AN OUTLINE OF AMERICAN GEOGRAPHY

AN OUTLINE OF AMERICAN GEOGRAPHY

Of the many inquiries that are received by the United States Information Service, Embassy of the United States of America, a large proportion are concerned with American geography. Through words and photographs, this book gives the reader a partial picture of the nation, telling about some of the ways Americans have used their land and their resources. This is in no sense definitive account; each of the aspects treated here within the space of a few pages has been the subject of many in-depth studies. On pages 129-131 are listed the titles of a few of the many volumes available for more thorough research. It is hoped that this introduction to the subject of American geography will add to the store of shared knowledge and mutual understanding between those who read it and the people of the United States.

CONTENTS

The text of this revised volume was prepared by Dr. Earl N. Mittleman, formerly of New York University and now a writer for the United States Government.

INTRODUCTION

There is almost no end to the things men have done to make their land productive. The raw material with which they work is their geography: the natural features of the area and the distribution of life within it.

What people do with their geography is an exciting tale —one that gives human meaning to dry facts about soils, winds, mountains, plains, rivers. This book tells of the partnership of land and people in the United States, and of some of the changes that partnership brought about.

But first, an overall look at the country: The main landmass of the United States lies in central North America, with Canada to the north, Mexico to the south, the Atlantic Ocean to the east and the Pacific Ocean to the west. The two newest states, Alaska and Hawaii, are separated from the continental United States: Alaska borders on northwestern Canada, and Hawaii lies in the central Pacific.

The diversity of the country stems from the fact that it is so large and has so many kinds of land, climate and people. It stretches 2,575 kilometers from north to south, 4,500 kilometers from east to west. The deep-green mountain forests of the northwest coast are drenched with more than 250 centimeters of rain each year. At the other extreme, the deserts of the southwest receive less than 13 centimeters annually. A traveler from almost any other country can find parts of the United States that remind him of home. There are pine forests dotted with lakes, and mountain peaks covered with snow. There are meadows with brooks and trees, and sea cliffs, and wide grassy plains, and broad spreads of grapevines, and sandy beaches.

In some parts of the United States, the pattern of life seems to have happened by accident. Sometimes when families moved westward to new farmland their wagons broke down or they became ill along the way. As a result, today, almost 200 years later, their descendants are farmers in little hidden valleys where few would expect people to live. But these are exceptions. Most people live and work as they do because the resources of their part of the country have opened certain opportunities and closed others. Traditional occupations, political borders, feudal custom have been less important in the United States than in many other countries.

PANORAMIC VIEW

"The existence of an area of free land, its continuous recession, and the advance of American settlement westward, explain American development."

Frederick Jackson Turner
"The Significance of the Frontier in American History", 1893

THE FACE OF THE LAND

On a topographic map of the United States, the mountains look like jagged masses, the plains like vast open flat spaces, and the rivers like meandering threads. Today, highways, railways and transcontinental aircraft criss-cross the land, making travel easy. But only a few generations ago, the topographic features on the map represented great dangers and difficulties. Today's visitors, riding over a good road in the Cascade Mountains in the west coast States of Oregon and Washington, may see marks on the rocks made by ropes where pioneer settlers painfully lowered their horses and wagons down cliffs to reach the fertile river valley far below. In the Sierra Nevada Mountains of California, the main route now runs through a mountain pass which was once too narrow for a wagon to go through. Pioneer families reaching that pass had to take their wagons apart piece by piece, carry them through, and then reassemble them on the other side.

Modern means of communication and transportation have enabled man to overcome these obstacles. Poles and wire now carry electrical power and telephone communication over ridges that are so deep in snow that only persons wearing snowshoes or skis can reach them. Railroads run along the sides of mountains or in tunnels through them. Bridges have been built over valleys and rivers. Highways

run through the burning heat of deserts.

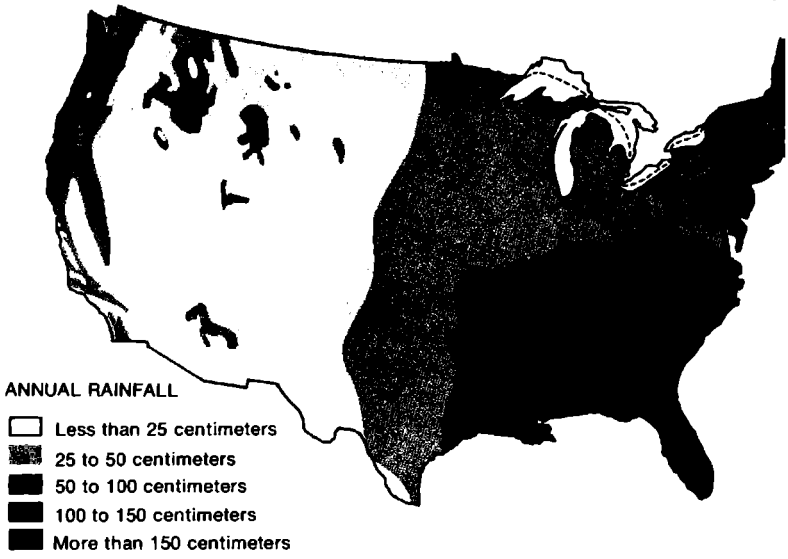
Much of the geography and history of the United States was determined some 10,000 to 25,000 years ago. At that time, the great northern ice cap flowed over the North American continent and ground into it a number of major changes. These ice flows determined the size and drainage of the Great Lakes. They changed the direction of the Missouri River (see map on page 36) and carved the channel of the Hudson River (see map on page 22). They pushed soil off a huge part of Canada into the United States, thus creating the northern part of the Central Agricultural Basin—one of the richest farming areas in the world.

On the Atlantic shore of the United States, much of the northern coast is rocky and uninviting, but the middle and southern Atlantic coast rises gently from the sea. It starts as low, wet ground and sandy flats, but then becomes a rolling coastal lowland somewhat like that of northern and western Europe. The Appalachians, which run roughly parallel to the east coast, are old mountains with many coal-rich valleys between them. To the west of the Appalachians lie plateaus built up over the centuries from bits of stone that were washed down from the mountains and then cut into small hills by streams. Beyond is the great Central Lowland which, in its configuration, resembles the plains of eastern Europe, or Manchuria, or the Great Plains of Australia, or certain plains in Africa or South America.

North of the Central Lowland, extending for almost 1,600 kilometers, are the five Great Lakes which the United States shares with Canada. The lakes, estimated to contain about half of the world's fresh water, were gouged out of the land by the ice that once covered the northern United States.

West of the Central Lowland are the Great Plains, likened to the flat top of a table which is slightly tilted upward to the west. They are stopped by the Rocky Mountains, "the backbone of the continent." The Rockies are considered young mountains: of the same age as the Alps in Europe, the Himalayas in Asia, and the Andes in South America. Like these ranges, they are high, rough and irregular in shape.

At first sight, the land west of the Rockies appears to be tumbled masses of mountains. Actually, however, it is made up of quite distinct and separate regions, shaped by different geological events. One region was formed of material which was washed down from the Rockies and pressed into rock.



This now encompasses the high Colorado Plateau, in which the Grand Canyon of the Colorado River is cut, 1.6 kilometers in depth. But another region, the high Columbia tableland to the north, was created in much the same way as the great Deccan Plateau of India: lava poured from inside the earth, burying old mountains and filling valleys to a depth of thousands of meters.

Volcanoes also built the Cascade Mountains. The Sierra Nevada range and the ridges of the Great Basin, on the other hand, were formed when a strained portion of the earth's crust broke into high tilted blocks of rock. At the border of the Pacific Ocean lie the Coast Ranges, relatively low mountains, in a region where occasional earthquakes show that the process of mountain-building has not yet stopped.

THE RAINFALL

In the Northern Hemisphere, the western portions of continents are especially favored by the prevailing winds. This is because the western lands gather the rains as they come off the ocean, blown by storms that circle from west to east.

Unfortunately, the Cascade Mountains and the Sierra Nevada Mountains, so close to the west coast, catch the largest share of the rain off the Pacific Ocean before it can go further inland. As a result, there is too little rain for almost

the whole western half of the United States, which lies in the "rain shadow" of the mountains. In a great part of that territory, therefore, farmers must depend on irrigation water from the snows or rains that are trapped by the mountains.

One of the most important geographic boundaries in the United States is the 50-centimeter rainfall line, which runs north and south almost through the middle of the country. East of the line, farming is relatively easy, and the population is relatively large. West of the line, one finds man-made irrigation systems, dry-farming, grazing, and fewer people. West of the Rocky Mountains, running all the way from the Canadian border to Mexico, there are vast areas where almost no trees grow. In this section of the country are the deserts which receive as little as 12.7 centimeters of rainfall a year. Yet, west of the Sierra Nevada Mountains, there are places in which 250 centimeters of rain falls annually.

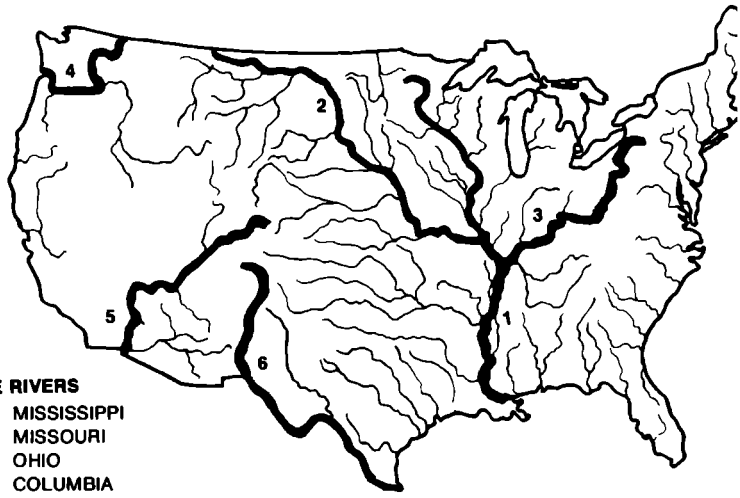
THE RIVERS

The Mississippi is one of the world's great continental rivers, like the Amazon in South America, the Congo in Africa, the Volga in Europe, or the Ganges, Amur, and Yangtze in Asia. Its waters are gathered from two-thirds of the United States and, together with the Missouri (its chief western branch), the Mississippi flows some 6,400 kilometers from its northern sources in the Rocky Mountains to the Gulf of Mexico, which makes it one of the world's longest waterways.

The Mississippi has been called the "father of waters." Through all its lower course, it wanders along, appearing lazy and harmless. But people who know the river are not deceived by its benign appearance, for they have had many bitter struggles with its floods. Finally, they had to learn that nothing was to be gained by fighting against the rages of the mighty stream. To tame it, Americans have had to accept some of the river's own terms and to undertake the patient work of conserving and rebuilding soil, grasslands and forests, far back to where the waters begin to gather.

Where the Missouri pours into the Mississippi from the west, it colors the river deep brown with small pieces of soil. Farther downstream, where the clear waters of the principal eastern tributary, the Ohio, join the Mississippi, evidence of the difference between the dry west and rainy east becomes apparent. For kilometers, the waters of the two rivers

flow on side by side, without mixing. Those from the west are brown; they have robbed the soil in areas of sparse vegetation. The waters from the east are clear and blue; they come from hills and valleys where plentiful forest and plant cover has kept the soil from being washed away.



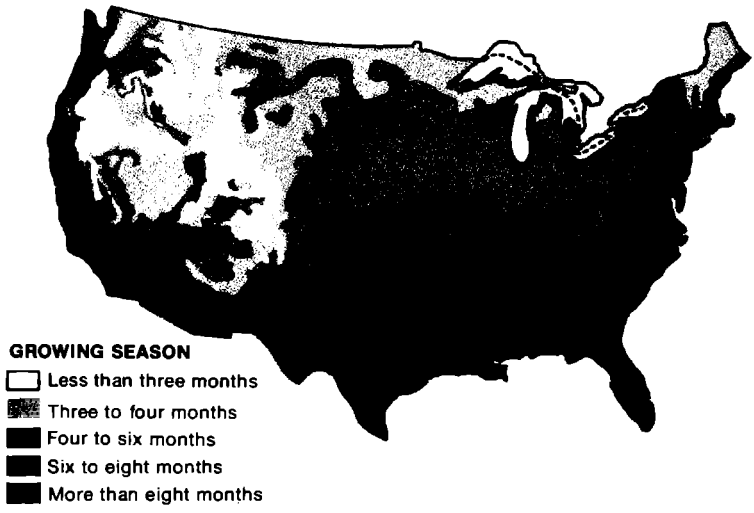
THE RIVERS

1. MISSISSIPPI
2. MISSOURI
3. OHIO
4. COLUMBIA
5. COLORADO
6. RIO GRANDE

Like the Mississippi, all the rivers east of the Rockies finally reach the Atlantic; all the waters to the west of the Rockies finally arrive at the Pacific. For this reason the crests of the Rocky Mountains are known as the Continental Divide. There are many places in the Rockies where a visitor may throw two snowballs in opposite directions and know that each will feed a different ocean.

The two great rivers of the Pacific side are the Colorado in the south, and the Columbia, which rises in Canada and drains the north. In the dry western country, both rivers, very different in character, are vital sources of life. The Columbia, wild in prehistoric times, cutting and shaping the land, now flows with quiet dignity. But the Colorado is still a river of enormous fury—wild, restless and angry. It races and plunges, cutting deeply into the desert rocks. But even the furious Colorado has been dammed and put to work. All the farms and cities of the southwestern corner of the country depend on its waters.

The Rio Grande, about 3,200 kilometers long, is the foremost river of the Southwest. It forms a natural boundary



between Mexico and the United States, which together have built irrigation and flood control projects of mutual benefit.

THE TEMPERATURE

If there were no mountains or oceans, and if the winds circled the earth with perfect regularity, then the amount of heat and the length of the farmer's growing season would progress uniformly from north to south. Instead, there are all kinds of unexpected differences in climate, as temperature maps of the United States show (see opposite page). For instance, all along the western coast, the temperature changes little between winter and summer. In some places, the average difference between July and January is as little as 10 degrees centigrade. The climate along the northern part of this coast is similar to that of England. But in the north central part of the country, summer and winter are worlds apart. There the average difference between July and January is 36 degrees centigrade and more violent extremes are common. The coldest days of a typical January may be -40 degrees centigrade, and the hottest July day may be 45 degrees. This is the sort of climate that is also found in central Asia, far from the moderating influence of the oceans. In the eastern part of the United States, the difference between summer and winter is also very distinct, but not nearly so extreme. Near the southwestern corner of the

country, the climate is mild and springlike in winter, but in summer the temperature may reach equatorial intensity. In Alaska, almost continuous daylight in summer makes the short growing season an intense one.

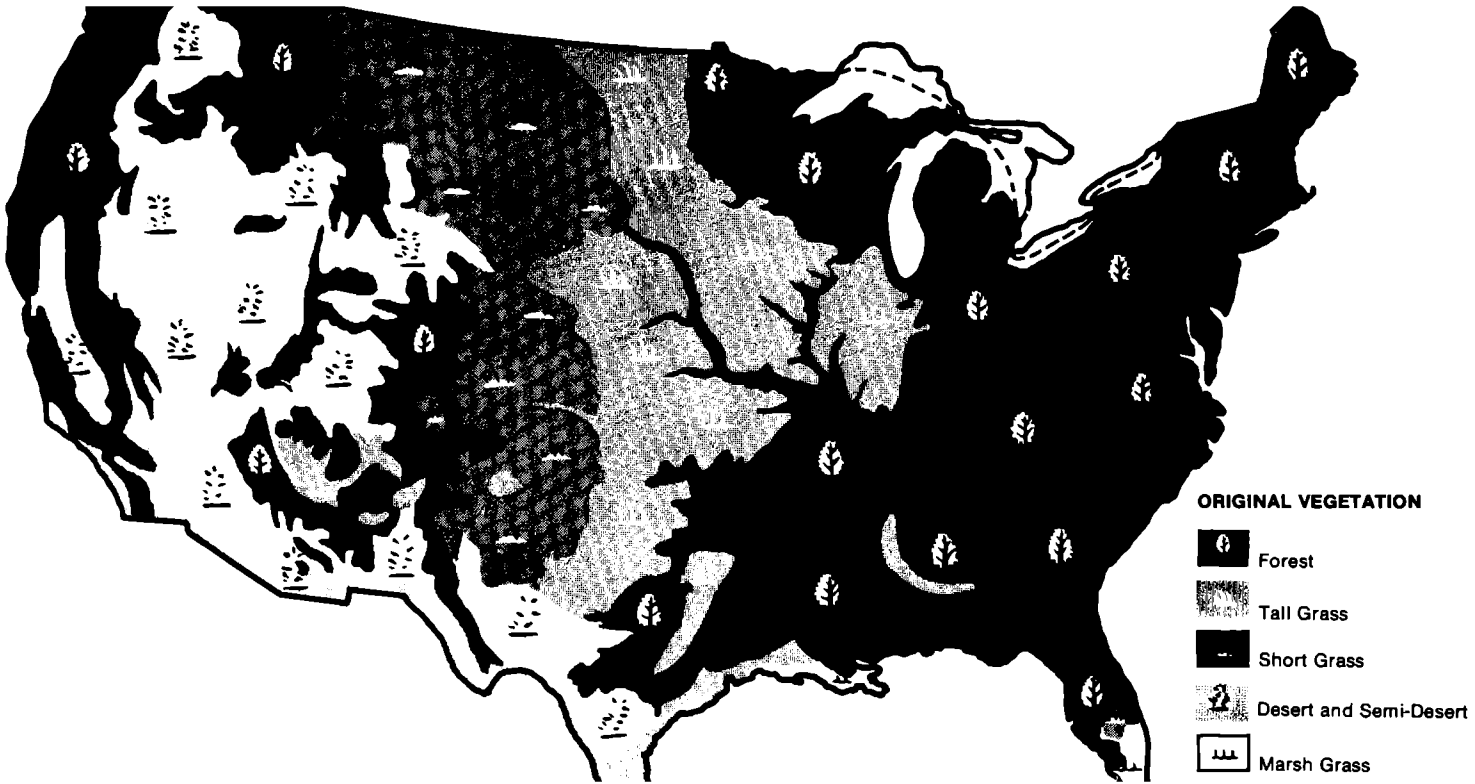
The variations in temperature within the United States have had a marked effect on the country's economy and living standards. As the Growing Season Map on page 13 shows, there is a long crop-growing season along the southeast coast where cotton is a principal product. This is also true in several small strips and pockets to the west where crops like grapes grow well during a large part of the year. In some of the cooler climates or in climates which combine coolness and humidity, animals and produce such as apples, wheat and corn thrive, thus giving the United States a large range of agricultural products.

These variations, combined with a fast transportation system, have meant that there can be a rapid interchange of agricultural products from one part of the country to another. Thus, not only is there a greater market for what otherwise would have been strictly regional products, but this expansion of markets has meant great employment opportunities in all areas.

THE PLANT LIFE

When early voyagers approached the land that is now the United States, they noticed a sweet and surprising "land smell," a clue that they were near the shore. This "land smell" came from the great, thick forest that covered all the eastern part of the country and stretched about 1,600 kilometers westward until it met the tall grass of the prairies.

No one knows just why the woods ended where they did, or why the tall grass of the prairies—the wide rolling and almost treeless plains—began at that point. The reason still remains shrouded in mystery, for the eastern part of the prairies' tall grasslands have soil that will support tree life. One explanation has it that the Indians burned off the forest in order to force game animals out to the hunters. Another reason given is that perhaps some early special conditions of soil and rainfall were responsible. This has been accepted as a more plausible explanation, but nobody really knows. Nevertheless, the early settlers wrote that the prairie grass was very beautiful, interlaced with flowers in the spring, and



so tall that a man on foot could not see over it.

It is clear why the tall grass became short grass farther west—lack of rainfall. The transition line roughly follows the important 50-centimeter rainfall line discussed earlier.

Still farther west, the Vegetation Map looks quite mixed. Forests cover the slopes where mountains catch enough rain. A few favored grassy meadows lie in the high mountain valleys. On the dry lowland—and on high tablelands—dry, harsh bushes grow; so do kinds of grass common to arid regions, with places here and there too dry or too full of salt for even this poor desert growth.

The greatest wonder of all are the forests of sequoia and fir trees on the northwest coast, where the mountains catch the heavy Pacific rains. These great trees, some of which are 3,000 years old, are among the largest and oldest living things known. Some were seedlings when Troy fell, and already giants when Rome was founded. The silent forests are filled with columns of great trunks lighted dimly by sun filtered through leaves far above. Most of these forests are protected by law and preserved as a national treasure.

THE POPULATION

When the first census was taken in 1790, much of the country had not even been explored, and much of it did not belong to the United States, but to France and Spain. The "western settlers" of that day were in the Appalachian Mountains.

By 1854, the United States had acquired the western part of the country by purchase and by treaty. This region had been unified politically, and there were about as many people living west of the Appalachians as east of them. At that time, people seriously believed that the task of settling and developing the country would require at least 500 years, and perhaps as long as 2,000.

The speed with which it actually was settled is one of the most exciting stories in American history. Within the space of a single lifetime, vast expanses of forests and prairies were converted into farms and industrial cities.

At first, the settlers pushed westward in thin lines, along the rivers; then they began to fill the intervening spaces throughout the middle of the country. And then, dramatically, the movement of population jumped to the Pacific.

