of the territory's farm population that created the resources and the demand for industrial production. Success in agriculture supported the region's early market centers, and it was the gradual mechanization of agriculture that demanded diversified manufacturing support. Mechanical reapers, winnowing machines, and cultivat-



ing implements by the tens of thousands were required during the later 1800s. Tractors, hay balers, pumps, and increasingly specialized farm machinery continued to be important local sources of industrial demand during the first half of the 20th century. Transportation lines were improved and expanded to carry the tremendous volume of agricultural products grown on the region's farms.

Therefore, we encounter here a single portion of America that must be treated as two interdependent

MAP 4

thematic regions. One theme, the urban and industrial nature of the region's manufacturing centers, is discussed here. The other, the rural and agricultural character of the territory's small towns and countryside, is presented in

chapter 10.

Turning to the manufacturing theme, what set of conditions or circumstances led to the development of so complex a mix of economic interrelationships on this portion of the continent? What is it about this region that encouraged the growth of heavy manufacturing industries and all of the related human activities that have come to dominate

here?

MINERAL RESOURCES

The United States is blessed with industrial resources. America's broad interior plains are nearly enclosed by zones of metallic mineral concentrations: the Canadian Shield to the north and two linear areas, one extending northeast-southwest (the Appalachian Mountains) and one extending northwest-southeast (the Rocky Mountains). Furthermore, much of these same interior plains are underlain by large deposits of high-quality mineral fuel, especially in the eastern section. In terms of the mineral requirements of heavy industry, then, a relatively small triangular region contains much of what is needed.

Also, the interior portion of America's Manufacturing Core possesses great accessibility resources. Connecting the mineral-rich Canadian Shield and the fuel-rich interior plains, the five Great Lakes—Superior, Michigan, Huron, Erie, and Ontario—represent an internal waterway unlike any other in the world. The Great Lakes are interconnected with only two significant changes of elevation. A small

drop of about 6.7 meters between Lake Superior and Lakes Huron and Michigan was overcome by locks at Sault Sainte Marie, Michigan, first opened in 1855. The much greater change of elevation between Lakes Erie and Ontario might have been a serious barrier to water transport, but the Welland Canal (first opened in 1829) was built in Ontario to skirt Niagara Falls, and the Erie Canal was constructed (by 1825) in New York to permit some freight to avoid Lake Ontario altogether. With these exceptions, the lakes offered well over 800 kilometers of inexpensive transportation to early developers of America. Later, in the 19th and early 20th centuries, the same cheap transportation was of critical importance to those moving the Shield's iron ore to the coal fields in Illinois, Indiana, Ohio, West Virginia, and Pennsylvania. Much of the basis for the location of the industrial capacity that developed along the southern margins of the Great Lakes can be attributed to this natural accessibility resource.

Within the interior core, flowing westward from deep within the coal-rich Appalachian region, the Ohio River crosses the interior plains for hundreds of kilometers before joining the Mississippi River. Dozens of tributaries supply the Ohio with its water and provide further accessibility, either directly because they are navigable, too, or

less directly because they offer easier routes of land movement through their valleys. Along the western margin of the core region, the Mississippi River and its tributaries provide access from the south and west.

So unique is this combination of spatial and mineral resources that the Manufacturing Core in the United States is often thought of as this interior territory alone. References to “the industrial Midwest” or “America’s industrial heartland” may seek to fire the imagination, but they are geographically incomplete. The American Manufacturing Core includes both the interior core and Megalopolis, the urban region through which the interior has its primary linkage to international commerce.

Prior to 1830, the region’s urban and industrial development was limited almost entirely to the Atlantic Coast in the ports’ immediate hinterlands. European settlement of the trans-Appalachian area consisted of scattered subsistence agriculture and a few urban outposts. Between 1830 and the outbreak of the U.S. Civil War in 1860, population density in the interior increased and agriculture intensified

and began to produce a regular surplus, spurring demand for efficient centers of exchange. The foundations for the growth of the region are reflected in the gradual shift of transportation concentration as railroad lines began to be spread across the interior plains.

The technological changes that directly affected the manufacturing geography of the United States have been grouped by one geographer, John Borchert, into four periods, or historical epochs as he called them.

Writing in *Geographic Review*, Borchert identified the earliest period, 1790-1830, as the Sail-Wagon Epoch. During this period, almost all cities and towns were associated with water transportation. The Atlantic ports and towns that had their beginnings along some of the coastal rivers were the major urban centers. The greatest inland urban growth during this period occurred along the main inland waterways—the Mohawk River, the Great Lakes, and the Ohio River.

The second period, 1830-1870, was triggered by development of the railway, a radical innovation in land movement. The Iron Horse Epoch at first stimulated further growth in the already established port locations. The new railway networks were constructed to focus on the port cities. Aside from additional growth of the larger port

cities in what was soon to become Megalopolis, the greatest growth occurred in such cities as Pittsburgh (Pennsylvania), Cincinnati (Ohio), and Louisville (Kentucky) (all on the Ohio River); Buffalo (New York), Erie (Pennsylvania), Cleveland (Ohio), Detroit (Michigan), Chicago (Illinois), and Milwaukee (Wisconsin) (all on the lower Great Lakes); and St. Louis (Missouri), Memphis (Tennessee), and New Orleans (Louisiana) (all on the Mississippi River).

The Steel-Rail Epoch, 1870-1920, was stimulated by the development of steel, the replacement of iron rails with stronger and heavier steel rails, increased demand for bituminous coal, and the spread of electric power generation. Although the greatest growth in national urban areas occurred in cities only peripheral to the Manufacturing Core, there were several notable exceptions—the numerous smaller cities near the coal fields, near the Great Lakes, or on one of the major rail connections between larger cities. These cities were able to establish themselves because the interconnecting rail network crisscrossed the region so densely between the Ohio River and the Great Lakes. Akron, Canton, and Youngstown, Ohio, are clear examples, because they are located between the coal-and-steel city of Pittsburgh and the iron-ore port and steel city of Cleveland.

A fourth epoch, the period 1920-1960, was the Auto-Air-Amenity Epoch. The main effects of transport innovations such as the automobile and the airplane were to increase individual mobility and to minimize the impact of shipment costs in the production process. Industry was drawn to areas of greatest population growth; these were primarily the amenity areas (California, Florida, Arizona) outside the traditional manufacturing core.

The United States entered yet another period after 1960, one that might be called the Information Technology Epoch. As the U.S. economy becomes more dependent on the production and exchange of information, the means of processing and transmitting this information will encourage the growth of industries that do not need cheap bulk transportation or even large population clusters. This suggests that those factors that supported growth in the Manufacturing Core cities during the first two-thirds of the 20th century will no longer provide those cities with special development advantages during future decades, although their skilled labor forces, large markets, and estab-

lished air transportation patterns will make some of them strong competitors for growth.

CITIES IN THE REGION

With Boston, New York, Philadelphia, and Baltimore based early and firmly on commerce and the financial exchanges it stimulated, these ports and their satellites began to accumulate population long before manufacturing became dominant in the U.S. economy. Although manufacturing was drawn to the eastern coast by the promise of matchless local markets, tremendous labor supplies, and easy access to water transportation, the economies of most of Megalopolis's cities maintained a distinctly professional character.

New England was the exception by developing manufacturing at the same time that its ports were growing. Shipbuilding industries thrived along the coast and generated countless subsidiary manufacturing operations needed to supply such a complex industrial undertaking. When factory industry began to grow in importance elsewhere in America, New England had several advantages that kept manufacturing significant, the most important of

which was the ready availability of power in the area's small but abundant rivers.

Boston, as the regional capital of New England, characterizes many of the changes in this portion of the continental core. Boston's apparel and leather industries, as well as shipbuilding in nearby Connecticut, are remnants of an earlier period, but most growth in the last 50 or so years has occurred in electronic components and machinery. The harbor and the facilities found there remain excellent, but industry in New England now ships most of its products by land, either to markets in the rest of the United States or south to New York for export through Megalopolis's primary port.

New York's primacy among American harbors has been discussed. As might be expected, manufacturing industries found proximity to this node of international commerce and the population cluster around it to be very advantageous. So strong was this pull that New York's industrial mix became extremely diversified. Many industries were located on Manhattan until after the beginning of the 20th century. The increasing demand for space by the even more space-intensive office businesses gradually pushed the heavier industry to the very margins of lower Manhattan or beyond the island's confines into the New Jersey tidal

marshes across the Hudson River.

The New York metropolitan economy has been dominated for some time by office industries. These are the headquarters for activities of dozens of companies and corporations, the banking and insurance cluster, publishing houses, and all the other service and control centers that require a worldwide information network and the facilities to transmit their responses rapidly.

Philadelphia and Baltimore, so different in industrial inheritance and urban character, have shown indications during recent years that they may be becoming more alike. Philadelphia's manufacturing base is almost as diversified as New York's, although there is a greater emphasis on food-processing industries and on shipbuilding and ship repair.

The growth of Philadelphia's industrial base suffered somewhat from the presence of New York's better harbor and superior access to the interior only 120 kilometers to the north. But Philadelphia's better access to the coal and steel

regions of western Pennsylvania, its respectable port facilities, and its heritage as an early political and cultural center in the United States have maintained the Philadelphia metropolitan region's growth within Megalopolis. Baltimore, on the other hand, has always been on the periphery of the Manufacturing Core region. Like Philadelphia, its port possessed good rail connections with the coal and steel regions of the interior, and Baltimore's industrial mix reflects this. The manufacture of transport machinery is also important in Baltimore.

Two additional industrial sectors—metals fabrication and chemicals—are well represented in Philadelphia and Baltimore, and they emphasize the coastal connections of these regions with the heavy industrial interior.

The major cities of the other, larger portion of America's Manufacturing Core region, the industrial Midwest, have derived their primary character from their location relative to the rich mineral and agricultural resources of the continent's interior. Almost all of the large cities in the western portion of the manufacturing region are located along the Ohio River or one of its tributaries, or along the shores of one of the Great Lakes.

Most important in the development of urban centers in the interior portion of the Manufacturing

Core has been the movement of metallic mineral ores from the margins of the Canadian Shield to the coal fields of western Pennsylvania and West Virginia, and the smaller movement of coal in the reverse direction. Iron ore is mined at the Mesabi range of northern Minnesota and at the Gogebic, Marquette, and Menominee ranges in northern Michigan and Wisconsin. Mesabi ore is now processed into pellets at the deposit site, but for decades unprocessed ore was carried to the southern shores of Lakes Michigan and Erie in large ships designed specially for Great Lakes travel. Pellets and ore are carried to the southern shore of Lake Michigan, to Hammond and Gary in Indiana, where these shipments are met by coal transported north by rail from the large Illinois coal fields. Most of the ore, however, is shipped to Lake Erie ports. From there, it is either carried south, primarily to the steel cities of the Ohio River, or converted to steel in the lakeside cities using coal carried north on the return rail trip from the Appalachian fields.

Of the cities of the interior core, Pittsburgh is the one whose name

became synonymous with steel. Located where the Allegheny and Monongahela Rivers join to form the Ohio River, Pittsburgh was in an excellent position to take advantage of access to both raw materials and downriver markets. The Allegheny and the Monongahela drain the coal-rich margins of the Appalachians, and the Ohio flows along the southern margins of the Agricultural Core and into the Mississippi. As Pittsburgh grew, industries that depend on steel crowded onto the narrow river bottoms to take advantage of proximity to low-cost water transportation. Metal-fabricating industries, machine parts, and other industrial consumers of large quantities of steel located their plants in and around Pittsburgh. Nearby cities also benefited from the powerful pull of steel at Pittsburgh. Youngstown, Canton, and Steubenville in Ohio, Wheeling and Weirton in West Virginia, and New Castle and Johnstown in Pennsylvania shared to some degree in the industrial growth of this region and obtained steel and steel products industries.

Urban-industrial growth did not occur solely at the source region of coal. The iron ore shipped across the lake system had to be transferred to railroads at points along the Lake Erie shore for final movement to the Pittsburgh region.

Cleveland was the largest of the

Lake Erie port cities. Cleveland's initial growth was stimulated by a canal connecting the narrow and winding Cuyahoga River with a tributary of the Ohio River. Although the city quickly outgrew this small initial advantage, it was enough to give Cleveland a head start on its nearby urban competitors. The diverse industrial base that resulted took advantage of the accessibility offered by the lakes and by the major east-west railroads connecting New York with Chicago and the Agricultural Core to the west. Cleveland's growth also spilled over into adjacent ports, such as Lorain, Ashtabula, and Conneaut, Ohio, and perhaps as far east as Erie, Pennsylvania, and as far west as Toledo, Ohio, as well as to complementary growth centers inland, such as the rubber-producing city of Akron, Ohio.

Buffalo, New York, is located at the eastern end of Lake Erie. Wheat from the Plains states is brought to the western Great Lakes and carried in bulk to Buffalo for refining. The same factors that generated steel and metals manufacturing elsewhere along the lakeshore helped ensure that a significant portion of the city's manufacturing would be connected to this type of

industry. The harnessing of nearby Niagara Falls for hydroelectric power attracted chemical and aluminum industries.

The city on the narrow water passage between Lakes Huron and Erie, Detroit, grew rapidly only early in the 20th century because it is located more than 80 kilometers north of the primary New York-Chicago rail connection. It was not until the rise of the industry that fostered the railroads' chief land transport competitor—motor vehicles—that Detroit developed the character for which it is best known. The most successful automobile manufacturers concentrated in Detroit and nearby cities, and the demand for automobiles skyrocketed, drawing a variety of component suppliers to southeastern Michigan.

The smaller of the two remaining metropolitan centers along the southern Great Lakes margin is Milwaukee. In addition to its industrial mix of heavy industry and motor vehicle manufacturing, Milwaukee is one of the leading centers of the brewing industry, a result of the large number of German immigrants who settled in Wisconsin during the late 19th century. A significant food processing industry is also present in Milwaukee, because it is a major focus for the middle Dairy Belt of the state.

Chicago is easily the dominant

city of the interior Manufacturing Core. So important did this city become that, for many years it was called the “Second City,” recognizing Chicago’s population (2,725,979 in 1990) as second only to that of New York City. Although Los Angeles now outranks Chicago in population, the informal “capital” of the Midwest persists as the strongest urban focus of the United States’ interior.

Located along the southwestern shore of Lake Michigan, Chicago occupies the optimum location for the transfer of people and goods between lake transportation and the rich agricultural region to the west and southwest. The Illinois and Michigan Canal, located in part through the heart of the city, was completed in 1848 to link the Great Lakes and the Mississippi River system. Four years later, Chicago was connected to New York by rail and became the primary regional rail focus in the Midwest.

Chicago absorbed thousands of immigrants throughout the later 19th century and spawned a radial network of rail lines into Illinois, Wisconsin, and the agricultural states beyond. Meatpacking developed around the city’s large stockyards. Other industries, such as furniture and clothing manufacturers, located there to take advantage of the growing local market and good access to markets farther west.

After the turn of the century, the steel industry was introduced to the Chicago region, south of the city itself but still along the lakeshore in Illinois and Indiana and easily accessible to the city’s unparalleled railroad network.

Already a city of 1 million by 1890, Chicago doubled in size before 1910 and exceeded 3 million by the mid-1920s. The volume of Chicago’s manufacturing activities today is matched only by the immense diversity of products manufactured, making the city at least partly an effective regional counterbalance to the intense economic nodes in Megalopolis. ■

A map of America's eastern seaboard reveals a lack of large cities along the coast north of Boston. Few major overland routes extend inland from this coast, and interior cities are generally smaller than those along the ocean. This area, comprising northern New England and the Adirondacks of New York, can be referred to as the Bypassed East (map 5).

The Bypassed East is near, even astride, major routeways, but not on them. Ocean transportation can easily bypass the region, putting it in a transportation shadow that has produced slow regional economic growth and even stagnation.

Southern New England is a part of metropolitan America. Northern New England, for the most part, is not. It is much more like Canada's Atlantic Provinces.

THE PHYSICAL ENVIRONMENT

Much of the Bypassed East is beautiful. The Presidential Range in the White Mountains of New Hampshire contains some of the most rugged topography in the eastern United States. The extensive shoreline thrusts out into the Atlantic and meets the ocean's waves with a heavily indented coast that mixes dramatic headlands with many small coves bordered by rocky

THE BYPASSED EAST

CHAPTER

6

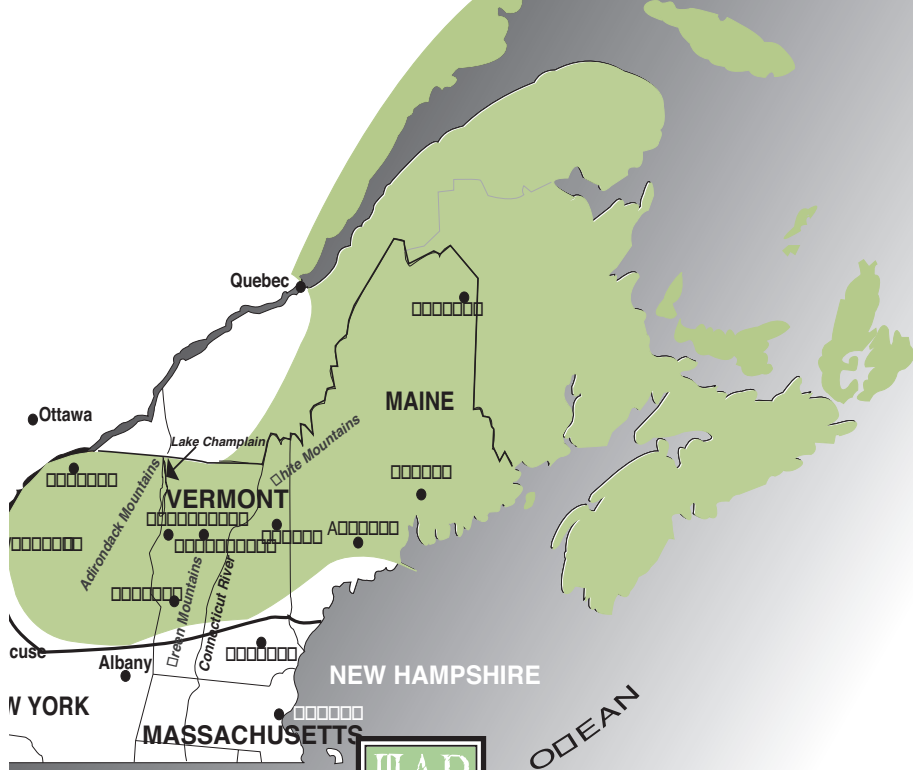
beaches. Large empty areas, almost totally lacking in settlement, are only hours away from some of the largest cities on the continent.

Most of the Bypassed East is a part of the north-eastern extension of the Appalachian Uplands.

However, the structure of the area bears little surface resemblance to the clearly delineated ridge and valley system of the southern Appalachians.

The Adirondacks, in northern New York, are a southern extension of the Canadian Shield. This broad upland was severely eroded by continental glaciation, so that the surface features are generally more rounded than angular. Although elevations in the Adirondacks are not great, the areal extent of this highland is considerable.

A large upland plateau covers most of New England. This upland is old geologically and has also been heavily eroded by moving water and ice. One result is that elevations throughout the region seldom top 1,500 meters. Widespread scouring by continental glaciers rounded most of the hills and mountains



across the plateau. Only where elevations were high enough to remain above the moving ice can one find more rugged mountains.

The two major mountain areas of northern New England are the Green Mountains of Vermont and the White Mountains of New Hampshire. The Green Mountains are lower in elevation, less than 1,500 meters at their highest, and their tops are well rounded. The White Mountains, by comparison, rise to 1,900 meters, and their upper slopes are rugged and steep.

Farther south, where the upland plateau has been heavily eroded by flowing water, several isolated

peaks stand well apart from the major mountain areas to the north. The largest of them is Mount Monadnock in southern New Hampshire. Monadnock is a name given to all such areas of hard rock that have become low, isolated mountains as the surrounding rocks were removed by water erosion. Mount Katahdin, an equally dramatic monadnock, dominates the landscape of its portion of central Maine.

Although northern New England

(with New York) draws character from its mountains, its people find their homes and their livelihoods in the valleys and lowlands. The largest such areas are the Connecticut River Valley between New Hampshire and Vermont, the Lake Champlain Lowland along the northern Vermont-New York border, and the Aroostook Valley in northern Maine. A number of smaller lowlands border the seacoast, and innumerable streams have sliced the plateau throughout the area.

The Bypassed East is a place where polar, continental, and maritime weather systems meet, and the result is a climate that is seldom hot, often cold, and usually damp. Because of its location on the eastern side of America, the wind systems tend to push continental conditions into the area and to limit the maritime impact on the location. The substantial climatic difference between coast and interior is further increased by higher inland elevations.

The Labrador Current that flows southward along the Bypassed East is cold. Even in late summer, only the most intrepid swimmers are willing to dip themselves into its waters for more than a short time. Still, the climatic conditions along the coast are moderated substantially by proximity to the water. The growing season near the coast is as much as 70 days longer than

the interior average of 120 days. Average midwinter temperatures at coastal sites are often 3° to 6°C higher than at nearby interior locations. Midsummer temperatures, in contrast, are slightly higher in the interior.

The maritime influence brings frequent cloud cover and fog, particularly along the southern coastline, which serve to cool temperatures further during the summer. It is consequently difficult to grow crops that require summer heat and sunlight.

Almost all parts of the region receive substantial precipitation, usually between 100 and 150 centimeters annually. Precipitation is usually scattered evenly throughout the year. Snowfall is generally substantial, with most places receiving between 25 and 50 percent of their total moisture in the form of snow. Most interior locations average at least 250 centimeters of snow annually. Winter snowcover near the coast is sporadic, with frequent thaws and bare ground, but snow covers the ground inland for three to five months each winter.

POPULATION AND INDUSTRY

The Bypassed East is not an easy place in which to live and work.

Its harsh climate, hilly terrain, and thin, rocky soils limit agriculture, except in a few particularly blessed locations. Few mineral resource deposits of substantial size have been found until recently. Coupled with a small local market and relative isolation, this has limited the development of manufacturing. The advantages that the area does offer thus become relatively more important.

This was not always the Bypassed East. Its foreland location, jutting far out into the Atlantic Ocean, meant that its shores were among the first parts of the New World encountered by European explorers and settlers. By the mid-17th century, many of the small harbors of central and southern Maine housed British villages. Settlement was kept out of the interior by the American Indian population until the middle of the 18th century.

To the early European settlers, the rich fishing banks off the coast of Maine were immediately important. The banks, shallow areas 30 to 60 meters deep in the ocean at the outer margins of the continental shelf, underlie waters that are rich in fish. Their shallowness allows

the sun's rays to penetrate easily through much of the water's depth, which encourages the growth of plankton, a basic food for many fish. Cold-water fish, such as cod and haddock, are abundant. Using this resource, the early settlers began a substantial export of salted cod.

The other prime resource of the region was its trees. The white pine was dominant in the forests of New England. A magnificent tree, it reached heights in excess of 60 meters and stood straight. Its wood was clear, light yet strong, and easily cut. Almost all of the virgin forests are gone now, and the second- and third-growth forests that remain are short and insignificant in comparison. Forest resources allowed the state of Maine to become a center for ship construction.

Agriculture was the third major occupation of the early settlers, but farms tended to be small and production limited. Early farming was primarily a subsistence activity.

The peak of agricultural development in northern New England probably came just after the start of the 19th century. But two developments elsewhere in America soon began to pull people off their farms, first in a trickle, then in droves. One was the opening of the West. Settlement moved beyond the Appalachians onto the rich farmlands south of the Great Lakes

early in the century. Then, in the 1820s, the construction of the Erie Canal, and later other canals farther west, made the markets of the East Coast more accessible to western farmers. The poor farms of upper New England rapidly lost what little market they had to crops imported from places like Ohio and Indiana. New Englanders left their farms and joined the migration westward, exchanging bad land for good.

A second blow to the region's agricultural fortunes also occurred during the late 1700s and early 1800s with the development of manufacturing in southern New England, where the Industrial Revolution began in the United States. Industrial growth created a great demand for labor. That demand was first met with New England farmers seeking the higher wages and steady income offered by manufacturing employment. An increase in child and female labor, particularly in the textile mills, further enhanced the value of manufacturing work over farming.

Agricultural decline has continued across most of the Bypassed East for the last 150 years. Today, less than 10 percent of the land in the three states of northern New England is in farms; 100 years ago,

the amount was closer to 50 percent. Until the last decade or two, many northern New England towns had patterns of population decline that lasted for a century or more. Farming retreated off the slopes, allowing them to return gradually to forest. Even in the valleys, soils were often too infertile, the climate too cold, and the farms too small for successful agricultural production.

Where farming in the Bypassed East remains important, it tends to specialize in single-crop production and to be concentrated in a few favorable locations. For example, the acid soils of Washington County, in northeastern Maine, support one of America's major centers of wild blueberry production.

While agriculture is found in a number of other locations, two significant areas of agricultural production in the region deserve special notice. One of these is the St. John-Aroostook Valley, an area of northeastern Maine and western New Brunswick (in Canada). The area's silty loam soils are ideal for potato growth, and the short growing season encourages a superior crop that is used widely elsewhere as seed potatoes. Large-scale, mechanized farming predominates.

The valley's potato growers have gone through a difficult period during the past several decades as a result of a declining market demand

for potatoes and a preference on the part of consumers for the potato products of Western growers. As a result, poultry and eggs, mostly from large producers in south-central Maine, now account for half of the state's agricultural income—double the potato's share.

The second area is the Lake Champlain Lowland, whose proximity to Megalopolis gives it a substantial market advantage over more distant areas for the sale of milk, a relatively high-bulk, low-cost product that spoils easily and cannot be stored for any extended period. The Champlain Lowland supplies milk to both New York City and Boston. The area's summers are mild and moist, a climatic condition that encourages the growth of fodder crops. These cool summers are also well suited to dairy cows.

Vermont has long led the United States in the per capita production of dairy products. Dairy farming accounts for 90 percent of the state's agriculture, and much of it is found in the Champlain Lowland.

In much of the Bypassed East, the land is in trees, so lack of a large-scale wood-products industry may be somewhat surprising. However, earlier uncontrolled logging and limited organized reforestation meant that much of the forest that replaced the original trees is of poor quality for both lumber and pulp production.

An exception to this pattern of limited output is the pulpwood production of northern Maine. Here, on some of the most inaccessible large tracts of land in the eastern United States—where a small number of private owners control most of the land—forest industries remain important.

Fishing also remains an important, if troubled, part of the economy of the Bypassed East. Maine lobstermen account for about 80 to 90 percent of the total U.S. lobster catch, and the state also leads in sardine production.

There are two kinds of ocean fishing in the region. Inshore fishing, the most important, uses small boats and requires a relatively small capital investment, with lobsters and cod the most valuable catch. Deep-sea fishing on the banks off the coast requires far larger boats and more capital investment. Most fish caught on the banks are bottom feeders such as cod, flounder, and halibut.

Offshore fishing has recently been threatened by the high demand for domestic petroleum in the United States. Fears of pollution from offshore oil drilling in the country's rich fishing banks were overruled in 1979 when the Department of the

Interior granted exploration leases to several oil companies, and major resources of petroleum and natural gas have been discovered.

Mining other than for offshore petroleum and natural gas in the Bypassed East is not currently of great importance. This was not always the case. Iron ore has been mined in the Adirondacks for more than 100 years, and the reserves there are still substantial, but total output from the mines is relatively small.

The igneous and metamorphic rocks of northern New England have made the area an important producer of building stone for years. Many granite quarries operate in central Vermont and along the central coast of Maine. Vermont is also the leading marble-producing state in the United States. The value of all of these rocks is small compared to the minerals industries found in other parts of the continent, but it is still an important element in the economy of the two states.

CITIES AND URBAN ACTIVITIES

By a slight majority, most of the residents of the Bypassed East are urbanites. However, the region contains few substantial urban areas. The two largest cities of northern New England are Burlington, Vermont, and Lewiston, Maine, both of which have about 40,000 residents.

The small size of the major regional centers is a good indication of what may be the greatest single reason for the relatively low per capita income levels found in the region. Most higher-income occupations in the United States are urban based, and this area lacks urban occupations. Although they are less than half of the total, a high percentage of the work force is engaged in primary occupations, which are traditionally among the lowest paying in America. The absence of a large local market and poor access to major urban areas means that primary industries have not served as the foundation for the development of a more broadly based manufacturing economy as they have elsewhere in the United States.

Nevertheless, there seems to be reason to anticipate that the economy will grow in northern New England. The 1980 U.S. census indicated that Maine, New Hampshire, and Vermont were the only states outside the South and West to grow at a rate above the national average. In the 1980s, New Hampshire continued to grow at a rate well above the national average, and Vermont

and Maine were only somewhat below the average.

There seem to be several reasons for this shift in regional population fortunes. One is the gradual northward growth of Megalopolis. As the cities of the urban region expand, as new peripheral areas urbanize and become a part of urban America, and as people search farther outward to find residences away from the large cities, the Megalopolitan periphery has been pushed steadily northward in New England.

Northern New England is also attracting a number of new manufacturing facilities, which tend to be light industry with medium-sized work forces. In part, they are locating in the region because the employers and their workers find the small-town and rural environments to be good places to live. Also, the construction of several interstate highways into the region during the 1960s has provided greater accessibility.

Tourism has been northern New England's boom industry since the mid-20th century. Fishing, skiing, canoeing, and just driving around looking at the beauty of the place—all of these are a part of this tourist growth.

The economy of the Adirondacks area is also heavily dependent on tourism. Lake Placid, home of the 1932 and 1980 Winter Olympics, is but one of many ski areas. The state

of New York oversees much of the area through its Adirondack State Park, America's largest state park.

Strung along the seashores and around the lakes, and strewn across the mountains, is a growing collection of vacation homes—second homes for the well-to-do. They are occupied by the owners for a few months or a few weeks each year and then rented for as much of the rest of the time as possible to help pay the purchase and upkeep costs. In a number of the counties of northern New England, there are more of these part-time dwellings than there are permanently occupied houses.

Finally, many of the coastal communities of Maine, the small college towns of Vermont and New Hampshire, and old villages throughout the region have become popular retirement centers. ■

The Appalachian Uplands, stretching from New York to Alabama, and the area of the Ozark-Ouachita mountains are separated by some 400 kilometers of land. They are actually two parts of a single physiographic province that have a strong topographic similarity and an unusually close association between topography and human settlement.

Early settlers, when they reached the shores of colonial America, heard tales of a vast range of high mountains to the west. As they moved into those mountains, they discovered that their elevation had been exaggerated. Only in a few small areas do the Appalachians or Ozarks approach the dramatic vistas so common in the West.