RELATIVE POPULATION DENSITY

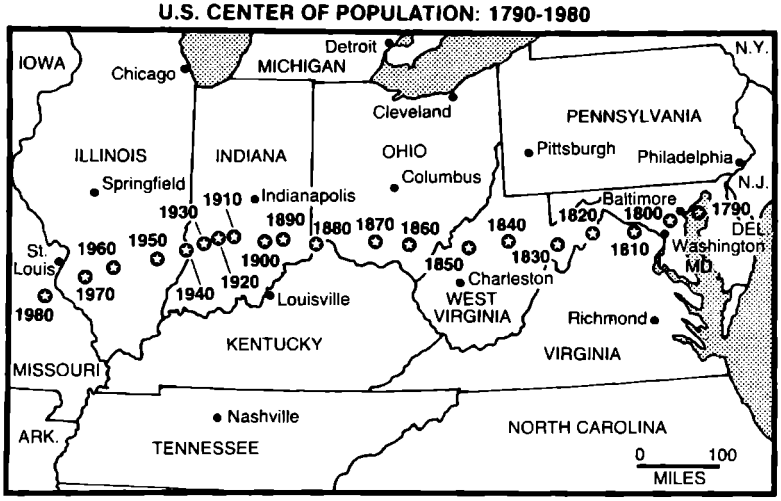
Population density in the United States varies from under four people per square kilometer (in light blue areas) through medium density (purple and dark red) to higher density (red) of about 100 people or more per square kilometer.

The reason was the discovery of gold in northern California in 1849. By then, too, a route known as the Oregon Trail had been found through the mountains to the farming valleys of the northwest coast. The last regions to be settled were the dry plains just east of the Rocky Mountains. In the meantime, the cities of the East grew at an astonishing rate.

Where did all these people come from? Many left the East because of discontent with their prospects or the appeal of adventure. Many came from abroad, mostly from Europe, in search of political or religious freedom; others fled from poverty and hunger. Before 1880, most of the settlers came from northern and western Europe; after that, from southern and eastern Europe. Thousands of Asians came to the Pacific Coast. The peak of movement was reached in the period from 1901 to 1910 during which some 8,800,000 persons entered the country. Even before the turn of the century, however, the frontier disappeared in the United States: no longer was there good new land ready for the plow or the herd. Nevertheless, since 1910, the nation's population has more than doubled.

The map on the opposite page shows how population is distributed today. The light red patches in the eastern third of the country are mainly industrial cities. The thick scattering of dark red over almost the whole eastern half shows that the land there is thickly inhabited. The dense patches of population in the interior generally indicate cities that are trading, cultural and service centers for the farming areas around them. Some are centers of mining and manufacturing. The light blue areas that dominate the West indicate principal areas of cattle, goat and sheep raising. Where the map is colored purple, areas of irrigation farming are indicated. Along the west coast, we find well-irrigated areas and again some big industrial cities.

Today the principal reason for population movement is the growth of new industries, especially in the West and South.



What demographers describe as the "population center of gravity" (that point at which the country would balance if only the weight of the population were considered) has been moving westward since 1790. Census Bureau has now designated the population center "as a small wooded tract near pond 72 kilometers south of St. Louis."

THE SCIENCES PUT TO USE

Although the population of the United States more than doubled between 1910 and 1980, the amount of productive land remained almost stable. Yet, Americans are far better fed and clothed today than in 1910.

This has been accomplished largely through the widespread use of machinery in agriculture as well as the application of scientific advances and discoveries. Trucks, automobiles and farm machines have replaced horses and hand methods almost completely as a means of farm labor, making the modern farmer more productive than his forebears.

Scientists have bred new hybrid plants and animals which yield more food. New ways have been found for controlling harmful insects, for preserving food, for packaging, storing and marketing farm products. All together, these improvements have made the farmer's labor so much more productive that he now produces 8 times as much each working hour as he produced in 1940.

Great progress has been made as well in using the land itself. Through improved methods of fertilization and con-

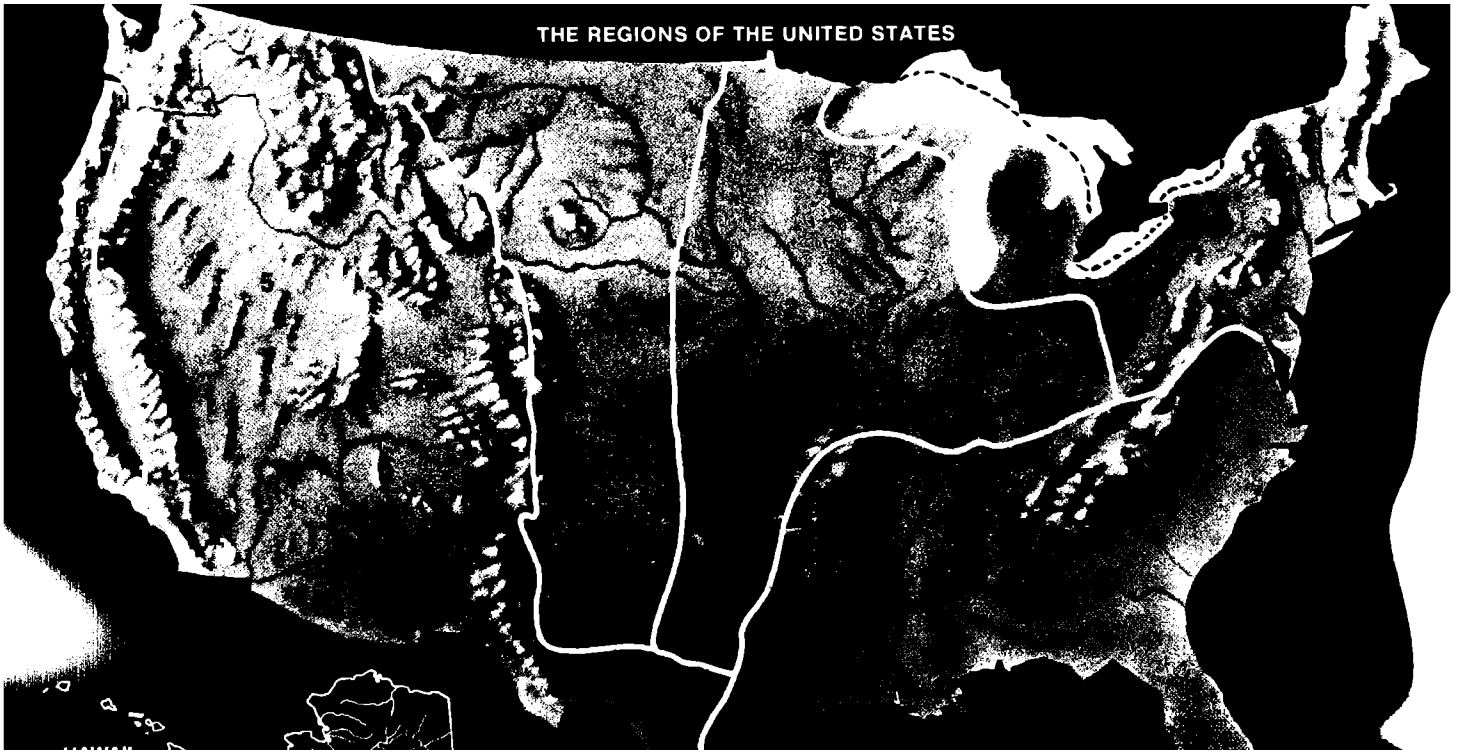
servation, farms are yielding more than ever before. In many areas like the Great Plains, land once used inefficiently for grazing is now used to produce food.

But perhaps the most remarkable achievements have resulted from irrigation. West of the Mississippi River alone, about 18 million hectares, once thought useless, have been reclaimed through irrigation projects and supply water and power to many farm communities.

In this book, we will see the problems which the people in each region of the United States have faced, and some of the things they have done to solve these problems. But what will happen in the future? How can the land in the United States continue to feed a constantly increasing population? Many Americans are trying to find an answer.

Scientists know that there are 20 million hectares in the vast western United States which can be irrigated—a source of food for many millions of people. In addition, these scientists know that an equal amount of land can be reclaimed by draining swamplands, and that another 36 million hectares of sandy pinelands and wet grasslands can be cleared for cultivation.

The people of the United States have really only begun to use their land resources. But what they have been able to do thus far has made them appreciate how much more can be done.



THE NORTHEAST

"Yesterday and tomorrow
cross and mix on the skyline."

Carl Sandburg
"Haze", 1920

THE "MELTING POT"

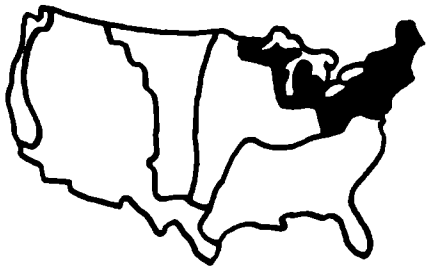
This is the part of the United States which most visitors see, and the part that is most often described. The skyscrapers of New York, the steel mills of Pittsburgh, the automobile assembly lines of Detroit—these symbols of industrial America belong to this region.

Into this area of industry came millions of Europeans who made of it what became known as the "melting pot," the fusion of people from many nations into Americans. More than any other part of the country, this section reflects European culture and traditions.

Seeing this great area today, it is hard to realize that it was wilderness only three centuries ago. The effect of that wilderness upon the colonists was a powerful force in developing the United States. As soon as permanent settlements were made in the new land, subtle changes occurred in the people. Faced with the problems of a new and uncharted land, these settlers had to give up many of the traditional behavior patterns of Europe. In order to survive, they developed a cooperative and democratic life-style that laid the foundations of the American political system and pragmatic philosophy.

Even today, the visitor who expects only factories, apartment houses, and crowded streets is surprised. In the Northeast, he sees more wooded hills than factory chimneys, more fields than concrete roads, more farmhouses than office buildings.

The features of the land over most of this region are on a small and gentle scale. It is a country of many brooks, of low mountain ridges, of rolling hills, of orchards, pastures and



METROPOLITAN POPULATION AREAS
(1980 Estimate)

New York — 9,119,737	Milwaukee — 1,397,143
Chicago — 7,102,328	Buffalo — 1,242,573
Philadelphia — 4,716,818	Rochester — 971,879
Detroit — 4,352,762	Albany — 795,019
Boston — 2,763,357	Toledo — 791,599
Washington, D.C. — 3,060,240	Providence — 919,216
Pittsburgh — 2,263,894	Akron — 660,328
Baltimore — 2,174,023	Gary — 642,781
Newark — 1,965,304	Grand Rapids — 601,680
Cleveland — 1,898,720	

vegetable gardens. In only a few places is a visitor so much as 40 kilometers distant from rich farms. There are areas of true wilderness such as the forests on the northern part of the State of Maine, where to this day the only way of crossing great stretches of land or water is by foot or canoe. Everywhere, the outer reaches of cities mingle with farms, and in many towns there are old farmhouses and barns, changed into dwellings, now crowded close by taller buildings.

The observant visitor quickly guesses that he is in a relatively old farming region on which a pattern of cities and industries has grown and spread. What he cannot see is how the look of the countryside has changed with this growth of industry. A few generations ago the majority of these farms produced grain to be sold, and a variety of plants, meats and poultry for the farm family itself. Today, most of the farms are devoted primarily to one type of farming: dairy cattle, or vegetables, or chickens, or fruit. Most specialize in products that can be rushed fresh to the cities nearby. Thus, the nature of agricultural production has changed to meet the needs of the region's industrial economy.

This change in agricultural production illustrates a very important factor in American geography: the "market." In economic-geographic terminology, the market means all the people and organizations in an area that are able to buy goods. And, in examining the industries of the U.S. Northeast, we find that many of them are there because the area is a good market, because there is an industrial and agricultural population financially able to buy clothing, goods, equipment and services. The manufacturers of these items find it cheaper to bring in raw materials and produce these goods near a large market than to ship the finished items and arrange their sale from a distance. Furthermore, when these industries are established in the market area, more workers are employed, thus further adding to its economy.

Why has this region become a center of heavily developed trade and industry? One of the most important reasons is the sea.

CITIES OF THE SEA

The sea means many things to the industrial Northeast. From the outer point of Long Island northward, the coast

borders one of the world's great "fish bowls," an area especially rich in the tiny plants and animals that support a large fish life. Along this coast there are several busy fishing ports, many little fishing villages, and the small towns from which American sailing ships used to depart, seeking whales. In the days before petroleum, when whale oil was used on factory wheels and fueled lamps, these sailing ships hunted whales all around the world.

The sea also means long stretches of jagged rock and gleaming white beaches to which millions of city people go on summer holidays. And from the earliest days of the American settlements, the sea has meant foreign trade. The young nation depended heavily on its overseas trade which brought to North America many of the items not yet produced there: cloth, tools and furnishings.

Today, four of the eight most heavily populated areas in the Northeast are centered around the seaports of Boston, New York, Philadelphia and Baltimore. (On the map, Philadelphia appears to lie inland, but it is on the wide, deep tidewater of the Delaware River mouth and is a good harbor for the largest ocean-going vessels.) These four places are not only important ports, but leading industrial centers.

The importance of these northeastern cities, both as ports and as hubs of manufacturing, did not simply come about by chance.

About 1815, when the westward settlement of the United States had already become an important movement, trade routes from the ports to the interior began to be a serious problem. The slow wagon trains of that time, drawn by horses or oxen, were too expensive for moving freight any great distance. One answer to the transportation problem was a canal, an idea that was especially practical in New York State. From the eastern end of Lake Erie all the way across the state to the Hudson River, there is a long strip of low land. The Hudson itself flows deep and without waterfalls to New York harbor. For the small population and the agricultural economy of the time, constructing so long a waterway was a most ambitious project, but—after several years of work—the Erie Canal was completed in 1825. Freight costs from New York City to Lake Erie were immediately cut to about *one-tenth* of what they had been, and New York, which had previously been smaller than Philadelphia and Boston, quickly became the leading city of

the coast. When, in the years which followed, traffic on the Great Lakes was joined to that on the Mississippi River, New York became the terminal of a great inland shipping system that extended from the Atlantic far up the western branches of the Mississippi. The coming of the railroads made canal shipping less important, but it tied New York even more closely to the interior.

Exports from New York were greater than imports. Consequently, shipping companies, on the return trip from Europe, were willing to carry passengers for very low fares. Thus, New York also became the greatest port for the entry of immigrants.

While the Erie Canal was being built, the people of Philadelphia began to worry about the future of their own port. Unlike New York, they had no easy canal route over one river system to the interior. Mountains barred the way either to the Great Lakes or to the Ohio River, the eastern branch of the Mississippi. Nevertheless, the people of Philadelphia built a canal. Where it reached the ridges that separated the eastern slopes from those to the west, railroad tracks came to the edge of the canal, and hoists lifted the barges onto special railroad cars, to be carried over the mountains. Philadelphia's canal was one of the major engineering feats of 19th century America, but all the work was in vain. Shipping on the Erie Canal was so much cheaper that Philadelphia's effort was little used. But the Philadelphians swallowed their disappointment and looked about for a better plan. Since coal had been discovered near several upper tributaries of the Delaware River, canals were built to the mines. This project worked. The combination of the port with cheap shipping for fuel assured Philadelphia a position as a manufacturing center. Later, railroads provided the much-needed link with the interior.

The fear that their port would lose its importance also worried the people of Baltimore. Their city is situated where the hard rocks of the Appalachian hills and the soft soil of the coast come together. This made waterfalls, and the waterpower gave them an early advantage for manufacturing. But they realized that this was not advantage enough, and conditions were not right for building a canal. Instead, they constructed the first railroad across the mountains, and became a vital center for export and import trading. Yearly, about 6,000 vessels move into Baltimore's

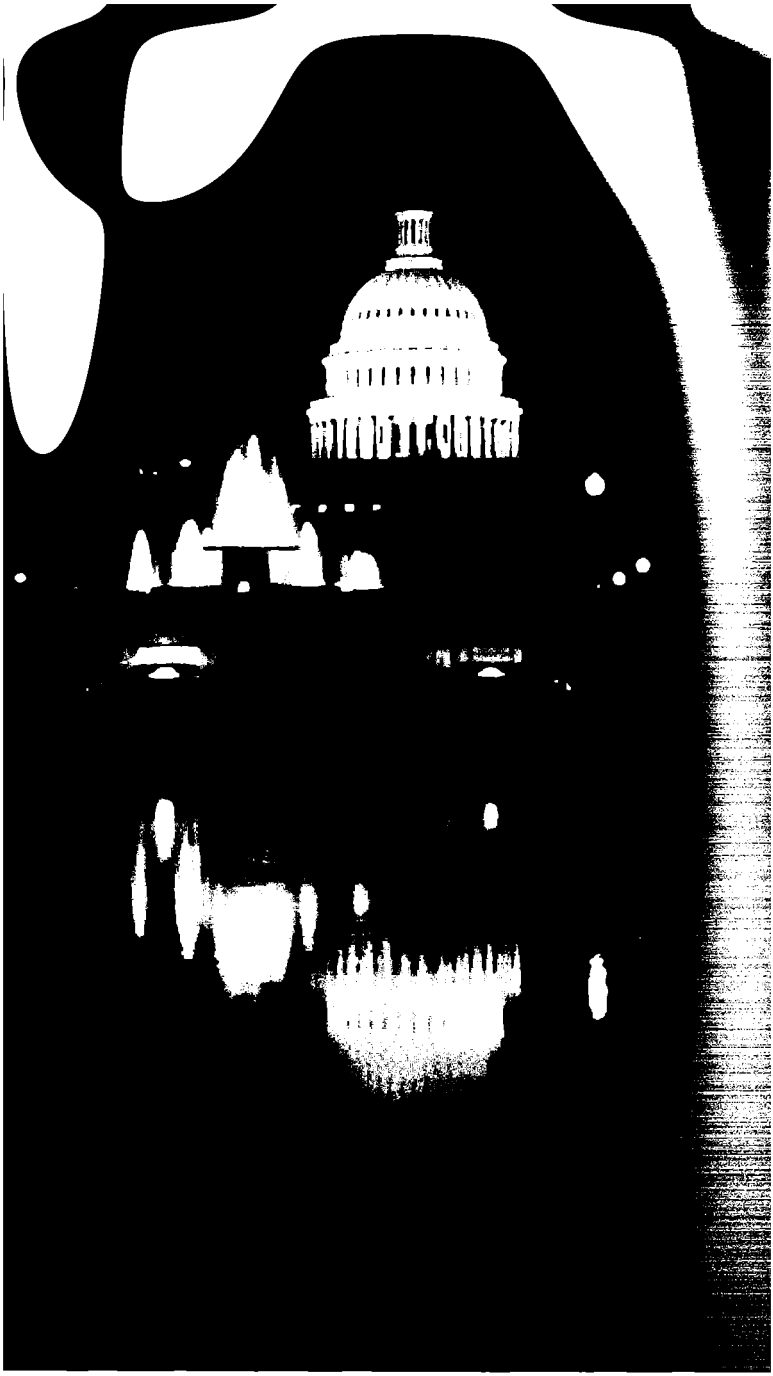
natural harbor. Lumber, ores, crude oil—raw materials from the world—are unloaded and reshipped by rail or coastal tank ship to American industry in exchange for grain and machinery. World trade helps make Baltimore America's sixth largest port.

Boston alone, of these four ports, did not develop primarily through export trade. Located in a region which early became an important center of industry and therefore required raw materials, Boston was primarily an import point and only secondarily an export city for the northeastern corner of the country. This corner, called New England, had special problems of its own.

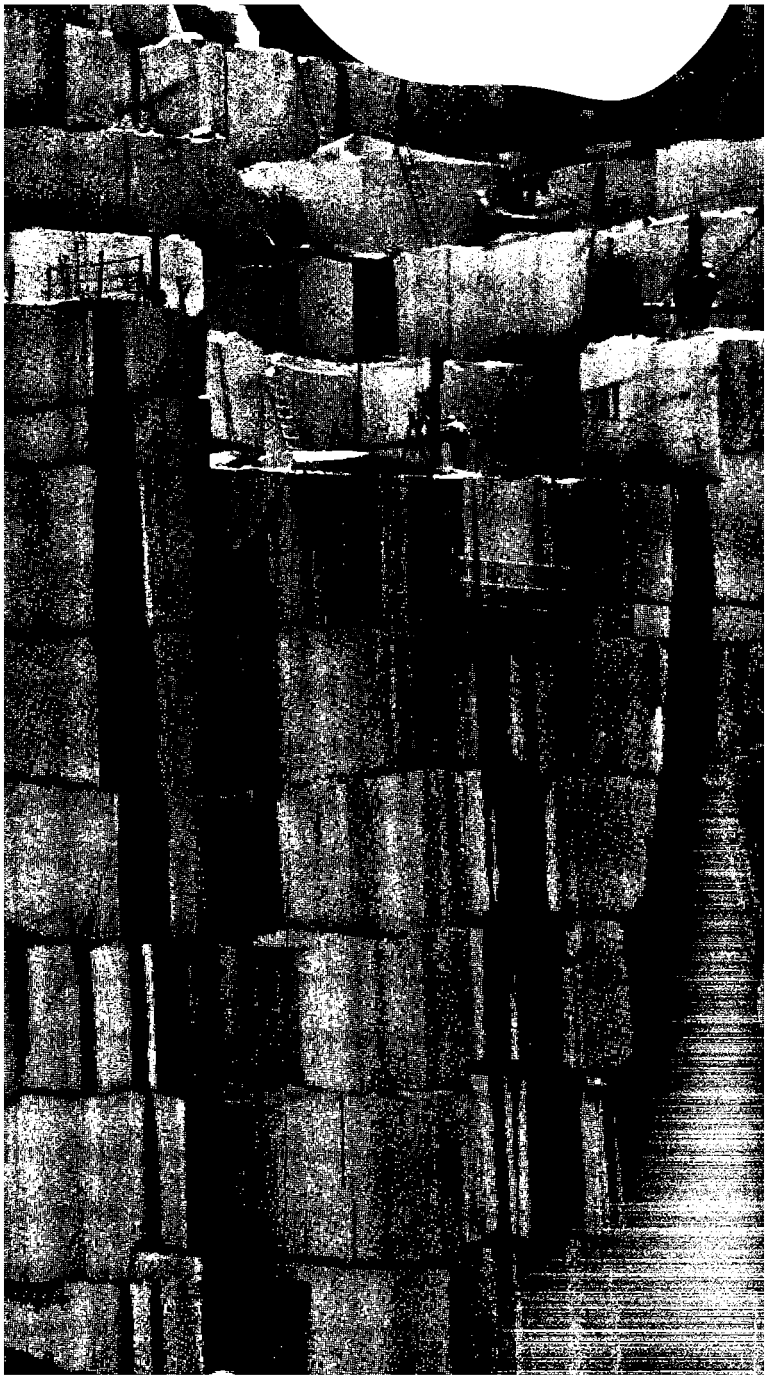
THE STONY SOIL

Generations of exasperated farmers in New England have declared that the chief product of their land is stones. More than 10,000 years ago, the ice caps that covered this part of the country gouged out the hard rocks that lay close to the surface. When the melting ice retreated, it left the rock bare. Over the centuries, a thin layer of soil formed on top of the rock. To clear this land for farming meant not only cutting trees and digging out their stumps, but removing stones of every size, an endless process since the frosts of each winter bring more stones up to the surface through the thin soil. Even today, farms which have been worked on for well over 200 years still yield their annual crop of stones. But the very rockiness that created such problems for farming was a great aid to industry. In the mountains and hills of New England, rocks created numerous waterfalls that could be harnessed for water power. Very early in the 19th century, many a New England falls had beside it a little mill or factory for weaving cloth or for producing wood- or metal-turning machines.

In one way, the opening of the Erie Canal in 1825 was an economic threat to New England. When large amounts of grain from farther west began to reach the towns on the east coast, New England farmers had difficulty selling their own poor yields in the markets. Some farmers moved westward to better land, some turned their farms back to pasture and raised sheep to supply wool for the nearby mills, but a great many found work in industry. For the transportation route that brought grain to the East could also be used to take the products of industry to the West. The New Englanders



Fountain reflection: A night view of the United States Capitol in Washington, D

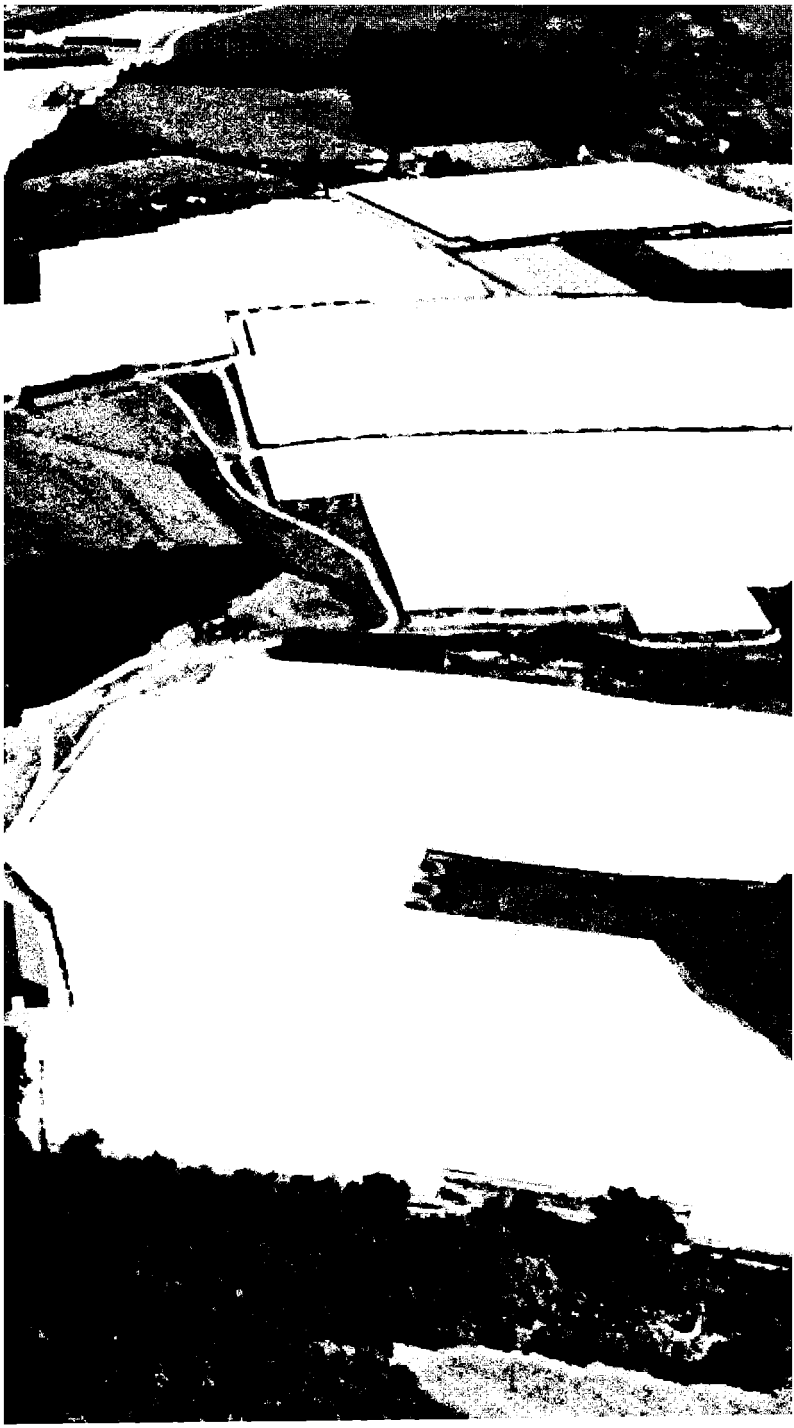


's most famous yield, potatoes, constitutes about 10 per cent of the nation's crop.

men cut huge blocks of granite from the walls
uarry in Vermont, a state which contains some of
ıtion's most extensive deposits of both
e and marble.

Robots automatically weld automobile frames on assembly line, greatly increas

productivity and quality control in one of America's basic industries.



Hectares of thin cotton cloth shade tobacco plants in New England's Connecticut

quickly understood this fact and used it to their advantage. Did the frontier hunter need a better gun? Did the prairie farmer need a better plow? New Englanders watched for such opportunities, and before long their stony land became "the workshop of the nation."

In time, industrialization spread to other parts of the country. Farm machine factories grew up in the West. Metal smelters, or ore refining plants, were built near richer mines. Textile mills moved southward. But New England kept its position as a great production center. Today it makes many of the machine tools that are the basis of all mass production, and heavy electrical motors, looms for weaving cloth, machines for manufacturing shoes, plastics, and other precision instruments.

Life in New England has always required ingenuity and resourcefulness, and it is still chiefly a place of carefully planned specialties. For instance, farms on the strip of good land along the Connecticut River specialize in cigar-wrapper tobacco painstakingly grown under cheesecloth canopies. The stony farms are devoted to dairy cattle, and farmers tap the maple trees to make sugar. In thinly populated Maine, part-time farming is combined with part-time small industry, lumbering or fishing, and at the far northern tip of the state there is a highly developed area of potato farming. Throughout the whole of New England, there is also a widely developed tourist industry which entices vacationers to the area's forests, mountains and sea both in its cool summers and snowy winters.

THE BASE OF INDUSTRY

The greatest part of America's heavy industry depends upon three resources: iron ore from the Lake Superior area, coal from the Allegheny hills of western Pennsylvania and West Virginia, and transportation across the Great Lakes. From Wheeling and Pittsburgh to Milwaukee and Duluth, every urban center shown on the map on page 22 plays a part in the production of heavy industrial goods. Steelmaking is basic, but there are many other related industries in this area too—glass, nonferrous metals, chemicals, rubber and machinery.

Pittsburgh, in the heart of coal fields, was the first of the great steel cities, for it was cheaper to bring the ore to the

coal than the coal to the ore. From the Pittsburgh area came much of the steel for the railroads that opened America's West, for the bridges that spanned the rivers, and for the girders that went into the construction of skyscrapers. Today, the Pittsburgh area still produces about one-fifth of the nation's steel, and also ships coal to the other great steelmaking centers—Chicago, Youngstown, Detroit, Toledo, Cleveland, Erie, Buffalo, Wheeling, Gary.

Several of the cities on the Great Lakes grew up first as grainmilling centers, and even today grain is a major cargo of Lakes freighters. Detroit, heart of the automobile industry, had a rather special start. It began as a wagonmaking town, using wood from the forests that covered the peninsula between Lake Michigan and Lake Huron. Its founders even laid out the streets of the city to resemble a giant wagon wheel. It was fortunate that when, early in the 20th century, the makers of wagons and carriages turned to making automobiles, they found the new raw materials they needed close at hand.

An almost unbelievable quantity of freight is carried across the Great Lakes, and most of the shipments are raw materials. The cargo tonnage which passes between Lake Superior and Lake Huron about equals the combined capacity of the Panama and Suez Canals.

THE CENTRAL BASIN

"These are the gardens ...
The unshorn fields, boundless and beautiful...."

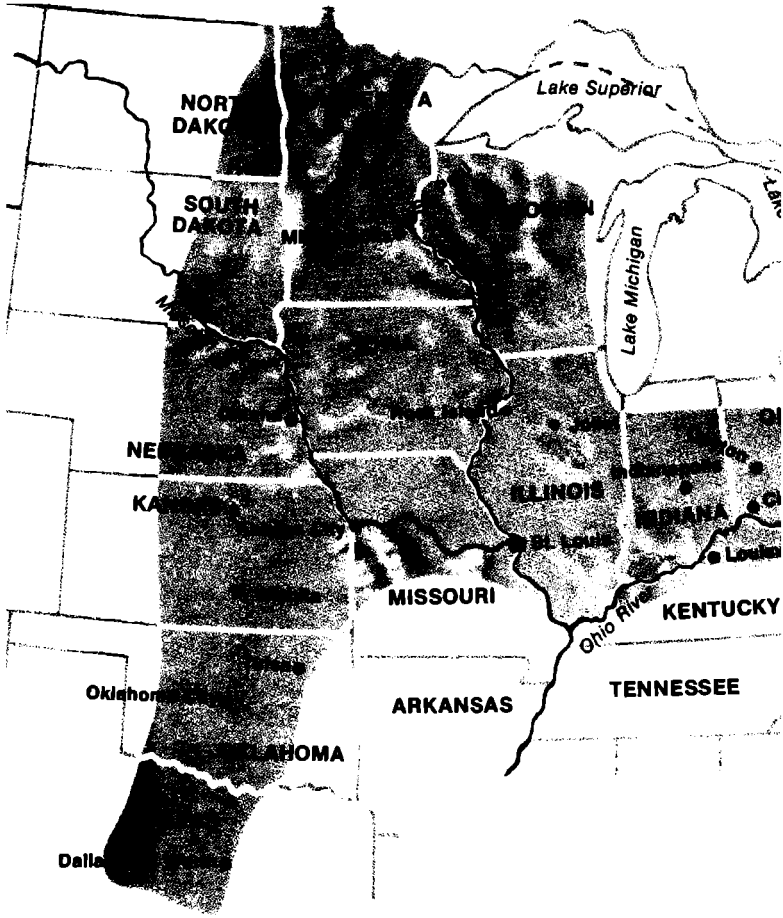
William Cullen Bryant
"The Prairies", 1833

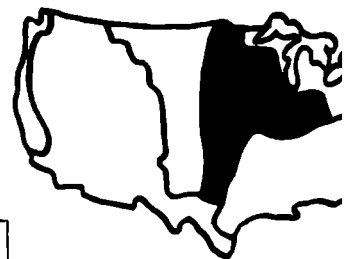
THE PLAINS

For almost the first 200 years of American settlement, the only way to make a new farm was by clearing the forest, a long, hard job. Many of the trees were giants, so big that a man might chop for two days before he could fell one. The pioneer farmer also had to build his house and barn, his fences and often his own furniture and tools. At best, he could hope to clear only about one hectare each year. Because the stumps of the trees would resist burning or loosening, the farmer plowed and planted corn around and between them. Hidden roots often broke his horse's harness or even the plow itself. But, after years of such effort—with a little more land cleared each season—a good-sized farm finally emerged among the tall trees. When new settlers arrived in great numbers, this cleared land became very valuable. The first frontier farmers, those with true pioneer zeal, would then sell the farm, buy better cattle and equipment, and move on again westward. In this way, the farmer's labor created capital for an expanding agriculture.

By the early 19th century, frontier farmers finally reached the edge of the great eastern forest. They had arrived at the eastern pocket of the prairie, in what is now the State of Illinois. Many of those who recorded their feelings told of their joy in leaving the dark forest and coming out into the sunny, open grasslands which rose and fell in low, graceful slopes.

The prairie soil was richer than most of the forest land. But the pioneers did not know this. In their experience and that of their fathers, the only good soil was soil in which trees grew. So they settled in the forest at the edge of the grass.





METROPOLITAN POPULATION AREAS
(1980 Estimate)

St. Louis — 2,355,276
Minneapolis-St. Paul — 2,114,256
Cincinnati — 1,401,403
Kansas City — 1,327,020
Indianapolis — 1,166,929
Columbus — 1,093,293
Louisville — 906,240
Dayton — 830,070
Oklahoma City — 834,088
Dallas-Fort Worth — 3,974,878
Omaha — 570,399
Tulsa — 689,628

After some years, however, latecomers or unusually adventurous families decided to experiment with the open land. At first, they had serious problems. The wooden and cast-iron plows of the time could not cut through the deep, thick prairie sod. New Englanders, with their experience in mechanics, invented a much larger, heavier plow which could break and turn the sod. But the soft soil stuck to the rough iron, making the plow so heavy that a team of six oxen could scarcely pull it. The solution to the problem was steel, which could be sharpened and polished smoothly. The first steel plow was made by a prairie farmer, using strips from an old saw, in 1833. A few years later, John Deere, one of the pioneer makers of farm machines in the United States, began to manufacture steel plows. Rapidly, the prairie became the nation's richest agricultural region.

THE GARDENING OF THE ICE CAPS

When the ice sheets of the last glacial age pushed down from the north, reaching as far south as the Missouri and Ohio Rivers, they did not encounter New England-type mountains or hard rocks. The limestone, sandstone and shale of this area were soft. As a result, the same glaciers that left New England with such poor soil brought riches here. Like a giant gardener, the ice leveled the land by cutting off the tops of hills and filling the valleys. Even more important, it crushed the rocks into fine powder, mixed this with the old surface soil, and added fresh minerals brought up from the subsoil. It shaped the basins of the Great Lakes from old river valleys and carried the fine, fresh soil mixture southward, laying it as much as 90 meters deep in some places.

Along with all their benefits, however, the glaciers created one problem. They changed the way the land drained, with the result that water ran off very slowly in rainy years. When the farmers plowed the land, the smallest bits of earth were carried downward by rain and formed a hard layer beneath the tilled soil. Consequently, in rainy seasons the plowed earth would often hold the water while the crops spoiled. Then the water drained slowly off the surface, instead of sinking into the soil.

To solve this problem, the farmers on these lands laid hundreds of thousands of kilometers of tile drains to let some of the water trickle out beneath the soil. To pay for building

and repairing these artificial creeks, groups of farmers organized local government units known as "drainage districts" to regulate the extent of the drainage necessary and the particular methods of control needed.

In some places in the State of Ohio, where floods or loss of soil or road construction complicated the problem, these drainage districts evolved by 1920 into "conservation districts" where the farmers worked cooperatively on their common problems. These conservation districts marked an important step in the social development of the United States as they became the basis for the nationwide soil conservation plan adopted in 1933. Today there are thousands of local conservation districts formed and controlled by farmers themselves but receiving advice and help from state and national agricultural experts.

Improvements which are made through the conservation district method commonly increase a farmer's yield by 10 to 20 per cent, and sometimes more. The districts include 88 per cent of all the nation's farm and pasture land.

THE CORN BELT

On hot, still midsummer nights in the Corn Belt, the farmers insist they can hear the corn growing. This facetious claim points up the fact that this crop grows fast, sometimes five centimeters during a night. By late summer, it may be three or four meters high. It is easy to get lost in a large field of full-grown corn because there is no way of looking over it or through its tall, heavy growth of thick stalks and broad leaves. The only thing to do is to follow the straight line between two rows of the plants which may stretch for a kilometer or more to reach a road at the edge of the field.

Corn is the most important of all American crops, as basic to American agriculture as iron is to American industry. In the United States, two farmers out of every three, and one hectare out of every four cultivated, grow corn. The annual crop is greater than the nation's yield of wheat, rice and other small grains combined, and probably one of the United States' greatest resources is its ability to grow great quantities of corn.

However, the only corn most Americans see is "sweet corn," a garden vegetable that is eaten either fresh or preserved, or is ground into meal for baking. But these uses

account for only a small fraction of the crop.

Most of the yield—some three-fourths of it—is used as animal feed and reaches the table in the form of milk, cream, cheese, butter, eggs, beef, lamb, pork or poultry. Much of the remainder is processed into oil, syrups and starches.

Corn also has proven to be an astonishingly versatile industrial material. From a corn distilling process manufacturers extract alcohol-fuel, or gasohol, used in many farm vehicles and growing numbers of cars. Corn soaked in warm water for 2 days produces "steepwater," which can be converted into drugs, vitamins and minerals. Scientists have derived a biodegradable plastic film from corn starch that could replace plastics made from petroleum. Another technological offspring of corn starch is called the "Super Slurper," a dust that can absorb 2,000 times its weight in water. And corn starch itself has become such a popular sweetener in soft drinks and other prepared foods that it now rivals sugar.

There are two main reasons why corn has become the basic crop of American agriculture. One is that it grows so well. A hectare of corn requires only one-twelfth as much seed as a hectare of wheat, for instance. Yet the yield of grain from the hectare of corn is several times as high as that from the hectare of wheat. The other reason is that farmers have worked out high-yield mechanized production methods in all the important corn-producing areas. The Corn Belt farmer uses machines for every step of his operation—planting, enriching the soil, cultivating, spraying, killing weeds, harvesting the ears, removing the thick natural wrappings, shelling the kernels from the long cobs on which they grow, and cutting the stalks. Because of this extensive use of machinery, the average farmer can cultivate as many as 140 hectares and care for a large herd of livestock with no more help than perhaps a son who spends several hours a day in school. On a Corn Belt farm, the most impressive buildings are the large barns and machine sheds which may dwarf the farmer's house itself.

Farmers first began to keep reliable records of corn production in 1866. Between 1866 and 1939, the corn yield in the United States averaged between 700 and 1,000 liters of shelled grain per hectare. Suddenly, in 1940, it began to increase greatly each year; by 1948, it was about 1,500 liters per hectare; and, by 1972, it reached about 3,400 liters per hec-

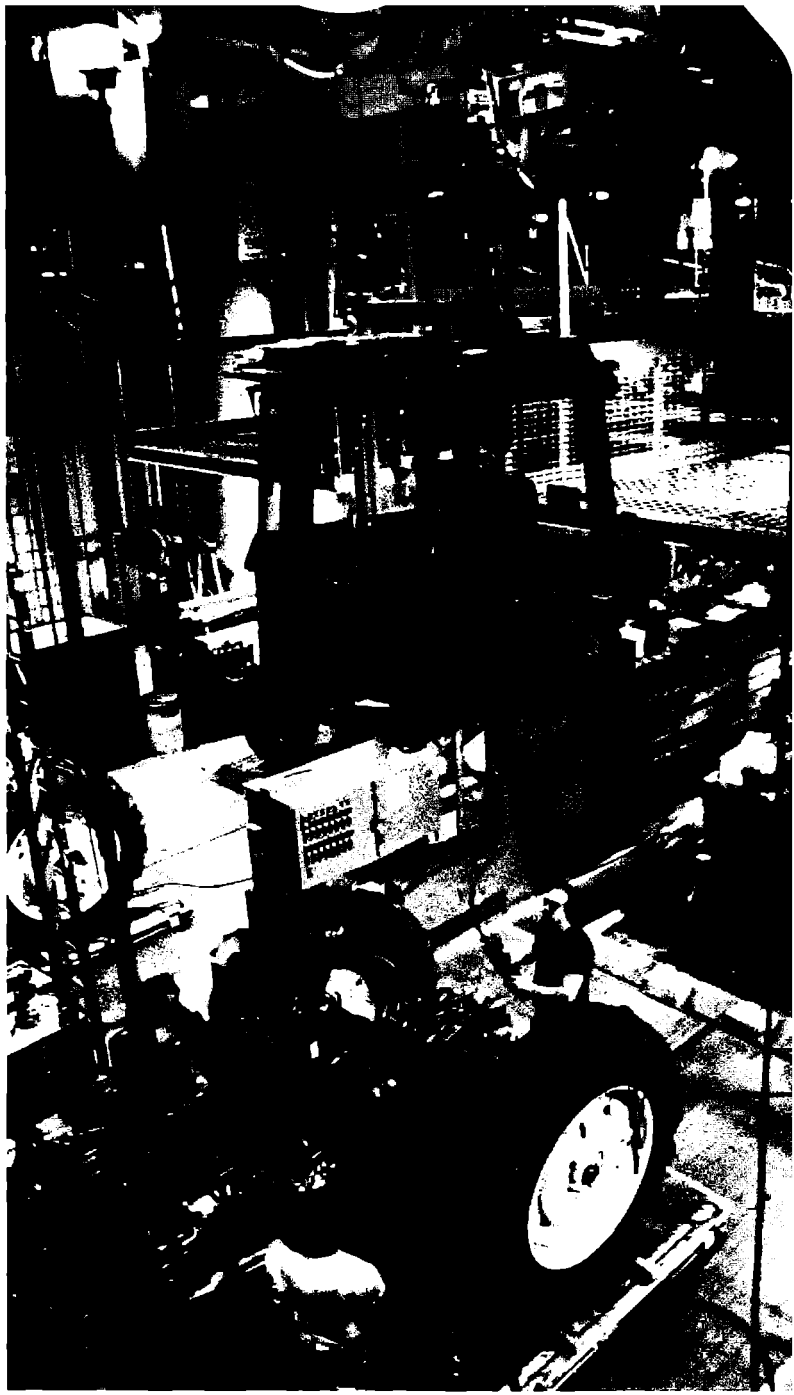
tare. (The highest recorded yield is about 7,000 liters per hectare, produced in the State of Iowa.) Such a vast and rapid change in the most basic crop represents a real agricultural revolution.

This has been a quiet sort of revolution, however, because the chief difference between the older corn agriculture and the new is simply that the farmer plants a different kind of seed. Instead of saving the best ears from each year's crop for the next year's planting, the traditional method, the farmer now buys new seed every year. The increased value of the crop more than pays for the extra cost.