Nevertheless, most who concern themselves with such questions would agree that much of the Appalachian and Ozark topography should be called mountainous. Local relief is greater than 500 meters in many areas, and it is sometimes greater than 1,000 meters. Slopes are often steep.

The human geography of Appalachia remains closely intertwined with its topography. Without the mountains, the area would merely be a part of several adjoining areas, such as the Deep South. With them, Appalachia

APPALACHIA AND THE OZARKS

CHAPTER

7

and the Ozarks exist as a distinctive and identifiable American region (map 6).

A VARIED TOPOGRAPHY

Appalachia is composed of at least three physiographic provinces.

These sub-areas are arranged in parallel belts lying roughly northeast-southwest.

The easternmost belt is the Blue Ridge. Composed of ancient Precambrian rocks, this section has been severely eroded, and its highest elevations are currently only a fraction of their former levels. The Piedmont section of the Atlantic southern lowlands bounds the Blue Ridge along Appalachia's eastern side from New York to Alabama.

The Blue Ridge generally increases in elevation and width from north to south. In the south, especially south of Roanoke, Virginia, is the most mountainous part of Appalachia. The changes in elevation from the Piedmont onto the Blue Ridge are usually abrupt and substantial. In Pennsylvania and Virginia, the Blue Ridge is a thin ridge between the Piedmont and the Great Valley to the west; along the North Carolina-Tennessee border, it broadens to a width of nearly 150



kilometers.

To the west of the Blue Ridge, one encounters the ridge and valley section. This is part of the great expanse of sedimentary rock beds that lie between the Blue Ridge and the Rocky Mountains. The eastern edge of these beds has been severely folded and faulted, resulting in a linear topography.

The ridge and valley section aver-



ages about 80 kilometers in width. It is occupied by many ridges, usually rising 100 to 200 meters above the separating valleys. Gaps in the ridges are relatively infrequent and usually have been created by rivers that cut across the grain of the area. Several kilometers wide,

the valleys provide some of the best farmland in Appalachia. The ridges throughout this section generally are composed of relatively resistant shale and sandstone, and the valleys usually are floored by limestone.

Between the Blue Ridge and the first of the ridges is the Great Valley. Running virtually the entire length of the region, the valley (which is hilly rather than flat in most areas) is historically one of the important routeways in America, and one that has tied the people of Appalachia together more than any other physical feature save the mountains themselves.

The westernmost part of Appalachia is the Appalachian Plateau. The plateau is bounded by a steep scarp (slope) on the east called the Allegheny Front, which was the most significant barrier to western movement in the country east of the Rocky Mountains. The topography of this region has been created largely through stream erosion of the horizontal beds of the interior lowland. Erosion created a rugged, jumbled topography, with narrow stream valleys bordered by steep, sharp ridges. The northern portion of the Allegheny Plateau, in New York and Pennsylvania, has a rounder, gentler appearing landscape. Except for limited areas, level land is scarce. Most communities are forced to squeeze themselves into small level spaces in the stream

valleys.

The Ozarks-Ouachita uplands follow a topographic regionalization broadly similar to the Appalachians, with the "grain" now east-west instead of northeast-southwest. The Ouachita Mountains to the south exhibit a series of folded parallel ridges and valleys. They are separated from the Ozarks by the structural trough of the Arkansas River Valley. The Ozarks is an irregular, hilly area of eroded plateaus, much like the Appalachian Plateau section.

THE APPALACHIAN PEOPLE

Settlers did not push through the Blue Ridge into the Appalachian Highlands until late in the colonial period, 150 years after initial occupation of America's East Coast. The easiest and first-used passage-way into the Great Valley and the mountains beyond was in southeast Pennsylvania, where the Blue Ridge is little more than a range of hills. Many Pennsylvanians found the mountain lands to the north and west inhospitable. Consequently, they gradually spread their settlement down the valley into Virginia. They were soon joined by others moving inland from the southern lowlands.

Then, late in the 18th century, people began settling the valleys and

coves of the surrounding highlands. The land they chose was poor in comparison with areas farther west. Its ruggedness, coupled with the cool upland climate, rendered most of the region unacceptable for the plantation economy. Only in some of the broader lowlands did a few sizable plantations develop.

When American settlers came to this area in the late 18th and early 19th centuries, the region provided adequate settlement potential for smaller farms. About 10 to 20 hectares of cleared land was all a farmer could handle. Such plots were available in the stream valleys. The forests teemed with game, wood was plentiful, and animals could graze in the woods and mountain pastures. By the standards of the time, this was reasonably good land, and a farming population soon occupied the mountains.

Much of the region gradually grew more isolated and separate from other areas. As flatter, richer agricultural land to the west was opened and grain production was mechanized, the small Appalachian farm became increasingly marginal economically. Even famous pathways through the region, such as the Cumberland Gap at the western tip of Virginia and the Wilderness Road from there to the Bluegrass Basin of Kentucky, were, in fact,

winding and difficult.

East-west travel between the northeastern seaboard and the Great Lakes area followed the route of the Mohawk Corridor and the flat lakeshore of Lake Ontario, thus avoiding the northern Appalachian uplands. There was no easy passage at all across the southern Appalachians. Major railroad lines skirted the area.

Appalachia, particularly southern Appalachia, was slow to develop any substantial urban pattern. In part, it shared with the rest of the South an emphasis on agriculture that continued well after other regions of the country had begun their rush toward manufacturing and urban living. Also, the products of Appalachia were few, and the demand for the goods and services of cities was limited. Added to this was the paucity of transportation.

One major result of the lack of both plantations and urban development was that few new migrants were added to the early settlers. These people tended to stay where they were, and, as time passed, their attachment to family, community, and land grew. This regional immobility led to the development of a cultural distinctiveness uncommon in the rest of the United States. Appalachia became increasingly unusual by simply remaining the same.

Appalachia's people are relatively

poor. In some areas, especially eastern Kentucky, Appalachia's major coal-producing area, much of the blame for the area's poverty can be attributed to a great decline in the regional demand for labor as coal mining was mechanized in the 1940s.

The region's people are conservative in attitude. Many of America's most conservative Protestant churches trace their roots to Appalachia. Others are found where mountain people have moved and taken their religion with them. Politically, most elected officials are decidedly conservative, although strands of rural populism are found. The area's provincialism is bred of the strong bonds of family and community formed in relative isolation, which tie their members together and lessen their association with others.

The southern portion of the area is the most clearly Appalachian, and the one that most Americans recognize as Appalachia. But much of what has been said here about the region's residents fits the Ozarks and the Appalachian region to the north as well.

The northern Appalachians are far less clearly associated with the broader region. Certainly they share the mountainous topography, and some of the early developmental problems created by steep slopes were also common. But poverty is far less evident than it is farther south. Also, more recent immigrants followed the early northwestern European settlers into the area. This is especially true in Pennsylvania and northern West Virginia, where coal mining attracted many East European migrants in the late 19th and early 20th centuries.

Many cultural patterns in the northern Appalachians, with religion a notable example, are not at all the same as those of the southern highlands. Fundamentalist churches are less common; in many counties, especially in Pennsylvania, Catholics and members of various Eastern Orthodox churches are in the majority.

Transportation within the northern Appalachians soon became far better than that in the southern Appalachians, in part because the mountains were less continuous and lower and, thus, more easily breached. Also, as the upper Midwest boomed, the northern Appalachians became the center of the continent's major belt of commercial and manufacturing growth. Transport lines connecting

the eastern and western portions of the manufacturing core region soon ribboned through the mountains. The economic consequence of this was far more development within the northern Appalachian area, especially in central and western Pennsylvania and New York, as compared to the southern Appalachians.

ECONOMIC AND SETTLEMENT PATTERNS

The national image of Appalachia is unquestionably rural. In some ways, this is valid. The urban percentage for the region is only about half the national average. A majority of the population is classified as either rural or rural nonfarm residents (people who live in rural areas but have urban occupations). However, Appalachia's high rural density is not supported by a large-scale, commercial agricultural system. Rather, small farms and minerals dependency (primarily coal) are the keys to this dense population.

Appalachia is America's primary region for owner-operated farms, with Kentucky and West Virginia leading the country in that category. Without any important commercial crop in Appalachia, there was little early growth of farm tenancy, and that pattern has remained.

The average farm in Appalachia contains only about 40 hectares. Furthermore, the rugged topogra-

phy, poor soil, and short growing season in much of the region have resulted in a limited amount of available cropland and a greater relative emphasis on pasturage and livestock. Because fields are small and scattered in the valleys, the efficient use of large farm machinery is nearly impossible. The net result of all this is that farm incomes are low. A great many of the region's farmers turn to part-time jobs to provide supplementary income that will allow them to remain on the farms.

The type of agriculture found in most of the region is called general farming; that is, no discernible product or combination of products dominates the farm economy. Extensive animal husbandry is the most common and probably best agricultural use of the steep slopes. A number of crops, such as tobacco, apples, tomatoes, and cabbage, are locally important in some valley areas, with small plots of tobacco being the most common cash crop in the southern Appalachians. Corn is the region's leading row crop, but it is normally used on the farm for animal fodder.

There are important exceptions to this pattern of semi-marginal agriculture. The Shenandoah Valley of Virginia, for example,

was early called the breadbasket of Virginia. Competition from wheat grown in the fertile grasslands of the Deep South and Great Plains forced the valley out of the national wheat market in the late 19th century. Although winter wheat is still grown, hay and corn for fodder and apples are now the valley's major crops, with turkey-raising also locally important. Dairying and apple production are important in the many valleys of central Pennsylvania. The Tennessee Valley is also a substantial agricultural district, with fodder crops and livestock most important.

Over much of Appalachia, farming's chief partner is coal. Almost all of the Allegheny Plateau is underlain with a vast series of bituminous coal beds that together comprise the world's largest such coal district. The coal seams have been exposed by the same streams that have, through their erosive activity, created the rugged topography of the plateau.

The coal of Appalachia became important shortly after the U.S. Civil War in the 1860s. It was the development of new types of coke-burning iron and steel furnaces that created this demand, because coke is processed from bituminous coal. The thick coal seams of southwestern Pennsylvania and northern West Virginia provided the fuel for Pittsburgh, Pennsylvania, to

rise to its status of Steel City during this period. As the nation turned to electrical power in the 20th century, coal from Appalachia provided fuel for electric-generating facilities along much of the East Coast and in the interior manufacturing core.

After the better part of a century of growth, the coal industry fell into a period of decline beginning in the 1950s. Production dropped as petroleum and natural gas replaced coal as major fuel sources. Between 1950 and 1960, many coal counties lost a full one-quarter of their population. The resulting economic depression, blending with the poverty common to Appalachia, created areas of particularly severe problems.

Today, growing power demands, coupled with continuing concern over the availability and cost of petroleum supplies and the safety of nuclear power, have reemphasized the need for coal in electric power generation. New generating plants use huge quantities of locally mined coal to produce electricity, much of which is transmitted to areas outside the region. Nearly 100 million tons of Appalachian coal is exported annually.

Appalachian coal is mined in several different ways. Underground or shaft mining was used first and

is still quite important, especially in the northern parts of the region. Modern underground mining techniques—huge mobile drills and continuous mining machines that rip the coal out of the seams and then deposit it on conveyor belts for the trip to the surface—mean that tons of coal per minute can be removed from a seam.

Surface or strip mining, which is far less expensive if the coal seams are near the surface, has increased greatly in importance. In the central region (primarily eastern Kentucky, western Virginia, and southern West Virginia), where the most important producing section is today, large machines remove the rocks along a slope above a coal seam and then simply lift off the uncovered coal. Extraction along several seams on a slope by this method creates a peculiar, stepped appearance that looks from a distance like a series of increasingly smaller boxes piled on top of one another.

About half of the coal mined in Kentucky and most mined in Ohio and Alabama is from strip mine lands, while most of the coal from

Pennsylvania, Virginia, and West Virginia—and two-thirds of that

from Appalachia as a whole—is from shaft mines.

The first important coal field in Appalachia was not the bituminous fields of the plateau. Their exploitation was preceded by operations in the anthracite field at the northern tip of the ridge and valley in Pennsylvania. Anthracite is a much harder, smokeless coal that was important in home heating. Anthracite was also a major fuel for ore smelting until techniques to produce coke from bituminous coal were developed in the 1860s. The decline in use of coal for heating, coupled with the lack of alternative uses for anthracite, led to an economic depression in the anthracite belt. Although substantial anthracite reserves remain, production today is minimal.

Coal has been a mixed blessing to the people of Appalachia. It has long been the economic mainstay for large parts of the region and has employed, either directly or indirectly, hundreds of thousands of workers. Still, tens of thousands have died in mine-related accidents. Black lung, the result of many years of breathing too much coal dust, has affected countless others. The recent recovery of production in response to increased market demands has been accomplished

mainly by greater mechanization. Most mineral rights are held by corporations that obtained them early and at low prices. While a number of Appalachian states have either initiated or increased surcharges on coal mined in their state, coal taxes remain low, and most coal profits leave the region.

In other mining activities, the Tri-State district in the Ozarks, where the borders of Oklahoma, Kansas, and Missouri meet, has long been a major area of lead mining. Southeastern Missouri, outside Appalachia, has produced lead for over 250 years, and surface mines there remain America's most important. Missouri has supplied most of the lead ever mined in the United States and currently produces more than three-quarters of the total national production.

The first oil well in the United States was drilled in northern Pennsylvania in 1859, and that state led the country in production through most of the 19th century. Today, the area supplies only a small part of the nation's crude oil needs, but it remains an important producer of high-quality oils and lubricants.

Finally, southeastern Tennessee is

the most important remaining area of zinc production in the United States. In addition, several mines around Ducktown, Tennessee, near the North Carolina and Georgia borders, are the only major copper producers east of the Mississippi River.

REGIONAL DEVELOPMENT PROGRAMS

Like coal, Appalachia's rivers have been a mixed blessing to the region. Some of the streams have been important transportation routeways, and water power was used by the earliest gristmills and sawmills. These rivers also had a darker side, for they frequently flooded their narrow valleys during periods of heavy rain. The southern highlands are the moistest area of the country east of the Pacific coast.

Out of a desire to control one of these rivers, the Tennessee, the largest and perhaps most successful regional development plan in American history was implemented. In the 1930s, a plan was conceived to harness the river and to use it to improve the economic conditions of the entire Tennessee Valley. As a result, the Tennessee Valley Authority (TVA) was first given the charge to develop the Tennessee River for navigation. Today, a three-meter barge channel exists as far upstream as Knoxville, Tennessee.

Most of the other activities of the TVA can be viewed as logical extensions of the initial commitment. Navigation development included the construction or purchase of a series of dams to guarantee stream flow and reduce flooding. As long as the dams were there, it was natural to include water-power facilities with them. Today, most of the more than 30 dams controlled by the TVA on the Tennessee and Kentucky Rivers have power-generating facilities. About 80 percent of the electricity produced at TVA facilities comes from thermal plants, including 10 that burn coal, and several nuclear-powered facilities. The TVA uses nearly 50 million tons of coal annually and is Appalachia's largest coal user.

The inexpensive electricity attracted to the valley a few industries that are heavy users of power, including a large aluminum-processing facility south of Knoxville. The country's first atomic research facility was placed at Oak Ridge, west of Knoxville, partly because of the availability of large amounts of power there. Knoxville, Chattanooga, and the Tri-Cities of

Bristol, Johnson City, and Kingsport are all substantial manufacturing centers. The TVA also became a principal developer and producer of artificial fertilizers, another heavy power-consuming industry.

Above the dams, the TVA initiated a major program to help valley farmers control erosion at the farm. The goal was to hold part of the floodwaters at the farm and to slow the rate at which the lakes were filling with silt.

In addition to the water itself, the Authority owned 520,000 hectares of land along parts of the rivers. Major public recreation areas were developed on some of this land, and the area is now a substantial recreation facility.

In 1965, Congress passed the Appalachian Redevelopment Act, which created the Appalachian Regional Commission (ARC). Responsible for an area that extends from New York to Alabama, the commission has spent several billion dollars in a program to improve the region's economy. Its primary thrust is to improve highways in Appalachia in the hope that this will decrease isolation and encourage manufacturers to locate in the region.

An additional government activity, the Arkansas River Navigation System constructed during the 1960s and 1970s and dedicated in 1971, established a three-meter

navigation canal up the Arkansas River from its confluence with the Mississippi River to Catoosa, Oklahoma, just downstream from Tulsa. The result has been an increase in barge traffic and the production of hydroelectric power from the many dams constructed to stabilize the river's flow.

What of the region's future? Certainly Appalachia and the Ozarks are not likely to become part of America's Manufacturing Core, and few in these regions really want that. Still, there is a sense of change. Parts of the southern highlands in Georgia, the Carolinas, and

Tennessee have witnessed a boom in recreational and second-home construction. Havens for the well-to-do are found in North Carolina, Virginia, and the Ozarks and Ouachita Mountains. The long-term pattern of out-migration from the region, while not ended entirely, has been reduced, and the gap between per capita income levels in the regions and the United States has narrowed. Economically, perhaps the worst is over. ■

The region of southern culture—the Deep South (map 7)—can be viewed as a geographic composite of beliefs, attitudes, patterns, habits, and institutions. Many of the early patterns and current changes are explicitly geographic; many others have geographic consequences.

Strong differences exist within the South. The Gulf Coast, the southern highlands, the Georgia-Carolinas Piedmont, and many portions of the northern interior South each possess their own versions of southern culture. But they are also clear about the “southern-ness” they share.

THE HERITAGE

The earliest European colonization in America was commercial and exploitative. And the coastal plain south of Delaware Bay, especially that south of Chesapeake Bay, contained many areas that appeared ideal for agricultural exploitation. The long, hot summers, regular rainfall, and mild winters permitted settlers a selection of crops complementary to those grown in northern Europe. The large number of rivers that crossed the plain, navigable by small boats at least, allowed settlement to expand freely between the James River in Virginia and the

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CHAPTER



Altamaha River in Georgia.

Population densities remained low throughout most of the region, with urban concentrations larger than the village size limited to port cities (Norfolk, Virginia; Wilmington, North Carolina; Charleston, South Carolina; Savannah, Georgia) or the heads of

navigation on the main rivers (Richmond, Virginia, and, later, Columbia, South Carolina, and Augusta, Georgia). The strong rural and agrarian elements of southern culture established a pattern that remained significant until after the mid-20th century.

The greatest return for the effort expended by Europeans in settling the Atlantic southern lowlands was through highly structured cash crop agriculture. The plantation organization came gradually to dominate the early southern colonial economy. Production of tobacco along the James River and to the south in northeastern North Carolina, and production of rice and indigo in and around the many coastal swamps in the Carolinas and Georgia, were important from 1695 onward. Cotton production grew slowly in importance until about 1800 and spread rapidly inland, from the ini-



MAP 7

tial concentrations on the Sea Islands between Charleston and Spanish-held Florida. Although privately held small farms were numerous, the plantation form of organization was successful enough that it was carried westward with cotton production and reached its most prevalent form in Georgia, Alabama, Mississippi, and Louisiana during the first half of the 19th century. Tobacco was similarly carried westward into Kentucky and Tennessee by settlers migrating from Virginia and North Carolina.

The South's spatial organization was weakly developed, with small market centers serving as collection and transshipment points; larger cities containing a variety of

economic activities were few in number. The transportation network accompanying this pattern was one that simply allowed the inland products to be moved most directly to the coastal export centers; interconnections between the smaller marketplaces remained few.

A major consequence was rural isolation for most of the region's population.

Large-scale plantation agriculture required a sizable annual invest-

ment, and much of that investment was in the form of slave labor from Africa. Once this practice was established, it restricted population immigration because potential settlers and urban workers found freer opportunities in the North. Since early in the 19th century, therefore, the South's proportion of foreign born has been lower than any other region of the country. And because significant immigration to the United States from countries outside Britain did not occur until the 1840s, the overwhelming majority of southern whites are of British descent.

Two long-term resident populations that are neither British nor African in ancestry are the Cajuns of southern Louisiana and several American Indian groups. The Catholic, French-speaking Cajuns are descended from French exiles from Canada. The rural Cajun population settled in southern Louisiana and remained culturally distinct in spite of the gradual integration of the remainder of the state into Deep South culture. Most American Indian groups were removed from the South in much the same ruthless manner and at the same time as in the Midwest, but significant exceptions remain. The

largest of these are the Lumbee in southeast North Carolina, remnants of the once powerful Cherokee in southwestern North Carolina, the Choctaw in central Mississippi, and the Seminoles in southern Florida.

Another strong element of Deep South culture took root in its agrarian communities and homesteads. The South's population has long been characterized by adherence to evangelical Protestant religions. Small, unpretentious church buildings still dot the countryside, consistently drawing their congregations every Sunday from the scattered rural and small-town populations. Methodist, Episcopal, and other Protestant congregations are numerous across the region, but it is the Baptists who have numerical dominion.

The heavy use of slaves in the southern colonies lies at the crux of both additional components of southern culture. One impact was the transfer of many elements of the African cultures to the region and the amalgamation of these elements with those of the white population. The first Africans arrived in Virginia in 1619, only 10 years after the initial James River settlement had been established. Although slaves were not imported in large numbers until the early 18th century, blacks were present in the region and were part of its organization and social

environment from the beginning. The impact on patterns of speech, diet, and music in the South is undisputed.

The other indisputable cultural consequence of the slave presence is less positive. To justify the enslavement of other human beings, it is necessary to consider the enslaved group as inferior. The acceptance of this view of blacks by southern whites was no different from the dominant European view until late in the 18th century. By the turn of the 19th century, however, opposition to slavery had gained strength in those regions where it was of less importance. Justification of slavery became more intense and self-righteous within the region, as pressure to eliminate it arose from outside.

By the outbreak of the Civil War in the 1860s, in which slavery was an underlying issue that pitted the North against the South, the South's geographic pattern of population settlement and economic organization had changed dramatically from its colonial beginnings. Still, it was strongly rural—urban development was limited to numerous villages and small towns, the larger cities were almost all located on the coast or at major transfer points along interior waterways, and transportation and communication networks were sparse.

Production of plantation cotton had become so successful that the

region's economy was dominated by this one crop. Other crops were grown—tobacco, rice, sugarcane, and hemp, for example—but primarily as a local food supply or a secondary cash alternative. In 1860, cotton dominated not only the South's economy but also, at least in terms of export income, the entire country's; over 60 percent of the total value of goods exported from the United States during that year was from cotton. Currently produced in significant quantity outside the South, cotton still ranked fifth in value of U.S. agricultural exports in 1996.

With the loss of the Civil War, the South's economic underpinnings were badly damaged. Railroads were torn up and equipment confiscated, shipping terminals disrupted, and most of the scattered industrial base destroyed. Confederate currency and bonds were worthless. Cotton stocks awaiting postwar sale in warehouses and ports were confiscated by northern forces. Farms and fields were in disrepair, and implements and livestock were often stolen or lost. The slave labor supply was formally eliminated, and large landholdings broken up or heavily taxed.

THE CONSEQUENCES

The first half-century following the Civil War was a period of readjustment for the South. The white population proceeded through several alternative reactions to the emancipated status of the large black population before finally settling into institutionalized segregation. Blacks, for their part, experienced changes in opportunity that were largely out of their control until more than a half-century after the war. This was also a period during which southern attitudes and feelings of isolation from the remainder of the country became even more inflexible.

The disintegration of the antebellum economic organization led to difficult times for most of the South's population during the 12-year period of reconstruction (1865-1877) following the Civil War. Quite aside from the destruction of transportation and manufacturing capacity, the plantation economy had become refined to the point of rigidity and overdependence on slave labor. After the war, a continuation of intense exploitation was necessary to meet heavy taxation and other costs of rebuild-

ing. The resource most available for exploitation continued to be the land; thus, cotton production remained dominant in the region's economy.

The other factors necessary for production, however, were much less available. Local capital was scarce, with much of it consumed by the war effort or drawn off after the war by the North through taxation. Interest rates increased sharply, and farmers found themselves continually in debt. This tended to perpetuate the southern dependence on agriculture.

With few jobs available in the small towns, most rural blacks were forced to make whatever arrangements they could with the remaining white landowners. Sharecropping—in which blacks were provided with credit for tools, seeds, living quarters, and food in return for a share of the crops raised on another's land—became the means of subsistence and the way of life, just as it was for many poor whites who had lost their land. Once this pattern was established, it was enforced with “black codes” that restricted black movements outside the agricultural areas and with a continuation of low educational opportunities. Even when they owned their land, black farmers were hampered by poor access to credit, farm sizes too small to be highly productive, and the anti-

black aspects of the regional culture.

About 1880, the environment for economic opportunities in the South entered a new phase. During this decade, manufacturing experienced rapid development led by the growth of the cotton textile industry. By 1929, 57 percent of the nation's cotton textile spindles were in the South, over two and a half times the share existing in 1890.

Natural and synthetic fiber industries began to appear in the region to produce the raw material for cotton and synthetic textile manufacturers, just as the textile industries provide the raw material for apparel manufacturing. Taking advantage of proximity, the growth in textile and apparel manufacturing across the Carolina Piedmont and in northern Georgia was followed by an increase in the number and output of fiber industries.

Cotton textile manufacturing was not the only new source of industrial opportunities. Reconstruction of the region's railroads and other public improvements stimulated the flow of money and the development of railroad towns. Cigarette manufacturing began to be focused in the tobacco regions of North Carolina and Virginia. With the establishment of a new federal land policy and a strengthened railroad

network, the South's large timber resources began to be exploited. Much of the timber was taken out as a raw material, but furniture manufacturing in North Carolina and Virginia and (after 1936) pulp and paper manufacturing throughout the South also were an outgrowth of the exploitation. These industries continue to be important.

Also, during the last quarter of the 19th century, technological improvements in iron-making led to the rise of Chattanooga, Tennessee, as an important center of iron production. At the same time, a large deposit of high-quality coking coal was discovered near Birmingham, Alabama, and exploitation of the seam was begun before the end of the decade. Numerous iron-making companies and iron- and steel-using industries accumulated in and around Birmingham and Chattanooga. These two cities combined with the transport focus and subsidiary industries in Atlanta, Georgia, to form an important industrial triangle by the end of the century.

This development was significant in the economic geography of the South because of the way in which iron and steel production tends to draw other manufacturers dependent on steel—industries that are not as low-skill and low-wage as textile and tobacco product manufacturing. Also, this centrally

located region of nonagricultural economic development could have been an industrial focus for the South as a whole, stimulating increases in labor skills, income levels, and general economic welfare through each city's connections with other major urban centers.

This did occur to some degree, but discriminatory shipping rates imposed on Birmingham-manufactured products dampened the beneficial effects considerably. Even though this pricing practice was eventually ruled illegal and stopped, the policy severely restricted the competitive cost advantage of Alabama steel during the rapid economic expansion decades of the early 20th century and contributed to the slow growth of southern industry.

In the late 1880s and the 1890s, restrictive laws were passed in each southern state requiring racial separation in more and more aspects of southern life. Formal segregation had many geographic expressions. Two sets of schools were operated. Two sets of restaurants, recreation facilities, park benches, drinking fountains, restrooms, and other points of potential contact between blacks and whites had to be constructed and maintained. Housing was separated into white areas and

black areas. Entry into certain occupations was restricted, and both overt and covert restrictions were placed on black efforts to vote.

For almost 50 years following the end of the Civil War, the slow trickle of black migrants who left the South increased very little. Thus, 91.5 percent of all U.S. blacks resided in the South in 1870 and 89 percent in 1910. During the next decade, however, the number of black emigrants increased sharply, "pushed" by restrictive laws, violence, and near-subsistence economic conditions. Too, World War I led to a strenuous effort by northern industries to "pull" blacks (and poor whites) from the South.

Prior to 1914, national industrial expansion had depended on millions of European immigrants to meet the large demand for labor. More than one-third of the U.S. population in 1910 was foreign born or had at least one parent born outside the country.

When the war shut off this supply, an alternative was found in the large unemployed and underemployed southern labor pool.

The southern economy might not have suffered from the exodus of blacks if the population involved had not also been selective. Most blacks who left were between the ages of 18 and 35. Raised in the South, this group's most economically productive years were then

spent outside the region. Many of those who remained behind were in their later productive years, retired, or not yet in the labor force. Racial limitations on opportunities in professional occupations also resulted in a loss of many of the most highly trained young people from the region.

Another consequence of the Civil War was an intensification of the sectionalism already felt in the region. The South is the only part of the United States to have suffered occupation by a conquering army, and it has taken more than a century and a great deal of economic growth to temper the bitterness that followed.

The Civil War and reconstruction were also instrumental in unifying Southern whites. The “Solid South” was a term that indicated that the entire region voted as a bloc and often in direct contradiction to otherwise national trends. The war and reconstruction were associated with the North and the Republican party, so southern whites became stubborn opposition Democrats. When southern whites could no

longer tolerate the ideological connection with the Democratic party, the explicit sectional label “southern Democrats” became common. Today, national political changes and southern cultural changes have made the South no longer solidly Democratic. The full range of the political spectrum is represented among southern elected officials, although the majority tend to continue some of the traditional orientations.

THE ONSET OF CHANGE

The spatial and regional characteristics of the New South have been built on patterns that evolved over decades and, in some ways, over centuries. The key to recent changes lies in the gradual loss of regional isolation.

Prior to the mid-20th century, most of the South’s population, and certainly its leadership, appeared to react to events as though the South was a separate country, reluctantly required to continue dealing with a northern neighbor. Since the later 1930s, however, and especially since the later 1940s, trends and pressures external to the South began to infiltrate the region and break down its isolation.

The economy of the South in the 1930s was little different from that of 1870: dominantly agrarian, producing raw agricultural products primarily for export, capital

deficient, supported by heavy use of animal power and hand labor, and operated through sharecropping and tenant-farming arrangements and a regionally distinctive crop-lien system. What industry existed was largely low-wage or oriented toward narrow local markets. The region's urban structure continued to reflect this orientation, with small market centers, railroad towns, textile mill towns, and county seats representing the pervasive urban form in the South.

Over the next half century, tremendous changes occurred. By the early 1950s, over half of the region's labor force was engaged in urban-based, nonagricultural employment; the proportion in agriculture has continued to decline. This paralleled a sharp increase in manufacturing employment and employment in service activities. Further, the industrial mix in the South has shown a strong trend toward diversification; no longer is southern manufacturing limited to the early stages of raw materials processing.

Within agriculture, diversification also occurred. Cotton remains the most important cash crop to the region; other crops include tobacco, sugarcane, peanuts, and rice. But the area producing cotton is only a shadow of its former size. This shrinkage was supported by the decay of old cotton-ginning

institutions in sections of the former production area.

While cotton dominance declined, livestock industries and other crops, such as soybeans, increased sharply. Beef production improved greatly as farmers improved pastures with better grasses and fodder crops and with higher fertilizer applications. At the same time, new cattle strains were developed to survive and thrive in the hot, humid southern summer. Within the last 30 years, national broiler and chicken production has become industrialized and concentrated in the South.

Even more dramatic has been the transformation in the means of farm production. Wherever possible, machinery has been applied to the production process, and regional agriculture is now much more efficient than before. The traditional sharecrop system has almost disappeared since the mid-1930s, and there has been a sharp increase in the average farm size in the South.

Rural-to-urban migration within the South increased rapidly as the region's economy participated in

the post-Depression expansion of the late 1930s. In 1940, there were only 35 cities with populations greater than 50,000 in the South. By 1950, the number had increased to 42, and by 1980 it had reached 75. Many other small southern places have developed a certain vitality from the larger growth centers.

The pull to the cities was stimulated by industrial growth and a diversification that promised to match that of southern agriculture and to produce a varied industrial mix. The proportion of the non-agricultural labor force in manufacturing jobs increased greatly, and in virtually every part of the region. The traditional industries—such as steel, tobacco products, and textiles—remained regionally important for a period but less dominant as other kinds of manufacturing activity appeared. Synthetic textiles and apparel industries, the former in the Carolinas and the latter primarily in northern Georgia, widened activities even within this broad industrial category. Chemical industries expanded rapidly along the Gulf Coast. Furniture production in the central Carolina Piedmont increased, and other wood-processing plants became more prominent throughout the eastern and Gulf coastal plains. Shipbuilding was continued at Norfolk, Virginia, and begun at several sites on the Gulf Coast; aircraft

production at Marietta, Georgia, drew skilled labor and higher wages to the Atlanta area.

Most significantly, as the average southern consumer earned higher wages, the regional market increased enough to draw many consumer goods manufacturers into the South. This increased the demand for nonagricultural labor, spreading the income further and strengthening the local market.

The South's rapid industrial growth is a consequence of a growing regional market, gradually demanding and able to pay for more goods and services. But the question remains: Why did the market expand? One observer has proposed that the federal government's Agricultural Adjustment Acts (1935 and later) provided the main stimulus to the market growth.

Before the acts took effect, the prices that farm products could demand were set to a great extent by supply and demand in the international marketplace. To the South, this meant that prices for southern cotton, for example, fluctuated partly according to the production success or failure in other cotton-growing areas of the world. More important, farm labor in the cotton

South was in competition with cotton producers in what was still largely a colonialized world economy. When agricultural wages and prices were adjusted upward under the Agricultural Adjustment Acts to reflect national industrial wage differentials, the sharply improved market in the South for manufactured goods initiated the upward development spiral still affecting the region.

In an act of federal intervention much more widely recognized as significant to the South's social structure, the U.S. Supreme Court in 1954 struck down the segregationist "separate but equal" doctrine permitted almost 70 years before. Changes in the South's social geography were initiated by this decision, changes that reverberated in every other part of the country

where race affected opportunity, and the repercussions are far from settled today.

A thread common to many of the South's changes since the mid-1930s is the gradual decline of its regional distinctiveness. Economic diversity is replacing simple dependency on agriculture. There are indications that the region's supply of low-wage labor is almost exhausted; new industry and service activities will have to compete more actively and may continue to force wages upward slowly. A significant infusion of northern migrants, especially to regional metropolitan growth centers, has made some of these cities less distinctively southern in culture and more clearly just urban. ■

The southern margins of the United States can be divided into two approximately equal sections. One half, the Southwest Border Area, shares a long land boundary with Mexico and includes an extensive inland area that has experienced many influences from that country. The other half, which we discuss here, traces the coastline eastward from the mouth of the Rio Grande River in Texas to North Carolina and includes the Florida peninsula (map 8). Both stretches are south-erly in latitude, and they share a small area of overlap in southern Texas, but the Southern Coastlands is as distinct from the Southwest Border Area as are any other two adjacent regions in America.

The Southern Coastlands is distinctive for two primary reasons. First, it has a humid, subtropical environment. The warm waters of the Gulf of Mexico also contribute a strong maritime influence to the coastlands' climate. The region has a clear appeal to visitors and potential residents, and its agriculture is distinctive because of this environment.

Second, the region's role in generating U.S. trade patterns with the rest of the world and its distinctive industrial pattern also help to

THE SOUTHERN COASTLANDS

CHAPTER

9

define it.

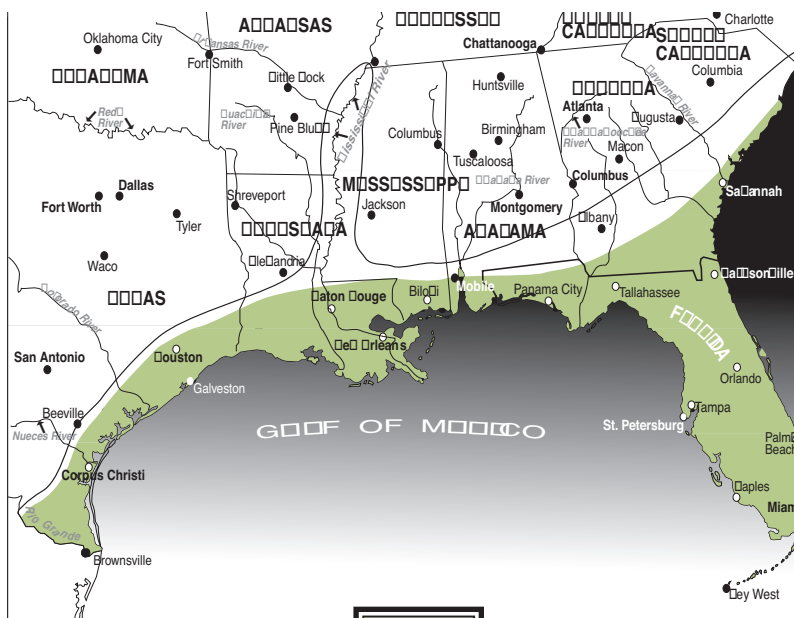
A third factor relevant to the character of the region is its position between the Deep South and Latin America. The cultural influences on the region from Latin America were buffered for a long time by the water separating most of the Coastlands' population from their neighbors.

But in recent decades, the growth of the population of Cuban heritage in southern Florida and the intensification of trade between Latin America and the United States has emphasized the distinctive character of this region.

THE SUBTROPICAL ENVIRONMENT

Of the several components that make up a physical environment, climate has the greatest impact on the human geography of the Southern Coastlands. A humid subtropical climate, a long growing season, mild winter temperatures, and warm, humid summers all contribute to patterns of human activity associated with the region.

Only in southern California,



southwest Arizona, and Hawaii is the average length of the growing season equivalent to that in the Southern Coastlands. Measured as the number of days between the last killing frost in the spring and the first frost in the fall, almost the entire region experiences nine months or longer of potential growth for its agricultural crops. Also, almost the entire region receives precipitation abundant enough for most agricultural activities—an average rainfall in excess of 125 centimeters, with most of the rain falling in the summer between April and October, when sunlight is plentiful and warm temperatures support plant growth.



There are two primary consequences of these climatic conditions. First, as long as other agricultural conditions are met, such as fertile soil, appropriate ground drainage, and control of insect pests, farmers can grow their crops without fear of frost until late in the fall. In a few locations, it is possible to harvest two crops in one growing season, and some vegetable

farmers are achieving even more. Second, and even more important, is the opportunity for production of specialty crops that can be grown in few other locations in the United States.

Citrus production has been a particularly important contributor to Florida's economy since it was first introduced to the region by Spaniards during the 16th century, although the areas of primary production have gradually shifted southward along the peninsula's interior.

Oranges and grapefruit are the most important of the seven major citrus fruits grown in the state. In 1992, over 6 million tons of oranges were harvested. Since 1945, an increasing share of the orange crop—now at about 80 percent—has been processed rather than sold as fresh oranges. By processing the oranges (mostly into frozen concentrate), a sizable industry has developed in Florida, spreading the benefits of this specialty crop among a larger proportion of the state's population than if only fresh fruit were shipped northward. In addition, processing allows year-round sales instead of limiting returns to the immediate harvest period.

Grapefruit is produced in an area almost coincident with orange production, but total demand is lower and output is only about one-fourth that of the more important crop.

Significant orange and grapefruit farming is also found under irrigation in the extreme southern portion of Texas.

Since citrus fruits are tree crops, a major share of their production costs are associated with the harvest. The fruit must be hand-picked, often from the top of a long ladder. Large amounts of short-term labor are required during the citrus harvest, which annually draws thousands of migrant laborers to dense, park-like groves for periods of intense physical effort.

Sugarcane production is exclusive to the Southern Coastlands in the mainland United States. Sugarcane is a perennial crop requiring more than one year for full maturity, and it is not tolerant of frost. In addition, water requirements for cane are high—a minimum rainfall of about 125 centimeters per year. Both temperature and water requirements would seem to preclude growth in the continental United States except under irrigation, but moderately large quantities of cane are grown in Louisiana and Florida.

Rice is less demanding than sugarcane in its climatic requirements. Given sufficient water, rice will mature within one growing season at a rate roughly in proportion

to the amount of heat it receives during the summer. Within the Southern Coastlands region, irrigated rice is grown in Louisiana and Texas.

In addition to the specialty crops, portions of the Southern Coastlands are among the country's primary regions of vegetable production. Most fresh vegetables reaching the urban markets during the winter are grown in Florida and the southern margins of the other Gulf coastal states. Also, efforts to eradicate the cattle-fever ticks, upgrade pasture, and crossbreed hardy Brahman bulls with improved domestic cattle has made the Florida beef industry an important contributor to that state's economy.

Although climatic conditions in the region are favorable for agriculture, soil conditions and quality are much more variable. The soils range from the fertile but poorly drained muck of the Louisiana coast and Mississippi Delta to extremely sandy soils in northern and central Florida. To complicate the pattern, sections of Gulf coastal Florida and the state's extensive Everglades region are largely swampy muck soils or poorly drained sands, while the coasts of Texas, Georgia, and South Carolina may have either marsh soils or sandy soils, depending on local conditions. Areas of muck in Louisiana have proven to be extremely productive, especially

for sugarcane and rice, once they have been drained.

In sharp contrast, much of the remainder of the Southern Coastlands benefits from heavy irrigation. The central highlands of Florida, for example, are underlain by sandy soils with moderately poor to very poor water retention capacity. The productive citrus-growing region and vegetable areas have yielded annual output as much as 10 times more valuable when the crops are irrigated than when precipitation is relied on as the sole source of moisture. With this degree of improvement possible and the technological capacity available for its achievement, the distinctive subtropical environment of the Coastlands has been developed agriculturally beyond the levels found in much of the interior Southeast.

Recreation and retirement are also major industries for the Southern Coastlands. Even by the early 1950s, the importance of amenity factors in stimulating the regional growth of Florida and the Gulf Coast was clear; since then their effects have increased.

A direct economic advantage is also generated by tourist activities in the region. Between New Orleans, Louisiana, and Mobile, Alabama,

the coastal section of Mississippi has experienced a tourist boom with construction of numerous hotels, motels, restaurants, and artificial beaches.

The most dramatic tourist magnet in the region, however, has been Florida. With long beaches facing both the Atlantic Ocean and the Gulf of Mexico, this state has drawn winter vacationers for decades. The demand for subtropical amenities has become so strong that the development of recreation resources has spread well north along the Atlantic margin into coastal Georgia and coastal South and North Carolina.

Not all tourist attractions depend on resources provided by nature. The construction of Disneyworld has brought millions of out-of-state visitors to south-central Florida. Many other new attractions were drawn to this part of the state, especially around Orlando, by the promise of tourist traffic and the possibility of tourist expenditures. This central Florida recreation complex is expected to become the inland link between Florida's east coastal and west coastal urban clusters.

Although the Southern Coastlands' subtropical environment has many advantages, this environment is not entirely beneficial. Agriculturally, successful vegetable production has encouraged growers to attempt to produce

crops year-round. Thus, when an occasional midwinter frost reaches into southern Florida, considerable crop damage can occur. Similarly, Florida citrus is harvested between October and late May, and a winter freeze can hurt the ripening fruit. Less well publicized is the potential damage of these untimely wintry blasts for sugarcane growers in Louisiana.

More erratic, more sporadic, more dramatic, and locally more destructive are the region's hurricanes—large cyclonic storms generated by intense solar heating over large bodies of warm water. Because these storms are an accepted feature of the region, and weather satellites and other forecasting tools are available, preparations to withstand the greatest force of the wind and rain can be made early. And because the heaviest damage is usually limited to a relatively narrow swath as the storm moves onshore, many portions of the region have not been affected for years. On the other hand, because hurricanes are so variable in occurrence and strength, settlements have spread in spite of warnings into coastal areas that are

very much exposed to the dangers of a large storm.

ON THE MARGIN OF THE CONTINENT: TRADE

The coastline of the Gulf of Mexico has only a few good-quality harbors suitable for large-volume trade activities. A shallow, emergent coastline containing many high-action beaches, much of the coast itself is either backed by extensive swamps or partially shielded behind offshore bars. If passage can be made through gaps in the sand bars, protection from rough seas is gained. Coastwise shipping uses this protection in the intracoastal waterway system. However, since most bays behind the bars are too shallow to provide good anchorage for ships engaged in transoceanic trade, most of the larger ports have developed on the edge of large river estuaries along the coastline or a short distance inland from the mouths of rivers emptying into the Gulf of Mexico or the Atlantic Ocean.

Each of the bays providing good harbor facilities is the outlet for a river draining a part of the interior, but these rivers vary greatly in navigability. All assisted early settlement expansion, and some are still navigated by small barges. All have had their access to the continental

interior strengthened by rail connections with major inland markets, or the river flowing into the coastal harbor has been improved for better navigation. Jacksonville, for example, was an early terminus for railroads entering Florida from Georgia. It also was the main focus for a hinterland that extended westward into the state's "Panhandle" and south into the agriculturally rich central highlands. A result was that Jacksonville was well established even before highway connections reinforced its locational bases for growth.

New Orleans is in a class by itself in terms of accessibility. It formerly was both a control point and a shipping focus for the entire Mississippi River system. The Mississippi was navigable (with caution) by shallow draft paddle-wheel steamers far to the north, well into the agricultural heartland. The river's main tributaries extended the single waterway system both westward into the Great Plains and eastward into the manufacturing core. New Orleans' site, within a large river meander and on the low-lying river delta only a few meters above mean sea level, meant that flooding was an annual threat often realized. But the city's situation was of such tremendous advantage to all associated with trade that its population grew early in the 19th century and has remained large.

New Orleans' French colonial heritage is consciously maintained in the city's French Quarter. And a distinctive mix of local Creole, Cajun, and European cuisines, a wealth of jazz and performances, and 18th-century architecture have drawn millions of tourists to the city. A visitor to New Orleans may be surprised by the heavy barge and ship traffic on the river (it is the busiest port in America) and by the heavy industry supported by this traffic.

The other major city in the western portion of the Southern Coastlands, the largest in the entire region by 1970, provides a contrast with New Orleans. Houston, Texas, is a new city in many ways. It was not originally a port city but has become one through construction (beginning in 1873) and repeated improvement of the Houston Ship Channel across shallow Galveston Bay. Its port connections became more important to growth in the late 1940s with the rise of the local petrochemical industry.

The main themes that characterize the Southern Coastlands can be

found uniquely represented in the unparalleled cultural transformation of the greater Miami, Florida, region.

Through the 1950s, Miami's attractions were treated as passive characteristics of place. It was enough to enjoy what was there. The city's weather was warm throughout the winter; its coastal location provided easy access to long beaches and warm tropical waters; the harbor required only modest improvement to ease the travel of cruise passengers from America to the Caribbean islands nearby. It was not until the 1960s that the region's location at the southern extremity of the continental margin led to the full integration of Miami into a hemispheric system of finance and commerce.

Key to the change in Miami's use of its location was Cuban immigration. Between 1959 and 1981, the Latin American population of the greater Miami area (about 85 percent of which is Cuban) grew from 25,000 to almost 700,000.

The Cuban population was absorbed relatively quickly into financial, commercial, and retail activities. The rapidity with which large numbers settled in Miami created its own "instant" market. Businesses in other parts of the United States that wished to expand their activities into Latin American

markets began to move at least part of their domestic operations to Miami to employ the Spanish-speaking Cubans. The trans-Caribbean business contacts brought with the Cuban refugees were also attractive to Anglo business interests. Multiplied many times in many ways and over several decades, this pattern has opened up Miami's natural geographic orientation toward the south.

INDUSTRIAL DEVELOPMENT

The true physical margin of North America as a continent does not coincide with the seacoast. A shelf of land below sea level extends beyond the coastline. In some cases, the shelf extends only a few kilometers, but along much of the Atlantic Coast and in the Gulf of Mexico, the edge of this shelf may lie more than 80 kilometers from shore. Mineral exploration along the coast from the Rio Grande River to the mouth of the Mississippi River has led to the discovery of an extensive series of petroleum and natural gas deposits, both onshore and off.

When the Gulf Coast oil field was brought into production during the early 1900s, Houston was still a moderate-size city of less than 75,000. When

the 1990 census was taken, the city had grown to 1.6 million, to rank it fourth in the United States behind New York, Los Angeles, and Chicago. Located about midway along the long coastal arc between the Mississippi River and the Mexican border, Houston also lies at the coastal apex of the Texas Triangle joining the cities of Dallas-Fort Worth and San Antonio. With Dallas ranked eighth in population in 1990 and San Antonio ranked tenth, connections with these major inland growth centers and the large cotton exports that originate in eastern Texas have also contributed to the locational strength of Houston.

The search for additional petroleum deposits along the Gulf Coast was extended seaward before mid-century. The petroleum companies' success created new problems, even while economic problems were temporarily alleviated by the discoveries. In overcoming the technological difficulties of drilling for and extracting petroleum using platforms far beyond sight of land, conflicting claims between state and federal governments over jurisdiction of continental shelf resources flared. One result of a complex series of court cases has been variable jurisdiction: Florida and Texas are sanctioned to claim up to 15.3 kilometers seaward, while Louisiana, Alabama, and Mississippi are limited to 4.8 kilometers.

The continuous rapid increase in domestic consumption of petroleum, natural gas, and petroleum products led the federal government, during the early 1970s, to open commercial bidding on offshore tracts between Biloxi, Mississippi, and Tampa Bay, Florida, and, beginning in the early 1980s, off the Atlantic Coast.

So extensive are the petroleum deposits along the coast between northern Mexico and the Mississippi River that the resource importance of the Southern Coastlands would be a national priority even if these deposits were the region's only mineral resource. Texas and Louisiana are currently two of the three leading petroleum-producing states (with Alaska). And while Texas and Louisiana possess large producing fields well inland from the Gulf, the coastal fields are major contributors to both states' totals.

The numerous scattered Gulf Coast deposits of natural gas are spatially intermingled with the region's long arc of petroleum deposits. Pipelines to carry the gas radiate from the main coastal production centers to the primary con-

sumption points across the country and within the Manufacturing Core.

Also, geologic formations of the Texas and Louisiana coastlands that contain petroleum and natural gas contain two additional minerals of economic value—sulfur and rock salt. The subsurface rock contortions found where petroleum and natural gas have been trapped in economically recoverable deposits were formed in this region by the gradual upthrust of large salt domes. Far less valuable than either of the mineral fuels, rock salt is nonetheless mined in large quantities in southwestern Louisiana. More valuable than salt is the sulfur found in the caprock covering many of the salt domes. The large sulfur deposits at Beaumont, Texas, and across the state boundary near Lake Charles, Louisiana, supply all U.S. needs. Additional deposits both inland and beneath the continental shelf indicate an abundance of this mineral for many years. Also of national significance is phosphate production from substantial deposits in Florida.

Petroleum and natural gas extraction do not, by themselves, usually generate strong local urban and industrial growth. The process of exploration and drilling requires specialized and expensive equipment but not the large variety of support materials or labor demanded by many mining operations.

However, large-volume petroleum production can generate tremendous quantities of capital in a short time, and locally accumulated wealth has attracted a variety of industries able to use the minerals near their production sites. Petroleum refineries were built outside all major ports from Corpus Christi, Texas, to Pascagoula, Mississippi, with the most intensive concentration around Houston, Beaumont, and Port Arthur in Texas.

Of broader development impact are the industries that depend on the refinery output for their own existence, such as petrochemicals. Natural gas and petroleum products are used as chemical components for a great many products. Items ranging from plastics, paints, and antifreeze to fertilizer, insecticide, and prescription drugs have their origin in chemical plants located along the western Gulf Coast. In addition, other chemical industries not tied to petroleum and natural gas production, such as those producing sulfuric acid, superphosphate fertilizer, and synthetic rubber, are major consumers of

sulfur and salt. The coincidence of the basic minerals within a region possessing large capital investment capabilities has supported rapid economic and population growth.

There is also more to the location of industry, however, than the availability of capital and proximity to raw materials, even petrochemical industries—there is the matter of accessibility. The Southern Coastlands, as noted, is on the continental margin and as such constitutes the line of exchange between water transport and land transport. Further, since water transportation is cheaper than land transport, shipment of the finished products from the Gulf Coast can be accomplished efficiently by ocean carrier to the ports of Megalopolis and by barge via the intracoastal waterway and the Mississippi River system to the manufacturing core. Conversely, products and raw materials can be moved more efficiently to Gulf Coast industries. ■

The Agricultural Core (map 9) is a culture region based on an accumulated mix of habits, attitudes, and reactions to the traditional opportunities for livelihood and contact with other groups within the region. Basically, the Agricultural Core is small-town and rural America

specially flavored with the agricultural patterns of this region. The population of the Agricultural Core is politically and socially cautious yet independent, secure in what has proven successful and not strongly exposed to the pressures for change found in major urban centers or in the transition zones between regions. "Middle America" is a popular term applied to the region.

The Agricultural Core population received contributions of foreign-born migrants, most of whom originated in northwestern Europe, until late in the 19th century. Later immigrants, from eastern Europe and Mediterranean countries, found the better agricultural land occupied, and settled in the nearby metropolitan areas of the Manufacturing Core.

THE
AGRICULTURAL
CORE

CHAPTER

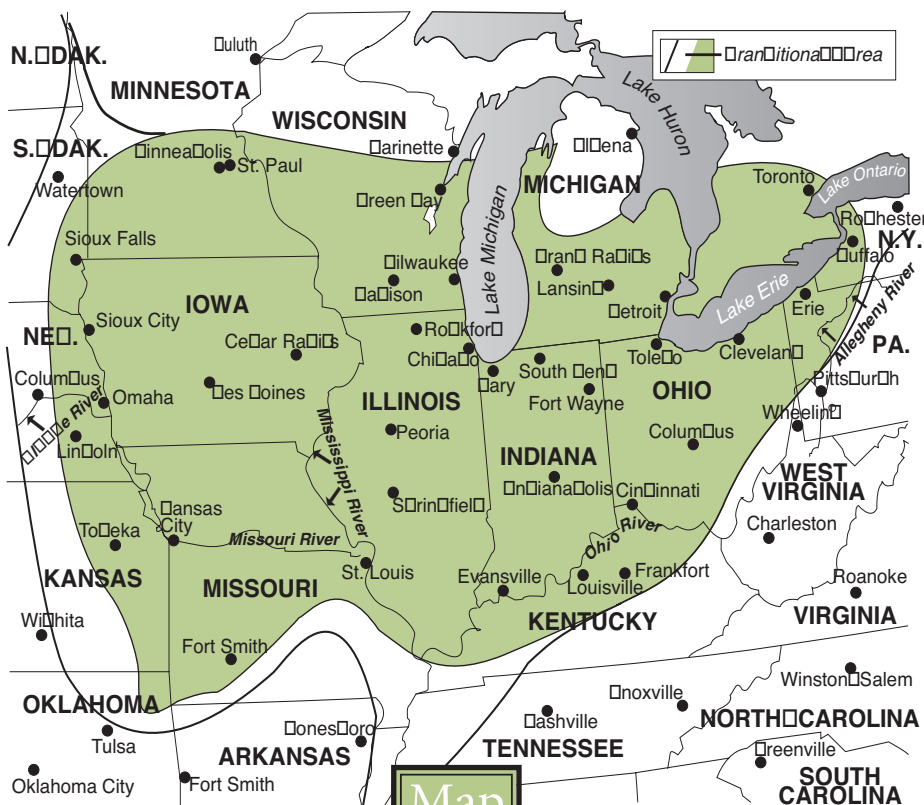
10

THE ENVIRONMENTAL
BASE

The settlers who moved across the Appalachians and onto the eastern interior plains were concerned with survival and pursuit of a livelihood. Except for the resistance of the local American Indian population and the usual vagaries of nature, the environ-

ment was supportive. Most of Ohio, Indiana, and lower Michigan was covered by a mixed hardwood forest. The trees encountered indicated to the experienced easterner where the best soils were located. They also provided considerable local fuel and building material. Near the western margin of Indiana and farther into Illinois and southern Wisconsin, the small openings and glades in the forest were larger and more frequent. Except along the rivers and in hillier country, Illinois, Iowa, and parts of southern Minnesota and northern Missouri appeared to be as much open grassland as forest. By the time settlers reached north-central and western Iowa, the dense woodlands had been left kilometers behind.

In general, the presence of trees indicates adequate moisture for crop growth. And except for the northwest corner of the region and a few sections of Michigan and eastern Wisconsin, the entire



Agricultural Core receives an average of more than 75 centimeters of precipitation each year. The southern margin of the core can expect in excess of 100 centimeters. More important, most of this precipitation occurs between the end of April and the beginning of November, during the growing sea-

son. Also important to plant growth, the variability of this rainfall over a 10-year period is low. Summer rains do often come in the form of intense thundershowers, occasionally accompanied by damaging hail and high winds, but even in this the region's farmers are less likely to be economically crippled than are those located on the open plains.

Like other interior regions of America, the Agricultural Core is characterized by a wide range in its temperatures. The coldest winter

temperatures at a given latitude are often as low as those occurring much farther north. Similarly, summer temperatures can be expected to climb as high as those found at more southerly latitudes. At Peoria, Illinois, for example, near the center of the Agricultural Core, the average temperature in January is -4°C , while the average in July is 24°C .

For the agriculturalist, the high summer temperatures encourage rapid crop growth; for the average nonfarm resident, summer can mean a miserable combination of hot days, warm nights, and high humidity. The Agricultural Core's winters are long, often gray, and uncomfortably cold.

Just as the Agricultural Core's climatic mix is highly appropriate for farming, the region's topographic relief is properly moderate. The landscape is gently rolling with few areas of either very flat or very hilly terrain. The low relief means that a very large proportion of the total area can be used for cultivation, and fields can be as large as practical for good management without a high risk of erosion.

As farm machinery was developed, it could be used throughout the region. The scattered hillocks and stream courses that broke up the unending land swells were obvious locations to maintain woodlot or pasture. The rolling landscape also permitted good soil drain-

age and, in most cases, restricted swamps to small areas.

The landscape that dominates the Agricultural Core is largely a consequence of the same glaciation that created the harbors of Megalopolis. As the heavy ice mass spread outward from its Canadian Shield center, soft sedimentary hilltops were ground down by the weight and movement of the ice. The debris removed in this way became incorporated in the ice sheet, gradually settling out and partially filling the valleys between the decapitated hills. As the glacier fronts later retreated, long, low hills of this debris remained to offer a few lines of slightly greater relief for the human populations that followed. The tremendous quantity of meltwater released by the glacial retreat eroded several major river outlets, such as the Illinois River west and south from Lake Michigan and the Mohawk-Hudson river valleys east and south from Lake Ontario. The higher surface altitude of the Great Lakes during this period submerged large areas of what is now dry land south of Chicago, south of Saginaw Bay in Michigan, and the Black Swamp lake plain extending from Toledo, Ohio, to Fort Wayne, Indiana.

In north-central Kentucky is a large basin many would argue does not belong within the continent's Agricultural Core. The Bluegrass Basin, or Bluegrass Plains, nevertheless extends the region of low relief and highly productive agriculture into the margins of the Appalachian Plateau. The low, rolling relief of this region is primarily a residual karst terrain, one that has developed over thick limestone bedrock. The limestone is gradually soluble in moving water and permits many major surface features to be worn away. The limestone is also dissolved underground and forms stalactite- and stalagmite-columned caves that can extend for miles. The Mammoth Cave complex southwest of the basin is probably the best known in this region.

The soils of the Agricultural Core are good, often much better than average, but usually not excellent. With the major exception of central Illinois and south-central Wisconsin, soils east of central Iowa are alfisols, formed under conditions of moderate moisture and usually in association with conifer-

ous or mixed forests. Although the thin surface soil is deficient in humus, the soil retains agriculturally important minerals. In general, the soils found throughout the eastern Agricultural Core require only careful plowing, some form of crop rotation, and the application of agricultural lime to remain productive.

Western soils within the region and those throughout much of Illinois are mollisols, among the most fertile of all soils and naturally suited to grain production. These soils were formed under grasses rather than under forest cover. They range in color from dark brown to almost black, indicating a very high organic content. They also tend to be rather deep, with the surface horizon between 50 and 150 centimeters.

The major soil exceptions to these two broad categories are the alluvial soils, found within the main river valleys and former lake beds, and the swamp soils. Both types of soil are capable of high fertility but often require special treatment.

The natural environment of the Agricultural Core provided highly beneficial transportation opportunities. Even prior to the railroads and to extensive development of the road network, the river and lake connections within the region permitted easy and inexpensive

shipment of goods to the eastern seaboard population centers and to the main international trade ports.

Movement of settlers into the region was earliest along the larger waterways. The southern Great Lakes, the Ohio River, the Illinois, Wabash, and Wisconsin Rivers to the east of the Mississippi, and the Missouri River westward to Kansas City all provided major routes of entry for settlers and major routes for marketing their produce. The eastern Great Lakes offered more direct shipment through the Mohawk-Hudson routeway to New York City. The entire interior river network funneled into the Mississippi River system and was navigable by small boats and barges with very few interruptions throughout.

The city of Detroit, Michigan, grew as a military control point and focus for farm products. This city, whose name means "the narrows" in French, is located at the best crossing point between Ontario, Canada, and Michigan and is also near the entry of the northern lakes into Lake Erie. The southern Michigan hinterland was not as rich agriculturally as that of northern Ohio, however, and Cleveland, Ohio, remained more populous until after 1910, when mass-

produced automobile industries transformed Detroit's economic structure.

Located at the Great Bend of the Ohio River, Cincinnati, Ohio, became the main collecting and shipping center for agricultural products from the southeastern portions of the Agricultural Core as early as 1820. Kansas City, Missouri, at the junction of the Kansas and Missouri Rivers, also experienced early urban growth by handling large quantities of agricultural products in river transit. Chicago's location, near the southernmost end of Lake Michigan and only a short land distance from the upper Illinois River, also was beneficial to rapid growth. The transshipment opportunities provided by this site were supplemented by extensive canalization projects and by land connections built west and south across the rich Agricultural Core and, later, eastward directly to the growing cities of Megalopolis.