Corn grown from the new kinds of seed is called a "hybrid," that is, a corn which results from the mating of different types of the same grain. Different kinds of hybrids are developed for such basic qualities as higher yields, stronger stalks and hydrotropic roots. As with other grains, different strains have been developed for different soil and climate conditions and for different purposes. For instance, some contain twice as much oil as ordinary corn; others are rich in certain minerals.

Producing hybrid corn is a lengthy process which must be done by hand, during 12 or more years of crossbreeding among different varieties. This process, difficult and complex as it is, is simple compared to the job of discovering that new kinds of corn could be developed, or to the job of discovering how to develop them. With other grains, all or nearly all the plants are like the parents. But corn is different. American plant scientists began working on the problem of controlling corn qualities very early in the 20th century and it was only after many years of trial and error that they were able to master the theory and practice of growing hybrids.

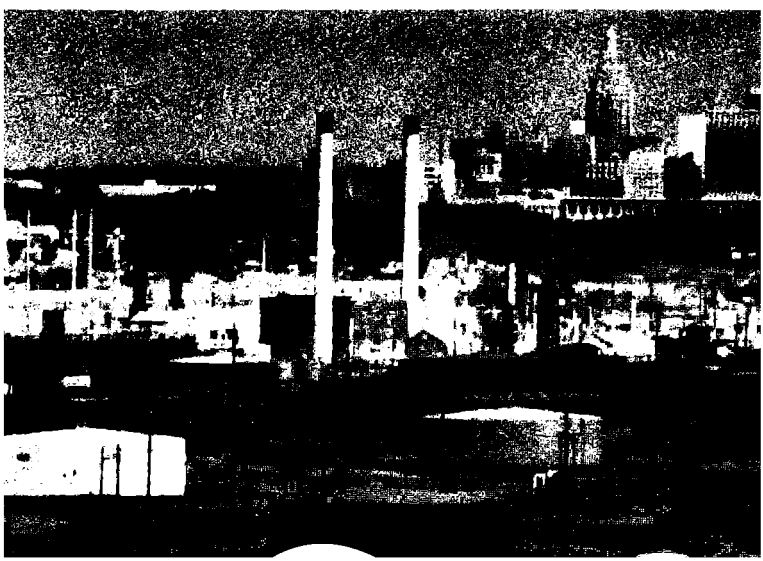
Like farmers everywhere, American farmers did not like to throw away anything that experience had taught them. They did not like to risk an untried new idea, no matter how good it sounded. To the eye, hybrid corn did not look as impressive as the prize ears of ordinary corn they were so proud of growing. So, even after the first hybrids were developed, farmers were unwilling to use them. The corn breeders had to spend some 20 years more improving the value of the new strains before a few farmers were convinced it was worth risking. After that, the revolution in the Corn Belt took only a few years as the greater yields proved the value of the new grain.

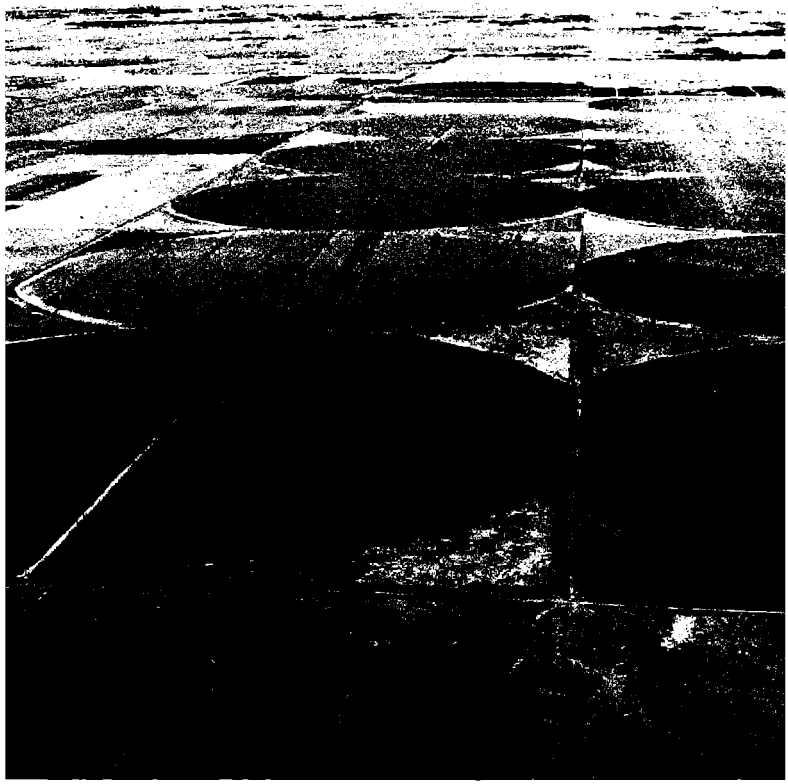


At a John Deere & Company plant in Waterloo, Iowa, computer-controlled assembly l
cab onto the body of a tractor. John Deere is the largest manufacturer of farm equipme

imes known as "the land where the tall corn grows," produces about one-fifth
States crop, most of which is used for feed for hogs and cattle.

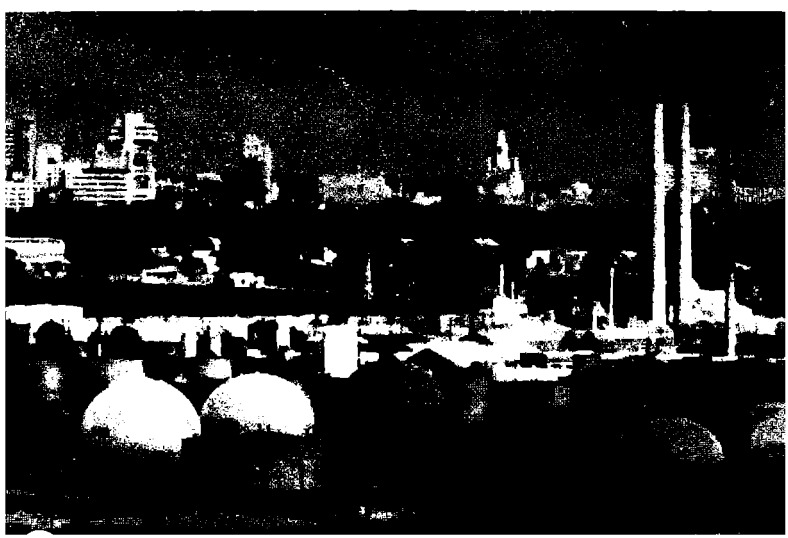
Tulsa, Oklahoma's skyline includes a complex of refinery facilities and sto





These 52-hectare farms-in-the-round in Nebraska are irrigated by a unique system center-pivot pipes sweeping around the fields like the hands of a gigantic clock.

anks. State oil production ranks third in the nation.



To prevent soil erosion in the fertile, rolling countryside of Wisconsin's dairy

region, farmers plant crops in curves which conform to the contours of the land.

FARM AND VILLAGE

The rural village typical of many countries in Europe and Asia—a collection of homes, close together, occupied by the people who work on the surrounding lands—is virtually unknown in 20th-century America. In the United States, instead, each farm family usually lives separately on its own fields, often beyond the sight of its neighbors. The village or town is predominantly a place where the farm family travels to buy supplies, to attend church, and to go for entertainment or political, social or business meetings. In most such areas, special buses pick up children every day to take them to the schools which are usually in the town.

When the early settlers first came to America they followed the old European pattern. In New England, they lived in a cluster of houses around a central green where the cattle of the whole village grazed. The farmer's croplands extended outward around the village.

Southward, in the State of Virginia, however, farmers scattered up and down the creeks and rivers, with great distances between families. These settlers were planting a New World crop, tobacco, which required fresh land every few years. This forced the tobacco farmers to move westward, as separate families, whenever the land became exhausted. When, after several generations, families reached the low hills at the edge of the Appalachian Mountains and the long valleys enclosed by the mountains, they changed their farming from tobacco to grain and livestock. With these new crops which did not exhaust the soil, people had no further need to move. However, the tradition of the independent, separate farm was very strong, and there were no desires to adopt a village type of organization.

Much the same thing had been happening in other eastern states, but for different reasons. In the western reaches of Maryland and New York, wealthy landowners held great blocks of uncultivated land. Frontier farmers who traveled to these areas to clear and farm them without any legal right to the land, naturally did not wish to call attention to themselves by establishing villages. Many other families in New Jersey, Pennsylvania and New York lived on separate homesteads because they came from different countries or held different religious beliefs from their neighbors.

In any case, it was the most independent and self-reliant

families who were the first to push westward to the Appalachian Mountains, then southward along the mountain valleys, then into the great Central Basin, and finally westward beyond the Rockies. These were the people who set the pattern of the separate farmstead.

Until the days of good roads and automobiles, farming in the United States was a hard and lonely life. To be successful, the farmer and his wife had to develop a variety of skills. Whenever a problem arose, they usually had to deal with it themselves. There were times, of course, when neighbors helped each other with big jobs like building barns but, in day-to-day work, the farmer had to be his own mechanic and was often even his own inventor.

This tradition of the individual farm family was further reinforced by government policy. For many years, beginning in 1862, the government gave land away free. To take full possession of that land, a settler and his family had to clear it, build a house and live there for at least five years.

Between 1890 and the early 1930s, there was an increase in the number of tenant farmers. To reverse this development and to help farmers keep their holdings, the national and state governments provided loans in times of drought or crop failure. Many tenant farmers have also been helped to buy land of their own.

As a result of this combination of tradition and policy, there are not many farms which are owned by absentee landowners. In the United States, only about two to three per cent of all farms are operated by hired managers and only slightly more than one-fourth of all farm labor is done by full-time hired workers or by transient farm labor.

The frontier settlers took with them into the Central Basin many different agricultural traditions which influenced the methods brought over by the original English settlers. The Swedes introduced the log cabin, which became the typical dwelling of the frontier wherever there were trees. The Dutch brought new breeds of farm animals and skills in dairying. The Scots and Irish brought potato cultivation, for although this was a New World crop, it was first widely planted in Europe. What became the typical American barn was actually first created by Germans. Even today, this process of borrowing continues. Two pasture plants, lespedeza and kudzu, have been brought to the United States from Asia. The soybean, another Asian plant, has become

one of the chief crops in the Corn Belt. Italians and Japanese have influenced fruit and vegetable growing. Scandinavians have played a large role in dairying and cheesemaking in the great northern dairy region of the Central Basin.

Until rather recently, most of the farmers in the Central Basin practiced "general farming," that is, the family produced as much of its own food and equipment as possible, and sold whatever remained to buy things it could not raise or make.

Today, however, nearly all the farm families in the Central Basin do "commercial farming": they raise products for sale and do not generally try to produce crops to be self-sufficient. This change from general farming to commercial farming represents another kind of agricultural revolution typified by a decline in the number of farm families concurrent with an increase in the size of farms.

As a result of the growing use of sophisticated farm machinery and advances in the development of fertilizers and in the breeding of animals and crops, the average size of farms in the United States increased from 60 hectares in 1920 to 155 hectares in 1973. A century ago, two-thirds of the American people lived on farms. In 1920, as many as 32 million, or 30 per cent, of the population were farmers. In 1960, farmers and their families numbered 15 million, or about eight per cent. By 1980 the farm population had fallen to 6,241,000.

THE WILD MISSOURI

Curving through the heart of the whole western half of the Central Basin is the Missouri River, chief western branch of the Mississippi, and once the most destructive river in the United States. When the first explorers reached a point near the present city of St. Louis, they were amazed by the mighty stream of dirty water pouring down from the west. Father Marquette, a French priest who was leading the expedition, wrote: "I have seen nothing more frightful. A mass of large trees ... real floating islands, came rushing ... (so) that we could not, without great danger, expose ourselves to pass across." That was the Missouri River in flood in 1673—and in flood many times since then.

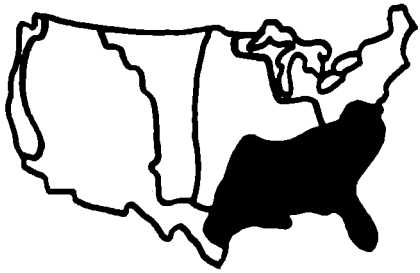
The Missouri rises high among the snows of the Rocky Mountains. Before it reaches the Central Basin, it runs for

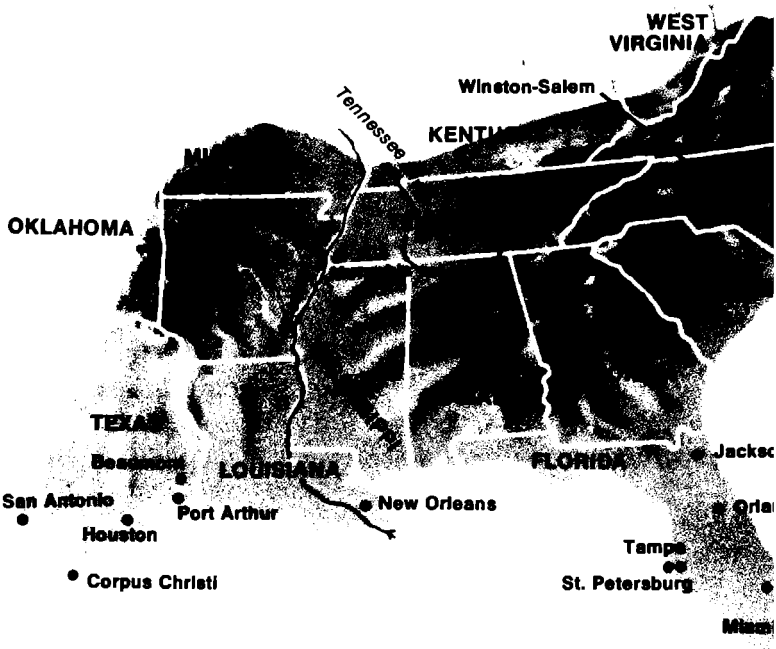
1,600 kilometers through a region where there are long droughts and sudden, extremely heavy rains. The Missouri is really two rivers: one of water, and one of small bits of soil washed off the land. The people who live along the Missouri's banks say that it is "too thin to plow and too thick to drink."

Time after time, the muddy waters of the Missouri had flooded, spreading ruin in the states of Nebraska, Iowa, Kansas and Missouri. A devastating flood in 1951 killed 41 persons, left more than 200,000 homeless, put more than 800,000 hectares of farmland under water, and destroyed more property than any previous flood in United States history.

In 1944, the U.S. government began a vast project to control the Missouri. Known as the Pick-Sloan plan after the engineers who devised it, the project called for a series of man-made lakes, dams, navigation channels and dikes. Six dams have been completed—four of which are among the largest in the world. The dams, with a holding capacity of 93 thousand million cubic meters, provide protection of farmlands from floods, and a three-year supply of water in periods of drought. Better utilization of the Missouri River through water-control projects such as Sloan-Pick ensures Central Basin farmers high yields of wheat and feed grain.

Many people who know the Missouri River well doubt that it can ever really be tamed. Yet they know that somehow it must be. For as one Iowa farmer put it: "You can't live on a river that takes your future away."





METROPOLITAN POPULATION AREAS
(1980 Estimate)

Houston — 3,905,350	Ft. Lauderdale — 1,014,043
Atlanta — 2,029,618	Nashville — 850,505
Miami — 1,625,979	Norfolk — 806,691
Tampa-St. Petersburg — 1,569,492	Jacksonville — 737,519
New Orleans — 1,186,725	Charlotte-Gastonia — 637,218
San Antonio — 1,071,954	Richmond — 632,015
Memphis — 912,887	Orlando — 700,699
Birmingham — 847,360	Beaumont-Port Arthur — 375,497
Greensboro-Winston-Salem — 827,385	Corpus Christi — 326,228

THE SOUTHEAST

"The earth, restive, confronts a new era ...."

Walt Whitman
"Years of the Moderns", 1865

LAND OF CHANGES

This southeastern region is changing more rapidly than any other part of the United States—not because the land is new, but because the area's old, exhausted land is being given new life.

The problems of the Southeast area are best illustrated by a story that goes back a decade before the turn of the century. The tale describes the funeral of a poor man. "They cut through solid marble to make his grave and yet the little marble tombstone they put above him was from Vermont. They buried him in the heart of a pine forest, and yet his pine coffin came from Ohio. They buried him beside an iron mine, and yet the nails in his coffin and the iron in the shovel came from Pittsburgh. They buried him in a coat from New York and shoes from Chicago and a shirt from Cincinnati. The South didn't supply anything for that funeral except the body and the hole in the ground."

The point of the story was expressed by a modern southerner in this way: "We have added too little human skill to our raw materials."

As this comment and the fable both suggest, geography itself has been kind to the Southeast. The region is blessed with plentiful rainfall and a mild climate. On most of its farmlands, crops can be grown without frost at least six months of the year. A transportation artery, the Mississippi River and its southern branches, runs through the heart of the area, and other rivers are found near its coast. Crops grow easily in its soil, which is brown on the coastal plain, red on the low hillsides, and black in east Texas. The mountains contribute coal, water power, and rich valleys. Much of

the Florida peninsula is a garden for subtropical fruits. Some of the nation's largest oil fields lie in the States of Louisiana and Texas. The region is naturally rich in fisheries, forests and minerals.

And to delight the human sense of poetry and wonder, the Southeast has many landscapes of special beauty. For instance, there are low water-covered lands where cypress trees, shaped like long-necked wine bottles, rise out of dark, quiet waters into dark, tent-like masses of vines above. There is soil that looks like broad expanses of red silk, decorated with the long curving rows of pink and white flowers of the cotton plant. There are quiet little valleys hidden between great green hills; or sunny, sandy islands where all the world seems to be one endless stretch of sand, water, sky and wind.

Since the end of World War II, there has been a great upturn in the region's economic fortunes. Persons returning to the Southeast after many years' absence are astonished at the improvements they see: new roads, bridges and factories; new schools, hospitals and community centers.

Today, the Southeast is experiencing a surge of industrial development, although average income and standard of living remain lower than any other region of the nation. However, economists predict that in the next decade the standard of living will rise substantially with the increase in population, jobs and industry attracted by the relatively lower costs of land, energy and labor. Industries ranging from solar research to chemical technology are moving to the Southeast for example, creating blue- and white-collar jobs, and boosting incomes. Three-fourths of the jobs created by this influx of population are in service-oriented businesses such as restaurants, hotels, gas stations and TV-repair shops. Only four percent of southern workers remain employed by agriculture. Yet the South's extensive woodlands, rich farmlands and agrarian heritage give Southerners a sense of tradition, history and regional identification that remains resistant to the encroaching values of modern industrial society.

MINING THE SOIL

Before the United States declared its freedom from Great Britain in 1776, the economy of the colonies (both north and south) was predominantly agricultural. Such manufactured

goods as were available came to the New World from the mother country in exchange for raw materials. The geography of the Northeast did not fit well into this pattern and, with independence, the northern states broke away from it. But the South, with its rich soil and ideal climate found its wealth in agriculture with such crops as tobacco, rice and indigo. Then, in 1793, great new possibilities for the production of cotton appeared with the invention of the cotton gin, a machine that made it easy to separate the cotton fiber from the seeds. Cotton, a crop supremely suited for the South, needs about six months to grow and ripen, and this fitted perfectly into the region's weather pattern. Land was cheap and many farmers put all their energies into growing this single crop mainly with the help of slave labor. At first this labor was supplied by the degrading slave trade from Africa. After the slave trade was abolished in 1808, the natural population increase of slaves continued to provide workers for the cotton fields.

Cotton seemed wholly suited to slave labor. Its culture is simple; few tools and little equipment are needed, and its cultivation extends over a large part of the year. Women and children can be employed as well as men.

The adaptability of cotton to slave labor, however, was not the only influence favorable to slavery. In one sense, slavery tends to perpetuate itself by eliminating competition. Free immigrants from Europe, in their desire to avoid competition with slave labor, largely avoided the agricultural South. Slavery was also strengthened by the abundance of fresh land, which made it possible to waste the soil under a one-crop system with unskilled slave labor and then move on to ruin another piece of land in the same way.

Despite appearances, slave labor was expensive. If sickness and old age are added to the initial cost, accurate cost-accounting shows that slave labor was often more costly than free, besides usually being more inefficient. The margin of profit on cotton tended to grow smaller with the expanding cotton crop. It was the fertility of the virgin soil, ruthlessly exploited, that brought the profits.

More than anything else, the increase over the years of the value of slaves fastened the system upon the South and convinced southerners of its value. Land might wear out and decline in value, the price of cotton might be low as it was in the five years preceding the Civil War of 1861-65, but the

value of slaves kept on climbing. The reason was that the Southwest was being opened to cotton more rapidly than the labor market could supply the necessary slaves. As long as this situation continued, profits could be made with slave labor. When the cotton kingdom ceased to expand, slavery was doomed, and the end of this expansion was in sight in 1860. But then the United States became engaged in the tragic Civil War between the northern and southern states. When the war ended, the defeated South had lost one-quarter of its adult men and almost all its capital. The slaves were freed, but the economic pattern was not really changed for either blacks or whites. The people could only turn again to the resources they knew best—their land and their knowledge of its most salable crops. And so the mining of the soil continued until, in some places, the land was producing only one-fourth of what fresh land had given. Even the poorer crops required as much labor as ever because, while agriculture in the North and the West was mechanizing, the combination of poverty and the false savings of low wages held back the use of machinery in the South.

New difficulties, too, troubled the region. The price of cotton on the world market was very unstable and would vary greatly from year to year, which resulted, in some years, in a loss of income. The post-Civil War South also faced another enemy, the cotton boll weevil—an insect which moved into Texas from Mexico in 1862 and ravaged the crop as it spread eastward. By 1921, it had reached the Atlantic Coast, leaving ruin and despair in its wake. Eventually, the damage was partly controlled by planting types of cotton that ripen before the insect matures. Also, the development of modern insecticides helped kill the pest.