THE AGRICULTURAL RESPONSE

As the settlement frontier moved westward across the Agricultural Core during the early 19th century, it was accompanied by a wave of wheat production for eastern markets. The bulk of raw wheat was not a great problem for shippers while water transport was continuous, but flour milling soon became established at the points of embarkation

(such as Cincinnati on the Ohio River) or at sites at which the grain was to change from one transport mode to another (such as Buffalo, New York, at the lake terminus of the Erie Canal). Continuous wheat farming was hard on the region's soils, however, and primary zones of production moved westward with the expanding line of settlement.

For farmers who remained behind, the next best agricultural product was meat from domestic livestock. Both cattle and hogs were raised. So economically reliable was feed grain and livestock farming that it quickly supplanted wheat production as the dominant farming system throughout the Agricultural Core.

Corn (maize) was the grain that best met the combination of environmental requirements and high economic return. Well adapted to a humid summer climate, corn thrives during the region's long hot days and warm nights. Also, yields are high since plants can be grown close together, and each plant produces two or more ears of grain. Further-more, the large quantity of vegetative matter produced by each plant can be used as feed with appropriate supplements and cutting.

The mixed farming operation of crop-livestock production has provided farmers with economic security beyond that found in any other

U.S. agricultural region.

A distinctive characteristic of the central Agricultural Core landscape is a semiregular rectangular field pattern. The original 13 U.S. states had developed their internal boundaries in an unsystematic manner, using the metes and bounds system of lot designation that relied on visible landscape features, compass directions, and linear measurement. The irregularly shaped results were often subject to confused interpretation and litigation. Through the Ordinance of 1785, the land north of the Ohio River and west of Pennsylvania, known as the Northwest Territory, was delimited according to the regular rectangular township and range survey before it was opened to settlement. The irresistible logic of this system remains visible in the predominantly rectangular road network of most of the United States between the Appalachians and the Rockies.

While the land survey system and the ecological and economic realities of the Agricultural Core produced an inevitable homogeneity to the landscape, there are portions of the Agricultural Core that lie beyond the "Corn Belt." In Wisconsin and central Minnesota, north of the centers of

continued on page 117

**A
PICTURE
PORTFOLIO
OF THE
UNITED
STATES**





(Above) Autumn foliage provides a colorful backdrop for a dairy farm in the northeastern state of Vermont. (Right) In downtown Boston, Massachusetts, residents and visitors frequent shops and restaurants at Faneuil Hall Marketplace. Faneuil Hall was a meeting place for organizers of the American Revolution.











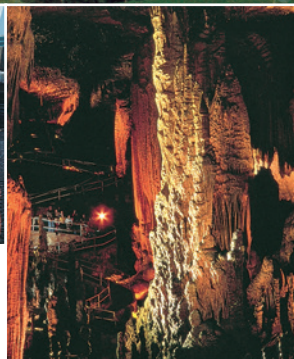
(Above) Maryland fishermen harvest oysters from the Chesapeake Bay, which is also abundant with clams, crabs, and other seafood. (Left) Coal is moved by rail from the mines of West Virginia in the Appalachian Mountains. Coal mining is one of the state's most important economic activities.







(Above) Shadows on the Teche mansion in New Iberia, Louisiana, is typical of a 19th-century southern plantation home. (Far left) In Florida, a farm worker picks oranges, the state's leading natural crop. (Left) Atlanta, the capital of the state of Georgia, is a growing center for international trade and business.



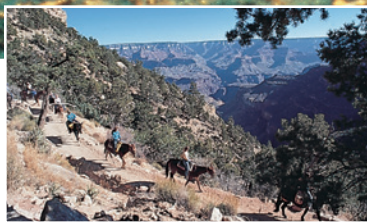


*(Above) Chicago, Illinois, is the largest city in the midwestern United States.
(Far left) Barbecued hot dogs and spareribs are popular at the Ohio State Fair. (Center left)
Blanchard Springs Cavern is a major tourist attraction in Arkansas.
(Left) A farm in Iowa; 90 percent of Iowa's area is farmland.*



(Below) American bison roam the plains in Theodore Roosevelt National Park in North Dakota. (Clockwise from top left) On the Mississippi River near Hannibal, Missouri, barges carry goods to market; modern cowboys herd longhorn cattle in Texas; vacationers rollerskate against the backdrop of the Rocky Mountains in Colorado.





(Top) Death Valley, located in east-central California and a small portion of Nevada, contains the Western Hemisphere's lowest elevation, 86 meters below sea level. (Above) Tourists ride mules into the Grand Canyon in northwestern Arizona; the canyon was formed over millions of years by the Colorado River cutting through layers of rock.



(Top) Abundant forests provide the raw materials for Oregon's leading industry, the manufacture of forest products — lumber, plywood and hardboard, pulp, and paper. (Above) The Golden Gate Bridge in San Francisco, California, is one of the largest and most spectacular suspension bridges in the world. It spans the entrance of San Francisco Bay.



grain production where the climate prevented feed grain maturation, farmers chose dairy farming as an economic substitute. Corn in silage, other grains such as oats and barley, and abundant hay crops provided excellent support for large dairy herds. When the supply of fresh milk exceeded even the large demand of the nearby cities, it was converted into butter and cheese for more leisurely shipment to more distant markets. Wisconsin continues to produce a large proportion of America's surplus milk and approximately half of its cheese output.

Another distinctive extension of the Agricultural Core's boundaries occurs around the western Great Lakes, where fruit production is possible in a narrow band along the Lake Michigan shores of Wisconsin and Michigan. The moderating influence of the lake retards fruit tree blossoming in the spring, usually until after the last frost, and also retards the arrival of the first killing frost in the fall. Sour cherry, apple, and, to a lesser extent, grape production are all important. A similar effect is found along the southern shore of Lake Erie, especially the few lakeshore counties in Pennsylvania and western New York, where grape production has been significant for

more than a century.

CHANGES IN THE PATTERNS

The Agricultural Core was pretty well settled by 1890, and the corn-livestock farming system that worked well in southern Ohio was carried west to the edge of the Great Plains with only local adjustments. Early technological improvements such as the reaper (1831), the steel plow (1837), and other devices suited to the region's chief economic activity tended to ensure the system's success. More recent changes, however, have stimulated modifications to the traditional geographic patterns.

One of the more subtle changes in Corn Belt patterns lies in the rise of the importance of soybeans since the 1950s. As late as 1925, less than 200,000 hectares of soybeans were harvested in the United States. By 1949, soybean acreage had increased to about 4.5 million hectares, and during the next 20 years, it exploded to 16.1 million hectares; plantings in the Agricultural Core exceeded 10 million hectares. Nationwide today, some 20 million hectares are planted in soybeans.

The reasons for the tremendous increase in soybean production are several. First, as a legume, soybeans act as a soil reconditioner by increasing the nitrogen content of the soil in which they are grown. Second, soybeans generally may be

grown throughout most of the eastern United States, and even in areas receiving less than 50 centimeters of rainfall if irrigation is feasible. Third, the bean itself can be eaten directly or milled to produce an edible vegetable oil and a meal low in fat but very high in protein. The meal has been used primarily as a livestock feed supplement, but an increasing amount has entered human consumption patterns. And fourth, the world food and feed situation maintained export demand for soybeans at high levels. This has kept prices relatively stable, an encouraging condition to farmers.

This combination of advantages has concentrated a great amount of soybean production in the Agricultural Core. The traditional three- and four-year rotations gradually gave way to a two-year corn-soybean rotation. In some cases within southern portions of the core, early maturing varieties of soybeans can be planted in the late spring after a harvest of winter wheat, giving the farmer three crops (corn, wheat, soybeans) every two years without significant loss of pro-

ductivity in any year.

A more complex set of changes in Agricultural Core geography is built on new levels of mechanization and alterations in average farm size. The original land survey in the region set the minimum farm size that could be purchased at 64.75 hectares (160 acres) and then at half or one quarter that amount at various times. After the initial purchase, of course, parcels of land could be broken up and sold in even smaller lots or added to previously established farms.

By 1900, farm size in the Agricultural Core states showed marked variation: about one-third of the farms were of 73 to 202 hectares, another third were of 40 to 72 hectares, and most of the remainder were smaller than 40 hectares. The amount of land in farms smaller than 73 hectares began to decline after 1935. By 1964, more than 50 percent of the farmland in these states was in farms larger than 105 hectares; fully one hectare in five was located on a farm larger than 202 hectares, a trend that has continued.

The reasons for these changes in farm size are economic and related to mechanization of operations. Agricultural Core farmers traditionally have taken advantage of mechanical innovations to increase their output per work-hour. The large fields and gentle terrain in

this region permitted early and continuing use of farm machinery that would have been impossible on smaller farms and erosion-prone hill farms.

A labor shortage during the early 1940s as the result of World War II accelerated the mechanization process, and innovations became oriented increasingly toward large-scale operations. Two- and four-row equipment gave way to six- and eight-row equipment. Storage and shipment operations also became mechanized and more and more attuned to the requirements of large-volume producers.

Accompanying the changes in farm size, the amount of land farmed in the region declined gradually. The proportion of land in farms was above 80 percent across much of the region in 1987, with most of Iowa and Illinois still showing rates above 90 percent. Even

so, the overwhelming number of counties in the Agricultural Core had experienced a reduction in land in farms across the previous two decades.

While still dominant, the fully owned, individually operated family farm is disappearing rapidly from the Agricultural Core states.

This decline is associated with the demands of increased farm efficiency. Personal effort and individual integrity still contribute to a farm's success, but the factor of scale is increasingly critical.

As the need for more land per operation increased, some farmers found it feasible to rent or lease additional land rather than purchase it outright. Other farm operators may be full tenants, choosing to work for the landowner through one of several arrangements. In addition, about one-third of those renting farmland lease it from a relative, often as a means of transferring the land from one generation to another.

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The historian Walter Prescott Webb, in his book *The Great Plains*, suggested that the northwest Europeans who settled much of the United States faced three great “environmental encounters”—areas where climatic conditions were so unlike those of their home region that the agricultural crops and settlement patterns developed in Europe were inappropriate. The first of these encounters was with the high summer temperatures and humidity levels of the Southeast. The second was the arid Southwest and interior West. The third was the great continuous grasslands located astride the center of the country (map 10).

Among the problems on the grasslands, average annual precipitation was much less than in the East, although violent storms accompanied by high winds, hail, and tornadoes were common. Blizzards with wintry blasts intensifying the cold drove the snow into immense drifts. The hot, dry winds of summer parched the soil and sometimes carried it away in great billowing clouds of dust.

The region’s sparse natural water supply would not support tree vegetation except along the stream courses. Many of these streams were small and flowed only inter-

THE GREAT PLAINS AND PRAIRIES

CHAPTER

11

mittently. Eastern farmers, accustomed to a plentiful supply of water for crops and animals, as well as ample wood for building, fencing, and heating, had to adapt to quite different conditions in their attempts to settle the Great Plains.

THE PLAINS ENVIRONMENT

The topography and vegetation of the grasslands is among the least varied to be found anywhere in the United States. Early settlers following the Oregon Trail could reach the Pacific coast in one season of travel, in part because the grasslands were so easy to cross. The region lies entirely within the interior lowlands physiographic province. The underlying sedimentary beds dip gently. Elevation increases gradually, almost imperceptibly, from east to west. Along the eastern margin, the elevation is only 500 meters, whereas in the west, Denver, Colorado, claims an altitude of more than 1,500 meters.

Physiographically, the largest portion of the Great Plains is the High Plains stretching along the western margin of the region from south Texas northward to southern

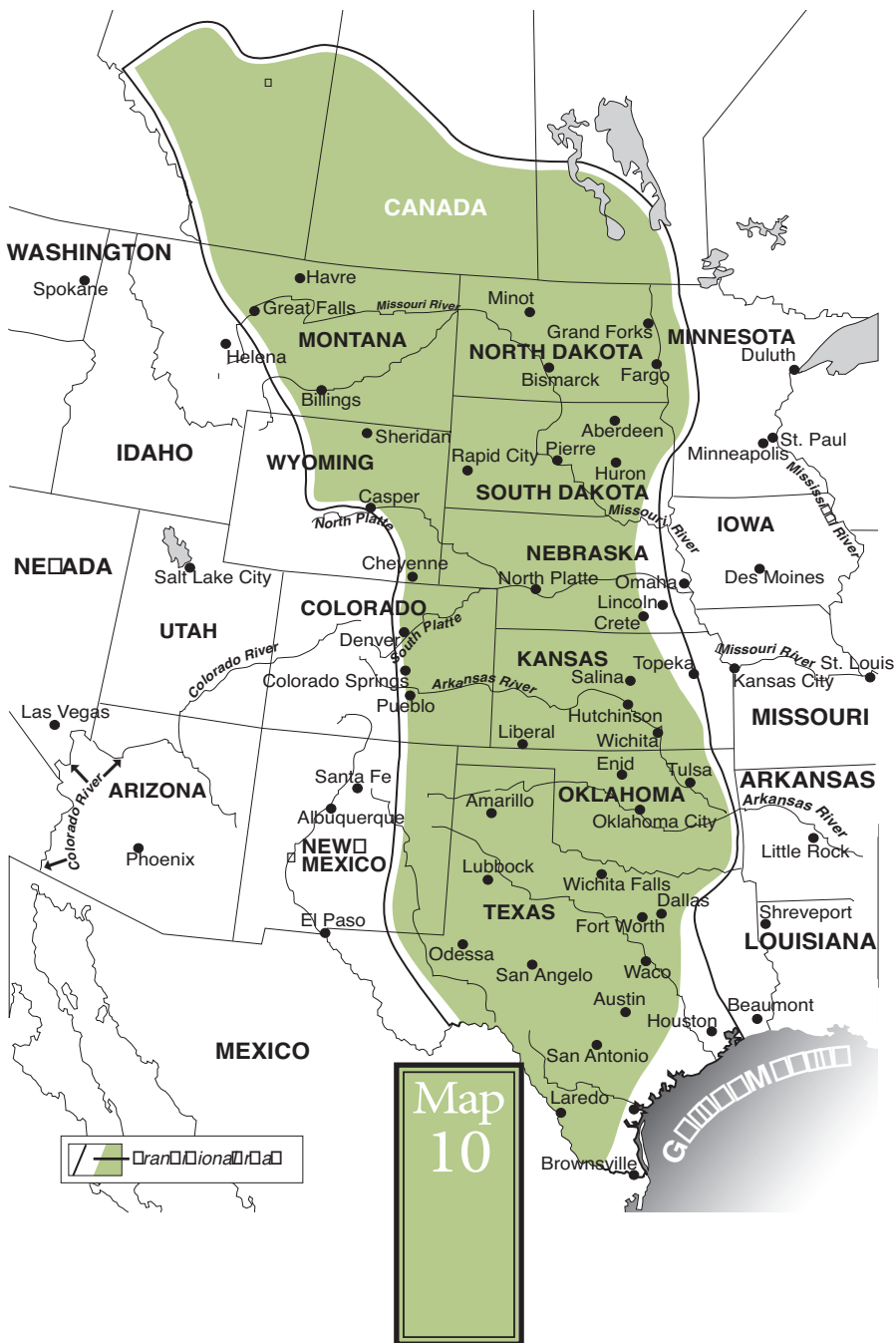
Nebraska. Covered by a thick mantle of sediments that are often quite sandy and extremely porous, this section is generally flat. Only along streams such as at Scottsbluff on the Platte River in western Nebraska or at Palo Duro canyon on the Red River in northwest Texas has erosion resulted in substantial local relief. The Lake Agassiz Basin, formerly occupied by the largest of the Pleistocene lakes, is another exceptionally flat area and includes the valley of the Red River of the North in North Dakota and Minnesota.

Not all portions of the region are so unvarying topographically. The most obvious exception are the Black Hills of South Dakota and Wyoming. A large, dome-shaped area of eroded igneous rock, the Black Hills are associated both geologically and topographically with the Rocky Mountains to the west. In southern Texas, the Edwards Plateau is heavily eroded into a canyonlands landscape along its southeastern margin where it is adjacent to the coastal plain. In central and northwestern Nebraska, the Sand Hills offer a dense, intricate pattern of grass-covered sand dunes, many of which are well over 30 meters high. The dunes were created by sand blowing along the southern margins of continental glaciers during the Pleistocene. Badlands topography—extremely irregular features resulting from

wind and water erosion of sedimentary rock—is widespread on the unglaciated Missouri Plateau from northern Nebraska northward to the Missouri River. North of the Missouri River and west of the Lake Agassiz Basin, the glaciated Missouri Plateau, although sometimes flat, is covered with ponds, moraines, and other glacial features.

Although agriculture has destroyed much of the original grasslands vegetation, the moister eastern portions (areas with more than 60 centimeters of annual precipitation in the north or more than 90 centimeters in the south) were originally a continuous tall-grass prairie, where grasses grew between 30 centimeters and 1 meter in height. Along the western margins of the Plains, prairie grasses gave way to bunch grasses—shorter, more separated grasses could succeed in the semiarid conditions of the western Plains.

The prairie grasses have developed deep, intricate root systems that commonly extend much deeper into the soil than the grass blades reach above, allowing them to utilize available water. The tangled root system made the prairies exceptionally difficult to plow. The first settlers often had to employ heavy plows pulled by as many as 20



animals to break the sod. The prairie sod could also be “cut” into large bricks used in the construction of sod houses during the early period of Plains’ settlement by Europeans.

The warm, moist tropical maritime air flowing in from the Gulf of Mexico, the prime contributor of moisture to the Plains, commonly curves up the Mississippi Valley and then moves northeast, missing much of the western Great Plains entirely. One result of this pattern is the marked westward decline in average precipitation amounts. In Kansas, for example, average annual precipitation varies from a moist 105 centimeters in the southeast to a semiarid 40 centimeters in the southwest.

Periods of higher than normal precipitation on the Great Plains result when tropical air masses move northwestward from the Gulf of Mexico, which brings these air masses over portions of the Plains. This provident current is far from dependable, however. Fortunately for the Plains farmer, about three-quarters of the precipitation falls during the period of more rapid crop growth, from April to August.

Some of the region’s spring and summer precipitation comes in the form of violent thunderstorms.

Hail is occasionally a product of these storms. These frozen pellets, sometimes measuring more than 5 centimeters in diameter, have the power to devastate a crop of mature, top-heavy wheat. Much of the southern and west-central Plains experiences frequent hail storms, with parts of western Nebraska and southeastern Wyoming leading the continent in average annual hail frequency.

Tornadoes, which can have funnel wind speeds in excess of 350 kilometers per hour, are another violent result of these storm systems of the Great Plains. Although the area affected by any one funnel is small, the frequent occurrence on the central Plains makes tornadoes a significant regional hazard.

Wind has been a mixed blessing on the Great Plains. Late spring and summer wind velocities on the central and southern Plains are among the highest in interior America. In the past, this served to maximize the efficiency of windmills in the region. However, the persistent winds also mean that the amount of moisture evaporated and transpired by plants is high across much of the region.

The chinook, a winter wind, occurs when dry, relatively warm air from the Pacific Coast pushes over the Rocky Mountains. As it descends onto the Great Plains, it warms still further and is much

warmer than the cold, continental air mass commonly found over the region in winter. The Pacific air temporarily pushes the cold air from the western Plains, and a rapid, dramatic temperature rise results. Partly because of this interesting phenomenon, winter temperatures along the higher western area are slightly warmer than along the eastern edge of the Plains.

In addition, the length of the frost-free season varies widely around the average from year to year. As with annual temperature range, the variation increases as one moves northward.

Snow, wind, and cold are all part of one of the most devastating weather elements on the Plains: the blizzard. A blizzard occurs in winter when a very cold polar air mass pushes southward along the Rocky Mountains and onto the Plains, breaking the usual west to east storm pattern. High winds, intense cold, and considerable amounts of snow are associated with these storms. A blizzard can last for several days and bring half of the average winter snowfall. Because Plains ranchers usually leave their livestock outdoors during the winter, a severe blizzard may block an animal's access to food and result in high animal mortality.

SETTLEMENT PATTERNS

The pre-European occupation of the Plains by American Indians was limited. Hunting, particularly for buffalo, was the primary economic activity. Most tribes lived along streams in semipermanent settlements. With no means of rapid long-distance overland movement (the dog was the only domesticated animal in pre-European North America), the Indians could not leave the dependable water supplies of the streams for any long period. This was a substantial problem, for the migration of the great buffalo herds often took this food source far away from the settlements for many weeks.

When the Spanish departed from the southern Plains following their initial explorations, they left some of their horses behind, a "gift" that dramatically altered the lifestyle of the Plains Indians. By the time Americans reached the Plains in the early 19th century, they found what many have called the finest light cavalry in world history. The horse had diffused throughout the grasslands, and the Plains Indians, no longer restricted to the waterways, freely followed the buffalo migration.

The early American perception of the region as an unpromising and difficult place to settle was not totally wrong. The lack of trees meant that farmers had none of the

traditional material used for the construction of houses and barns, for fencing, or for fuel. Water sources were scarce; often rivers and streams had only a seasonal flow. Those who arrived early settled along these waterways. The crops that settlers brought with them to the Plains often failed, and crop success varied greatly from year to year as precipitation amounts fluctuated widely. Agricultural production rates were also generally lower, and the 65-hectare farm size that seemed so adequate farther east proved to be too small on the Great Plains.

The settlement frontier hesitated along the eastern boundary of the Plains partly as a result of these problems. Settlers tended to bypass the Plains for the Pacific Coast until technological and land ownership changes made Plains settlement more inviting.

During this hesitation, an alternative economic system swept across the region. An extensive ranching economy had been introduced into south Texas by Spaniards and into east Texas by American settlers from the South. This economy spread from Texas northward during the period from 1867 to 1885.

Great herds of cattle were driven northward from south Texas to railheads in Kansas both for shipment east and to stock the huge, relatively unsettled Plains region. By 1880, perhaps 5 million head of cattle had been moved.

The open-ranching economy collapsed rapidly in the late 1880s. Widespread overgrazing, competition from the superior beef of expanding cattle-raising operations in the Midwest, a slipping national economy, a disastrous winter in 1887-1888, and a rapid influx of farmers onto the Plains combined to end this short period of American history. The open-range, unimproved ranches were pushed to the drier western side of the Plains or were forced into a more restrained fenced operation.

On the agricultural frontier, barbed wire, developed commercially in the 1870s, provided an effective alternative fencing material to take the place of the missing wood supply. For a time, dwellings constructed of sod provided adequate housing. Nevertheless, most settlers replaced them as soon as possible with frame homes. Lumber was brought in by the railroads, which were under construction all across the Plains by the 1870s. The development of a simple windmill and mechanical well-drilling devices meant that sufficient water could be obtained locally for humans

and animals, as well as for irrigation. It was the widespread adoption of windmill technology on the grasslands that led to its subsequent acceptance across most of rural America. Grain farming also became increasingly mechanized, enabling farmers to operate larger farms and thus compensate for lower yields.

Finally, crops that were better adapted to the growing conditions of the region were introduced into the agricultural system, and farmers began to improve their understanding of how to use the Plains environment. Hard winter wheat is perhaps the best example. First brought to the United States by Mennonite immigrants from Russia, it was far better adapted to the dry growing conditions of the Great Plains than the wheat strains grown there earlier.

Today, the Great Plains is America's premier wheat-producing region, and it is largely on the abundance of Plains agriculture that the United States is the world's top wheat exporter.

PLAINS AGRICULTURE

The agriculture of the Great Plains is large scale and machine intensive, dominated by a few crops, the most important of which is wheat. Winter wheat is planted in the fall. Before the winter dormant season sets in, the wheat stands several centimeters tall. Its major growth comes in the spring and early summer, when precipitation is at a maximum and before the onset of the desiccating winds of summer. It is harvested in late May and June. Today, winter wheat is grown across much of the United States, but its zone of concentration is the southern Plains from northern Texas to southern Nebraska.

Spring wheat—grown primarily from central South Dakota northward into Canada—is planted in early spring and harvested in late summer or fall. It is suited to areas of winters so severe that germinating winter wheat would be killed.

Most grasslands wheat is grown using dry farming techniques, without irrigation. The soil is plowed very deeply to break the sod and slow evaporation. Most visually obvious, especially in the northern Plains, is the widespread use of fallowing, where the land is plowed and tilled but not planted for a season to preserve moisture.

Beginning around June 1 with the winter wheat harvest in Texas, custom combining crews gradually fol-

low the harvest northward. Unlike migrant farm laborers harvesting other crops, these people, often in large crews that use many combines and trucks, have traditionally been well-paid agricultural workers. The farms in most of the "Wheat Belt" now exceed 400 hectares, which means that more wheat farmers can now afford their own combines. Still, probably one-third of all Great Plains wheat is harvested by custom combining crews.

A major problem with profitable wheat production is the difficulty of moving the harvest rapidly to storage in the large grain elevators that dot the Plains. Competition from truck hauling and, in parts of the winter wheat region, barge transport has encouraged the railroads to abandon many small country grain elevators in favor of much larger complexes usually in larger towns. Most export wheat moves through the Great Lakes or in barges down the inland waterway system and the Mississippi River.

Sorghum has emerged as a major crop on the southern Plains in recent decades. Able to withstand dry growing conditions, this African grain now equals winter wheat in

importance on the hot, dry southwestern margins of the Plains. Both Texas and Nebraska now have more land in sorghum than in wheat. Most of the grain sorghum crop is used as stock feed.

On the northern Plains, barley and oats are major second crops, with most of the continent's barley crop coming from the Lake Agassiz Basin of North Dakota and Minnesota. Nearly all flaxseed produced in North America also is grown in the northern Plains. Sunflowers, a source of the vegetable oil canola and important ingredients in many livestock feeds, are rapidly increasing in importance in the Red River Valley of Minnesota and North Dakota.

WATER CONTROL AND IRRIGATION

Irrigation in the United States is usually associated with the dry region of the far West. Yet the benefits derived from irrigation may be higher in many semihumid or even humid areas—in terms of the level of increased production per dollar invested—because irrigation water may be used either as a supplement in dry times to maximize yields for crops already grown in the area or to grow crops for which the available moisture is not quite sufficient.

There are a number of Great Plains areas where large-scale irrigation developments are important. Perhaps the most noteworthy of

these is on the High Plains from Colorado and Nebraska to Texas. The area is underlain by the Ogallala aquifer, a vast underground geologic reservoir under 250,000 square kilometers of the area that contains an estimated 2 billion acre-feet of water. (An acre-foot is the volume of irrigation water that covers 0.4 hectares to a depth of 0.3 meters.) This is “fossil” water, much of it deposited more than a million years ago. About a quarter of the aquifer’s area is irrigated, almost entirely with Ogallala water. The High Plains is a major agricultural region, providing, for example, two-fifths of America’s sorghum, one-sixth of its wheat, and one-quarter of its cotton. Irrigated lands here produce 45 percent more wheat, 70 percent more sorghum, and 135 percent more cotton than neighboring nonirrigated areas. Groundwater withdrawals have more than tripled since 1950, to more than 20 million acre-feet annually.

Early in the 20th century, the area centered on Lubbock, Texas, became a significant region of cotton production. Irrigated farming, using water from wells drilled into the water-bearing sands that underlie much of the southern High Plains, gradually replaced the early dry-farming approach. Today, the region is the most important area of cotton production in the United States. More than 50,000 wells sup-

ply irrigation water in the area.

The second major irrigated area on the Plains is in northeastern Colorado, with sugar beets the primary specialty crop. The area has long been irrigated from wells and from the waters of the South Platte River. The federal government covers the cost of construction, and those who use irrigation pay for the water. Because these waters are no longer adequate to meet demands, the government funded the Big Thompson River project, which is designed to carry water from the west slope of the Front Range of the Rocky Mountains to the east slope and the irrigated lands beyond. The most striking technological feature of this project is a 33-kilometer tunnel, lying 1,200 meters below the Continental Divide in Rocky Mountain National Park.

The largest of the water impoundment projects on the Plains is the Missouri Valley project. The project was an outgrowth of two different sets of needs. People living at the lower end of the Mississippi Valley, including those in Kansas City and St. Louis, needed an effective system of flood control. About 100 centimeters of precipitation

falls on this area each year. In contrast, people in the upper Missouri Valley, especially the Dakotas and Montana, needed a system to provide ample water for irrigation. The resultant system is composed of a series of large earth-fill dams on the upper Missouri, as well as numerous dams on many of the tributaries of the river.

These and many other smaller irrigation projects and individual wells have allowed a great expansion in the diversity of Plains agriculture. Throughout the central and northern Plains, alfalfa—the premier hay crop of the West—claims the largest irrigated hectareage. Sugar beets are important in the Arkansas River Valley of eastern Colorado and western Kansas, and along the South Platte in northeastern Colorado. Arkansas valley growers also take great pride in the quality of their cantaloupes, while corn, usually irrigated from wells, is a major crop in south-central Nebraska.

NATURAL RESOURCES

The sediments of the Great Plains contain major reserves of energy resources—petroleum, natural gas, and coal. To the south, major petroleum and natural gas fields are traditionally among America's leading suppliers of these products. The Panhandle Field, encompassing western portions of Texas, Oklahoma, and Kansas, is the

world's leading supplier of natural gas. The same three states are major petroleum producers, and recent developments have also added Wyoming to this group.

North Dakota can boast of sizable energy resources, mostly in the form of soft coal, but it is Wyoming that is the leading coal-producing state in the United States. In 1996, Wyoming mines provided 26 percent of the total U.S. coal output, or 1.06 billion tons.

Denver has become a focus of considerable petroleum-based wealth. Alliance, Nebraska, nearly doubled in size between 1975 and 1980 because of its location on the Burlington and Northern rail line, which carries coal eastward from the Wyoming fields. Gillette, the largest town in the center of Wyoming mining activity in the Powder River basin, saw its population increase by a factor of five in a decade.

The passage of the Clean Air Act in the United States in the early 1970s provided an important boost for the West's generally low-sulphur coal. At least 100 billion tons of low-sulfur sub-bituminous coal that meets strict antipollution laws can be found near the surface in the Northern Plains, an amount equiva-

lent to that needed for 125 years at current levels of national consumption. Within 2,000 meters of the surface, the total is perhaps 1.5 trillion tons. Already the structure of the regional economy is shifting, with agriculture and ranching declining in importance.

POPULATION PATTERNS

Population decline, or at best stagnation, has become the accepted standard across much of the Great Plains during the past 50 years. The region has a decided lack of urban centers, major recreational potential is minimal, and, until recently, there were few important natural resource developments. Regional population growth is concentrated in the larger cities near the margins of the Plains, while most smaller communities and rural areas experience outmigration and often population decline.

Much of the region is served by major urban centers that are found somewhat beyond the peripheries of the Plains. Chief among these are Kansas City (Missouri) and Minneapolis-St. Paul (Minnesota). Denver (Colorado), Dallas-Fort Worth (Texas), and San Antonio (Texas), the largest American cities on the Plains, are all peripheral. Denver is a regional office center as well as the focus of financial activity for energy resource development on the Northern Plains and in the

Interior West. Dallas, also a dominant regional office center for the Southwest, seems more of a city of the humid east, whereas the smaller Fort Worth—50 kilometers to the west—is a ranching and stockyard center that is clearly part of the Plains. San Antonio is the largest commercial center in south Texas plus the home of several major military bases.

Many of the somewhat smaller centers serving the area are also peripheral—cities such as Tulsa (Oklahoma) and Omaha (Nebraska). The service areas of the cities grouped around the edges of the Plains tend to be elongated east-west zones that cover the region.

Most towns on the Plains began as transportation centers, commonly strung out along the railroads. Those that have prospered maintain some transport service function, but they have also become established regional market centers. Some are also supported by special local conditions—Oklahoma City and Tulsa, for example, are important petroleum centers. Wichita, Kansas, is a manufacturing center for small aircraft.

The beef processing industry has expanded into many smaller Plains communities during the last three decades. Formerly, the industry had been concentrated in the Midwest, where facilities were large and complex. Changing technology in the slaughter industry, the growth of feedlots on the Plains, and more diversified marketing patterns grad-

ually made smaller plants located near the new feedlots of smaller Plains towns more economical.

Transportation routes on the Plains were originally built to cross the area rather than to serve it. Thus, most major highways and railroads pass east-west across the Plains, with few lines running north-south.

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Stretching from the eastern slopes of the Rocky Mountains westward to the Sierra Nevada of California, to the Cascade Range of the Pacific Northwest and into Alaska, is the largest area of sparse population in America (map 11). Its low average population density is the key identifying feature of this region. Indeed, there is much variation in other elements of the territory's geography. Portions have rugged terrain interspersed with a series of plateaus, many of which contain extensive flat areas. Annual precipitation ranges from more than 125 centimeters in northern Idaho to less than 25 centimeters in the plateau country. The population of the region is mostly of European origin, although Hispanic-Americans and American Indians are found in significant proportions in the south. Irrigated agriculture is important in some areas, as is ranching, whereas in other areas, lumbering, tourism, and mining are dominant.

This massive expanse of land contains some of America's most strikingly scenic portions. The impact of humans on the region, although locally important, has been overshadowed to a great degree by the varied splendors of the natural environment.

THE EMPTY INTERIOR

CHAPTER

12

A DIFFICULT ENVIRONMENT

Eastern Americans are accustomed to an undulating terrain where variations in elevation are seldom dramatic. Where mountains occur, most do not contain an elevation change from the mountain's base to its top that exceeds 1,000 meters. By comparison,

dramatic changes of 1,000 meters or more are common in the interior West.

A second element of the region's physical geography is its ruggedness. Most of the mountains of the eastern United States appear rounded and molded; the ranges of the West present abrupt, almost vertical slopes, and the peaks frequently appear as jagged edges pointing skyward. This difference is due partly to age. Most of the western mountains, although by no means all of them, are substantially younger than the eastern ranges. Thus erosion, which results in an eventual smoothing of the land surface, has been active for a much shorter time.

During the most recent period of geologic history, the Pleistocene, the carving done by mountain glaciers did much to form the topography of the interior West, and remnants of the glaciers can still be found

in parts of the region. Most widespread in the Pacific mountains of southern Alaska, smaller glaciers are found as far south as the central Rocky Mountains in Colorado and the Sierra Nevada of California.

Alpine glaciers form in higher elevations and gradually flow downhill as the volume of ice increases. The moving ice is a powerful agent for erosion. Where this erosion pattern continues for a sufficiently long time, a deep U-shaped valley is created with almost vertical sides and a relatively flat bottom. If two glaciers flow side by side, a narrow ridge line is formed, characterized by jagged small peaks called aretes. Yosemite Valley in the Sierra Nevada, an almost classic glacially carved valley nearly 2 kilometers deep, is perhaps the region's most photographed example of alpine glaciation.

Most of the Empty Interior is occupied by plateaus rather than mountains. Probably the most scenically dramatic portion of this section is the Colorado Plateau along the middle Colorado River in Utah and Arizona. Although there are some large structural changes in relief, most of the area is underlain by gently dipping sedimentary

rocks. The major landscape features are a result of erosion by exotic streams (so-called because they carry water, something otherwise unknown—or exotic—into this arid environment) that cross the plateau, most notably the Colorado River and its tributaries. In this environment, streams are easily the predominant erosive influence. Thus, when accompanied by recent substantial geologic uplift over much of the plateau, great downward erosion has resulted, primarily in the immediate vicinity of the streams. The canyonlands that have been produced are some of the best known examples of America's natural scenic resources. In fact, the Grand Canyon of the Colorado River in Arizona is one of the country's most widely recognized natural scenic attractions. In Grand Canyon National Park, a canyon system has been created that is at places more than 16 kilometers wide. In addition, the variable resistance of strong and weak rocks in these sedimentary formations has created an angular pattern of scarps and benches that is especially characteristic of the area.

Filling the country from the Colorado Plateau to the south across southern New Mexico and Arizona, west into Death Valley and the Mojave Desert in California, and as far north as Oregon and Idaho, is the basin and range region.

This wide area is composed of a series of more than 200 north-south trending linear mountain ranges that are usually no more than 120 kilometers long and typically rise 1,000 to 1,600 meters from their base within a collection of some 80 broad, flat basins. North and west of the Colorado River basin, most of the area has interior drainage; that is, streams begin and end within the region, with no outlet to the sea. One result is that much of this area has received vast quantities of alluvia eroded from the surrounding mountains.

During the Pleistocene, substantial parts of the region were covered by lakes that resulted from a wetter climate and the melt of alpine glaciers. The largest, Lake Bonneville, covered 25,000 square kilometers in northern Utah. Most of these lakes are gone or greatly diminished in size because stream flow now depends on a lower annual precipitation, and many of the lakes that remain, such as Pyramid Lake in Nevada or Utah's Great Salt Lake, are heavily saline. Flowing water always picks up small quantities of dissolvable salts, which normally

make a minor contribution to the salinity of the world's oceans. But because they lack an outlet to the ocean, lakes in the basin and range area have increased their salt concentration. The Great Salt Lake, covering about 5,000 square kilometers, is the remnant of Lake Bonneville and today has a salt content much higher than that of the oceans.

North of the basin and range region, the Columbia Plateau is the result of a gradual buildup of lava flows. Contained by the surrounding mountains, these repeated flows, each averaging 3 to 6 meters thick, have accumulated to a depth of 650 meters in some areas. A few small volcanoes and cinder cones dot the area, but the primary features of volcanic activity here are the vast flows of formerly molten material. Here, too, streams have eroded deep, steep-sided canyons.

With some gaps, the pattern of eroded plateaus continues northward into the Yukon Territory in the area between the Rocky Mountains and the Pacific Ranges. In central Alaska, the drainage basin of the Yukon River occupies the territory from the Alaska Range to the Brooks Range. Surface materials are mostly sedimentary rocks.

There is a strong association between precipitation and elevation throughout the Interior West. Low-lying areas are generally dry. Heavi-

est precipitation amounts are usually found on the mid-slopes of mountains. The entire region is almost totally dependent for surface water on the exotic streams.

The association between topography, temperature, and precipitation results in a marked altitudinal zonation of vegetation throughout the Empty Interior. The lowest elevations are generally covered with desert shrub vegetation, most notably sagebrush. In the far south, there is a modest late summer increase in precipitation that allows a sagebrush/grasslands combination. Elsewhere, this combination is found at elevations above the desert shrub. Upslope from the sagebrush is a tree line, above which precipitation is sufficient to support tree growth. The forests are at first a transitional mix of grass and small trees, like pinon pine and juniper. At higher elevations, these blend into more extensive forests of larger trees, such as ponderosa pine, lodgepole pine, and Douglas fir. If the mountains are high enough, smaller trees such as subalpine fir varieties and then a second tree line are encountered. Above this upper tree line, a combination of high winds and a short, cool growing season render tree growth impossible, and the trees are replaced by tundra.

The Empty Interior supports a growing wildlife population that includes the bison (buffalo), the North American elk, the pronghorn antelope, the wild bear, the white-tailed deer, and the wild turkey.

THE HUMAN IMPRINT

In the state of Nevada, various government agencies control almost 90 percent of all land. Although the percentages are lower elsewhere, the basic pattern of governmental predominance is found throughout the Empty Interior.

It is not surprising that so much of the land remains in government hands. This area and Alaska were the final regions to be occupied by any substantial numbers of people, and federal programs of land distribution, designed to encourage agricultural use, were not relevant because little of the region held any real agricultural promise. The U.S. Bureau of the Census proclaimed the end of the settlement frontier in 1890, a time when much of the Interior West still remained unsettled. Also, by the time other interests, such as lumbering or mining, began to push for greater private land ownership, the federal government was reevaluating earlier programs in which it distributed land almost for free.

A substantial part of America's total national park system is found in the interior West, including

such famous parks as Yellowstone, Glacier, and Grand Canyon. But the national parks are only a small portion of the total public land area. The largest share of these lands is held by the Bureau of Land Management, a part of the U.S. Department of the Interior, which puts this land to many uses, grazing being the most important. The bureau has also been the main agent in the construction of irrigation and hydroelectric dams in the area.

The Forest Service, part of the U.S. Department of Agriculture, is the second largest of the federal landholders. The service has traditionally emphasized logging and grazing under its multiple-use charge, and it has increased the quality and quantity of recreational uses of the land.

Two other uses of parts of the Empty Interior say much about the region's past and about America's attitude toward the land's quality and usefulness. First, some of the largest American Indian reservations are found here, especially in northern Arizona and New Mexico. Also, some of the country's largest bombing and gunnery ranges, as well as its only atomic bomb testing facility, are found here. The population is sparse, and alternative demands on the land are not great.

As the agricultural frontier moved westward in the late decades of the 19th century, it largely swept

past the Interior West. In fact, were it not for minerals, transportation, and the Church of Jesus Christ of Latter-Day Saints, few people would have chosen the region until well into this century.

The Latter-Day Saints, or, more commonly, the Mormons, were established in upstate New York in 1830. The church and its followers were attacked repeatedly, both verbally and physically, for what were considered their "unusual" beliefs. The Mormons moved several times, searching for a place to practice their religion. Many Mormons, often on foot, pushed into the West, where they hoped to create an independent Mormon state.

The locale they selected for their initial western settlement was the Wasatch Valley, tucked between the Wasatch Mountains and the Great Salt Lake in northern Utah, a location that would later become Salt Lake City. It must have seemed an unlikely spot to begin an agricultural settlement. The climate was dry, the lake saline and useless, and the landscape barren. Nevertheless, the Mormons quickly began their agricultural operations; their settlements expanded as new arrivals came. A high birth rate also pushed

their population numbers upward. They dreamed of founding an independent country to be called Deseret, stretching northward into what is now Oregon and Idaho and southward to Los Angeles, California, and Mormon communities were established at greater and greater distances from Salt Lake City.

The Mormons ultimately failed in their hopes for creating Deseret. With the discovery of gold in California and Nevada, American expansion moved through and beyond the Mormon area, and the Mormons again found themselves under the will of the United States. Deseret was divided eventually among a half-dozen different states.

The Mormons were the first Americans to face the problems of life in the Interior West, and they solved the majority of them. None of their solutions was more important than irrigation. Americans had previously had no need for extensive irrigation, and the techniques and central control necessary to collect and move water to a large number of agricultural users were almost unknown. The Mormons constructed a large number of storage dams on the western slopes of the Wasatch Range, and many kilometers of canals moved the water to the users in the valley below. The results of these efforts today cover much of the valley with agricultural

crops, trees, and green lawns. These early efforts at large-scale irrigation were the beginning of an irrigation boom in the interior West.

Mormons continue to have a substantial impact on the Interior West. Of the roughly 11 million persons found in this region, over 1.5 million are Mormons.

DISPERSED ECONOMIC STRUCTURE

Irrigation and Agriculture:

Much of the flow of several of the more important rivers in the Empty Interior is diverted for various uses, with irrigation claiming the largest share. The Reclamation Act of 1902 provided for federal support for the construction of dams, canals, and, eventually, hydroelectric systems for the 17 western states (excluding Alaska and Hawaii). Today, over 80 percent of the water from these federally supported projects is used to irrigate over 4 million hectares. While most of this irrigated land is in California, large irrigation projects are nevertheless scattered throughout the region.

The 1 million hectares irrigated in the Snake River Plain makes Idaho the region's leader in terms of the amount of land irrigated. This enables the state to be among America's leaders in potato and

sugar beet production; alfalfa and cattle are also important. The Columbia Valley Reclamation project, supplied by the bountiful waters of the Columbia River impounded behind Grand Coulee Dam in central Washington, contains well over 400,000 hectares, producing such crops as alfalfa, sugar beets, and potatoes. Irrigation along the Wasatch Valley has expanded little since the first decades of Mormon settlement. About 400,000 irrigated hectares there are devoted primarily to sugar beets and alfalfa. The Grand Valley, along the Colorado River in west-central Colorado, produces alfalfa and potatoes as principal crops, although tree fruit, especially peaches, are also important. In Washington, tributaries of the Columbia River, notably the Yakima and Wenatchee, supply water for America's most famous apple-producing regions.

Each of these areas produces a limited set of crops. The region's short growing season precludes production of most long-season crops. And local demand is limited, minimizing the need for dairying or

many fresh vegetables.

The more southerly irrigated districts, although affected by irrigation water shortages, nevertheless have one major advantage over their northern counterparts—a far longer growing season. California's Imperial Valley, with a frost-free period in excess of 300 days, is one of America's premier crop producing areas. Much of America's winter head-lettuce supply comes from here, as do grapes, cotton, and alfalfa for fattening beef. The cattle population of the valley is over 250,000 head. A newly constructed electric power generating facility there uses locally abundant cattle manure for fuel. The Imperial Valley's growing season is long enough to support double-cropping, and of course this increases overall productivity.

The Coachella Valley north of the state's Salton Sea produces such crops as dates, grapes, and grapefruit. The Yuma Valley along the lower Colorado River supplies cotton, sugar beets, and oranges. In the Salt River Valley, near Phoenix, Arizona, winter lettuce, oranges, and cotton are the major crops. These southern crops, unlike those grown farther north, face little direct competition from the agricultural centers in the major market areas of the eastern United States.

Transportation Services:

Because little traffic is generated within the Interior West, a prime

goal of transport developers has been to permit movement across the region as speedily and inexpensively as possible. Consequently, most major highway and rail routes pass through the region east-west, from the urban centers of the Midwest to those of the West Coast.

Despite these requirements of transport design, the great width of the region demands development of many service facilities for the traffic passing through. Many of the towns of the region began as centers established to service and administer the railroads. The centers were founded wherever railroad personnel were needed, whether the region was populated or not. Although fewer local railroad workers were needed as technological innovations were implemented beginning in the late 1940s, this population reduction was more than compensated for by the growing need for people to serve truck and automobile traffic with gas stations, car repair facilities, motels, and restaurants.

Although transport services represented the principal early influence on the growth of urban centers, cities that have become the largest have usually been aided by some additional attribute. Spokane, Washington, with a population of over 350,000, has, for example,

become the principal center for the "Inland Empire" of Washington. That area, geographically defined and half encircled by the sweep of the Columbia River across central Washington State, has long had substantial agricultural production. Albuquerque, New Mexico, with a population of about 500,000, has gained a role similar to Spokane's through its centrality and accessibility in that state. Phoenix, Arizona, grew initially as an agricultural center and then boomed as Americans flocked to its warm, dry environment. It has become a retirement center as well as a focus of manufacturing activities, with industries that produce small, high-value products, such as the electronics industry, being particularly important in the city's growth.

Ogden, Utah, is one community that exists as a major rail center and was early among the most important such places in the region, but it has not become a major urban place. It is only about 55 kilometers north of Salt Lake City, a city whose continued dominance derived from its key functions as the capital of Utah and of Mormonism.

Tourism: The variety and appeal of the Empty Interior's scenic wonders attract millions annually. Visitors to most of the major parks must first pass a long, garish strip of motels, snack bars, gift shops, and other sources of local color. In

addition, distances between attractions are usually great, and services are thus needed in countless locations. When legal gambling operations in the state of Nevada are included as part of the area's tourist industry, the overall regional impact of tourism becomes even greater.

Lumbering and Ranching:
Ranching and lumbering depend on governmental land for many of their basic materials. The holdings of the Forest Service and the Bureau of Land Management are open to grazing, and most lumbering in the Empty Interior is carried out on Forest Service lands. Levels of production per hectare for both ranching and lumbering products are relatively low, especially when compared with land held in private hands.

One reason for this apparent inefficiency is the limited quality of the land. In many drier areas, 40 hectares of land per head is needed for satisfactory cattle grazing. The great seasonal climatic variations found in much of the region make this one of the few areas in America where transhumance is practiced—a seasonal movement of animal flocks, by those who tend them, from the lowlands in winter to mountain pastures and meadows in summer. It is especially important in the sheep-

ranching economy. Many Basques, expert shepherds from the Pyrenees of Spain and France, came to this area as contract laborers to manage the herds. Today, descendants of the Basques are a substantial part of the population of several states, especially Nevada.

Mining: In the late 19th century, gold miners followed shortly on the heels of the Mormons to become the second largest group of settlers in the region. The discovery of the Comstock Lode in Nevada gave rise to Virginia City, which grew into a city of 20,000 during its heyday around 1870 before nearly disappearing with the decline of high-quality ore.

The boom in gold and silver mining in the years immediately following the Comstock discovery created rapid population growth in Nevada. This culminated in the admission of the state into the union in 1864, long before most of its neighbors. The depletion of much of this mineral resource by the late 19th century resulted in a widespread population decline in Nevada, one from which it did not fully recover until well into the 20th century. Today, the mining economy is of little significance to the state—or to any part of the interior West—although some of the abandoned mining centers are important tourist attractions.

Leading today's list of min-

eral contributions to the region's economy is copper, with production concentrated in Arizona and Utah. The vast open pit of the Bingham mine outside Salt Lake City, said to be the largest human-made excavation in the world, has yielded some 8 million tons of copper. Among the several score major and minor copper-mining centers in Arizona, the most important is at Morenci in the eastern part of the state. Other important mines are at San Manuel, Globe, and Bisbee, all in southern Arizona.

Most of the copper ore mined in the Empty Interior is low grade, with a metal content of under 5 percent. Consequently, most mines have a smelting or concentrating facility located nearby to lessen shipment costs by greatly reducing the weight of the material being shipped. Refining is thus a major manufacturing industry in the region.

Lead and zinc follow copper in regional importance, with the two often joined by several other metals mined at the same location. The Butte Hill mine in Montana, for example, long was a significant producer of lead and zinc as well as copper. The Coeur d'Alene district in northern Idaho produces gold, silver, lead, and zinc; the Leadville district in Colorado has those four plus molybdenum, used in the manufacture of steel products. In

fact, some three-quarters of the world's supply of molybdenum comes from the Leadville district. Uranium exploration has also been widespread in the region, and today Utah and Colorado are the principal producing states. Approximately 25 million tons of coal is mined annually.

Spread across thousands of square kilometers of the area where Utah, Colorado, and Wyoming meet are the vast oil shale deposits of the Green River Formation. Locked in these rocks are as much as a trillion barrels of oil, vastly more than the entire proven alternative oil reserves of the world. However, operational and environmental problems have put development of this industry largely on hold.

There has been little sustained or substantial urban growth based on these mineral resources. Butte, Montana, with a population of 34,000 in 1990, is perhaps the region's largest city developed with mining (copper) as the main base of the economy, yet it has long been an important processing center for agricultural products as well. n

The area known generally as the Southwest is one of the most widely recognized yet one of the most transitional regions of America (map 12). It has an apparent physical uniformity that can be attributed primarily to its clear, dry climate, but, in fact, the region includes the broad flatlands of the lower Rio Grande Valley; the plateaus of New Mexico; the dramatic mesas, buttes, and deserts of Arizona; and the Sangre de Cristo Mountains of New Mexico.

The Southwest is made distinctive by the coexistence of Spanish-American, American Indian, and Anglo cultures, and the physical environment is almost like a stage that serves to emphasize aspects of each. The American Indian and Spanish populations coexisted in much of the region for 250 years after Spanish arrival at the end of the 16th century before Anglos began immigrating in the middle of the 19th century.

However, the tricultural border region is now preponderantly non-Spanish and non-Indian. Perhaps one person in four has a Spanish surname, and little more than 1 in 100 is an American Indian. The expectation might be that these minority populations would be engulfed by the larger and relatively

THE
SOUTHWEST
BORDER
AREA

CHAPTER

13

homogeneous Anglo population. But both minority groups have had a major sustained impact on the region. Spanish place-names abound, especially along the Rio Grande River and in coastal California. American Indian place-names are locally important, especially on the Navajo,

Hopi, and Papago reservations in Arizona. Hispanic neighborhoods are sometimes identified by the use of adobe, but more often by the use of bright colors in house painting and outside ornamentation and by yards encircled with bold fences. The distinctive hogan (a building made of logs and mud with near-vertical sides and a rounded top) can still be found on the Navajo reservation, and the pueblos of New Mexico are a striking element of that state's architecture.

The canyonlands of northern Arizona and southern Utah provided an effective barrier to Spanish expansion northward from Mexico. The Spanish moved up the Rio Grande to the broad expanse of the Rocky Mountains, north of which little Hispanic settlement developed. In Texas, most settlement remained concentrated along the Rio Grande



and Nueces Rivers. The extensive cattle-grazing industry that the Spanish introduced into south Texas was ill-suited to the moist, forested lands of the eastern portion of the state. That area, left as a frontier, was largely unsettled by the Spaniards. Most migration by Spanish-Americans beyond this original settlement area has been to urban places.

The aridity of Arizona, New Mexico, and bordering areas in Utah and Colorado discouraged large-scale Anglo agricultural

settlement into the 19th century, ensuring that substantial numbers of American Indians remained in the four states.

The Pueblo of the upper Rio Grande Valley had developed the technologically most advanced pre-European Indian civilization in what was to become the United States, and they remain important in New Mexico. The Navajo, Hopi, and Apache, all

primarily in Arizona, also survived the European wave better than most eastern tribes.

ETHNIC DIVERSITY

The Southwest's American Indian population is culturally diverse. The largest tribes are the Navajo in the "Four Corners" area, where the states of Colorado, Utah, Arizona, and New Mexico meet; several Apache tribes in Arizona and New Mexico; the various Pueblo groups in New Mexico; the Papago in southern Arizona; the Hopi in northwestern Arizona; and the Utes in southwestern Colorado.

Most American Indians are found in the major reservation areas, especially those centered on the Four Corners—where the 62,000-square-kilometer Navajo reservation has 10 times the population of any other reservation—and in California. Arizona and New Mexico together are the home for some 300,000 American Indians.

All of what is today the southwestern United States was incorporated into the Spanish Empire during the early years of the 16th century. By 1550, the Spanish had explored widely across the region. The lack of any identified, easily extractable riches, coupled with the great distance to the core of Spanish development in Mexico, minimized Spanish concern for their northern territory.

Before 1700, the only permanent Spanish settlements north of the present U.S.-Mexico border were along the valley of the upper Rio Grande in New Mexico. Santa Fe was founded in 1610, and other pueblos (civilian communities that could loosely be viewed as small towns), notably Taos and Albuquerque, soon followed.

A tentative Spanish occupation of Arizona began in 1700. The Apache Indians were a constant threat, repeatedly raiding Spanish settlements in the area. Colonization of Texas began at about the same time, with long-range results that were considerably more successful. Nacogdoches was founded in 1716, followed two years later by San Antonio. During the middle 1700s, the lower Rio Grande Valley was settled by the Spanish. Still, by the early 19th century, these and other centers of Hispanic settlement were viewed by Spanish authorities as a small, inadequate occupation compared with the large number of Americans then pushing westward toward Texas. Thus, foreigners, mostly Americans, were allowed to develop settlements there during the 1820s and 1830s.

California, the most distant of Spain's northern territories, was the last to be settled. A mission and

presidio (military post) were established at San Diego in 1769. During the next two decades, a string of missions, with a few presidios and pueblos as well, was established along the coast as far as Sonoma, north of San Francisco. This thin band of coastal occupation was encouraged partly in response to a growing British and Russian interest in the West Coast.

After U.S. acquisition of Texas in 1845 and the end of the Mexican-American War in 1848, the estimated Mexican population of this broad territory was 82,500. Of this number, 60,000 were in New Mexico, 14,000 in Texas, 7,500 in California, and 1,000 in Arizona.

By 1850, Mexicans in Texas and California represented less than 10 percent of the two states' total populations. There were good reasons for the rapid increase in the non-Spanish population. East Texas was the new western frontier for southern settlements, and the discovery of gold in California in 1848 was largely responsible for the influx of non-Spanish peoples into central and northern portions of the state. Only in New Mexico, southern California, and Texas south of San Antonio did the Hispanic population continue to dominate for a few more decades.

The original Hispanic population of the Southwest has been greatly increased by substantial immigra-

tion, especially during the 20th century. In 1990, persons of Spanish surname represented 18.8 percent of the population of Arizona; in California, the proportion was 26 percent; in Colorado, 13 percent; in New Mexico, 38 percent; and in Texas, 26 percent. In 1990, census figures placed the Hispanic population of the United States at 20.8 million, an increase of 34 percent over 1980. Over 60 percent of the Hispanic population is Mexican-American.

The economic gap between Anglos and Hispanics and American Indians is considerable. Differences in urbanization account for some of the variation; in the Southwest, Anglos are the most urbanized; American Indians, the least. Urban Americans tend to have higher incomes, more education, and fewer children.

Developments on the Navajo reservation, however, although not entirely typical, are indicative of altered reservation conditions. Final authority remains with the U.S. government's Bureau of Indian Affairs, but an elected tribal council makes most economic decisions for the reservation. Appropriations to

the reservation have increased dramatically since 1950. All-weather roads now cross the reservation, greatly reducing isolation, and health and educational facilities have been improved. Huge reserves of fossil fuel, particularly coal, have been found on the Navajo land, and several large power plants located on the reservation serve southern California. The power companies annually move millions of dollars into the reservation economy. The reservation also has expanded greatly its tourist industry and has attracted a number of new industries with its large, available, and now better-educated labor force.

During World War I and the economic boom times of the early 1920s, large numbers of Mexicans moved across the border to fill labor needs in the United States. Again in the 1940s, the United States had a warfare-generated labor shortage, and in the next two decades, Mexican laborers could enter the United States and work as seasonal laborers in the agricultural sector.

In 1965, Mexico started the Border Industrialization Program. Its goal was to attract U.S. labor-intensive manufacturing industries to border communities in northern Mexico. Foreign companies,

called *maquiladoras*, could import equipment and material duty free into Mexico if the manufactured products were then exported from Mexico. In 1989, that regulation was eased, and now *maquiladoras* can sell 50 percent of their total product in Mexico.

For Mexico, the program offered the possibility of jobs for its people. The attraction for U.S. firms was the opportunity to use low-cost labor at locations near the U.S. marketplace and sources of supply where transportation costs could be minimized. Many firms have been attracted by this cost-saving opportunity; by late 1990, an estimated 1,800 *maquiladoras* employed over 500,000 Mexican laborers.

POPULATION GROWTH TODAY

The Southwest is the sunniest and driest of all the U.S. regions. Throughout the area the characteristic vegetation is bunch grass, mesquite, and cactus. Temperature conditions across the region vary widely. Southern California, Arizona, and south Texas normally have hot summers and a short mild winter; the hot summers of the upper Rio Grande Valley in New Mexico are balanced by winter conditions that can drive temperatures far below freezing.

Despite this variety, the sunny climate of the Southwest has proven to be a powerful attraction for many

Americans. Arizona was the third most rapidly growing U.S. state on a percentage basis in the 1980s, following only Nevada and Alaska. In fact, all of the region's states during this period grew at a rate well above the national average. The city of Phoenix has doubled in size several times since 1950, and it is now a booming urban area, the 20th largest in the country. Greater Tucson grew from 266,000 in 1960 to 667,000 in 1990. These low-density urban areas now roll for kilometers across large expanses of former desert.

Some of the early attraction of the Southwest stemmed from the healthful effects of the dry environment for people with respiratory ailments. The warmer parts of the region today attract many thousands of retired Americans.

In addition, Arizona has attracted many industries and corporate offices. An aircraft industry developed in Phoenix during World War II, taking advantage of its proximity to the large aircraft complex in southern California, plus the promise of good flying weather. Many employers have located in southern Arizona because the environment has a strong appeal for a work force. The relative isolation of the state

from most of the major national markets, once possibly significant to Arizona's growth, has lost much of its impact with the emergence of high-value, low-weight manufactured goods, especially electronics.

El Paso, Texas, and Albuquerque, New Mexico, also roughly doubled in size between 1950 and 1970, and since then have continued to grow rapidly. Both cities, and San Antonio as well, have benefited from the presence of large military bases, although they also share in the diversified growth of light industry.

Elsewhere in New Mexico and in that part of Texas included in this region, population growth has been far more spotty. Many rural counties of the lower Rio Grande Valley and most in southern Colorado and eastern New Mexico have lost population during the last few decades, sharing the fate of other strongly rural areas in America.

PERSISTENCE OF A PLURAL SOCIETY

The rural highlands of central and northern New Mexico, the principal core of Spanish settlement in the United States, continues to show characteristics remarkably unaffected by the Anglo tide that engulfed Albuquerque and southern Arizona. Hispanics make up perhaps 70 percent of the highlands population of northern New Mexico and com-

prise the entire population of many small towns. American Indians, mostly Pueblos, are a much smaller but highly visible element of the region's rural non-Anglo culture.

Along the back roads north of Santa Fe, old adobe villages and public signs in Spanish dominate the cultural landscape. Along the highway near Albuquerque, as throughout the north central part of the state, are several centuries-old apartment-like Indian villages called pueblos; their ancient appearance is in striking contrast to the low, sprawling modern city. The pueblos each control substantial areas of surrounding lands that insulate them from the Anglo community. Pueblo society and traditions are vibrant and thriving. New Mexico's capital city of Santa Fe retains a Spanish flavor with its adobe architecture, open central square, and restaurants and stores offering the food and goods of northern Mexico.