DIVERSIFICATION

In a little town in the southern part of the State of Alabama, there is a monument honoring the cotton boll weevil! The people of that area erected the monument because, after the boll weevil destroyed their cotton crop in 1910, they were compelled to stop growing cotton and turned instead to dairying and to raising peanuts and melons. What was first viewed as a misfortune was a blessing in disguise, since the new farming was better suited to the land and raised their standard of living.

In another place, in Alabama, three brothers in 1934 acquired a lumber mill that had already depleted most of the surrounding forest. The remaining trees were enough to keep the mill busy only eight years longer. But the brothers had new ideas, and today the mill is cutting more wood than it ever did in the old days. The supply may continue forever because the forest has become a carefully managed "tree farm." Not only have the brothers grown new trees to replace the old ones, but they have also been instrumental in spreading "tree farming" to land that could no longer grow cotton.

Mississippi, the most thoroughly agricultural state of the South began a program around 1940 to increase manufacturing and adopted the slogan, "Balance Agriculture with Industry." The plan has helped create thousands of new industrial jobs.

These examples give but a glimpse of the three-sided movement of diversification that is revitalizing the South. First, southerners are bringing their agriculture into balance, with crops that put new life into the soil, and with many types of plants and animals which are suited to the varied features of their landscape. Second, they are adding to the basic wealth of the region by using and cultivating their resources, instead of either letting them lie idle or destroying them. And, third, they are bringing their whole economy into balance by adding industry to farming.

At first, diversification was slow and often happened by chance, as the example of the town in Alabama shows. But, over the years, it became a very broad movement, deliberately planned by individual farmers and manufacturers, and deliberately encouraged by local communities, states and the federal government.

The change in farming started in different ways in different places. Usually it began with one farmer, more daring than others, willing to experiment with new crops or a new way of plowing, or one adventurous enough to change from raising crops to raising farm animals. His success emboldened others to follow suit.

Remaking a farm is always hard and risky, but there are many ways in which the farmer is encouraged and helped to avoid mistakes. The government has, for example, a program under which farmers in a district vote to adopt a soil conservation program for their area. Agricultural experts

help them plan how to use their fields for various crops and show them how to rebuild the soil. In some parts of the South, farmers could not afford to buy the new equipment or seeds or animals needed to improve their methods. In these cases, the states and the federal government have arranged financial loans to meet such needs.

One of the biggest problems the South has faced has been the existence of tenant farmers who only rent the land they cultivate. Since most tenant farmers do not have the incentive that landowning farmers have, production and income on these farms has traditionally been low. To overcome this lack of initiative, loans have been made available to tenant farmers who wish to purchase the land they work.

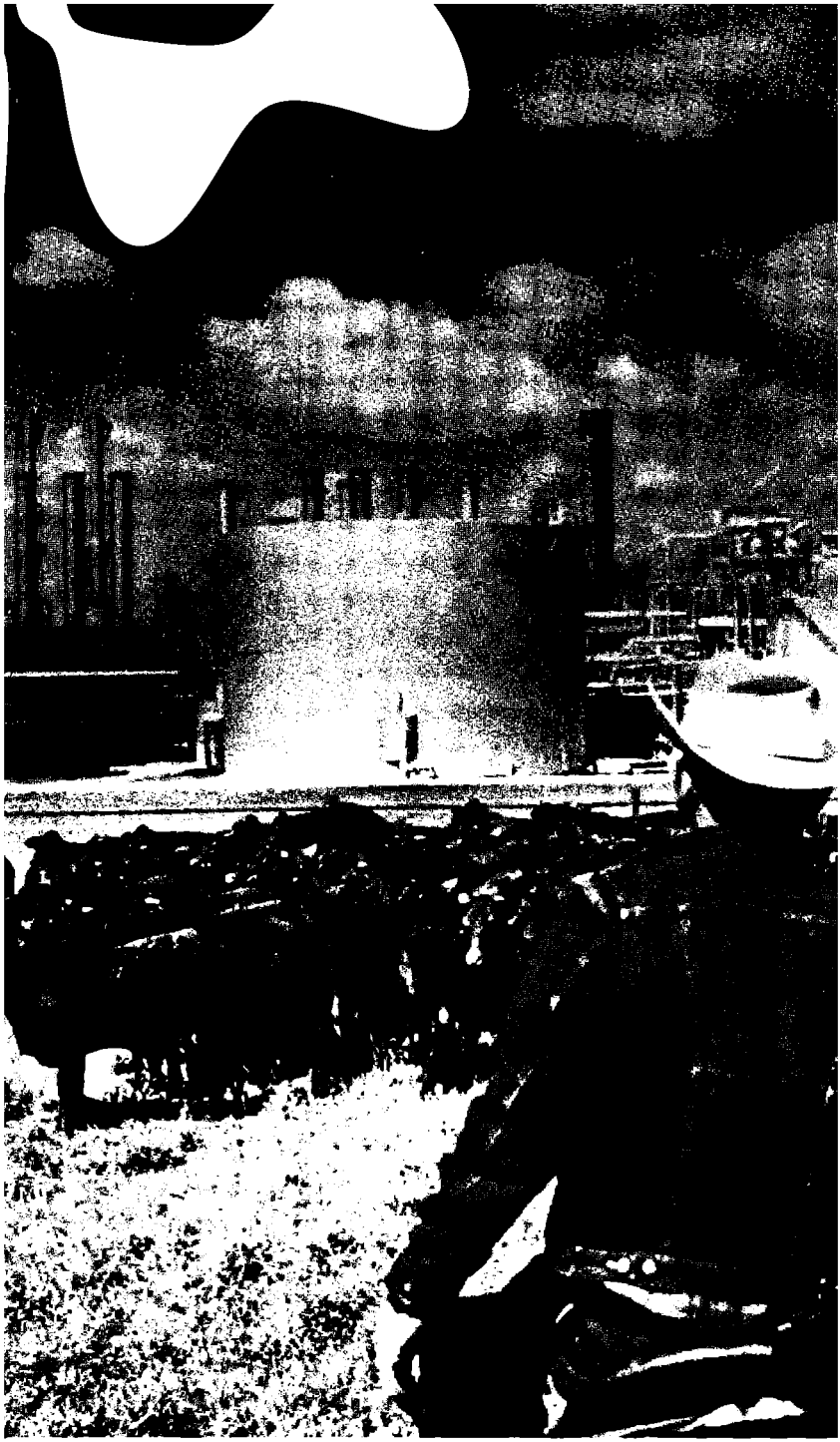
With these changes in agriculture has also come a growth in industries related to farm production. New processes have been developed for freezing foods so that many farmers can now profitably grow vegetables for city markets. Packing plants for poultry and dairy products have grown in number. The construction of new hard roads and highways as well as the growth of fleets of freight trucks have made it easier for farm goods to reach both processing plants and city markets.

Although cotton is still the principal crop of the South, cotton growing has changed. Mechanical cotton pickers, one of which can do the work of 40 men, have taken the place of low-paid labor. Usually, throughout the history of the industrial revolution, the introduction of machines has created at least temporary problems of unemployment. However, the growth of industry in the South has been gradual; thus, workers who have left farm labor have been absorbed into other occupations without undue hardship.

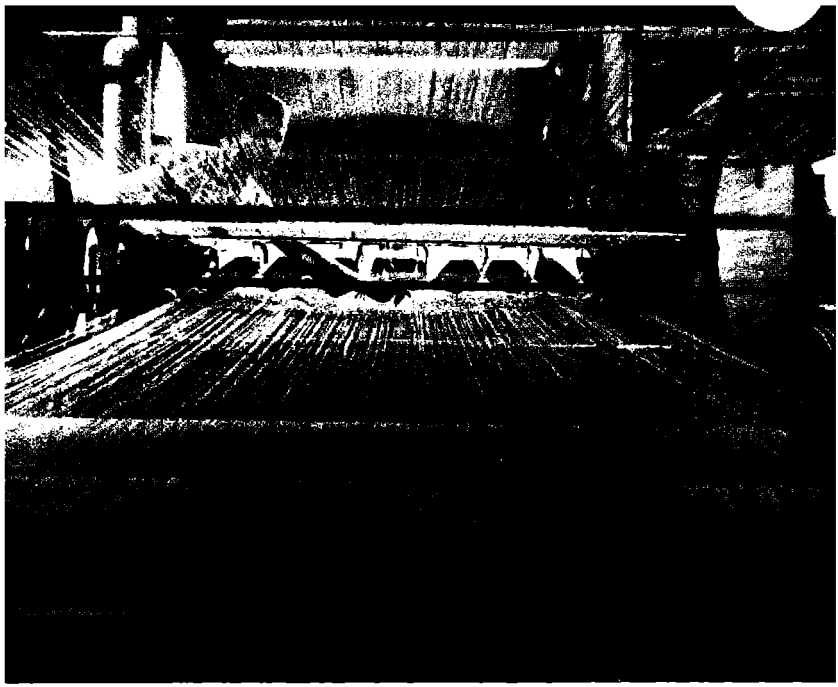
Until 1940, most southern factories did simple jobs, compared with those in the North. They turned raw materials into partly finished products—such as cotton into cotton yarn or unbleached sheeting—and then shipped these goods north to be made into finished clothing. Or they took already finished machine parts from northern factories, and assembled them into machines that would be sold in the South.

Birmingham, Alabama, for instance, has long had a large steel industry, but its machinery came from the North and it made few finished steel products. Instead, it shipped out the metal. The South also shipped out partly refined aluminum ore instead of aluminum products, wood instead of furniture,

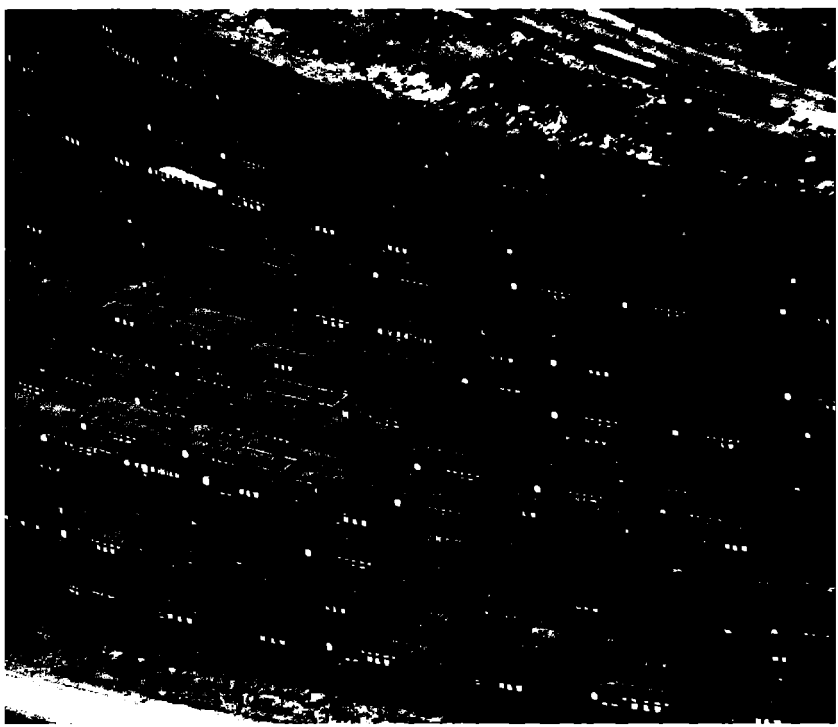
Arkansas, first in the nation in rice production, uses airplanes to seed, fertilize.



A cowhand herds cattle past a petroleum processing plant near Corpus Christi, Texas.

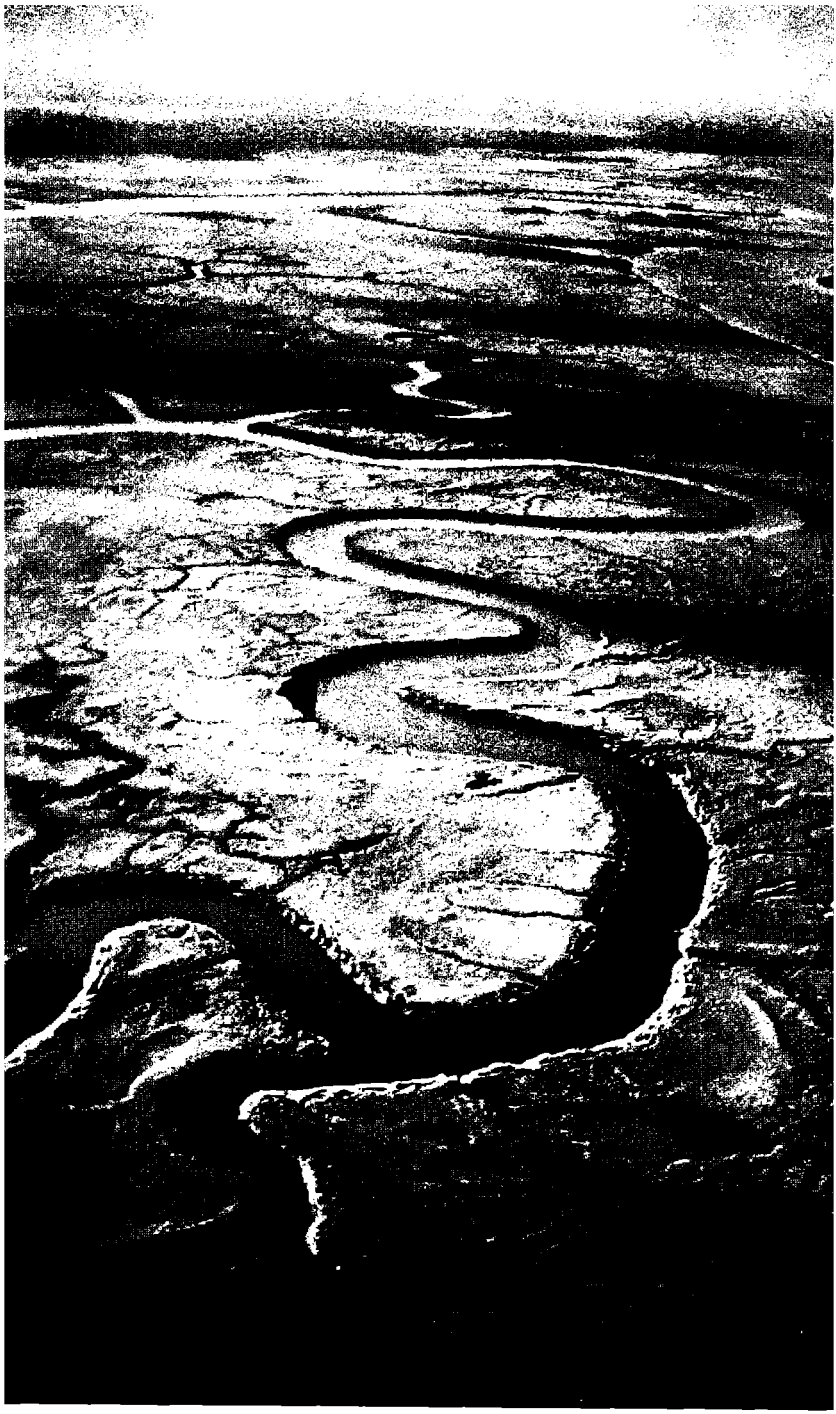


Weaving plants abound in North Carolina, leading state in U.S. textile production.



Coal, Virginia's chief mineral commodity, moves out across the country via railroad.

With two-thirds of its land area in timber, Alabama has an expanding paper industry.



Cut by Atlantic waves, a channel winds through marshes on Georgia's southern coast.

Salt, a leading Louisiana mineral product, is mined 300 meters below earth's surface.

and turpentine instead of paints.

This, too, has changed. Better farming has brought farm machinery and toolmaking plants to the South. Higher wages and richer farms have brought clothing and shoe and household utensil factories. New houses, schools, barns and machinery sheds have created a need for window frames and doors, pipes and furnaces, and all the other things that go into modern buildings.

There are millions more industrial workers in the South than there were before World War II, and the number is increasing every year. Not all the industries have grown because the South has become a better market, however. Industry depends on the proper use of basic geographical resources, in the South as in the North. The South has always had raw materials, transportation and population. What new resource therefore, has been bringing basic industries to the South?

Industrial power.

Industrial power, the energy that turns machines, is being developed, at last, for human use. For example, natural gas is a great resource for industrial power, but it must be transported after it is taken from the ground. Today the South has built new pipelines underground which carry this resource from the gas and oil fields to mines and mill sites. Most important of all, water power that was once wasted is now being used for cheap electricity that supplies energy for machines in homes and on farms and in the great new industrial plants of the region.

One industry which has done much to rejuvenate the economy of the South since the end of World War II is the very important oil industry. In the five states of Arkansas, Louisiana, Mississippi, Oklahoma and Texas, crude-oil production almost doubled from 1,272,782,000 barrels in 1950 to 2,480,764,000 barrels in 1972. By 1980, that figure had declined slightly to 2,266,980,000; but in the 1980's, increased energy prices spurred fresh drilling activity.

In earlier times, almost all the crude-oil in the South was piped to midwestern and eastern refineries to be made into gasoline, oil and other petroleum products which were then sold back to the South. Today, however, crude-oil refining and the manufacture of equipment for crude-oil production are huge industries in the southern oil fields. This has helped create great oil cities such as Dallas, Houston, San Antonio

and Beaumont. Some of the pipelines which stretch from these areas to ports in the Gulf of Mexico and north to the Great Lakes are more than 1,600 kilometers long and are constructed to carry several different crude-oil products, one after the other, through the same pipe without mixing them.

THE POWER OF THE RIVER

In 1933 the United States began a new kind of experiment with a river and its valley. The river was the Tennessee, part of the Mississippi drainage system, and it was a river that gave little to its people. Instead, it carried away soil and swept away lives, crops and homes in its frequent floods. In many places, it was not deep enough for navigation. The farmers in its basin were deeply in debt and poorly nourished. Disease rates were high. Average income and average farm production per person were only two-fifths of the national average. The few cities there were not prosperous. The few power dams in the river were idle much of the time. Experts who studied the region considered it the nation's principal problem.

But what was the use of building flood-control basins if they would soon be choked with silt brought down from the hills? Why should electric power be developed if the people of the valley were too poor to use it? Why should navigation be improved if there was little for boats to carry? These interrelated problems were fully recognized and when the United States Congress decided to develop the Tennessee Valley, it approached them with an idea that had never been tried before: to treat the entire basin as a whole, to deal with all its problems at the same time.

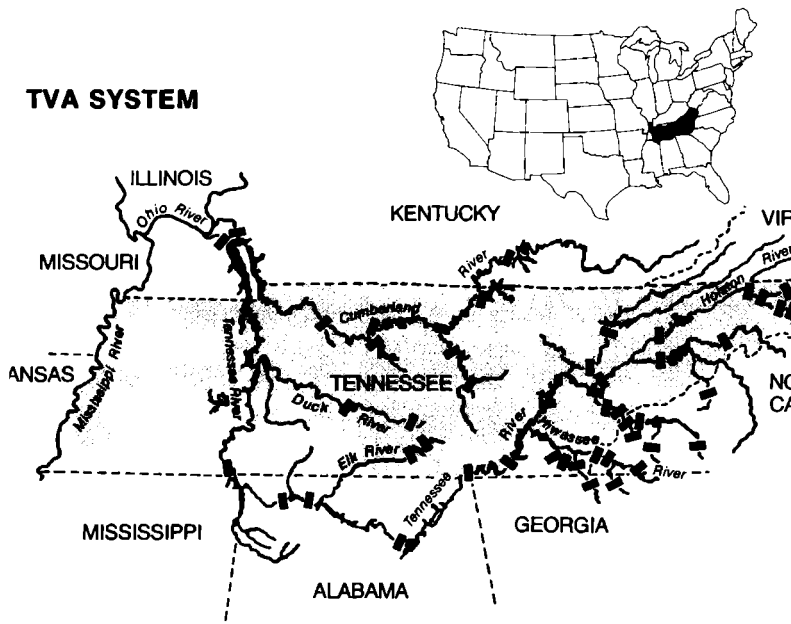
The Tennessee Valley Act of 1933 assigned six important tasks to the Tennessee Valley Authority (TVA): (1) to control floods; (2) to improve river shipping; (3) to develop electric power; (4) to improve the use of the land along the shores of the river; (5) to reforest any part of the basin where forests were needed; (6) to ameliorate the economic and social conditions of the people living in the basin.

Today the Tennessee River looks like a series of long, clear lakes. Thirty-six major dams control the waters of the main stream and its five principal branches. By 1980 freight traffic up and down the "lakes" had reached some 30 million

metric tons a year. In 1933 on the old river, the figure had been 240,000 metric tons, less than one percent of the freight traffic today. TVA's main channel links the river valley with an inland waterway connecting 20 states.

Today, when mountain streams turn into raging torrents, messages flash from dam to dam—to the control room of the Hiwassee Dam: "Hold back all the water of the Hiwassee River. Keep it out of the Tennessee!" To Cherokee Dam on the Holston River: "Hold back the Holston!" To Chickamauga Dam on the Tennessee itself: "Release water to make space for the waters from above." Behind these orders there is a regular system of reporting rainfall and stream flow from all over the huge basin. Hundreds of people who live in distant parts of the region take responsibility for controlling their river. Farmers, housewives, woodsmen and storekeepers take a few minutes from their daily work to measure the rainfall and telephone their reports.

Instead of wrecking the valley, the waters are put to use making electricity. In 1981 the TVA produced 115 thousand million kilowatt-hours of electricity, almost 80 times as much as the region used in 1933. A kilowatt-hour is equal to about 13½ hours of human energy. In other words, the valley has gained a servant that gives as much as *1,553,000 million*



hours of human energy each year. Before 1933, only three out of every 100 farms in the basin had electricity. Today virtually all of them have it to cool milk in the dairy, to operate the poultry incubator, to pump water from the well, to wash the clothing. And TVA's electric power also supplies a huge variety of new industries throughout the central South.