The Winter Garden area of the lower Rio Grande Valley in Texas, also overwhelmingly Hispanic, is a major area of irrigated agriculture. The average growing season is longer than 280 days and supports such crops as oranges, grapefruit, and winter lettuce and tomatoes. The Hispanic population has long provided labor for this agriculture.

In Los Angeles, Hispanic enclaves may contain hundreds of thousands of inhabitants. Despite far more

acculturation into Anglo society than has occurred in the upper or lower Rio Grande Valley, Hispanic traditions remain important. Spanish-language radio stations and newspapers abound, and major Mexican-American festive occasions attract huge throngs.

In the Southwest border area, then, the impact of the Hispanic and the American Indian cultures remains strong.

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California is home to more than 10 percent of all Americans and a central element in the American cultural fabric. Although more than two-thirds of native-born Americans live in their state of birth, fewer than half of all Californians were born in the state.

Rather, California has been an important destination for U.S. internal migration in nearly every decade since 1850.

By most of the criteria used in the definition of regions, California (map 13) is not a single unit. The agricultural population of the Imperial Valley in the southeast is quite different from the urban population of San Francisco. The striking flatness of the San Joaquin Valley is in sharp contrast to the ruggedness of the Sierra Nevada mountain range. There are broad areas of desert in the southern interior and heavily forested slopes along the coastal north. The lowest and highest elevations in the conterminous United States, Death Valley and Mount Whitney, respectively, are almost within sight of each other.

California's dramatic and varied physical environment has played a strong role in the state's settlement. Most of the state's population today is crowded into a small part of its

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territory, constricted by expanses of rugged topography and a widespread lack of water. In fact, this mecca for America's worship of the outdoor life surpasses every other state in its level of urbanization. Several factors account for this, but the restrictive aspects of the physical environment are certainly important.

THE PHYSICAL ENVIRONMENT

The coast of California is lined by long mountain ranges that trend in a generally northwesterly direction. They are collectively called the Coast Ranges. Most are not particularly high—summits are between 1,000 and 1,600 meters. They are heavily folded and faulted as a result of the pressures of plate contact just to the west. The California earthquake fault zones follow the same northwesterly trend as the Coast Ranges.

Small earthquakes are common across large sections of the region, especially from the San Francisco Bay area southward to near Bakersfield and from the Los Angeles area southeastward through the Imperial Valley.

To the east of the Coast Ranges for much of their distance lies the Central Valley. This valley is extremely flat, extends 650 kilo-

meters from north to south, and is nearly 150 kilometers wide in places. The Central Valley was originally a massive extension of the Pacific Ocean, open to the sea only at San Francisco Bay. A recipient of the erosion material carried off the western slope of the Sierra Nevada, this former section of the sea has been filled in with sediment. The result is a low-relief landscape rich in potential for large-scale agricultural pursuits.

To the east of the Central Valley, the Sierra Nevada rise gradually and have been heavily eroded. In contrast, the eastern face of the mountains offers a dramatic change in elevation. These are fault-block mountains, large rock masses that rose as a whole unit, and the eastern side was lifted far more sharply than the western face. Because they reach high elevations and contain few passes, the Sierra Nevada have proven a major barrier to movement between middle and northern California and areas to the east.

Two other landscape areas, less identifiably Californian, complete the state's topography. In the north, the mountain-valley-mountain pattern breaks down, and much of the northern tier is generally mountainous. The central plateau portion, directly north of the Central Valley, contains two of the state's major volcanic peaks, Mount Lassen and Mount Shasta. To the southeast of

the Central Valley, the Great Basin of the interior is composed of low-lying mountains interspersed with large areas of fairly flat land.

Variations in California's climate and vegetation are nearly as great as the diversity of its topography. Of greatest importance for precipitation is the frequent movement of moisture-laden air southeastward out of the northeast Pacific. The distance southward that storm systems from this air mass can move is influenced substantially by a stable high-pressure center usually found off the west coast of Mexico. Such a stationary center blocks the southward movement of storms emerging from the maritime air mass and forces the moisture-producing system eastward onto shore. This blocking high tends to drift northward during summer and southward during winter.

A definite north-south gradient in average annual precipitation occurs in California as a result of these air masses; the north is much more moist on the average than the south. Furthermore, summers are characteristically drier than winters, especially in the south. In summer, southern California frequently experiences long periods



during which there is no rain-fall. Consequently, the wooded mountain slopes grow dry as tinder. Forest fires, another of the region's recurring environmental problems, are most frequent in late summer and fall, toward the end of the long dry period.

The coast north of San Francisco has temperatures with relatively little seasonal variation, plentiful year-round precipitation, and frequent periods of overcast skies.

The Central Valley is much drier than the coastal margins of the state. Annual precipitation is usually less than half that found at a similar latitude

on the western slopes of the Coast Ranges. For example, Mendocino, on the coast north of San Francisco, averages 92 centimeters of precipitation annually, while Yuba City,

directly east of Mendocino in the heart of the Sacramento Valley, averages only 52 centimeters. Southward, coastal San Luis Obispo averages 52 centimeters, while inland Bakersfield must make do with only 15 centimeters annually.

Summer temperature differences between coastal and inland points at a similar latitude are equally dramatic. San Luis Obispo's average July temperature is 18°C; the average for Bakersfield is nearly 12°C higher. Daytime high temperatures in San Francisco in late summer are usually under 27°C, while Stockton, 100 kilometers east, is baking in temperatures over 38°C. Much of this difference is the result of the moderating effect of the cold ocean current offshore and the usual pattern of afternoon and evening fog in summer along the coast.

To the interior of the Coast Ranges and the Sierra Nevada, in California's southeast, is a broad region of dry steppe or desert environment. During the late summer months, dry winds occasionally press westward to the coast, bring-

ing extremely low humidity and temperatures that may register more than 40°C. The southeastern interior area of California receives, on the average, less than 20 centimeters of precipitation annually.

Vegetation patterns closely parallel variations in climate in the state. Nearly all of lowland southern California and the area east of the Sierra Nevada-Cascade ranges is covered with sage, creosote bush, chaparral, and other characteristic desert and semidesert growth. The Central Valley and the valleys of the southern Coast Range are somewhat better watered than areas farther south; they are steppe grasslands. Wrapping around the Central Valley and following the coast from Santa Barbara to Monterey Bay are mixed open forests of live oaks and pines. The coast from Monterey Bay northward is the home of the redwoods, the world's largest trees. At higher elevations in the Coast Ranges and Sierra Nevada are mixed forests of pine and fir, and high in the Sierra Nevada are subalpine hemlock-fir forests, including those of the sequoia.

CALIFORNIA'S GROWTH

Perhaps California's greatest disadvantage, at least until recently, is its location at the far western periphery of the United States, some 3,500 kilometers from the most important areas of economic

demand and supply in the country. This relative isolation is compounded by the nature of most of the land that lies between the Sierra Nevada and the South and the Midwest, a broad section of the country that generates little local freight.

More than anything else, climate has been the key in overcoming the state's apparent locational disadvantage; climate has been important to both the state's settlement history and its agricultural development.

The pre-European American Indians in California were hunters and gatherers. For food they depended on either seafood or grains and nuts that could be collected in the wild and ground into flour. There were few large tribes. Instead, most groups were organized into small units of perhaps 10 to 20 families. At the time of the first European arrival in the Americas, perhaps 1 Native American in 10 lived in what would become California.

Although Spanish explorers brushed the edge of California in the mid-1500s and claimed it as part of Spain's large North American holdings, they basically ignored it for the next two centuries. Not until concern arose over British and Russian expansion in western North America in the late 18th century did Spanish missionaries establish a string of missions from San Diego to Sonoma, near San Francisco.

These mission settlements were joined by presidios (forts) and a few pueblos (towns). During the next few decades, the Spanish and Mexican governments granted a series of large landholdings (ranchos) to immigrants. Still, the area remained peripheral; the towns were small and ramshackle, and hides and tallow were the ranchos' most important exports.

Following U.S. seizure of California in 1846, a great gold strike in the foothills of the central Sierra Nevada in 1848 brought the first significant change in the region's settlement fortunes. Within a year, 40,000 people had come to the gold fields by sea, passing through San Francisco harbor. Perhaps as many more came overland. By 1850, California was a state. The frantic period of the gold rush lasted only a few years, but it succeeded in breaking the state's isolation from the rest of the country.

Southern California, the center of Spanish occupation in the state, did not share in the early population expansion, but the completion of railroads going west in the 1880s brought a sudden end to the area's quiet existence. In an effort to create a demand for their facilities, the railroads advertised widely for settlers, aided new arrivals in finding housing and jobs, and lowered fares. During the first southern California

land boom, between 1881 and 1887, the population of Los Angeles grew from 10,000 to 70,000.

A large number of crops were also introduced into southern California during this period and in the years following, including the navel orange, the lemon, the Valencia orange, the avocado, and the date. They were in demand in eastern markets, and, at that time in the United States, only southern California could provide them in large quantities. Agriculture was to remain the backbone of southern California's economy until early in the 20th century.

AGRICULTURE TODAY

California, by some measures America's most urbanized state, is at the same time its most agricultural state in terms of total farm income. In 1988, the market value of agricultural products sold in California was \$16.6 billion. California's agriculture, although typified by its many specialty products, is, in fact, broadly based, thanks to the variety of climatic regions and the market demand of its own large population.

Many of the specialty crops are sensitive to variations in climate or soil type. The Coastal Range valleys that open onto the Pacific are frequently foggy and have moderate temperatures. Vegetables such as artichokes, lettuce, broccoli, and brussels sprouts grow well under

such conditions. The varietal grapes that people often feel produce the best of American wines need a mild, sunny climate such as that found in the inland Coastal Range valleys around San Francisco. The grapes of the San Joaquin Valley and of southern California, where summer temperatures are much higher, are used for table grapes, raisins, and for what some wine drinkers consider less distinguished wines. Most flowers grown for seed in the United States are planted in the Lompoc Valley west of Santa Barbara. Navel oranges and lemons are grown almost exclusively along the coast and the interior surrounding the Los Angeles Basin.

The importance of many specialty crops in California does much to explain why the state's farmers have had such success in penetrating the markets of the distant East. These crops can be grown, or at least grown on a large scale, in only a few parts of the country. Most require long growing seasons. Thus, there is no local competition in the demand areas. Southern California, especially the Imperial Valley, is also able to provide vegetable crops during the winter season, when competition is minimal and sale prices are at a maximum.

Although California produces many agricultural products, local areas tend to specialize in the growth of one or a few crops, and

some of California's specialty crops are grown by only a handful of farmers. In the San Joaquin Valley, some landholdings extend over many thousands of hectares.

California's agriculture has created a massive demand for water across much of the state. Nearly all of the state's cotton, sugar beets, vegetables, rice, fruits, flowers, and nuts are grown on irrigated farmland. California has more farmland irrigated than any other U.S. state, about 3.5 million hectares, and the state's farmers use more than one-fourth of all the irrigation water used in the country. On the average, irrigated land in the state receives about 1 meter of "artificial" water annually.

Crop selection at a location depends on water availability as well as soils, drainage, terrain, and growing season. But the potential for irrigation is usually critical. A transect across the San Joaquin Valley finds livestock grazing in the Sierra foothills; dry farming for grains in the flatter, but still too high for irrigation, land below; irrigated fruit trees and vine crops in the better drained soils near the valley floor; and irrigated field crops such as cotton and vegetables on the flat valley floor.

Some 70 percent of the state's precipitation falls in the northern mountains and valleys and in the Sierra Nevada, where few farms

or urban places exist, whereas 80 percent of the water for irrigation is used in the drier south. Of the state's major farming regions, only areas north of San Francisco and a few coastal valleys to the south receive as much as 50 centimeters of precipitation in an average year.

Farms are the principal users of water, but it was the cities that initiated the development of the state's tremendous water movement complex. At the beginning of the 20th century, Los Angeles outgrew its local groundwater supplies and looked for a supplementary source in the Owens Valley, east of the Sierra Nevada and some 300 kilometers north of the city. By 1913, the Los Angeles Aqueduct was carrying water to Los Angeles. This aqueduct still provides half the city's needs. In 1928, Los Angeles and 10 other southern California cities formed the Metropolitan Water District to develop an adequate water supply for their area. Today, the Metropolitan Water District

serves six counties, over 130 cities, and half of California's population.

Perhaps the most spectacular episode in the state's water history occurred in 1905 in the Imperial Valley. In 1901, private groups constructed canals to carry water from the Colorado River into the Imperial Valley; the result was an immediate agricultural land boom. Then, in February 1905, the Colorado River flooded, broke out of its channels, and flowed into the irrigation ditches. Before a massive effort returned the river to its channel in the fall of 1906, 1,100 square kilometers of the valley had been filled by the Salton Sea, a body that still exists, its size maintained by the ongoing drainage from irrigated farmland in the valley.

In the 1940s, the federal Bureau of Reclamation began the Central Valley project to improve the local availability of irrigation waters in the Central Valley. Today, water removed from the Sacramento River by the Delta-Mendota Canal flows southward along the west side of the San Joaquin Valley to Mendota, where it is put into the San Joaquin River. Thus, most of the normal flow of the San Joaquin River can be used for irrigation in the southern part of the valley, the state's leading agricultural region.

Despite California's agricultural importance nationally, its population is overwhelmingly urban and still increasing. Most of the state's population lives in one of its two major urban regions, one centered on Los Angeles, the other on San Francisco.

The land boom of the 1880s led to the establishment of several score of cities scattered across the Los Angeles Basin and the southern California coastlands. As their populations increased, these communities squeezed out the intervening rural lands that formerly separated them spatially.

Most of the 300-kilometer stretch of coastline from Santa Barbara to San Diego is now occupied by one long megalopolis, the home of about 15 million Californians. The entire complex is basically a creation of the 20th century. Thus, many of the elements of eastern cities placed on the landscape during the 19th century and the early 20th century are not present in Los Angeles. Among these missing features: four- or five-story walk-up apartment buildings, warehouses of about the same elevation, fixed-rail elevated or underground public transportation lines.

The most important stimulus in

the southern metropolis has been the family automobile. Fully half of the central portion of Los Angeles has been surrendered to the automobile, either for roadways or parking. The urban area's dense system of freeways makes possible fairly high-speed movement across much of the metropolitan region. The Los Angeles area has more cars per capita than any other part of the United States and only a minimal public transportation system.

Finally, Los Angeles is a city without a center. The traditional single central business district as a focus of urban activity barely exists here. Los Angeles is really many cities that have grown together as they increased in size; 14 of these cities currently have populations of more than 100,000. The absence of a dominant central business district results in part from the continued existence of independent centers for each of these communities.

Although the area is not without resources, their overall importance is not overwhelming. In addition to agriculture, petroleum production is important; three of the country's major fields are in southern California. Offshore development began in 1965. The heavy demand

for petroleum products, especially gasoline, results in the local consumption of virtually all of southern California's production.

Southern California is known worldwide as the location of Hollywood, long the center of America's motion picture industry. In the early days of filmmaking, outdoor settings and natural light were the norm. The area's cloudless skies and short cold-temperature periods made its streets and fields a fine home for countless motion pictures. Los Angeles remains one of the centers of American filmmaking and television, but today the motion picture industry plays only a small role in the metropolitan area's economy, employing less than 2 percent of its workers.

Its climate and its varied scenery, especially along the coast, early made southern California one of the country's centers of outdoor recreation. Today, these natural advantages have been supplemented by some of the country's largest and best-developed recreation facilities. Balboa Park in San Diego, with its excellent zoo, Knott's Berry Farm, and Marineland are major attractions. Disneyland has become an American phenomenon and the main destination of countless tourists.

Southern California is also the major destination for Latin American and Asian migrants

entering the United States. More than one schoolchild in four in the Los Angeles school district speaks one of 104 different languages better than English.

Recent migrants especially often settle in ethnic neighborhoods. Little Tokyo, long a part of the city, has a renewed vibrancy. Monterey Park in the San Gabriel Valley is 50 percent Asian, making it the most heavily Asian city in the mainland United States. A rich diversity of ethnic restaurants, many found within ethnic enclaves, dot the city.

Still, all of this does not add up to resource support for 15 million people. Heavy resources, such as coal or iron ore, are virtually nonexistent. San Diego has a good harbor, but Los Angeles's harbor, entirely human-made, is only average.

However, southern California has profited from government spending far more than most other areas of the country. California receives about 20 percent of all Department of Defense spending and nearly half of that of the National Aeronautics and Space Administration. San Diego is the West Coast home of the U.S. Navy, and the navy is easily the city's principal employer. San Diego has relatively little manufac-

turing employment for an urbanized area of over 2 million, surely an important part of its claim to be one of America's most livable cities. Also, electronics—where the value added by manufacture is high and worker skills particularly important—has been a major contributor to the southern California economy.

Los Angeles has a higher dollar volume of retail sales than the New York metropolitan area, and the value of its manufactured goods is also higher. A decade ago, the city passed San Francisco as the West Coast's financial center; it ranks second nationally to New York City in banking deposits. The twin ports of Los Angeles and Long Beach together form the fastest growing major cargo center in the world. The dollar value of their import-export ocean-borne cargo now easily surpasses that of the Port of New York and New Jersey.

By comparison with their upstart competitors in the south, San Franciscans choose to view their city as old and cosmopolitan. The city was the northern core of Spanish and Mexican interest in California. It served as the supply center for the California gold rush. By 1850, it was the largest city on the Pacific Coast, a ranking it maintained until 1920. The completion of the first transcontinental railroad in 1869, coupled with the city's size and its excellent harbor, made it

not only the focus of western U.S. growth but also the key location for U.S. commerce with the Pacific. Into the city came large numbers of immigrants from Asia, especially Chinese, plus substantial numbers of other foreigners. They created a cosmopolitan ethnic mixture that remains a readily apparent aspect of the city's character.

The romantic flair of its early history is one piece of the mosaic that makes San Francisco among the most popular of American cities. Its physical geography provides a splendid setting for a city: steep slopes that offer dramatic views of the Pacific Ocean or of San Francisco Bay, coupled with a mild climate that escapes the occasional staggering summer heat of southern California.

The city of San Francisco is currently home to fewer than one-eighth of the San Francisco Bay region's 5.4 million people. Hemmed into its small peninsula, the city is actually losing population while the entire urban area grows.

The Bay Area today is really composed of several different areas, each with its own character. The East Bay is the most varied, with a mix of college students, large tracts occupied by middle-class residents, and most of the port facilities and heavy industry of the region. The San Jose-South Bay area is upper middle class, with new houses, fine

yards, and major regional shopping centers. Along the Bay north of San Jose is Silicon Valley, so named because of its concentration of businesses engaged in chemical and electronics research associated with production of computer components. North of the Golden Gate Bridge, the cities are smaller, there is little manufacturing, and the conflict between agricultural and urban land use is sometimes obvious. Here are found the well-to-do urbanites searching for a place in the country. The city of San Francisco itself, with its grid pattern of streets incongruously placed on a hilly terrain, its closely spaced late 19th- and early 20-century housing, and its ethnic diversity, maintains a special appeal.

Unlike Los Angeles, the existence of a major urban center in the Bay Area is not surprising. Its excellent harbor and good climate are important site factors. By volume, it is the major Pacific port in North America. Its rail and highway ties to the East at least equal those for any other West Coast city. Just as Megalopolis is America's hinge with Europe, San Francisco is its hinge with Asia.

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Cold, clear mountain streams tumble down rock-strewn courses. The destination: a rugged, unused coastline where precipitous, fog-enshrouded cliffs rise out of pounding surf. Mountains are visible in the distance—lofty, majestic, covered with snow. Tall needleleaf evergreens cover the land between with a mantle of green. Cities, where they exist, give the impression that they are new. This is America's North Pacific Coast, or more popularly, the Pacific Northwest (map 14)—the coastal zone that stretches from northern California through coastal Canada to southern Alaska.

An important element of its regional character is the North Pacific Coast's relative isolation from the rest of America. Less than 3 percent of the American population lives there. Populated sections of the region are separated from the other principal population centers by substantial distances of arid or mountainous terrain. Residents of the region often view this isolation as positive, a geographic buffer against the rest of the world.

THE NORTH PACIFIC COAST

CHAPTER

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Economically, however, it has been a hindrance.

High transportation costs inflate the price of Pacific Northwest products in distant eastern markets and discourage some manufacturers from locating in the region.

THE PHYSICAL ENVIRONMENT

The North Pacific Coast is defined primarily on the basis of its physical environment. Stated very simply, it is a region strongly subject to maritime influence and rugged terrain. Precipitation is high, and vegetation associated with heavy moisture is located near the coast but with marked variation over short distances because of the influence of surrounding mountains on the region's climate.

The greatest average annual precipitation in the United States is found in the Pacific Northwest. Averages above 190 centimeters are common, and averages are double that amount on the western slopes of the Olympic Mountains in northwestern Washington. During the winter, the cloud cover is almost constant.

The northern Pacific Ocean is a spawning ground for great masses of moisture-laden air. As these air masses move, they are pushed south and east by the prevailing winds onto America's Pacific shores. A

high-pressure system located off the coast of California in summer and off northwestern Mexico in winter prevents many of these maritime air masses from drifting farther southward and ensures that most of their moisture falls over the North Pacific Coast. Winter precipitation amounts are everywhere higher than summer levels, but the seasonal difference is more marked on the southern margin of the region. The coast of southern Oregon and northern California receives less than 10 centimeters of precipitation during the summer months of July and August, only one-tenth of the amount that falls there between December and February.

Although this area has generally high precipitation, considerable portions are semiarid. Parts of the borderlands of Puget Sound in Washington receive only about 60 centimeters of precipitation annually. Precipitation seldom falls in the form of heavy thundershowers; more typical is a gentle, light, frequent rain that feels like a heavy mist. One consequence is that runoff, so normal in heavy rains, is lessened, and vegetation can make maximum use of the moisture.

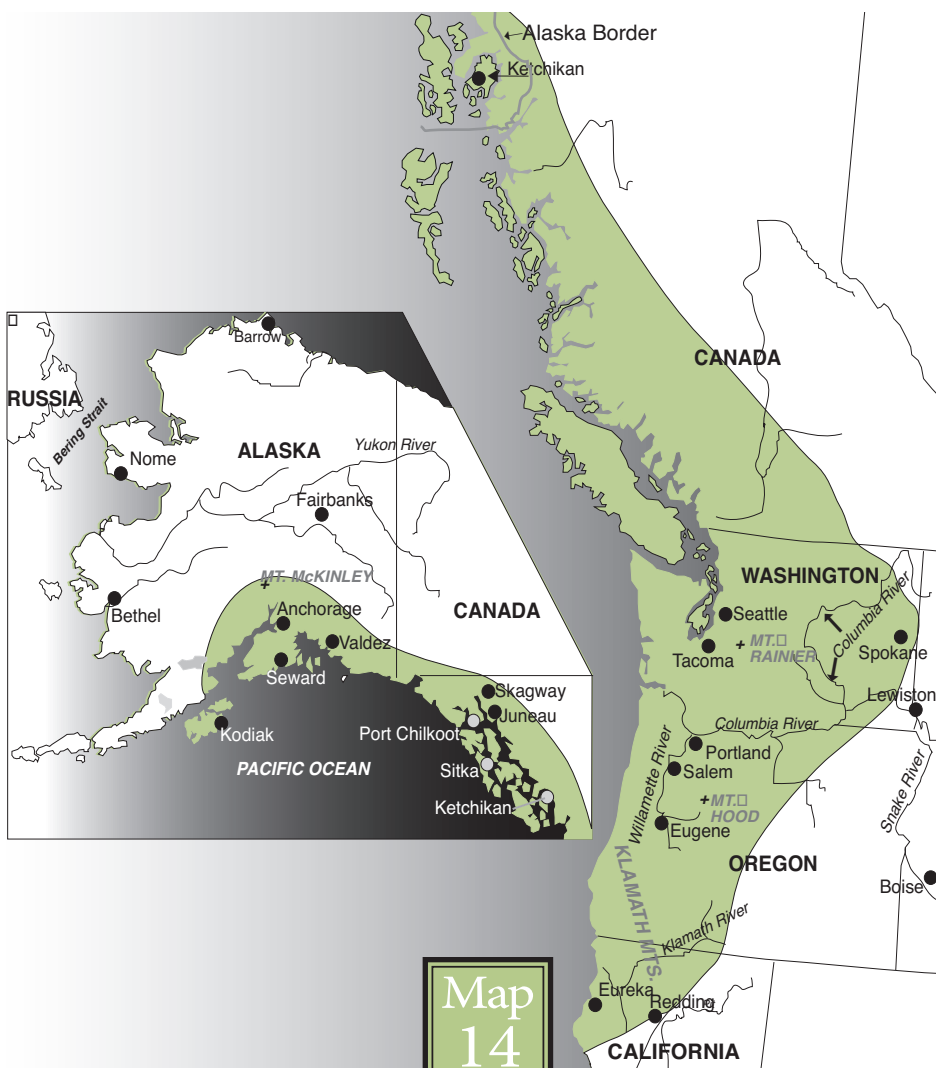
The region's mountains are the main reason for both the high precipitation along the coast and the substantial climatic variations that exist in close proximity. As a Pacific air mass passes over land moving

eastward and southeastward, it strikes the mountain ranges that line the North Pacific Coast and is forced to rise. As the air rises, it cools, and its moisture-carrying capacity is reduced, resulting in precipitation.

Along a belt extending from south-central Oregon to southwestern British Columbia in Canada, the Coast Ranges are backed by a trough of low-lying land, including the Willamette Valley in Oregon and the Puget Sound lowland in Washington. As the east-moving air descends into these lowlands it warms, and its moisture-carrying capacity is increased. Because additional moisture is not introduced into the air, little precipitation occurs.

To the east of the lowland is a second north-south trending range of mountains called the Cascades. Mount Rainier in Washington has an elevation of 4,390 meters, and many peaks are between 2,750 and 3,650 meters high. Winter precipitation in the mountains falls in the form of snow, making this the snowiest portion of the country.

Finally, in the eastern extension of the region beyond the Cascades in interior Washington, air masses again descend and warm. The little



Map
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moisture that remains in the air is retained, and most of eastern Washington averages less than 30 centimeters of precipitation yearly.

South and north of this mountain-valley-mountain system, the mountain ranges merge and

the separating valley disappears. Heaviest precipitation amounts are concentrated in a single band along the northern coast, including Alaska's "Panhandle," which is domi-

nated by moisture and cloudiness. Average precipitation levels drop sharply along the coast in Alaska north and west of the Panhandle; most of the southward-facing coast of central Alaska averages 100 to 200 centimeters annually.

In addition to bringing rain, the region's maritime location provides a moderate temperature regime. Summers are cool. Winters are surprisingly warm, although the dampness means that the air can feel raw and less comfortable than the thermometer might suggest.

The seasonal movement of air masses means frequent periods of high winds along the region's coastal margin. It is not uncommon during the winter months for winds to exceed 125 kilometers per hour during the stormier periods. Although the coastal mountains provide some protection and winds are generally lower in the summer, high winds can reach the eastern portions of the region even in the summer. When they do, the danger of fire is worsened.

Few places in the Pacific Northwest do not offer a view of neighboring mountain peaks when the weather is clear. Mount McKinley at the region's northern extremity is, at 6,200 meters, the highest in North America. The peaks of the Coast Range of Oregon are fairly continuous in that state, with elevations reaching about

1,200 meters. In Washington they are discontinuous, with several rivers, notably the Columbia and the Chehalis, cutting pathways across them. Coast Range elevations in Washington are seldom above 300 meters.

The Klamath Mountains of northern California and southern Oregon offer a jumbled topography. Little pattern is apparent in the terrain. This is a wild, rugged, empty area.

The lowlands of Oregon are part of a structural trough that was created when that area sank at the same time that the Cascades to the east were elevated. This trough extends northward in the form of straits separating Canada's Vancouver Island from the rest of British Columbia, then passes through the complex of islands that line the Alaska Panhandle and provides the Inside Passage north as far as Juneau.

Farther inland, the Cascades extend from the Klamath Mountains northward into southern British Columbia. The southern section of these mountains appears as a high, eroded plateau topped by a line of volcanic peaks. Between Mount Lassen in California (one

of the few volcanoes in the United States to have been active in historic time) and Mount Hood in Oregon, these peaks are especially splendid in their isolation above the surrounding plateaus. The northern Cascades are more rugged and have long proved a difficult barrier to movement eastward from the populous Puget Sound lowland. Here, extinct volcanoes, most notably Mount Rainier, provide the highest elevations and best defined peaks.

Beyond the Alaska Panhandle and the massive, glacier-covered St. Elias Mountains, the mountains divide in southern Alaska. The Coast Ranges, notably the Chugach and Kenai Mountains, decline in elevation from east to west. The interior Mountains, the Alaska Range, are much higher and more continuous. A large lowland at the head of Cook Inlet is south of a gap through the Alaska Range, and here Anchorage, easily the largest city in Alaska (with an estimated population of 226,000 in 1993), is located around its good harbor and with easy connection to the interior.

Juneau, the capital of Alaska, is located on a narrow coastal lowland on the Panhandle; its only transportation connections to the rest of the state are by air or water. The farthest one can drive from town is about 15 kilometers. This location for the capital was reasonable when Alaska's wealth was in the Pan-

handle's forests and salmon fisheries and when access to the Yukon gold fields through Skagway was a consideration. As the state's economy changed and other resources became more important, the Panhandle languished. Fairbanks (with an estimated population of 32,300 in 1989), in central Alaska, and Anchorage, which is accessible to the southern portion of the state, outstripped Juneau in population growth; the capital city still had fewer than 29,000 people in 1989.

In terms of vegetation, there are magnificent redwood stands in the Klamath Mountains; Douglas fir, hemlock, and red cedar in Washington and Oregon; and Sitka spruce on the Alaska peninsula. This is a land not just of forest, but of beautiful expanses of tall trees reaching straight for the sky.

Except for the drier lowlands, where the normal vegetation of the Willamette Valley is prairie grass and that of the land east of the Cascades a mix of grass and desert shrub, and except for the tundra above the tree line, all of the Pacific Northwest is, or was, covered by forest. Tree growth is encouraged

by plentiful moisture and moderate winter temperatures. Forest products were long the economic mainstay of the region. Even today, while the southeastern United States produces more wood for pulp and paper products, no other part of the country provides as much lumber as the North Pacific Coast.

PATTERNS OF HUMAN OCCUPATION

No other coastline, except for the polar areas, was explored by Europeans as late as was the North Pacific Coast. Vitus Bering had claimed the Alaska coast for Russia by 1740, but it was not until 1778 that Captain James Cook sailed the coast from Oregon to southeastern Alaska. By the time explorers Meriwether Lewis and William Clark worked their way across the Cascades to the mouth of the Columbia River in 1805, Philadelphia and New York City, each with about 75,000 people, were vying for the title of the country's largest city. By the mid-1840s, when American settlers began traveling the Oregon Trail to the Willamette Valley, New York's population was fast approaching 500,000.