Power and safety are important, but they are not the only measures of the economic and social improvement that the TVA was ordered to create. There have been many related changes. The engineers found that controlling the water also meant controlling the mosquitoes which carry malaria. Since the late 1940s, no indigenous malaria has been found in the region. There is swimming and boating, and each year people take millions of kilograms of fish from the clear waters. Forests and new methods of farming are checking soil erosion and increasing yields. Whole communities have doubled their production of food. Some farms have increased production three times while at the same time, restoring their soil.

One might think that maintaining all these enterprises would require an enormous staff. On the contrary, the TVA employs only about 47,000 persons, many of them construction workers. The people of the region do most of the work themselves. The TVA, for example, sells electricity to farmers' cooperatives and to municipalities which, in turn sell and distribute it to consumers.

Demonstration farms, used to test and teach new methods of agriculture, are often simply the lands of ordinary farmers who volunteered to follow the advice of agricultural experts and then explain their methods to interested neighbors. To start the program, volunteers were at first given free fertilizer. Now there is no need for this incentive; better crops are reward enough.

The Tennessee basin is still below the national average in its income and farm production but now the region is building on improvements which have already been made—and each year the gain is greater than the year before.

THE GREAT PLAINS

"Room! room to turn round in, to breathe and be free."

Joaquin Miller
"Kit Carson's Ride", 1871

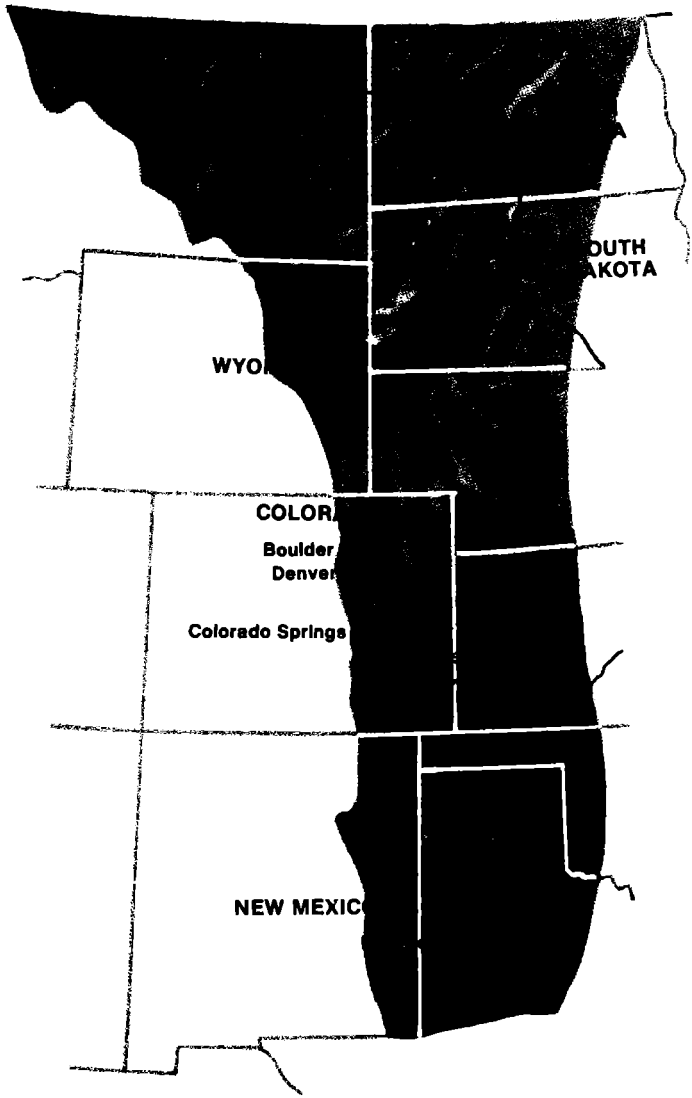
LAND OF TRAGEDY AND PROMISE

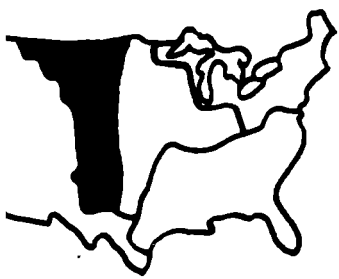
In 1911 a member of the United States Department of Agriculture described the Great Plains as a territory whose history was filled with tragedy, but whose future held possibilities for greatness. The same words might describe the Great Plains today. The tragedy has continued; the promise of greatness has been only partially fulfilled.

The Great Plains begin with the 50-centimeter rainfall line which runs north and south almost through the center of the country. The traveler becomes aware of the difference in the atmosphere once he crosses this invisible line. This is a land of extreme heat and extreme cold. It is a land where water is worth more than property. It is almost flat, rising imperceptibly for 640 kilometers until it suddenly meets the mountains to the west.

Nowhere is the rainfall more unpredictable or the climate more violent. For two or three years, there may be enough rain. Then there is a year when no rain falls, when the streams from the mountains dry up and their channels are filled with sand. The wind blows constantly. It is very hot from July to September, but in the winter snow covers houses and barns. Often the weather destroys a year's work in a single day.

The first travelers across this vast, flat, lonely land, known for many generations as "The Great American Desert," were the "Mountain Men"—those who went into the





METROPOLITAN POPULATION AREAS
(1980 Estimate)

Denver-Boulder — 1,619,921
Colorado Springs — 317,458
Lubbock — 211,651
Amarillo — 173,699
Billings — 108,035

mountains after furs. These hunters were followed by the great creaking wagons of settlers. But these pioneers heading west did not stop in the Great Plains, for the area was feared and disliked as a dangerous wasteland. Only the Indians knew how to exist in this place without trees or arable soil. Mounted on horses whose ancestors had escaped centuries earlier from Spanish explorers, the Indians hunted the millions of buffaloes roaming the Great Plains. Buffaloes provided the Indians with a way of life—the skin was used to make tents and clothes, the cured meat provided food, and the bones were shaped into tools.

In 1868 the railroads reached into the plains and construction men and hunters brought death to the buffalo. In a few tragic years, millions of them were killed, and without them the Indian was forced to abandon the plains. The cowboy and huge herds of cattle took his place.

The big cities of the East needed leather and meat, and the cattlemen began driving their great herds over the plains to the railroad towns for shipment. Two or three generations after the first wagon trains had lumbered over the Great Plains, the supply of good free farm land was exhausted: the eastern prairies were already settled, and the Pacific valleys were well populated. Eventually, therefore, some settlers, lured by the promise of land, did stay in the Great Plains to coax life from the hard, dry soil.

These were the first of the "homesteaders"—farmers who received 64 hectares of free land from the federal government in exchange for living on the claim and cultivating it for at least five years. When the first homesteaders arrived, they found that Indians and cattlemen controlled the plains. To both groups, the homesteader with his fences and plowed fields was an interloper encroaching on the cattlemen's grazing land and the Indians' hunting grounds. For years, conflict between these three forces flared up in violence, but two inventions which reached this region in the 1870s assured the farmers' victory. The first of these was barbed wire which, providing material for fences in a place where wood and stone were not available, stopped cattle from overrunning the cultivated areas. The other was the windmill which saved the farmer's life during droughts by pumping subsurface water to irrigate his vegetables and water his livestock.

The windmill saved the farmer's vegetable garden, but it could not save the rest of his land from destruction. He did

not realize it, but he was wasting his land by "square farming"—plowing his fields along the straight lines that marked the edges of his property. Wind swept over the square patches of plowed ground, and rains which fell heavily, if infrequently, washed the topsoil into the rivers. In the best years, half the crop succeeded; in the worst years, all crops failed.

A whole new system of farming was needed here, but this fact was not recognized until a terrible tragedy showed people all over the nation that the Great Plains region needed help and change.

THE SEA OF WHEAT

On the morning of May 11, 1934, the people of Boston, Massachusetts, stopped in the streets to look up at a dirty, yellow sky. Across the continent, for 2,800 kilometers, thick dust hid the sun as millions of tons of fine soil were being blown into the Atlantic Ocean by the unceasing winds of the Great Plains. This was the beginning of the great drought that brought temporary ruin to one-sixth of the nation's land.

The upper layer of soil on the plains was blowing away. Wells and streams were dry. Dust filled the houses and stopped machinery, even the windmills. Crops died in the fields. Cattle and sheep perished of thirst. And tens of thousands of people abandoned their homes and moved off the plains.

Less than a century after the first ground had been plowed, the land was devastated. It was now tragically clear that the people had failed to take proper care of it. What could be done to make the dry, grassless soil produce enough to feed the growing population of the area? Until the end of the 19th century, American settlers simply moved farther west when their old land stopped producing. But now no more land was available. The frontier was gone and the region needed a new kind of pioneer to rebuild the soil that their forefathers had destroyed.

The people who first dared to settle on the Great Plains were chiefly from northern and northwestern Europe. They were accustomed to difficult climates and hard living, and their descendants refused to be defeated by the terrible years of drought and crop failure. They were determined to stay on the Great Plains and to succeed.

When the dust storms made all Americans aware of the vast destruction of their land, farmers, scientists and government officials began to work together to restore fertility to the soil.

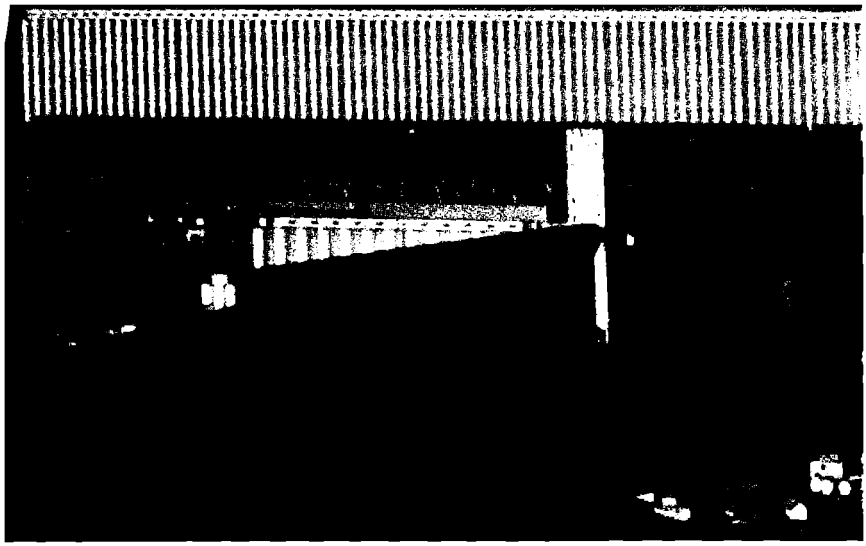
Only one group of pioneers seemed to be successful on the plains: a colony of Mennonites, a strict religious sect from Europe, who had brought with them their own wheat seed which had prospered in a similar soil and climate. This winter wheat, planted in the autumn to ripen in the following spring or summer, grew better than any of the soft spring wheat which had come from regions with more rainfall. "Turkey red" wheat (so-called because of its color and Turkish origin) was the first suitable crop for the Great Plains. It was the ancestor of the strong hybrid of spring and winter wheats that grows there successfully today.

The Great Plains now produce a larger wheat crop than the most hopeful pioneer could have imagined because today's farmer has learned to rotate his crops, and plant alfalfa or other legumes that restore nitrogen to the soil. Local farm agents and soil experts have taught him to work across the slope of the land as he plows so that the ridges and hollows catch and hold the heavy rains and keep the water from washing the soil away. He has also learned to terrace his land and to plant grass along the natural courses where the water drains away. Ponds and dams also keep the precious water on the land. Thus the farmer is helping nature rebuild the topsoil that holds the rain, resists the wind and provides food for growing plants.

New methods of production have also helped increase the farmer's yield. On the southern plains, the farmer begins in May to harvest the hard winter wheat which was planted during the previous autumn. As the summer advances, one can see thousands of combines, moving at a speed faster than a man can walk, cut the heads from wheat stalks, shake out the grains of wheat, and put the straw back on the ground to protect the soil.

With modern equipment, one farmer can manage his own fields of 200 or more hectares without help; but most farmers rent combines to do the work. The giant machines and their crews start at the southern edge of the Great Plains each spring and travel northward to the Canadian border as they harvest the golden wheat. Weather is always a risk: a storm may crush the stalks in a few minutes. For this reason,

Tapping the prairie breeze, windmills pump water for Herefords in Nebraska, a state famous for corn, wheat, sorghum and cattle.



Vast grain elevators on the Kansas landscape attest to the state's prime position as a

Untamed horses thunder down an embankment in South Dakota. Each spring cowboys

harvest crews sometimes work all day and most of the night to bring the wheat into huge storage bins or elevators which line the railroad tracks at about 16-kilometer intervals.

There is further hope for the future in the resources which lie beneath the soil. Below some parts of the plains, there are enormous supplies of minerals and crude-oil, and industry is starting to move into what was once called the Great American Desert. As the people become more and more aware of its possibilities, the Great Plains region continues to fulfill its promise.

CATTLE COUNTRY

The story of the Great Plains is a story of trails and mountain passes, of a swift and often desperate hurrying. Men were intent on what lay far beyond the Sierras and the Cascades. But some who came to the plains saw countless buffaloes and cattle on the vast pastureland and dreamed of a time when this supply of food and leather might be shipped to the eastern cities. Because of these men, the Great Plains became America's cattle country.

The thousands of wild cattle on the rich prairie grass were descended from six young cows and a bull that had come to Mexico with the Spanish in 1521. By 1870, they were there for the taking. A man needed only horses, some supplies, and a few helpers to gather in the wild animals. Soon meat-packing plants were established in Chicago, and railroads were pushed south and west toward the plains. It was still hundreds of kilometers from the southern plains to the railheads, but the cattle drives that were to become famous in stories of the Old West brought the animals there.

The tough longhorn cattle were scattered over hundreds of kilometers of country and had to be rounded up by cowboys who knew how to ride, and ride hard. Then the cowboys drove them in herds across the plains. Men of strength and courage, the cowboys occasionally met bands of thieves, fierce storms and flooded river crossings. They had to face angry farmers whose fields were crushed by the herds, and Indians who harassed the drovers crossing their lands.

The drive was long and slow: the animals had to graze where there was sufficient grass, and a watering place for camp had to be found in advance. A herd might travel 25 kilometers during a day, and at night the nervous cattle had

to be calmed. To keep them quiet, cowboys circled the herd throughout the night, singing to the animals. This was part of the cowboys' work and their sad ballads have become part of American culture.

The greatest danger on the trail was that the herd might suddenly stampede in a wild, frightened run that could kill both man and beast before it could be brought under control. The noise of thunder, the sight of a grass fire or the sudden movement of a frightened animal could start the herd in motion. Then it would rush forth, trampling anything which stood in its way.

Within a few years, thousands of hooves moving eastward had worn deep trails to cowtowns like Dodge City, trading centers where the cowboys celebrated and spent their pay after the long drive, and often described in stories and films about the Wild West.

The herds increased and the cattlemen's interest turned to the northern plains. As the buffaloes were killed off and the Indians left, a vast ocean of grass became open for ranching. With the development of refrigerated railroad-cars which permitted the shipment of fresh meat over long distances, cattle-raising extended over the entire plains. But there were troubles and terrors: the Indians made a last desperate attempt to keep their land; and the settlers who wanted to fence their land often got into gun battles with the cattlemen. Hot summers scorched the grass and dried up the watering places, and grass fires started quickly. Then, the Great Blizzard of 1887 struck, with wind, ice and snow. After the storm, millions of cattle on the open range were scattered far and wide, dead or dying. In some places, the snow had been blown into drifts 30 meters deep, burying houses, animals and men. After two months, the ice and snow melted, flooding rivers and adding new terror to the old. The Great Blizzard ended the power of the cattlemen; they could no longer resist the opposition of the settlers. The time of the open range was over.

Today a new and wiser cattle industry occupies the Great Plains. Many stockmen have formed cooperative associations which divide the land among the members and decide how many sheep or cattle should graze on each plot. They make rules for the use of the land, rules devised by experts who have studied the special problems of each area. Many problems remain, but the cattlemen are restoring the pas-

tures just as farmers are restoring the soil. Cooperative associations, individual ranchers, and government scientists work together at experimental stations, growing many types of grass under various range conditions. The ranchers are learning what their land needs and, slowly but surely, they are giving it new life.

Science and cooperation are also improving cattle strains. After years of experimentation, owners of one of the largest ranches have succeeded in crossing Brahman cattle from India, capable of enduring the heat of the plains, with heavy American cattle which are excellent for beef.

THE MOUNTAINS AND DESERTS

"A stern and desolate country, a high, bare country, a country brimming with a beauty not to be found elsewhere."

Bernard DeVoto
"The Year of Decision", 1950

THE ROCKY MOUNTAINS

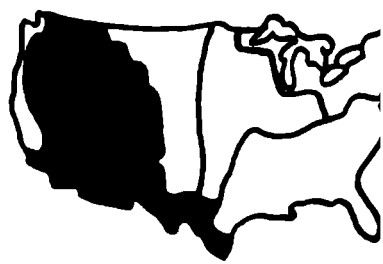
Like the Great Plains, the vast Mountain and Desert region was a land which people hurried through on their way west. Seeking land and gold, the settler at first found neither until he reached the Pacific slopes. But then gold was found at Pikes Peak and in a few other parts of the Rocky Mountains. Clearly, there was gold in the Rockies and men hurried back, faster than they had hurried through.

The majestic Rocky Mountains stretch all the way from Mexico to the Arctic. Like the Alps, they are high, sharp and rugged. Compared with the Appalachians in the East, they are young and their faces of bare rock are capped with snow, even to the south. In the high valleys, there are remains of glaciers, while below them are clear, icy lakes which the glaciers made.

More than 100 million years ago, the earth was violently folded and compressed where the Rockies now stand, and the molten rock which was forced up carried with it gold, copper, lead, silver and other metals. The tremendous movements of the earth continued, and the mountains rose and fell and rose again. The Sierras pushed upward. Lava poured over the land in great floods to build the Columbia Plateau, and the Colorado River began to cut the Grand Canyon. As the mountains rose for the last time, the Coast Ranges near the Pacific broke into pieces, leaving great

METROPOLITAN POPULATION AREAS
(1980 Estimate)

Los Angeles — 7,477,657
Anaheim-San Bernardino — 1,931,570
San Diego — 1,861,846
Phoenix — 1,508,030
Salt Lake City-Ogden — 936,255
Tucson — 689,628
El Paso — 479,899
Albuquerque — 454,499
Las Vegas — 461,816
Reno — 193,623



cracks along which huge blocks of the earth still shift occasionally, causing earthquakes. The whole tremendous broken system of the Rockies includes 39 named ranges, and in addition, there are flooded mountains whose tips form islands off the Pacific Coast.

The first white men to visit the mountains were Spanish explorers, moving across the southern ranges to the Pacific. Stories of gold took them there, but they did not stay. No one stayed—not even the hunters who roamed the northern ranges. Until little more than a century ago, the Rockies seemed almost impossible to cross; but the chance of finding gold makes men do improbable things. After 1848, when gold was found in the river beds of California, great numbers of people crossed the mountains over trails discovered by the hunters. Today, eight railroads and a dozen highways go winding over the mountains, following routes made by these settlers and prospectors.

In the days when gold was king and thousands of men lived in the mining camps in the wilderness, agriculture began in the Rockies. Most of the farmers were Mormons—or Latter-Day Saints, as they called themselves. After experiencing many years of intolerance in the East, where their sect was founded, they traveled west under the leadership of Brigham Young. They sought a secluded valley and finally found it near the waters of the Great Salt Lake, in what was to become the State of Utah.

The ancient waters that brought soil to these mountain valleys had no way of reaching the sea, so they spread out in shallow lakes. As the water slowly evaporated, minerals remained in the lake beds. Great Salt Lake, for example, contains an estimated six thousand million tons of salt. Another lake holds millions of tons of soda. The lakes change size and shape with the rainfall and sometimes dry up completely in arid weather.

In this land of little water, farming was very difficult—and would have been impossible without a series of irrigation canals that bring water from the high mountain streams to the dry valleys below. These canals are frequently excavated through rock, and require tunnels, flumes, syphons, aqueducts and open concrete-lined channels.

The water that is brought down the mountains is stored in two natural lakes—Utah Lake and Bear Lake—and six man-made storage facilities. These facilities account for

about 75 per cent of the total water in the state. More than 100 towns and countless gardens now flourish in this region which had once been considered worthless.

THE DESERT COMES TO LIFE

Since the last third of the 19th century, the immense stretch of barren American desert has been growing smaller. In the 1860s, the wasteland extended from the Mississippi Valley almost to the Pacific Coast. But men learned that the prairies could grow corn and the grasslands feed cattle and sheep or yield wheat. As they continued to cultivate the desert, its size decreased.

Today there are still about 170,000 square kilometers of desert. In the 960 kilometers between Salt Lake City, Utah, and Reno, Nevada, there is nothing but dead lakes, dry rivers, snakes and small animal life, enormous mineral wealth, and the inhuman beauty of the desert. No community action like the Mormon efforts could water this central desert. Parts of it can support cattle, but most of it remains desolate—equal to an empire in size, but to no more than a town in population.

Here in the vast triangle of land between the Sierra Nevadas to the west and the Rockies to the east, the climate is so dry and hot that even fairly large rivers from the mountains evaporate so rapidly that they die before reaching the end of the desert. The sun shines nine-tenths of the year, and the temperature goes up to about 50 degrees centigrade in the shade. But occasionally it rains, even here. In midsummer, the great heat of the desert causes the air to expand and rise so high that clouds form and rain falls. Then, for a few weeks, the desert is a brilliant mass of color. Brown, yellow and red change to purple and blue in the soft light of sunset and dawn. Coarse grasses and plants spring up quickly, and small bushes and flowers suddenly bloom magnificently in the great heat. Then their seed ripens, and soon they turn brown and shrivel up. With so few roots to hold it down, the desert shifts constantly. The wind and rain slowly change the shapes of the mountains, creating strange forms that resemble towers, peaks, rounded hills, and sawteeth.

Close to the western edge of this region, there is a particularly lonely stretch of desert named Death Valley by pioneers who tried to cross it in their rush to the goldfields.

For 225 kilometers scarcely a bush can be seen in this ancient lakebed 85 meters below sea level—the bottom of the United States.

But even in the vast, silent desert there are rich oases —prosperous towns which were built where men found sufficient water. The Colorado, the Gila and other smaller rivers have made the desert bloom along their shores. Centuries ago, American Indians used these western rivers to irrigate their fields. Ruins of their old canals are still found throughout the desert.

Observing these canals, early settlers reasoned that bringing water to this land would be easy. They had seen that the mountains held plenty of snow and rain. If the mountain rivers could be put to work, they thought, the valleys could be made productive again.

In the lifeless desert between the mouth of the Colorado River and the Salton Sea, farmers began to change the course of river water. For years, the river had wandered as it pleased across the broad delta, sometimes turning south to the Gulf of California, sometimes curving northward into the Salton Sea. Now the farmers made the river flow down the gently sloping surface of the lowlands. As a result, the farmers had one year with enormous crops. But they had not reckoned with the awful power of raging floodwater. In 1905 the wild Colorado River cut through an outlet and rushed across the fields, forming a lake that became 72 kilometers long. Before the river could be controlled again, this lake had covered fields, houses and railroad tracks with its bitter salt water.

Each year the Colorado threatened to flood when snow melted in the high mountains at its source. In summer it choked irrigation ditches with mud. Finally, the residents of the Imperial Valley realized their mistake: the entire course of the river had to be controlled, not just the lower end of it. A huge dam would have to be built to hold the river where its floods began—not where they ended.

In 1936 Hoover Dam was completed, taming the red waters of the Colorado. More than 200 meters high, the dam produces enough electricity to drive the industrial machines and light the houses of all southern California. It permits a steady flow of clean water to nourish 300,000 hectares of dry land. Releasing the waters of the Colorado slowly, it prevents the raging floods that formerly threatened property

and human life each spring. And now the Imperial Valley produces large quantities of tropical fruits which are shipped to all parts of the country.

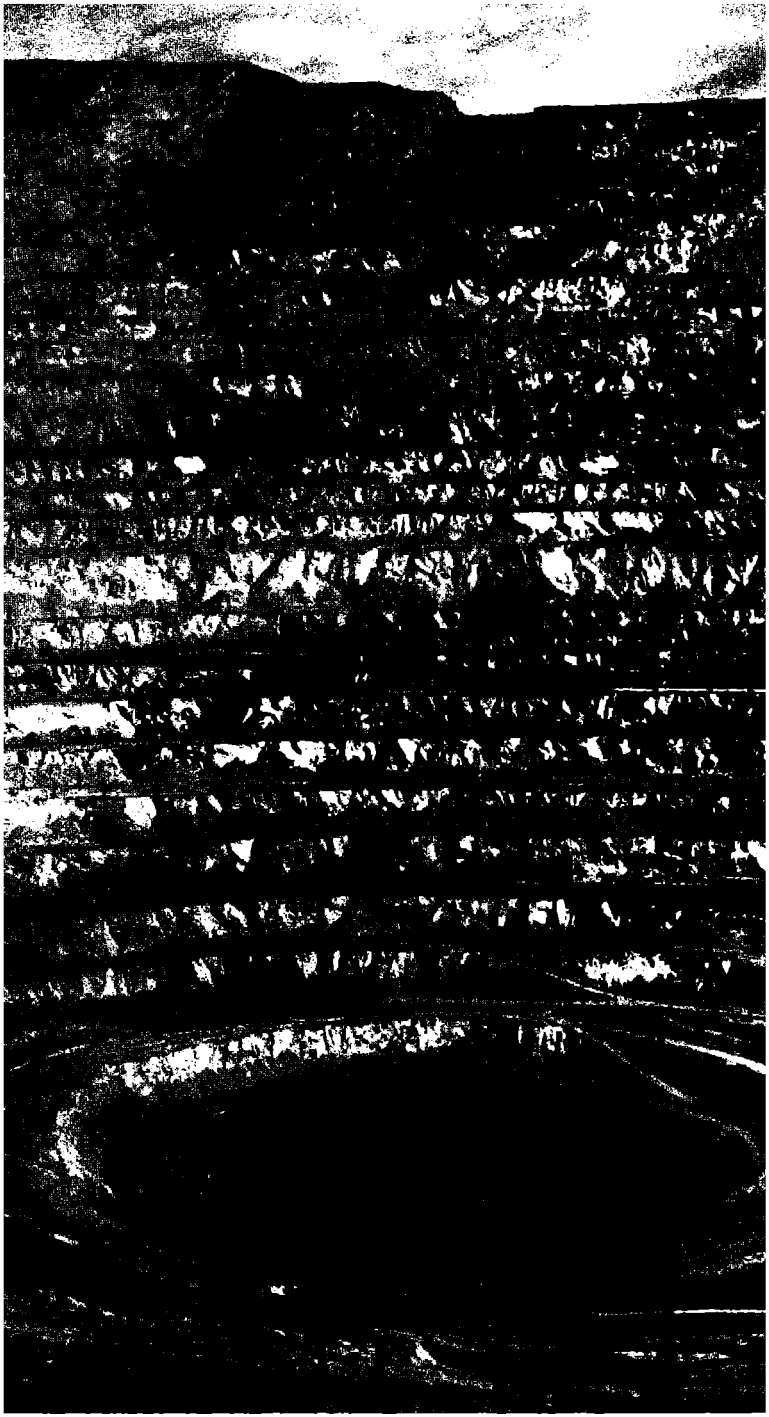
The success of Hoover Dam encouraged other similar projects throughout the nation. In 1952 about 400,000 hectares of dry wasteland in the State of Washington were brought back to life with the flow of water from Lake Roosevelt, a reservoir behind Grand Coulee Dam. The largest concrete dam and the greatest single source of water power in the United States, Grand Coulee harnesses the mighty Columbia River.

At the extreme south of the great mountain and desert region, John Shary, a Brownsville, Texas, farmer observed how the Indians dug ditches to water their small farms. Spurred on by their efforts, he decided in the 1920s, to apply scientific irrigation methods to his own land. His 120 hectares of trees grew so successfully that land suddenly became very valuable throughout his valley and fruit production soon became a major industry. Soon excess planting threatened to overload the market, but a young chemist developed a method of canning the fruits' juice—not possible before because the juice was so acid it would erode the metal—and saved the industry. Someone else discovered new uses for the skin of fruit and for the liquid squeezed from the peel. Today thousands of cattle, hogs and poultry live very well on fields made into one of the nation's richest agricultural regions, an industrial area rich in oil and natural gas reserves, and a major vacation center.

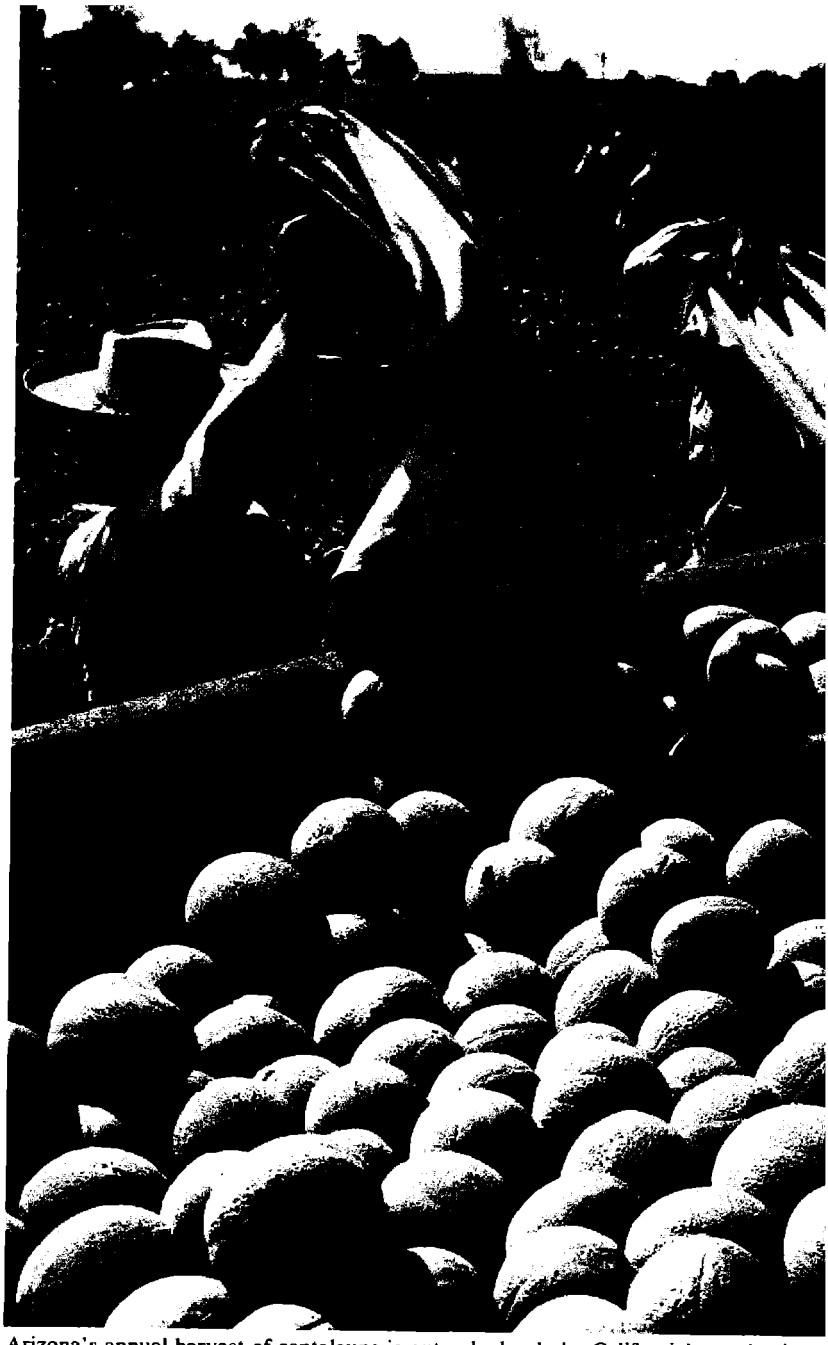
TREASURE IN THE ROCKS

Early in 1848 John Augustus Sutter, a German immigrant and sawmill worker, found a few yellow flakes in a stream in California. The news that he had discovered gold spread rapidly across the continent and across the seas. In one of the greatest mass movements of modern history, thousands of people came to California from all over the world to seek their fortunes in the rocks. Largely because of the gold rush, the whole continent was settled within the century, although it had once been estimated that this process would require 2,000 years.

Sutter's few yellow flakes came from the Mother Lode, a gold-rich region 190 kilometers long and 1.6 kilometers wide.

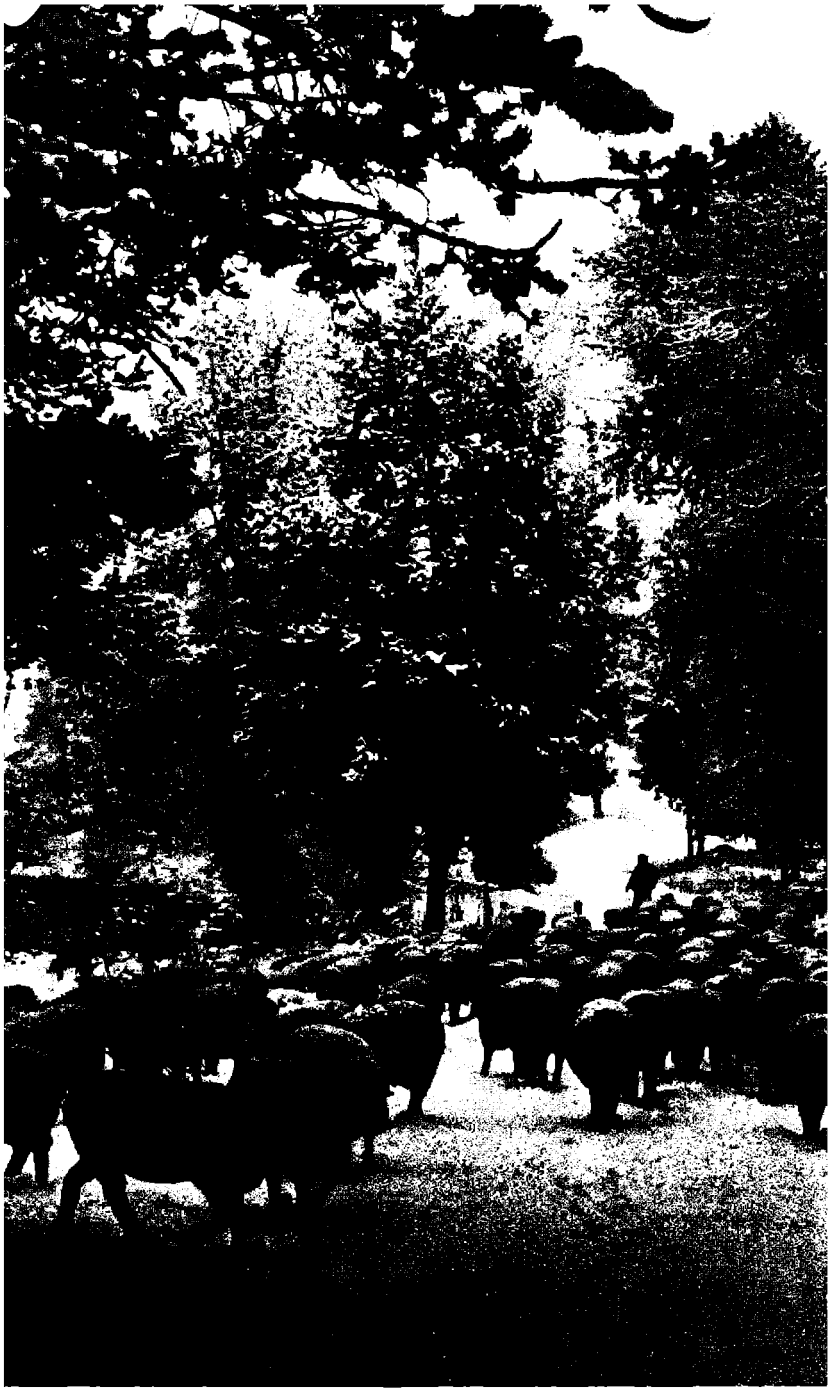


The nation's largest open-pit copper mine near Bingham, Utah.



Arizona's annual harvest of cantaloups is outranked only by California's production.

Hoover Dam on the Nevada-Arizona border supplies electric power for much of the Pacific Southwest.



Idaho, a leading state in the marketing of lambs, grazes sheep in the mountains in

summer and brings them down to the valleys and plains for lambing in the winter.

Washington leads the nation in annual growth of trees of commercial value and its

sawmills and factories produce large amounts of lumber, paper, other wood products.

But after about 10 years of intensive mining, the Mother Lode appeared exhausted and the pioneers went back to the Rockies where they had seen yellow mountain streams and heard stories of gold and diamonds. By 1860, hundreds of lonely prospectors were searching along the mountainsides for loose mineral specimens which might hint at rich deposits.

Thus, all over the United States, many kinds of mineral veins were discovered. The Black Hills of South Dakota were found to be rich in tin ores. A group of miners looking for gold near Butte, Montana, found far greater wealth in silver, lead, and copper. However, ores must not only be found, they must be dug out of the ground and the minerals extracted. Soon the ore-laden areas were dotted with mills to crush the ore, and furnaces to melt it down. In 1893, when the Northern Pacific Railroad reached Butte, the mining industry was established. Today in five operating mines, shafts and tunnels trace a network of passages from 365 to 1,200 meters underground, and open-pit operations cut into the earth's surface. Major mining activity is in copper and to a lesser degree in lead, with most of the silver deposits now exhausted.

Even now, mining is a dangerous and risky business. Some mines are high up on mountainsides and the ore must be carried down difficult trails. Sometimes a rich deposit cannot be mined because the cost of transporting the ore would be greater than the value of the metal. Also, a seemingly promising mine may yield only enough to cover a fraction of the cost required to dig it.

Scattered through all the old mining districts are ghost towns—once rich, wild cities whose mines produced unbelievable amounts of wealth and then were suddenly exhausted. With no further reason for existing, the towns were abandoned. One such town is Rhyolite near Death Valley. Rhyolite was born, became rich and died—all during a period of four years. Its railroad station, once the grandest in the State of Nevada, stands now without even rails leading to it. In 1859 Virginia City, Nevada, was a busy town where 10,000 men hunted for treasure in the rocks. For 16 years, the nearby mountains yielded huge fortunes in gold and silver. And then, almost overnight, the lode ran out. The settlement died like other famous towns: Tombstone, Goldfield, Cripple Creek, Central City. Miners and their families

moved away, leaving empty buildings, holes in the earth or heaps of gravel as reminders for later travelers of their life there.

Most of the Rocky Mountain gold is gone today. Some other minerals also vanished much too quickly due to rapacious mining methods. While soil can gradually be restored and trees planted on bare hillsides, the mineral wealth of the earth cannot be re-created. Judicious mining procedures are therefore vital until science finds substitutes for the minerals which industry requires.

Today the nation's largest open-pit copper mining center is Bingham, Utah, in one of the Great Basin ranges. Not many years ago, Bingham ore would have been considered worthless because it has a low yield. But modern methods of operation have made the ore valuable. More than 30 giant terraces were cut into the face of the mountain, rising one above the other from the floor of an immense pit. Gigantic machines load ore onto long trains which slide downhill to a smelter on the shores of the Great Salt Lake. These methods are so efficient that the mining of ore costs only a few cents per ton, and the enormous supply will last for many years.

New chemical processes now make it feasible to separate from the copper ore the four or five different mineral substances which it contains in small quantities, each valuable when separated from the others. As a result, deposits which were formerly considered worthless can now be extracted and much of the ore which previously was discarded now yields a rich harvest.

Modern industry demands more and more of the nation's mineral wealth. Each new electric plant needs many kilometers of copper wire; machines require iron, lead and other minerals. Coal, oil and natural gas must drive the machines.

States like Texas and Oklahoma long have been noted for their oil production, but the West also houses vast new energy reserves. Shale oil deposits located in Colorado, Utah and Wyoming, for example, are estimated to contain 1.8 million million barrels of oil. Utah's tar sands are another potential energy resource. While exploitation of these new fossil-fuel deposits must first overcome significant environmental constraints, notably the scarcity of water, the West is also the site for the development of alternative energy sources. Wind-power experiments conducted in New

Mexico eventually may lead to installations providing two percent of the nation's electrical power. The geothermal energy existing in geysers, volcanoes and hot springs generates electricity for 500,000 California residents. And sunny Colorado, New Mexico and California, along with numerous other states, are important testing grounds for solar energy.

THE TEMPLES OF NATURE

When the first miners and hunters returned from the Rocky Mountains, they brought back such marvelous tales of natural beauty that a group of scientists decided to test the truth of their stories. These skeptical scientists, who visited the Rockies in 1870, wrote reports that sounded more like fiction than fact. They described a mountain made entirely of black glass; rivers of ice that were blue-white; magnificent deep canyons; towering white waterfalls; and great caves far beneath the earth.

One night, as the members of the party rested around their campfire, they discussed ways of preserving these magnificent natural scenes. It was finally and enthusiastically agreed that the whole area should be set aside as a great national park for all people to enjoy. This suggestion was accepted by the federal government and, two years later, the Yellowstone National Park came into being. Today some 9,000 square kilometers of this magnificent wilderness are preserved for millions of visitors to enjoy. Since 1872, the system of national parks has grown steadily; by 1981, there were 48 such areas set aside by the national government. State and local governments have added smaller regions.

The land in the national parks belongs to the federal government which bought the areas from the states or private individuals. The government protects the plants and animals native to each national park area. No rancher, miner, hunter or logger may use its meadows, trees or wildlife, except under strict controls.

The parks are under the jurisdiction of the National Park Service, whose rangers protect the areas, guide visitors through the parks, and lecture on the natural phenomena so that the visitor can more fully enjoy the natural monuments, scenery, wild animals and plants. Within the parks, there are campgrounds, cabins and motels available to the approximately 180 million annual visitors.

Yellowstone is still the favorite of tourists. Excellent highways lead into the park; comfortable, inexpensive lodgings are offered. Experienced instructors serve as guides to the famed geysers and hot springs and animals wander about unhunted and unafraid.

Some parks are famous for their scenery; others have special significance for students of geology or cultural anthropology. For example, Mesa Verde National Park is a tableland about 24 kilometers long and 13 kilometers wide, rising 600 meters out of the valley below. It contains the cliff dwellings of some of America's earliest known Indian tribes. Rocky Mountain National Park is a geological museum which contains the remains of older mountains, canyons, forests and glaciers. Yosemite National Park is famous for its beauty: its waterfalls which cascade 730 meters, and its valleys which have walls over 900 meters high.

But perhaps no scene can equal the Grand Canyon of the Colorado. There, for a million and a half years, the great river has been gouging through the mountain rocks. The most impressive parts of the canyon lie within the 270-square-kilometer Grand Canyon National Park.

More than any other section of the United States, the mountains and deserts are still the country of immense open space. This land, which once barred the way of weary travelers, now has become a land for winter and summer vacations, a land of magic and wonder.

THE WEST COAST VALLEYS

"They came to the Far West, and found valleys as large as kingdoms, without kings...."

Glenway Wescott
"The Grandmothers", 1927

THE END OF THE TRAIL

When Americans began to move to the Far West—before any gold discoveries in the region—the entire Pacific Coast attracted them. Even during the period of the gold rush, five settlers journeyed to the Northwest for every four who went to California.

Why did they come, these men, women and children from the East? Why did they endure the frightful trials of the plains, the mountains, the deserts? Why did they want so much to move west?

More than anything else, these Americans came because they wanted more space, free land, a freer life, and perhaps a fortune, too. To all, old and young, the frontier offered the great chance—the great opportunity. These people wanted something new; they wanted a country that offered challenge because it was not yet shaped or built. Those who journeyed to the Pacific Coast found fertile land at the end of the trail. The conclusion of this westward passage made the United States a continental nation.