The pre-European population of the region was relatively large. The moderate environment provided a plentiful supply of food throughout the year. Deer, berries, roots, shellfish, and especially salmon rep-

resented a natural bonanza of food that seemed without limit. The

American Indians responded to this with a hunting and gathering economy, and no food crop cultivation. Concentrated along the coast, they were divided into many distinct ethnic groups, each occupying their own, often small, coastal valley. They constructed large, impressive houses of red cedar planks and went to sea in dugout canoes made of the same wood.

Along most of this coast, the Indians seemed simply to melt away when Europeans arrived. Because their extreme isolation made organized opposition impossible, each small tribe succumbed quietly, making little impact on European settlement. Today, few Indians remain in the south. Farther north, the Indian population remains a substantial ethnic group in the Panhandle of Alaska.

Russians were the first Europeans to establish permanent settlements along the coast. They came late in the 18th century, motivated by the search for easily extracted riches. These riches proved to be furs, and the Russians established a series of trading posts and missions that were concentrated in southeastern Alaska but that extended as far south as northern California. The

outposts never became self-sufficient in foodstuffs, and the cost of maintaining these scattered, distant sites usually exceeded the income from fur sales. Following several earlier Russian attempts to sell the colony to the United States, a \$7.2 million sale price was finally agreed upon in 1867.

The Hudson's Bay Company moved its fur-trading operations into the Columbia River basin early in the 19th century. It was the dominant influence in the Pacific Northwest until the late 1830s, when American missionaries and settlers began the long journey across the Oregon Trail from Missouri. Most new American settlers moved into the Willamette Valley, but they quickly outnumbered the small British population of the entire Northwest.

The railroads were of key importance in the eventual growth of Oregon and Washington. In 1883, the Northern Pacific Railroad was completed to Seattle and was followed a decade later by the Great Northern. This ended the region's overwhelming dependence on oceanic shipment, which sailed via the southern tip of South America

to the eastern United States and European markets.

Today, this land of the great outdoors, like nearly every other part of the United States, has an urban population. Both Seattle, Washington, and Portland, Oregon, have metropolitan area populations of more than 1 million people.

Seattle has been the largest city along the North Pacific Coast since the boom era of the late 19th century. Founded as a logging center, Seattle began to achieve regional dominance when it was linked to the transcontinental railroads. The city has been the home of the Boeing (aircraft) Company since the 1920s, and it has been called the world's largest company town. Other of the city's 3,500 manufacturers produce cement, clay, fishing supplies, flour, metal products, textiles, and food products.

Seattle's urban core is tucked onto a narrow isthmus bordered by Puget Sound on the west and Lake Washington on the east. It has a beautiful site, with views of mountains and water offered to the residents of its many hills and pleasant, scattered neighborhoods of tree-lined streets.

Portland is an old city by the standards of the region, new by most others. Its economy is more diversified than Seattle's, and its relations with the region's interior are closer because of the lowland routeway

to the east provided by the valley of the Columbia River. Portland is a major transshipment point for grain from eastern Washington, for example, and wood products and food processing are principal activities of the local manufacturing economy. Portland, inland about 160 kilometers from the coast, nevertheless rivals Seattle as an ocean port because the lower Columbia River is navigable.

THE REGIONAL ECONOMY

In many ways, the economic structure of the North Pacific Coast is dominated by the production of staple products and by its isolation from major markets elsewhere in the country. The region has always contained a number of high-demand products, notably lumber and foodstuffs. However, movement costs reduced the ability of producers to get their products to market at reasonable cost. Consequently, market areas turned to other sources of supply that were nearer and less expensive, so that much of the North Pacific Coast's agricultural products are grown for the local market, not for export.

The broad Willamette Valley in Oregon is easily the largest agricultural area near the region's coast. The land has been cultivated for more than a century, and its farms

are prosperous and well established. Much farmland is in forage crops, and many farmers still follow the practice of burning their fields in the fall—with the result that for a period of several weeks, large sections of the valley are covered by a layer of smoke.

Dairy products, also generated mostly for the local markets, are of greatest importance to the agriculture of the Willamette Valley; strawberries are perhaps the most important specialty crop. Other specialty crops also thrive in the valley's climate, including hops, grass for turf seed, cherries, and spearmint. Even grape production, supporting a local wine industry, has increased in recent years.

The Puget Sound lowland in Washington is another important dairy area. Again, specialty crops are also grown, with peas leading the pack. Quick frozen and then shipped to markets throughout America, this cool-weather crop is particularly well adapted to the local climate.

The area east of the Cascades in Washington presents a different kind of agricultural landscape. Most of this area is semiarid, and grasses and desert shrubs replace the majestic evergreens of the coast and mountains. Although called the Columbia Plateau, the area has little of the characteristic flatness one expects of a plateau. Much of

the area consists of rolling hills. Elsewhere in central Washington, the landscape has been cut by steep-sided dry canyons called coulees. That section—properly called “the channeled scablands” because lava pockets dot the surface with scab-like knolls—is covered by a deep blanket of lava flows eroded by the floods from glacial melt during the Pleistocene ice retreat.

That portion of the Columbia Plateau along the Oregon-Washington border and across much of eastern Washington is a substantial farming area, easily the most important in the Pacific Northwest.

The hilly country of east-central Washington, called the Palouse, averages between 35 and 65 centimeters of precipitation annually, somewhat more than other parts of the interior. Wheat is the primary crop of the area, with both spring and winter varieties grown. Wheat is normally planted on a given field every other year; in alternate years, the land is plowed, but nothing is planted. This practice retards evapotranspiration and allows soil moisture to increase. The large wheat farms of the Palouse are heavily mechanized and highly productive. Most of the product is exported through Portland to Asia.

Irrigation has played a major role in the area’s agriculture in recent decades. Two major irrigated areas

have been developed. The water from a number of streams flowing eastward out of the Cascades is used to irrigate their relatively narrow valleys. The result is one of the country’s most famous apple-producing areas.

The Columbia River, at Grand Coulee northwest of Spokane, was dammed primarily to provide hydroelectric power. It also made available large amounts of irrigation water to south-central Washington. After these waters became available in the late 1950s, crop acreage in the area expanded considerably in response. Major agricultural products include sugar beets, potatoes, alfalfa, and dry beans.

Washington, California, and Oregon together provide more than half of all timber cut in the United States, and Washington vies for the lead (with the Deep South state of Georgia) in pulp and paper production. Although forestry was the first major industry in the North Pacific Coast, its rich forest did not become nationally important until well into the 20th century, when improved transportation facilities, coupled with the destructive overcutting of many eastern forests, opened the region’s

woods to lumbering.

Douglas fir (of prime importance as structural supports for houses and for flooring, doors, and plywood) is easily the major lumber tree of the region, although each section has its own mix of trees to harvest. In northern California, for example, redwoods remain locally important; the western red cedar is also widely cut in the area from Oregon northward.

The large size of many of the trees plus the distances to market tends to encourage large-scale logging operations. One major U.S. lumber company, for example, owns some 690,000 hectares of land in Washington, making it the state's largest private landowner. A substantial part of Washington and a majority of all land in Oregon and northern California is government owned. Private logging on government land plays a large role in overall production. Effective marketing has enabled lumber products of the region to penetrate all market areas of the country.

The plentiful precipitation and rugged topography of the North Pacific Coast provide a hydroelectric potential unmatched in the United States—40 percent of the

country's potential is contained in Oregon and Washington alone. The Columbia River, in particular, with a flow volume larger than that of the Mississippi River and a drop of nearly 300 meters during its 1,200-kilometer course from the U.S.-Canadian border to the sea, is a power developer's delight.

Begun in 1933 and still the region's largest, Grand Coulee Dam was the first dam constructed on the Columbia River. It was followed by no fewer than 10 dams downstream. British Columbia and the United States agreed to the construction in Canada of three additional dams that would store water during periods of heavy flow and then release the water when flow was low to guarantee consistent power generation.

These developments have provided inexpensive electricity for the North Pacific Coast. Inexpensive electrical power, in turn, has attracted manufacturers that are heavy power consumers; most notable is the aluminum-smelting industry.

Forestry and fishing at one time formed the backbone of the region's economy. Large numbers of whaling vessels were attracted to the cold waters of the North Pacific during the late 18th century and first half of the 19th century. Heavy over-harvesting has reduced the North

Pacific's whale population to a small fraction of former levels.

Salmon contributed a major part of the foodstuffs of the coastal tribes before the arrival of Europeans, and remains the principal fish caught throughout the region. Salmon migrate upstream from the ocean to spawn in freshwater. Years ago, their spawning runs filled the rivers, and massive catches were easily available to people on the banks.

The size of the salmon catch has declined greatly over the past five decades, and today it is less than half its former level. Most salmon are caught off the Alaska coast. When the region's streams were dammed, access to many traditional spawning grounds was blocked, especially on the upper Columbia and its tributaries. Fish ladders—a series of gradual water-carrying steps that allow fish to jump from level to level and thus bypass a dam—have been constructed around some of the smaller dams, but they do not work on the larger ones. As a consequence, nearly all of the Snake River and its tributaries, plus all of the branches of the Columbia above Grand Coulee, are closed to salmon.

ALASKA — A POLITICAL ISLAND

Coastal southern Alaska is clearly a part of the North Pacific Coast, but it must be viewed as somewhat separate from the rest of the region.

No railroad connects Alaska with the more populated parts of the continent, and only a single, long highway, part of which remains unpaved, connects coastal southern Alaska through interior Canada to the rest of the United States. People in the Panhandle of southeastern Alaska are crowded by coastal mountains onto a narrow shoreline rarely more than a few hundred meters wide. This portion of the region looks to air and sea transportation for connection with the rest of the world, which leads to an even greater sense of detachment than might be typical of the rest of the region, a greater sense of separation from the activities of the rest of the country, and an economy of high prices resulting from scarcity and high transportation costs.

Many believe that the Alaskan economy is based heavily on minerals, lumbering, and fishing. In fact, the federal government, primarily the Department of Defense, is the dominant employer in the state. Even the petroleum development boom on the state's North Slope has only modified, not eliminated, this orientation.

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The United States is in many ways a creation of a frontier experience. The push westward remains part of recent American history, and many still live who remember the days of early settlement, of the often heroic struggle with the land.

The American frontier is largely gone today. Although humans presumably have the technology to live anywhere on the earth's surface, those areas of the United States that can be occupied with moderate physical and economic effort are already staked out.

Extending as far south as the northern Great Lakes states and including the interior to the Canadian border, as well as parts of Alaska, the Northlands (map 15) remains sparsely settled. The inhospitable nature of the physical environment plus the consequent thinness of settlement give the Northlands its special character.

A HARSH ENVIRONMENT

If Americans were asked to describe the Northlands, "cold" would probably be the most commonly used adjective. Average January temperatures range from a high of about -7°C along its southern Great Lakes margin to a full -40°C in parts of Alaska. Temper-

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atures can reach -60°C .

Not only are winter temperatures low across most of the region, but winters are long. The average time between the last frost in the spring and the first in the fall is roughly 135 days at the southern margins of the area but little more than 14 days along parts of the

Arctic Ocean. Because virtually all major food crops need a growing season of longer than 90 days, they can be grown in only a few small areas along the southern margins.

Summers, generally short and cool, can have surprisingly warm days. Maritime moderation is significant only along the peripheries, mainly in the east and west.

This dramatic seasonal variation in temperature results from the great shifts in length of day and the angle of incidence of the sun's rays. As the Earth follows its annual path around the sun, the North Pole is tilted toward the sun during what is summer in America and away from it in winter. Thus, everywhere north of the Arctic Circle is in darkness for at least one day at midwinter and experiences at least a 24-hour period without the sun setting at midsummer. Moreover,

during the winter, the sun, when it rises, remains low on the horizon. Even southern sections of the region receive only six or seven daylight hours during the winter.

Precipitation amounts vary widely across the Northlands. Highest levels are found in the far southeast, where both winter and summer storm systems dump more than 100 centimeters of annual precipitation along the southern shore of Labrador. Precipitation levels drop markedly toward the interior and north.

Despite the paucity of precipitation, little of the Northlands provides the appearance of a dry environment. In the summer, in fact, much of the region is covered with standing water. This is due, in part, to the low levels of evaporation and evapotranspiration found in this cold climate. In the northern portions of the region, standing water is also supported by the widespread existence of permafrost—a subsurface layer of permanently frozen ground that is commonly about 100 meters thick and sometimes extends downward for more than 300 meters. In warmer areas, the permafrost is discontinuous, with areas of frozen ground interspersed with unfrozen soil. As the surface layer thaws during the short summer to a depth of perhaps 1 meter, water is held on the surface by the frozen layer underneath, cre-

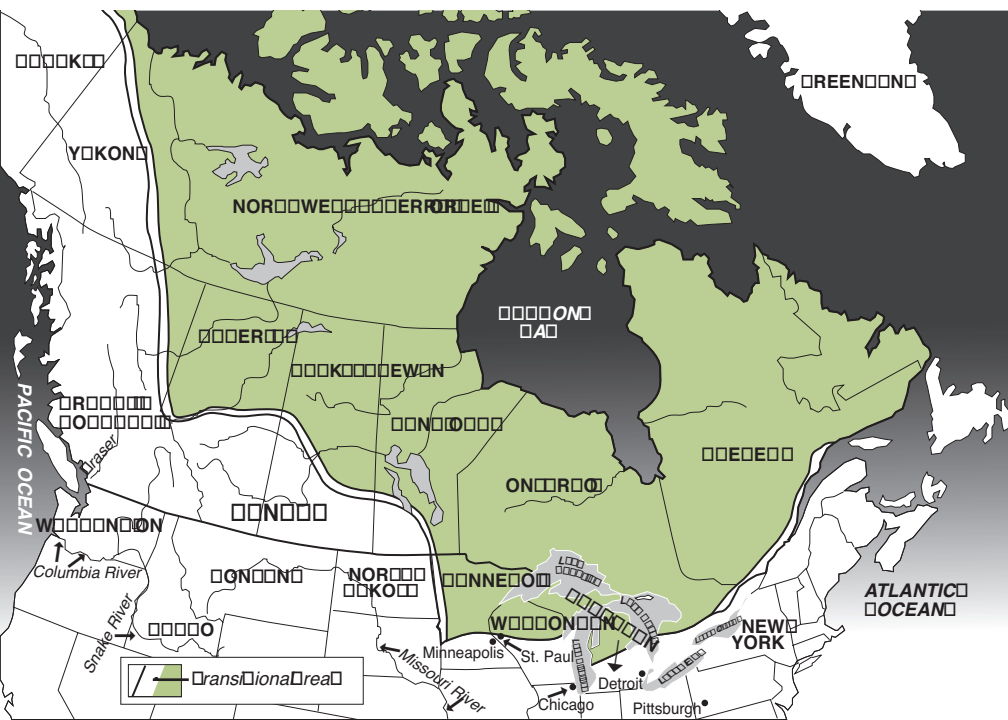
ating a boggy, shifting surface.

Construction in permafrost is difficult. Buildings must be placed on piles sunk deeply into the permafrost for stability, and roads must be repaired extensively each year to maintain any resemblance of an even roadbed. Most of Alaska is underlain by continuous or discontinuous permafrost.

Although considerable local terrain variation is found, much of the Northlands topography is either flat or gently rolling. The north slope of Alaska, for example, is a broad, flat coastal plain.

Northlands soils are varied but are generally acidic, poorly drained, and of low agricultural quality. Soils in the southern portion of the region are mostly boralfs or spodosols soils of a cool needleleaf forest environment. To the north, tundra soils, often water saturated and frozen, dominate. Fertile soil is confined to some of the old river valleys and to those lakes that have been filled by sedimentation and decayed vegetation.

Most of the Northlands can be placed in two distinct vegetation areas. Stretching across the southern arc of the region is a coniferous forest called the boreal forest,



or taiga. Covering hundreds of thousands of square kilometers, these closely ranked spruces, firs, pines, and tamaracks appear to blanket the landscape in a dark, almost black mass when seen from the air. Slow growing and never really tall, these trees decrease in number and height from south to north across the taiga. Around the Great Lakes, a mixture of pines and hardwoods predominate.

Passing just south of Hudson Bay, then angling northwest to the mouth of the Mackenzie River and across the northern edge of Alaska, is the tree line, which identifies the transitional zone between the taiga

Map 15

and tundra in the Northlands. North of it, climatic conditions are too harsh for tree-like vegetation. Beyond lies the tundra, a region of lichens, grasses, mosses, and shrubs.

The great Arctic ice pack, covering some 4.8 million square kilometers, is a thin (usually 3 to 6 meters thick), rugged sheet of nearly salt-free ice floating on the Arctic Ocean. It holds as much water as all the freshwater lakes in the world. In winter it extends southward to enshroud northern Alaska. Summer melt

briefly frees the area.

The ice limits ocean transport in the Arctic to a brief, often hectic period each summer. An early return of the ice can sometimes block ships (and whales that migrate into the Arctic Ocean during the summer) from escaping to open water to the south. The ice also minimizes any moderating impact by the Arctic Ocean on the Northlands' climate.

HUMAN OCCUPATION

Nearly all parts of the Northlands are sparsely populated, with highest densities found along the southern margins. American Indians, Metis, and Inuit (Eskimos) are numerically dominant over much of the region north of the United States. Inuit are the predominant population in most of the Arctic. American Indians are found mainly in the boreal forest area. The Metis are the result of intermarriage between American Indian women and whites during the early fur trading period of European settlement in the taiga.

The arrival of Europeans in the Northlands brought an end to much of the American Indian and Inuit traditional culture. Fur traders early acquired many of their pelts from the Indians of the taiga, and European goods entered the Indian economy as a result. Where hunting and fishing continue, the motor-

boat, rifle, and snowmobile have usually replaced the kayak, bow, and dogsled. But most Northlands Indians and Inuit no longer exist by hunting and fishing. They have moved in substantial numbers into towns, and many urban places of the Northlands today have large native populations.

The Northlands offered little of interest to most Europeans who came to America. Where Northlands settlement did occur, its focus was usually either extractive or military. French voyageurs, fur trappers, and traders pushed their canoes far beyond the agricultural settlements along the lower St. Lawrence River as early as the middle of the 17th century, extending French political control across the Great Lakes. The Hudson's Bay Company, an early British fur trading company, established itself on the margins of Hudson Bay in Canada and then pushed south and west, thus blocking further French expansion westward. By the mid-18th century, the Hudson's Bay Company, which had been granted a trade monopoly to the area by the British government, was in control of the entire boreal forest reaching from Hudson Bay westward to

the Rocky Mountains, with further extension of influence into the Arctic. This vast extractive empire brought with it only a minimal number of small and widely scattered settlements.

The voyageurs and Hudson's Bay Company relied on the numerous lakes and streams of their area for transportation, and they located small forts at control points along the water routeways. At places where important streams met lakes, where streams ended and an overland portage began, or where rapids or falls were encountered, vessels had to be unloaded and their goods moved and reloaded onto other boats; these points provided effective control of the entire water system. The sites of many early French forts are occupied today by important urban centers, including Chicago, Detroit, and Pittsburgh.

The boreal forest of the southern half of the Northlands contains the largest area of uncut forest remaining in North America. Until recently, the lumbering and the pulp and paper industries only nibbled at the edges of this vast forest. The area of the upper Great Lakes was logged on a massive scale during the late 1800s and the early 20th century. Because little reforestation was practiced at that time and because the cold climate of the boreal forest slows regrowth, much of this area is only now recovering

its previous appearance.

The portion of the Northlands in the upper Great Lakes area is America's leading source of iron ore plus a substantial contributor of copper. Alaskan North Slope petroleum has recently provided a large addition to the American energy supply, presently pumping about 25 percent of the country's total production.

As with logging, the accessible peripheries of the Northlands became the region's first important mining districts. The Mesabi Range in northern Minnesota, an area of gently rolling elongated hills, along with neighboring areas in Minnesota, Wisconsin, and Michigan, developed into America's chief source of iron ore late in the 19th century. Billions of tons of high-grade ore were moved by rail to Lake Superior ports and loaded there onto large specialized lake ships that carried the ore to ports in northeastern Ohio, where it was transferred to railroads for the trip to iron and steel-processing plants in the Pittsburgh-Youngstown area.

Today, most ore goes to the newer, integrated iron and steel facilities at the southern end of Lake Michigan. Locks at Sault Sainte Marie that connect Lake Superior with the rest of the Great Lakes are the busiest in the world, largely as a result of this ore traffic.

Most of the high-quality iron ores are now gone from the Lake Superior mining district. Attention has turned to a lower-grade ore called taconite, also found in huge quantities in the district. The iron content of taconite, roughly 30 percent compared to perhaps double that for the richer ores, is so low that to ship the ore to the lower Great Lakes for processing is considered far too expensive. Thus, the ore is ground into a fine powder, much of the rock removed, and the resulting material pressed into small pellets with a much higher iron content, which greatly lowers the cost of shipping taconite.

The cost of shipping low-grade ores is the major factor in choosing

to locate many smelting operations near the source of supply instead of near the market. For example, copper, which seldom represents as much as 5 percent of its ore and often less than 1 percent, is nearly always refined near the mine. The smelting and refining of ores is the major form of manufacturing employment in the Northlands, and the large smokestacks of refineries are the central element in the skyline of some of the region's larger cities.

The United States has moved rapidly to develop its North Slope petroleum fields in Alaska. Some oil producers paid well over \$1 billion just for the right to search for oil in the region.

Transportation of crude petroleum was the principal problem involved in opening the North Slope fields. A pipeline costing \$8 billion and crossing central Alaska to the port of Valdez on the Pacific was finally built and opened in 1977.

The Northlands' sparse population, and especially its lack of cities, mean that even if transportation routes could be constructed cheaply, they would be used relatively little. Only the Alaska Highway and some of its branches pass through the western margins of the region.

For much of the region, however, the light airplane and its bush pilot is the only transportation link avail-

able. Close to a score of carriers operate a relatively dense pattern of scheduled routes in the north.

Although the total regional population is not large, the great majority of people in the Northlands live in villages, towns, and cities. Agriculture, a major support of dispersed settlement elsewhere, is only locally important. Nearly all of the larger cities are dominated by a single major economic activity and are located in the south—Duluth, Minnesota, as a transportation center, for example. Most smaller towns in the boreal forest are similarly unifunctional.

In the far north, European development has resulted in few permanent settlements. Many people in the area work, in some capacity or another, for the U.S. government or in resource exploitation. Far northern communities are extremely isolated, often with predominantly male populations, and the labor force frequently spends periods of weeks away from the communities for family visits and recreation. As with communities everywhere that are totally focused on minerals extraction, they are often short-lived, owing to resource depletion. n

The Hawaiian archipelago is a string of islands and reefs, 3,300 kilometers long, that forms a broad arc in the mid-Pacific. The archipelago begins in the east with the island of Hawaii and ends almost at the international dateline with a small speck in the ocean called Kure Atoll (map 16). Only the easternmost 650 kilometers of the state contains islands of any size, as well as almost all of the state's population. It is this portion that is usually considered as the actual "Hawaii."

The eight main islands of Hawaii—Oahu, Hawaii, Maui, Kauai, Lanai, Molokai, Niihau, and Kahoolawe—contain more than 99 percent of the state's land area and all but a handful of its people. The island of Hawaii, at 8,150 square kilometers, comprises nearly two-thirds of the state's total area, and it is often referred to as simply the Big Island. The smallest of the eight, Kahoolawe, is 125 square kilometers and is uninhabited.

LOCATION AND PHYSICAL SETTING

Hawaii is near the middle of the Pacific Ocean. Honolulu, the state capital, is 3,850 kilometers west of San Francisco, California, 6,500 kilometers east of Tokyo, Japan, and roughly 7,300 kilometers northeast

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of the Australian coast. This might be viewed as a case of extreme isolation, and until the last few centuries this was probably true. But as countries around the Pacific Basin began to communicate more with one another and to use the ocean's resources, these islands became an important center of interaction.

The Hawaiian chain is merely the visible portion of a series of massive volcanoes. The ocean floor in this area is 4,000 to 5,000 meters below sea level. Hence, for a volcano to break the water's surface requires a mountain already approaching 5 kilometers in height.

The kind of volcanic activity that created the islands and that continues there today has, for the most part, not been of the explosive type in which large pieces of material are thrown great distances. Volcanic cones resulting from explosive eruptions do exist on the islands. Diamond Head, the Honolulu landmark, is the largest at about 240 meters. More common, however, are features formed from a gradual buildup of material as a sequence of lava flows piled one layer on top of another. The usual shape of volcanic mountains formed in this way

is domelike, with the main feature being undulating slopes instead of steep cliffs.

Several of the volcanos on the Big Island remain active. Mauna Loa pours out lava on the average of once every four years, and volcanic activity poses a constant threat to Hilo, the island's largest town. A 1950 eruption covered some 100 square kilometers. Another volcano, Kilauea, is usually active, but lava actually flows from it about once in every seven years. A 1960 flow from Kilauea covered 10 square kilometers, adding some 260 hectares to the island's size.

Hawaii is a state of rugged slopes and abrupt changes in elevation. This is the result of the erosion of the volcanic surfaces by moving water. Sea cliffs cut by waves form a spectacular edge to parts of the islands. Such cliffs on the northeast side of Molokai stand as much as 1,150 meters above the water and are among the world's highest; others on Kauai exceed 600 meters. Some small streams on the northeast side of the Big Island drop over such cliffs directly into the sea.

Stream erosion has heavily dissected many of the lava surfaces. Canyons lace many of the domes. The floor of Waimea Canyon, on Kauai, is more than 800 meters below the surface of the surrounding land. Waterfalls several hundred meters high are common on

the islands. The Pali, on Oahu, is a line of cliffs where the headwaters of streams eroding from opposite sides of the island meet. Those flowing east have eroded the ridges separating them to cut a broad lowland; the westward-facing valleys are higher and remain separated by ridges.

One important result of this intense erosive action is a limited amount of level land on the islands. Kauai is particularly rugged, with the only lowlands formed as a thin coastal fringe. Maui has a flat, narrow central portion separating mountainous extremities. Molokai is reasonably flat on its western end. Oahu has a broad central valley plus some sizable coastal lowlands. The island of Hawaii has only some limited coastal lava plains.

Hawaii's oceanic location obviously has a substantial impact on its climate. It is the ocean that fills the winds with the water that brush the islands' mountains. The ocean also moderates the islands' temperature extremes—Honolulu's record high of 31°C is matched by a record low of only 13°C.

The latitude of Honolulu, about 20°N, is the same as Calcutta and Mexico City. As a result, there is

little change in the length of daylight or the angle of incidence of the sun's rays from one season to another. This factor, plus the state's maritime position, means that there is little seasonal variation in temperature.

It is variations in precipitation that mark the major changes in season on the islands. During the summer, Hawaii is under the persistent influence of northeast trade winds, which approach the islands over cool waters located to the northeast and create characteristic Hawaiian weather—breezy, sunny with some clouds, warm but not hot. In winter, these trade winds disappear, sometimes for weeks, allowing “invasions” of storms from the north and northwest. Honolulu has received as much as 43 centimeters of rain in a single 24-hour period. Hawaiian weather stations have also recorded 28 centimeters in an hour and 100 centimeters in a day, both of which rank near world records.

The topography of the islands creates extreme variations in precipitation from one location to another. Mount Waialeale, on Kauai, receives 1,234 centimeters annually, making it one of the world's wettest spots, and Waimea, also on Kauai, receives about 50 centimeters annu-

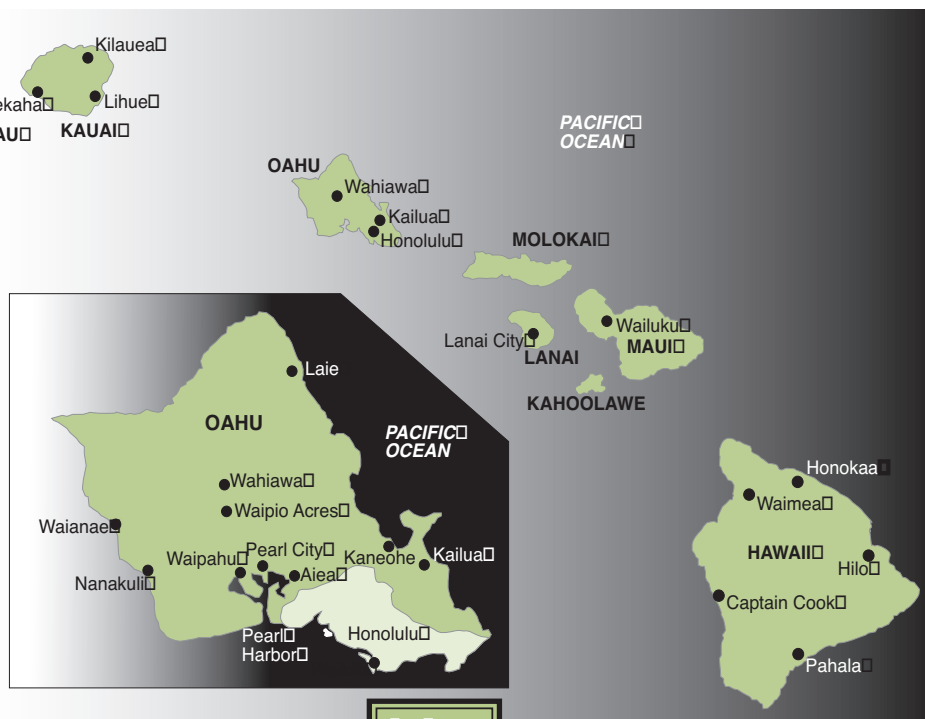
ally—yet these two sites are only 25 kilometers apart. Within the metropolitan area of Honolulu, it is possible to live near the beach in a semiarid climate with less than 50 centimeters of rainfall annually or inland near Pali on the margins of a rain forest drenched by 300 centimeters of precipitation a year. Unlike the Pacific Northwest, the greatest precipitation on the higher mountains in Hawaii occurs at fairly low elevations, usually between 600 and 1,200 meters.

Much of the volcanic soil is permeable. This allows water to percolate rapidly, draining beyond the reach of many plants. Thus, many areas of moderate to low precipitation are arid in appearance.

The isolation of the Hawaiian islands, coupled with their generally temperate climate and great environmental variation, has created a plant and bird community of vast diversity. There are several thousand plants native there and found naturally nowhere else; 66 uniquely Hawaiian land birds have also been identified. Interestingly, there were no land mammals on the islands until humans arrived.

POPULATING THE ISLANDS

The Polynesian settlement of Hawaii was a segment in one of humankind's most audacious periods of ocean voyaging. These peo-



Map 16

ple set out on repeated voyages in open canoes across broad oceanic expanses separating small island clusters. Settlers who came to Hawaii 1,000 years ago, for example, are presumed to have come from the Marquesas, 4,000 kilometers to the southwest. There was some kind of pre-Polynesian population on the island, but it was probably absorbed by the newcomers. A second substantial wave of Polynesian migrants arrived 500 or 600 years

ago.

The massive effort required by these voyages apparently became too great. As a result, Hawaii spent several hundred years in isolation after the second migration period. During the isolation, the Hawaiians solidified a complicated social organization in their insular paradise. Hereditary rulers held absolute sway over their populations and owned all of the land. By the late 18th century, when Europeans found the islands, the benign environment supported a population that numbered about 300,000.

The first European to visit Hawaii, which he dubbed the Sandwich Islands, was Captain James Cook in 1778. Cook was killed on the shore of the Big Island, but news of his discovery spread rapidly after reaching Europe and North America; it was quickly recognized that the islands were the best location for a waystation to exploit the trade developing between North America and Asia.

In the 1820s, the whaling industry moved into the North Pacific and, for the next half-century, the islands became the principal rest and resupply center for whalers. About the same time, Protestant missionaries came to the islands. Like most of the whalers, they were from the northeastern United States. They were very successful in their missionary work, and for decades had a major influence on the islanders.

The first Hawaiian sugar plantation was established in 1837, although the islands did not become a substantial producer until after the middle of the century. Between then and the end of the 19th century, Hawaii grew to the rank of a major world sugar exporter.

This development led to a need for agricultural laborers. Native Hawaiians were used for a time, but their declining numbers provided nothing like the labor force needed. Thus, between 1852 and 1930, plan-

tation owners brought 400,000 agricultural laborers, mostly Asian, to Hawaii. In 1852, ethnic Hawaiians represented over 95 percent of the population of the islands. By 1900, they were less than 15 percent of the total population of just over 150,000, whereas nearly 75 percent were Oriental.

After 1930, the mainland United States became the main source of new residents in Hawaii. In 1910, only about one resident of Hawaii in five was of European ancestry (referred to in Hawaii as Caucasian). Now, nearly 40 percent of the state's population is Caucasian or part-Caucasian.

The population of Hawaii fell from its pre-European peak to a low of 54,000 in 1876 before beginning to grow again. By the early 1920s, the state's population had reached pre-European levels, and in 1988, the state had 1.1 million residents. Because of immigration, Hawaii's annual rate of population growth is well above the U.S. average.

The pre-European population was spread across the islands, with the Big Island occupied by the largest number of people. Since European discovery, the islands' population has been concentrated

increasingly on Oahu. Honolulu, with its fine harbor, became the principal port city.

The political history of Hawaii was turbulent during the 120 years after Cook's discovery. The various kingdoms of the islands were eliminated by a strong chief, Kameha-meha, between 1785 and 1795. The missionaries' growing influence gradually made a sham of the authority of the Hawaiian rulers, and, during the 19th century, competing European political interests moved in to fill the resulting vacuum.

But the increasing role of Americans made it inevitable that, if Hawaii was to lose its political independence, it would be annexed by the United States. As American plantation owners increased in number and influence, their dissatisfaction with the Hawaiian government grew. In 1887, they forced the monarchy to accept an elected government controlled by the planters. The monarchy was overthrown completely in 1893, and the new revolutionary government immediately requested annexation by the United States. Initially refused, they were finally accepted as a territory in 1898.

No provision was made at the time of annexation for the eventual admission of Hawaii to statehood, and it was not until 1959, after Alaska was admitted to the

union, that Hawaii became the 50th U.S. state.

THE HAWAIIAN ECONOMY

Roughly half of all land in Hawaii is government owned, with the state, not the federal government, controlling 80 percent of that land. Most of it is in the agriculturally less desirable portions of the islands, and the bulk is in forest reserves and conservation districts. Most federal lands are primarily in national parks on the Big Island and Maui, or in military holdings on Oahu and Kahoolawe.

Seven-eighths of all privately owned land in Hawaii is in the hands of only 39 owners; each owns 2,000 hectares or more. Six different landowners each control more than 40,000 hectares out of a state total of about 1,040,000 hectares. Smaller unit ownership of private land is most extensive on Oahu, but even there the larger owners control more than two-thirds of all privately owned land. Two of the islands, Lanai and Niihau, are each nearly entirely controlled by a single owner, and on all of the other islands (except Oahu) major landowners control about 90 percent of all privately held property.

Most of these large landholdings were created during the 19th cen-

tury period of freewheeling exploitation on the islands. Land had previously been held entirely by the monarchies. This land passed into the hands of non-Hawaiian private owners during the political decline of the monarchy. With the deaths of the early owners, most estates have been given over to trusts to administer rather than passing directly to heirs. This has made it difficult to break up the ownership patterns, which has led to high land values and pockets of high population density.

Sugar, and later pineapples, fueled the Hawaiian economy for many decades after the 1860s. The economy remained primarily agricultural until the late 1940s. In recent decades, agriculture has continued to show modest gains in income, but its relative importance has declined. Only one Hawaiian worker in 30 is currently employed in agriculture.

However, Hawaii continues to provide a substantial share of the world's sugar harvest, and its production of pineapples is about 650,000 tons annually, making it the world's largest supplier of pineapples.

Gross economic statistics overwhelmingly emphasize the position of Oahu, where more than 80 percent of the state's economy is concentrated. The role of agriculture remains great on the other islands.

Both Lanai and Molokai depend on pineapples for much of their employment and income. Livestock and sugar form the backbone of the economy on the Big Island, as do sugar and pineapples on Maui and Kauai.

As agriculture declined and lost its dominance over the Hawaiian economy, its place was first taken by the federal government. Over the past several decades, governmental expenditures have increased at a rate roughly comparable to the growth of the total economy, maintaining about a one-third share of all expenditures. Most of this has come from the military, which controls almost 25 percent of Oahu, including the land around Pearl Harbor, one of the finest natural harbors in the Pacific. Nearly one Hawaiian worker in four is an employee of the military, and military personnel and their dependents together represent over 10 percent of Hawaii's population. The armed forces are also the largest civilian

employer in the state.

Tourism is a major industry, with over 4.5 million people visiting the state each year. Tourism has become the principal growth sector of the economy, increasing its share of total island income from 4 percent in 1950 to over 30 percent today.

INTER-ISLAND DIVERSITY

The major Hawaiian islands are part of the same state, they have similar geologic histories, and they are closely spaced in a vast ocean, yet each has its own character. Oahu is densely populated and intensely used, and it offers a view of bustle and confusion common to urban America. The island of Hawaii, the Big Island, by comparison has an air of relative space and distance, with large ranches, high, barren volcanoes, and large stretches of almost treeless land. Its land area is dominated by five huge shield volcanoes. Sugar, cattle ranching, and tourism are its major industries.

Kauai, sometimes called the garden isle because of its lush tropical vegetation, is heavily eroded into a spectacular scenery of mountains, canyons, cliffs, and waterfalls. Kauai is becoming increasingly popular with tourists because of its dramatic physical environment. Neighboring Niihau is privately owned and is operated as the Niihau Ranch Company. Most of its

few hundred residents are native Hawaiians.

Maui, the second largest of the islands, offers a contrast between the plantations of its central lowlands and the rugged mountains to either side. Tourist development, concentrated along the western coastal strip, has been intense, with the result that Maui had the most rapid rate of population increase of any of the islands in the 1970s and 1980s. Still, much of the rest of the island remains little changed and sparsely populated.

Molokai is half ranchland and half rugged mountains. Its north coast is dominated by spectacular sea cliffs as much as 1,100 meters high, while the south shore is a broad coastal plain. It is perhaps the least economically developed of the populated Hawaiian Islands.

Lanai and Kahoolawe are both in the lea of much higher Maui. As a result, both are dry. Neither have any permanent streams. Pineapple production is the only important economic activity on Lanai. The U.S. Navy administers Kahoolawe and uses it for military exercises. n

Absolute Humidity: The mass of water vapor in the atmosphere per unit of volume of space.

Accessibility: A locational characteristic that permits a place to be reached by the efforts of those at other places.

Accessibility Resource: A naturally occurring landscape feature that facilitates interaction between places.

Acid Rain: Rain that has become more acidic than normal (a pH below 5.0) as certain oxides present as airborne pollutants are absorbed by the water droplets. The term is often applied generically to all acidic precipitation.

Air Mass: A very large body of atmosphere defined by essentially similar horizontal air temperatures. Moisture conditions are also usually similar throughout the mass.

Alluvia: Clay, silt, gravel, or similar detrital material deposited by running water.

Alluvial Soils: Soils deposited through the action of moving water. These soils lack horizons and are usually highly fertile.

Antebellum: Before the war; in the United States, belonging to the period immediately prior to the Civil War (1861-1865).

Anthracite: A hard coal containing little volatile matter.

Arete: A sharp, narrow mountain ridge. It often results from the erosive activity of alpine glaciers flowing in adjacent valleys.

Arroyo: A deep gully cut by a stream that flows only part of the year; a dry gulch. A term normally used only in desert areas.

Badlands: Very irregular topography resulting from wind and water erosion of sedimentary rock.

Base Level: The lowest level to which a stream can erode its bed. The ultimate base level of all streams is, of course, the sea.

GLOSSARY

Batholith: A very large body of igneous rock, usually granite, that has been exposed by erosion of the overlying rock.

Bedrock: The solid rock that underlies all soil or other loose material; the rock material that breaks down to eventually form soil.

Bilingual: The ability to use either one of two languages, especially when speaking.

Biological Diversity: A concept recognizing the variety of life forms in an area of the Earth and the ecological interdependence of these life forms.

Biota: The animal and plant life of a region considered as a total ecological entity.

Bituminous: A soft coal that, when heated, yields considerable volatile matter.

Boll Weevil: A small, greyish beetle of the southeastern United States with destructive larvae that hatch in and damage cotton bolls.

Break-in-Bulk Point: Commonly, a transfer point on a transport route where the mode of transport (or type of carrier) changes and where large-volume shipments are reduced in size. For example, goods may be unloaded from a ship and transferred to trucks at an ocean port.

Butte: An isolated hill or mountain with steep or precipitous sides, usually having a smaller summit area than a mesa.

Caprock: A strata of erosion-resistant sedimentary rock (usually limestone) found in arid areas. Caprock forms the top layer of most mesas and buttes.

Carrying Capacity: The number of people that an area can support given the quality of the natural environment and the level of technology of the population.

CBD: The central business district of an urban area, typically containing an intense concentration of office and retail activities.

Chaparral: A dense, impenetrable thicket of shrubs or dwarf trees.

Chinook: A warm, dry wind experienced along the eastern side of the Rocky Mountains in the United States and Canada. Most common in winter and spring, it can result in a rise in temperature of 20°C (35° to 40°F) in a quarter of an hour.

Climax Vegetation: The vegetation that would exist in an area if growth had proceeded undisturbed for an extended period. This would be the “final” collection of plant types that presumably would remain forever, or until the stable conditions were somehow disturbed.

Confluence: The place at which two streams flow together to form one larger stream.

Coniferous: Bearing cones; from the conifer family.

Continental Climate: The type of climate found in the interior of the major continents in the middle, or temperate, latitudes. The climate is characterized by a great seasonal variation in temperatures, four distinct seasons, and a relatively small annual precipitation.

Continental Divide: The line of high ground that separates the oceanic drainage basins of a continent; the river systems of a continent on opposite sides of a continental divide flow toward different oceans.

Continentality: The quality or state of being a continent.

Coulee: A dry canyon eroded by Pleistocene floods that cut into the lava beds of the Columbia Plateau in the western United States.

Conurbation: An extensive urban area formed when two or more cities, originally separate,

coalesce to form a continuous metropolitan region.

Core Area: The portion of a country that contains its economic, political, intellectual, and cultural focus. It is often the center of creativity and change (see *Hearth*).

Crop-lien System: A farm financing scheme whereby money is loaned at the beginning of a growing season to pay for farming operations, with the subsequent harvest used as collateral for the loan.

Culture: The accumulated habits, attitudes, and beliefs of a group of people that define for them their general behavior and way of life; the total set of learned activities of a people.

Culture Hearth: The area from which the culture of a group diffused (see *Hearth*).

Cut-and-Sew Industry: The manufacture of basic ready-to-wear clothing. Such facilities usually have a small fixed investment in the manufacturing facility.

Deciduous Forest: Forests in which the trees lose their leaves each year.

De Facto Segregation: The spatial and social separation of populations that occurs without legal sanction.

Degree Day: Deviation of one degree temperature for one day from an arbitrary standard, usually the long-term average temperature for a place.

De Jure Segregation: The spatial and social separation of populations that occurs as a consequence of legal measures.

Demography: The systematic analysis of population.

Discriminatory Shipping Rates: A transportation charge levied in a manner that is inequitable to some shippers, primarily because of those shippers' location.

Dome: An uplifted area of sedimentary rocks with a downward dip in all directions; often caused by molten rock material pushing upward from below. The sediments have often eroded away, exposing the rocks that resulted when the

molten material cooled.

Dry Farming: A type of farming practiced in semi-arid or dry grassland areas without irrigation using such approaches as fallowing, maintaining a finely broken surface, and growing drought-tolerant crops.

Economies of Agglomeration: The economic advantages that accrue to an activity by locating close to other activities; benefits that follow from complementarity or shared public services.

Economies of Scale: Savings achieved in the cost of production by larger enterprises because the cost of initial investment can be defrayed across a greater number of producing units.

Emergent Coastline: A shoreline resulting from a rise in land surface elevation relative to sea level.

Enclave: A tract or territory enclosed within another state or country.

Erratic: A boulder that has been carried from its source by a glacier and deposited as the glacier melted. Thus, the boulder is often of a different rock type from surrounding types.

Escarpment: A long cliff or steep slope separating two comparatively level or more gently sloping surfaces and resulting from erosion or faulting.

Estuary: The broad lower course of a river that is encroached on by the sea and affected by the tides.

Evapotranspiration: The water lost from an area through the combined effects of evaporation from the ground surface and transpiration from the vegetation.

Exotic Stream: A stream found in an area that is too dry to have spawned such a flow. The flow originates in some moister section.

Extended Family: A family that includes three or more generations. Normally, that would include grandparents, their sons or daughters,

and their children, as opposed to a “nuclear family,” which is only a married couple and their offspring.

Exurb: A region or district that lies outside a city and usually beyond its suburbs.

Fall Line: The physiographic border between the piedmont and coastal plain regions. The name derives from the river rapids and falls that occur as the water flows from hard rocks of the higher piedmont onto the softer rocks of the coastal plain.

Fallow: Agricultural land that is plowed or tilled but left unseeded during a growing season. Fallowing is usually done to conserve moisture.

Fault: A fracture in the Earth’s crust accompanied by a displacement of one side of the fracture.

Fault Block Mountain: A mountain mass created either by the uplift of land between faults or the subsidence of land outside the faults.

Fault Zone: A fracture in the Earth’s crust along which movement has occurred. The movement may be in any direction and involve material on either or both sides of the fracture. A “fault zone” is an area of numerous fractures.

Federation: A form of government in which powers and functions are divided between a central government and a number of political subdivisions that have a significant degree of political autonomy.

Feral Animal: A wild or untamed animal, especially one having reverted to such a state from domestication.

Fish Ladder: A series of shallow steps down which water is allowed to flow; designed to permit salmon to circumvent artificial barriers such as power dams as the salmon swim upstream to spawn.

Focalcity: The characteristic of a place that follows from its interconnections with more than one other place. When interaction within a region comes together at a place (i.e., when the movement focuses on that location), the place is said to possess “focalcity.”

Functional Diversity: The characteristic of

a place where a variety of different activities (economic, political, social) occur; most often associated with urban places.

Geomorphology: The study of the arrangement and form of the Earth's crust and of the relationship between these physical features and the geologic structures beneath.

Ghetto: Originally, the section of a European city to which Jews were restricted. Today, commonly defined as a section of a city occupied by members of a minority group who live there because of social restrictions on their residential choice.

Glacial Till: The mass of rocks and finely ground material carried by a glacier, then deposited when the ice melted. Creates an unstratified material of varying composition.

Glaciation: Having been covered with a glacier or subject to glacial epochs.

Great Circle Route: The shortest distance between two places on the Earth's surface. The route follows a line described by the intersection of the surface with an imaginary plane passing through the Earth's center.

Growing Season: The period from the average date of the last frost (in the United States, this occurs in the spring) to the first frost in the fall.

Hazardous Waste: Unwanted by-products remaining in the environment and posing an immediate potential hazard to human life.

Hearth: The source area of any innovation. The source area from which an idea, crop, artifact, or good is diffused to other areas.

Heavy Industry: Manufacturing activities engaged in the conversion of large volumes of raw materials and partially processed materials into products of higher value; hallmarks of this form of industry are considerable capital investment in large machinery, heavy energy consumption, and final products of relatively low value per unit weight (see Light Industry).

Hinterland: The area tributary to a place and linked to that place through lines of exchange, or interaction.

Horizon: A distinct layer of soil encountered in vertical section.

Humus: Partially decomposed organic soil material.

Hydrography: The study of the surface waters of the Earth.

Hydroponics: The growing of plants, especially vegetables, in water containing essential mineral nutrients rather than in soil.

Ice Age: A time of widespread glaciation (see Pleistocene).

Igneous Rock: Rock formed when molten (melted) materials harden.

Indentured Labor: Work performed according to a binding contract between two parties. During the early colonial period in America, this often involved long periods of time and a total work commitment.

Indigo: A plant that yields a blue vat dye.

Inertia Costs of Location: Costs borne by an activity because it remains located at its original site, even though the distributions of supply and demand have changed.

Insular: Either of an island, or suggestive of the isolated condition of an island.

Intervening Opportunity: The existence of a closer, less expensive opportunity for obtaining a good or service, or for a migration destination. Such opportunities lessen the attractiveness of more distant places.

Intracoastal Waterway System: A waterway channel, maintained through dredging and sheltered for the most part by a series of linear offshore islands, that extends from New York City to Florida's southern tip and from Brownsville, Texas, to the eastern end of Florida's panhandle.

Isohyet: A line on a map connecting points that receive equal precipitation.

Jurisdiction: The right and power to apply the

law; the territorial range of legal authority or control.

Karst: An area possessing surface topography resulting from the underground solution of subsurface limestone or dolomite.

Kudzu: A vine, native to China and Japan but imported into the United States; originally planted for decoration, for forage, or as a ground cover to control erosion. It now grows wild in many parts of the southeastern United States.

Lacustrine Plain: A nearly level land area that was formed as a lake bed.

Latitude: A measure of distance north or south of the equator. One degree of latitude equals approximately 110 kilometers (69 miles).

Leaching: A process of soil nutrient removal through the erosive movement and chemical action of water.

Legume: A plant, such as the soybean, that bears nitrogen-fixing bacteria on its roots, and thereby increases soil nitrogen content.

Life Cycle Stage: A period of uneven length in which the relative dependence of an individual on others helps define a complex of basic social relations that remains relatively consistent throughout the period.

Light Industry: Manufacturing activities that use moderate amounts of partially processed materials to produce items of relatively high value per unit weight (see Heavy Industry).

Lignite: A low-grade brownish coal of relatively poor heat-generating capacity.

Loess: A soil made up of small particles that were transported by the wind to their present location.

Longitude: A measure of distance east and west

of a line drawn between the North and South Poles and passing through the Royal Observatory at Greenwich, England.

Maritime Climate: A climate strongly influenced by an oceanic environment, found on islands and the windward shores of continents. It is characterized by small daily and yearly temperature ranges and high relative humidity.

Mediterranean Climate: A climate characterized by moist, mild winters and hot, dry summers.

Mesa: An isolated, relatively flat-topped natural elevation, usually more extensive than a butte and less extensive than a plateau.

Mesquite: A spiny deep-rooted leguminous tree or shrub that forms extensive thickets in the southwestern United States.

Metamorphic Rock: Rock that has been physically altered by heat and/or pressure.

Metes and Bounds: A system of land survey that defines land parcels according to visible natural landscape features and distance. The resultant field pattern is usually very irregular in shape.

Metropolitan Coalescence: The merging of the urbanized areas of separate metropolitan regions; Megalopolis is an example of this process.

Monadnock: An isolated hill or mountain of resistant rock rising above an eroded lowland.

Moraine: The rocks and soil carried and deposited by a glacier. An "end moraine," either a ridge or low hill running perpendicular to the direction of ice movement, forms at the end of a glacier when the ice is melting.

Multilingual: The ability to use more than one language when speaking or writing (see Bilingual). This term often refers to the presence of more than two populations of significant size within a single political unit, each group speaking a different language as their primary language.

Municipal Waste: Unwanted by-products of modern life generated by people living in an

urban area.

Nodal Region: A region characterized by a set of places connected to another place by lines of communication or movement.

New England: The northeastern United States.

Nuclear Family: See Extended Family.

Open Range: A cattle- or sheep-ranching area characterized by a general absence of fences.

Orographic Rainfall: Precipitation that results when moist air is lifted over a topographic barrier such as a mountain range.

Outwash: Rocky and sandy surface material deposited by meltwater that flowed from a glacier.

Overburden: Material covering a mineral seam or bed that must be removed before the mineral can be removed in strip mining.

Palisades: A line of bold cliffs.

Panhandle: A narrow projection of a larger territory (as a state).

Permafrost: A permanently frozen layer of soil.

Physiographic Region: A portion of the Earth's surface with a basically common topography and common morphology.

Physiography: Physical geography.

Piedmont: Lying or formed at the base of mountains; in the United States, an area in the southern states at the base of the Blue Ridge Mountains.

Plural Society: A situation in which two or more culture groups occupy the same territory but maintain their separate cultural identities.

Plate Tectonics: Geologic theory that the bending (folding) and breaking (faulting) of the solid surface of the earth results from the slow movement of large sections (plates) of that

surface.

Platted Land: Land that has been divided into surveyed lots.

Pleistocene: Period in geologic history (basically the last one million years) when ice sheets covered large sections of the Earth's land surface not now covered by glaciers.

Polynodal: Many-centered.

Post-industrial: An economy that gains its basic character from economic activities developed primarily after manufacturing grew to predominance. Most notable would be quaternary economic patterns.

Precambrian Rock: The oldest rocks, generally more than 600 million years old.

Presidio: A military post (Spanish).

Primary Product: A product that is important as a raw material in developed economies; a product consumed in its primary (i.e., unprocessed) state (see Staple Product).

Primary Sector: That portion of a region's economy devoted to the extraction of basic materials (e.g., mining, lumbering, agriculture).

Pueblo: A type of Indian village constructed by some tribes in the southwestern United States. A large community dwelling, divided into many rooms, up to five stories high, and usually made of adobe. Also, a Spanish word for town or village.

Quaternary Sector: That portion of a region's economy devoted to informational and idea-generating activities (e.g., basic research, universities and colleges, and news media).

Rail Gauge: The distance between the two rails of a railroad.

Rainshadow: An area of diminished precipitation on the lee (downwind) side of a mountain or mountain range.

Region: An area having some characteristic or characteristics that distinguish it from other areas. A territory of interest to people and for which one or more distinctive traits are used as the basis for its identity.

Resource: Anything that is both naturally occurring and of use to humans.

Riparian Rights: The rights of water use possessed by a person owning land containing or bordering a water course or lake.

Riverine: Located on or inhabiting the banks or the area near a river or lake.

Scarp: Also “escarpment.” A steep cliff or steep slope, formed either as a result of faulting or by the erosion of inclined rock strata.

Scots-Irish: The North American descendants of Protestants from Scotland who migrated to northern Ireland in the 1600s.

Secondary Sector: That portion of a region’s economy devoted to the processing of basic materials extracted by the primary sector.

Second Home: A seasonally occupied dwelling that is not the primary residence of the owner. Such residences are usually found in areas with substantial opportunities for recreation or tourist activity.

Sedimentary Rock: Rock formed by the hardening of material deposited in some process; most commonly sandstone, shale, and limestone.

Sharecropping: A form of agricultural tenancy in which the tenant pays for use of the land with a predetermined share of his crop rather than with a cash rent.

Shield: A broad area of very old rocks above sea level. Usually characterized by thin, poor soils and low population densities.

Silage: Fodder (livestock feed) prepared by storing and fermenting green forage plants in a silo.

Silo: Usually a tall, cylindrical structure in which fodder (animal feed) is stored; may be a pit dug for the same purpose.

Sinkhole: Crater formed when the roof of a cavern collapses; usually found in areas

of limestone rock.

Site: Features of a place related to the immediate environment on which the place is located (e.g., terrain, soil, subsurface, geology, ground water).

Situation: Features of a place related to its location relative to other places (e.g., accessibility, hinterland quality).

Smog: Mixture of particulate matter and chemical pollutants in the lower atmosphere, usually over urban areas.

SMSA - Standard Metropolitan Statistical Area: A statistical unit of one or more counties that focus on one or more central cities larger than a specified size, or with a total population larger than a specified size. A reflection of urbanization.

Soluble: Capable of being dissolved; in this case, the characteristic of soil minerals that leads them to be carried away in solution by water (see Leaching).

Space Economy: The locational pattern of economic activities and their interconnecting linkages.

Spatial Complementarity: The occurrence of location pairing such that items demanded by one place can be supplied by another.

Spatial Interaction: Movement between locationally separate places.

Staple Product: A product that becomes a major component in trade because it is in steady demand; thus, a product that is basic to the economies of one or more major consuming populations (see Primary Product).

Sustainable Yield: The amount of a naturally self-reproducing community, such as trees or fish, that can be harvested without diminishing the ability of the community to sustain itself.

Taiga: A moist subarctic coniferous forest that begins where the tundra ends and is dominated by spruces and firs.

Temperature Inversion: An increase in temperature with height above the Earth’s surface, a reversal of the normal pattern.

Territory: A specific area or portion of the Earth’s surface; not to be confused with region.

Tertiary Sector: That portion of a region's economy devoted to service activities (e.g., transportation, retail and wholesale operations, insurance).

Threshold: The minimum-sized market for an economic activity. The activity will not be successful until it can reach a population larger than this threshold size.

Time-distance: A time measure of how far apart places are (how long does it take to travel from place A to place B?). This may be contrasted with other distance metrics such as geographic distance (how far is it?) and cost-distance (how much will it cost to get there?).

Township and Range: The rectangular system of land subdivision of much of the agriculturally settled United States west of the Appalachian Mountains; established by the Land Ordinance of 1785.

Transferability: The extent to which a good or service can be moved from one location to another; the relative capacity for spatial interaction.

Transhumance: The seasonal movement of people and animals in search of pasture. Commonly, winters are spent in snow-free lowlands and summers in the cooler uplands.

Tree Line: Either the latitudinal or elevational limit of normal tree growth. Beyond this limit, closer to the poles or at higher or lower elevations, climatic conditions are too severe for such growth.

Tropics: Technically, the area between the Tropic of Cancer ($21\text{-}1/2^\circ$ N latitude) and the Tropic of Capricorn ($21\text{-}1/2^\circ$ S latitude), characterized by the absence of a cold season. Often used to describe any area possessing what is

considered to be a hot, humid climate.

Tundra: A treeless plain characteristic of the arctic and subarctic regions.

Underemployment: A condition among a labor force such that a portion of the labor force could be eliminated without reducing the total output. Some individuals are working less than they are able or want to, or they are engaged in tasks that are not entirely productive.

Underpopulation: Economically, a situation in which an increase in the size of the labor force will result in an increase in per worker productivity.

Uniform Region: A territory with one or more features present throughout and absent or unimportant elsewhere.

Water Table: The level below the land surface at which the subsurface material is fully saturated with water. The depth of the water table reflects the minimum level to which wells must be drilled for water extraction.

Zoning: The public regulation of land and building use to control the character of a place.

POPULATION
OF THE
25
LARGEST
U.S.
CITIES,
1994

1 — New York, New York.....	7,333,253
2 — Los Angeles, California.....	3,448,613
3 — Chicago, Illinois.....	2,731,743
4 — Houston, Texas.....	1,702,086
5 — Philadelphia, Pennsylvania.....	1,524,249
6 — San Diego, California.....	1,151,977
7 — Phoenix, Arizona.....	1,048,949
8 — Dallas, Texas.....	1,022,830
9 — San Antonio, Texas.....	998,905
10 — Detroit, Michigan.....	992,038
11 — San Jose, California.....	816,884
12 — Indianapolis, Indiana.....	752,279
13 — San Francisco, California.....	734,676
14 — Baltimore, Maryland.....	702,979
15 — Jacksonville, Florida.....	665,070
16 — Columbus, Ohio.....	635,913
17 — Milwaukee, Wisconsin.....	617,044
18 — Memphis, Tennessee.....	614,289
19 — El Paso, Texas.....	579,307
20 — Washington, D.C.....	567,094
21 — Boston, Massachusetts.....	547,725
22 — Seattle, Washington.....	520,947
23 — Austin, Texas.....	514,013
24 — Nashville, Tennessee.....	504,505
25 — Denver, Colorado.....	493,559

STATE CAPITALS

Alabama: Montgomery	Montana: Helena
Alaska: Juneau	Nebraska: Lincoln
Arizona: Phoenix	Nevada: Carson City
Arkansas: Little Rock	New Hampshire: Concord
California: Sacramento	New Jersey: Trenton
Colorado: Denver	New Mexico: Santa Fe
Connecticut: Hartford	New York: Albany
Delaware: Dover	North Carolina: Raleigh
Florida: Tallahassee	North Dakota: Bismarck
Georgia: Atlanta	Ohio: Columbus
Hawaii: Honolulu	Oklahoma: Oklahoma City
Idaho: Boise	Oregon: Salem
Illinois: Springfield	Pennsylvania: Harrisburg
Indiana: Indianapolis	Rhode Island: Providence
Iowa: Des Moines	South Carolina: Columbia
Kansas: Topeka	South Dakota: Pierre
Kentucky: Frankfort	Tennessee: Nashville
Louisiana: Baton Rouge	Texas: Austin
Maine: Augusta	Utah: Salt Lake City
Maryland: Annapolis	Vermont: Montpelier
Massachusetts: Boston	Virginia: Richmond
Michigan: Lansing	Washington: Olympia
Minnesota: St. Paul	West Virginia: Charleston
Mississippi: Jackson	Wisconsin: Madison
Missouri: Jefferson City	Wyoming: Cheyenne

The United States stretches across the central portion of North America from the Atlantic Ocean in the east to the Pacific Ocean in the west. Its territory also includes the states of Alaska, in the north-west corner of North America, and Hawaii, in the mid-Pacific Ocean.