The leader of the first group of settlers from the East wrote: "...to our great delight we beheld a great valley....The valley of the river was very fertile, and the young tender grass covered it like a field of wheat in May." The chain of valleys along the Pacific is still a joyful sight to travelers. The lush vales of California alone, largely fed by irrigation systems, lead the country in production of such

delicacies as apricots, avocados, grapes, peaches, olives and almonds. To the north, the State of Oregon's forest-related industries provide jobs for 80,000 workers. Still farther north, the State of Washington leads the nation in the production of apples and red raspberries, and its commercial fishing catch, half of it salmon, was valued at over $85 million in 1980.

Long before the first settlers reached the Far West, New England sea captains and merchants had explored the Pacific Coast and built trading posts. The region was a long sea voyage away from the rest of the nation, and ships from Boston or New York had to sail for several months down the east coast of the Americas and then around Cape Horn. But those who dared the arduous journey grew rich, and with their riches, brought back tales of fertile soil, giant forests, and more fish than anyone had ever seen. An overland route to this paradise had to be found.

In 1826 a hunter led the first party through "South Pass"—the only gap in the Rockies where wagons, cattle, women and children could cross. But there was no great movement westward over land until 1843 when the great migration began along the Oregon Trail, which had been laid out by traders and missionaries. The trail began at Independence on the Missouri River, cut across prairies and the Great Plains, and then, rising suddenly, curved about through mountains for 640 kilometers until the travelers could follow the rivers descending to the Pacific valleys. A strong healthy pioneer could complete the trip in four months, but many less fortunate travelers died along the trail, their graves marking the way. In the first year of the great trek, 1,000 persons left the Mississippi and Ohio valleys. The next spring, 1,400 set out; and in 1845, nearly 3,000.

The trail ended beyond the rain-catching Cascades and Sierra Nevadas, in the valleys between these mountains and the lower, gentler Coast Ranges. (See the map on page 6.) The Klamath Mountains divide the chain of valleys into a northern and southern part. The southern valley—more than 800 kilometers long—is called the Great Central Valley, and is drained by the Sacramento and San Joaquin Rivers, which empty into San Francisco Bay. The northern or Willamette Valley is drained by the Willamette River, which flows north into the great Columbia River.

The Willamette Valley is a gentle, prosperous region of family farms, towns, orchards and fields which are green all year. The farmers grow wheat, oats and clover; they raise dairy cows, hogs and chickens. Today it takes just a few days for a trainload of fresh fruit to cover the same distance the first settlers took four or five months to travel.

Even here, however, life has not always been easy because of the heavy winter rains which once flooded the rivers and fields. To meet that problem, the people of the region in 1936 began a flood control project, and now 11 dams control the Willamette River, keep its water flowing evenly, and turn its energy into electric power for farm machines, sawmills, steelmills, fish canneries and other industries.

CITIES OF THE PACIFIC

Just as the natural harbors of New England are America's door to Europe, the shores of Puget Sound open the way to the Orient. Thousands of years ago, a glacier moved south from the Canadian mountains and dug out the valley floor of Puget Sound. Sea floods poured in when the ice melted, creating a blue-green inland sea, guarded east and west by snow-capped mountains. Between these ocean-filled valleys, there are wooded peninsulas and islands, with hundreds of waterways and natural harbors. South of the sound, tall cones of extinct volcanoes rise 2,400 meters into the air from great mountain plateaus.

Many manufacturing and fishing towns lie along the forested hills and lowlands that flank the bays and inlets of the northwest coast. At cities like Seattle, Portland, Everett, Tacoma, Bellingham and Olympia, goods from Asia and the South Pacific are unloaded while fruit, grain, fish, condensed milk in cans, timber or machines are put aboard ships bound for ports all over the world. The waters of Puget Sound itself are crowded with small fleets of fishing boats and houseboats afloat or anchored along the shore.

About 1,400 kilometers south of Seattle, San Francisco lies at the tip of a tongue of land broken by the narrow channel of the Golden Gate. Through this channel the tides of the Pacific pour into a great bay. The city has long been a center of commerce, finance, shipping and culture for more than three million people in the metropolitan bay area. Asians and successive waves of Europeans have made San

Francisco multilingual and multicultural. Freight from a hundred ports is unloaded at a fine landlocked harbor, while long lines of railroad cars bring into the city the fruit of the Central Valley. The transcontinental railroad connects San Francisco with the industrial and agricultural centers of the Midwest and the East, thus providing an interchange of goods and passengers. And the city's airport, one of the largest in the United States, accommodates close to a total of 400,000 landings and takeoffs a year. Great streams of motor traffic cross the Golden Gate Bridge, 1.6 kilometers long, to the north shore.

Less than a decade after the beginning of the 20th century, this major metropolis of the West was in ruins. In 1906 a great earthquake shook the city to its foundations and a great fire completed the destruction. But within three years, 20,000 new buildings were constructed; and in seven years, a new city had risen out of the ashes of the old.

FOOD FROM THE SEA

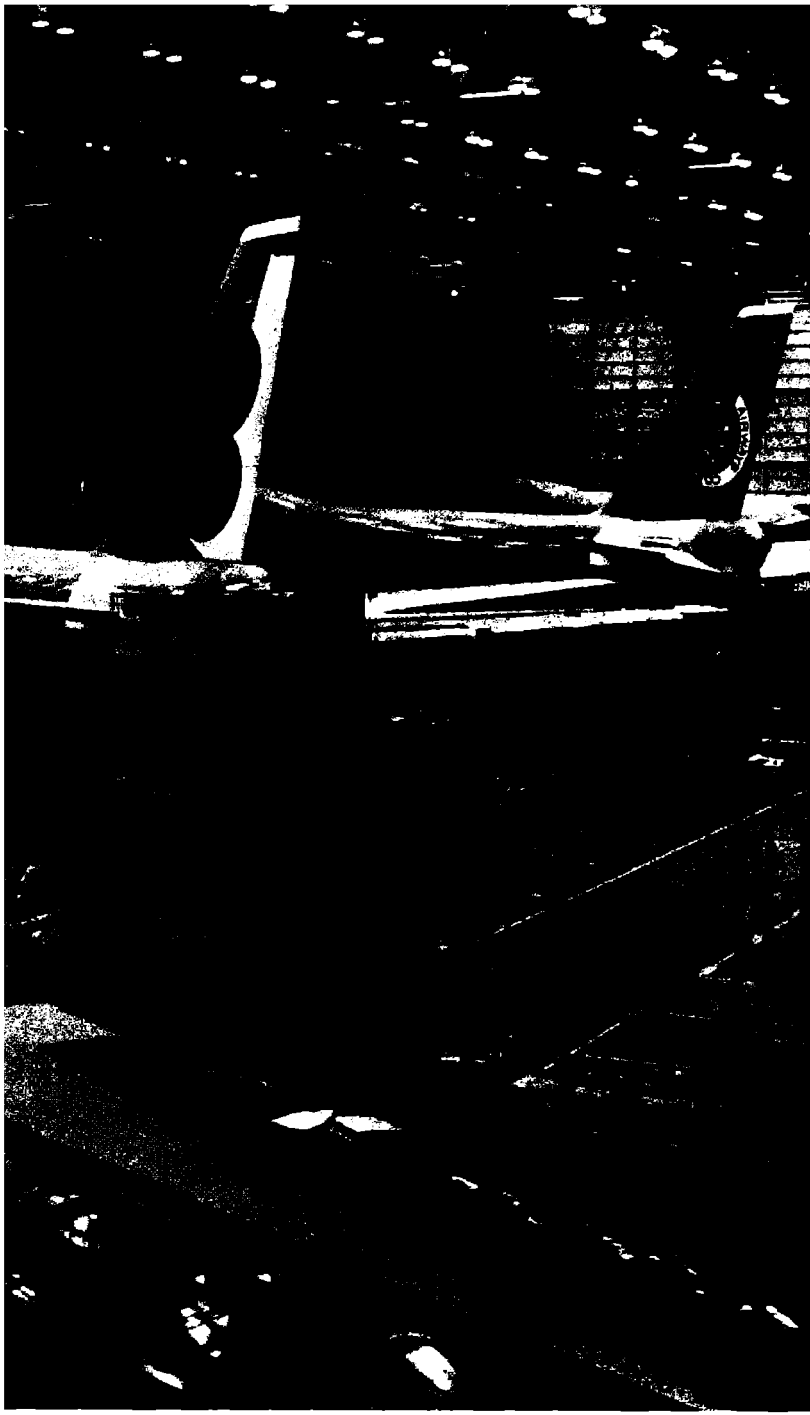
Every spring and summer, millions of salmon swim from the Pacific Ocean into the mouths of northwestern rivers and then steadily upstream. Passing through swift waters, around great rocks and cascading waterfalls, the fish finally reach the original streams or lakes where they were hatched several years before. They dig out shallow nests in the riverbed and lay their eggs; then, exhausted by their journey, the parent salmon die. They have finished the task that nature has assigned them. Months or even years later (depending on the species), the young fish start their trip to the ocean. They live in the salt water from two to seven years, until they, too, are ready to swim upstream to spawn.

This life cycle helps man provide himself with a basic food—fish. When the adult salmon gather at the river mouths for the annual trip upstream, they are in the best possible condition, and nearly every harbor has its salmon fishing fleet ready to catch thousands for markets and canneries.

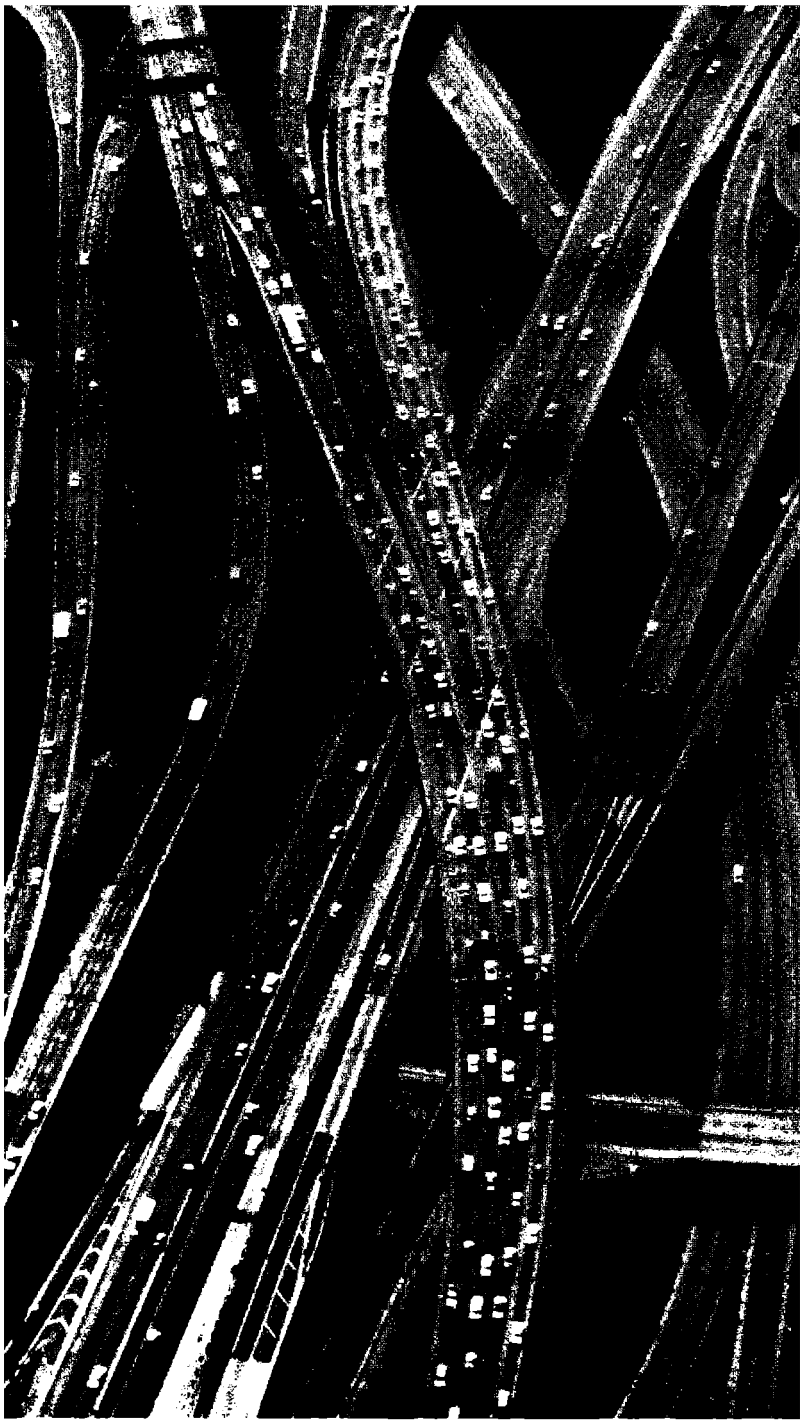
The town of Astoria, Oregon, established by the crew of a trading ship at the mouth of the Columbia River in 1811, is one of the oldest fishing towns on the Pacific Coast. At first, the vast numbers of salmon were neglected, because the traders were more interested in furs and because there

The Pacific Ocean laps at the shore at a beach in western Oregon. The state's 645-kilom
is host to riders, rock hounds, clam-diggers, hikers and fishermen.

Washington, a major center of the aircraft industry, houses the Boeing Company which,



with headquarters in Seattle, leads the nation in producing multi-engine jets.



Networks of four- and six-lane freeways cover the landscape like a vast net in that quintessential automobile city, Los Angeles, California.

seemed to be no way to preserve the fish. But, in 1867, a generation after the first overland settlers arrived, the citizens of Astoria built the first Columbia River salmon cannery. Although their experiment was a success and thousands of kilograms of fish were preserved ready for storage, the industry remained small for many years since there were few workers available for cutting, cleaning and canning. Today machines clean and can 60 salmon a minute and trainloads of canned salmon begin their trips across the country, often on the same day they were taken from the river.

Puget Sound and the Columbia River once had the richest of all salmon waters. But the supply decreased because nets and traps, and construction of dams, and the diversion of water for crops blocked the salmon's swim to and from his spawning grounds. By the late 1930s, the supply was seriously threatened. To preserve it, Canada and the United States joined forces in establishing the International Pacific Salmon Fisheries Commission. They began to study the life cycle of the salmon and built hatcheries for breeding. They ruled that one fish must be set free for every one caught. Then, to help the fish swim upstream to deposit their eggs, they built special fish ladders up the smaller dams and rapids.

The cold waters of the northern Pacific and the still, shallow inlets are also rich in flounder, tuna, halibut, shrimp and crab. Power boats drag long fish lines to make their catch in the early morning fog. And, during the season, fishermen in the small towns around Willapa harbor harvest shellfish that originated in Japan and were transplanted to beds in the waters of America's Pacific Coast.

THE GREAT FORESTS

On the western slopes of the United States, south of Puget Sound, warm, gentle rain falls almost constantly. On these mountain slopes, giant Douglas firs grow as they grow nowhere else in the world. For kilometers, pine and fir and other evergreen trees cover the western side of the Cascade Mountains. Farther south, in California, there are the great redwoods, the largest and oldest living things.

When America was first discovered, forests covered more

than half the area that is now the United States. Trees had to be cut down to prepare the land for farming and to provide shelter and fuel. In addition, the pioneers traveled in wooden boats and wooden wagons, drawn over wooden roads and bridges. They used wood for their houses, furniture and tools.

As America grew, the need for timber increased, and by the time settlers had reached the Midwest, industry needed wood in vast quantities. Railroads stretched farther and farther westward, and lumbermen harvested what then seemed like limitless reserves of trees.

What was not at first realized was that a forest is more than a collection of trees. It is a complex community of plant and animal life. Each tree must have sunlight, moist rich soil, and enough space for its roots. At the same time, it is a source of food for birds and animals, and protects the soil from erosion. By absorbing rainwater and slowing the melting snow in the spring, it lessens the danger of floods and regulates the flow of streams.

In a living forest, two opposing forces are constantly at work: growth and decay. The growth of new seedlings balances destruction by insects, plant diseases and occasional storms. But the unrestricted cutting of timber disturbs this natural balance and in America in earlier years, many forests were depleted more rapidly than they could grow. On such cutover land, fires burned out of control, wildlife disappeared, and worst of all, the rich soil of the forest floor was washed away by unchecked rain water.

About the beginning of the 20th century, the national government became concerned about the disappearing forest and in 1905, created the Forest Service in the Department of Agriculture, giving it three major responsibilities: to manage the national forests for the public welfare; to cooperate with the states and with the owners of private forest land to prevent and control fires, plant trees, improve watersheds, and fight insects and diseases; and to undertake research in forest management, use and protection.

More than 75 million hectares of timber and range lands are now managed as national forests and national grasslands to serve many purposes including recreation and the continuing yield of such resources as wood, water, wildlife, forage and special products like honey, nuts and Christmas trees.

About 75 per cent of U.S. forest land is on farms and other small, privately owned tracts. In cooperation with the states, the national government is encouraging better management of these lands by providing information and technical assistance, cost-sharing, and low-cost loans. Under this cooperative program, the Forest Service has given technical help to more than 2,124,000 owners of forest land. Since 1940 some 50 million hectares have been involved. These owners have planted more than 1.2 million hectares and have improved timber stands on another 1,000,000 hectares.

Forest industry organizations also encourage better management. Perhaps the least known programs are those called "Keep America Green," a fire-prevention project, and the American Forest Institute's tree-farm-system under which 41,600 privately owned tracts covering about 33 million hectares have been set aside as tree-farms, where modern methods are used for growing high-quality plants. The "farms" range in size from about four to 897,596 hectares.

Each year, owners of private forest land and national, state and local agencies plant or seed more than 520,000 hectares. Practices like these, combined with better protection from fire, disease, insects and other destructive agents, have brought enormous improvement to the forests of America. Timber growth in its woodlands now exceeds the loss that comes from destruction and cutting, and a good reserve is being built to meet future needs.

THE INLAND EMPIRE

Thousands of years ago, the Great Central Valley was formed between the Coast Ranges and the Sierra Nevadas. Today this valley is one of the highest producing farm regions in the United States. Pears grow on the cool mountain slopes; beans, onions and rice in the black soil of the delta; lettuce in the "valley of green gold"; and grapes for wine and raisins on the low, sunny hills. The sheltered orchards yield peaches, olives, oranges and lemons, in addition to other fruits, which refrigerated trucks and railroad cars carry throughout the country in all seasons. Grain and cotton grow all year on the valley's 60,000 farms; sheep and cattle feed in its pastures.

Nature generously provided a rich soil and a mild climate. Yet only a short time ago, the protected valley yielded

scarcely enough food for its own people because nature had failed to balance its gifts. Rain and snow fall in the winter and spring, but the summer is dry. The water came not only at the wrong time, but also in the wrong places. The Sacramento River flows down the center of the northern half of the valley. The San Joaquin flows through most of the southern half. These two streams meet in a low-lying region near the middle of the state, opposite San Francisco. While the Sacramento Valley gets two-thirds of the water for only one-third of the cropland, the San Joaquin Valley, with a larger, drier area, gets one-third of the water.

For many years, this problem seemed insurmountable. Year after year, the Sacramento poured its unused wealth with destructive force into the sea. At the same time, more and more land at the San Joaquin end of the valley died of thirst and became desert.

By 1931, the people of California saw the need for a valleywide program of flood control and irrigation. A State Water Plan was created which included dams, power plants, canals, power lines and pumps to move the extra waters of the Sacramento across hundreds of kilometers to the thirsty southern tip of the valley. The local government could not do the vast job alone, so California appealed to the federal government for help, and in 1935 it established the Central Valley Project.

While the TVA had to rebuild what man destroyed by not knowing nature's balance, the Central Valley Project had to do more; it had actually to create a natural balance. And the lives of more than a million people depended upon its success.

The first part of the Central Valley Project was a rescue job. The waters of the northern rivers had to be held back in floodtime and released during the dry summers. Reshaping nature, engineers built three large dams, 590 kilometers of canals, giant pumps, and hydroelectric plants to produce the power for controlling and pumping the water. Shasta Dam, the biggest in the project, stores 5,600 million cubic meters of water in its lake. When needed, these waters are released. A canal carries Sacramento River water southward across the delta to a giant pumping plant. On its way, this water pushes back saltwater tides, which used to creep up the riverbed from the sea.

In order to make water flow uphill to irrigate the south-

ern valley, engineers built huge pumps which lift 130 cubic meters of water every second. They pour the water into canals that slope gently southward. Friant Dam and more canals were built to direct the course of the San Joaquin River into farms and orchards which need its water. Instead of flowing north as it once did, 7.5 million liters of water now travel south every minute. And where the insufficient waters of the San Joaquin once flowed, the waters of the Sacramento now serve the region—800 kilometers from the original source of the river.

Because of new dams, pumping stations and irrigation ditches, the Central Valley now enjoys a new life of rich orchards and fields and of industries run by new power. The project is not complete. Construction of still another dam with accompanying power plant and canal is even now underway to save more land from the desert. The families of the valley can indeed be proud of their inland empire, where—a few years ago—they refused to admit defeat despite constant disappointment.

THE COAST VINEYARDS

Vineyards stretch along the gentle, sunny slopes of the Coast Ranges, north and south of San Francisco, where the rich soil and warm sunshine give every possible assurance to crops in California's eight major wine-producing areas.

Spanish missionaries who brought their knowledge and their seedlings from their native country were the first to grow vines here. They did not sell their wine, but travelers who stopped at the missions praised its special flavor. It was not until 1824 that settlers began to make wine commercially from Spanish mission grapes. Experimenting with different varieties, growers both tried to improve the strong-flavored native grapes and also imported more delicate European varieties. But often the imported vines would die in the new soil, or the change in climate and conditions would give the grapes a different flavor.

For many years, the growers were unsuccessful. Then, in 1870, a disease of vine roots suddenly ravaged the vineyards of Europe. The disease was traced to small insects on the roots of American vines which a European winemaker had introduced into his own fields for experimental growing. In turn, the insects returned to America—this time in European

vine cuttings and like the vineyards of Europe, the California fields were almost destroyed by the disease.

The hardy native roots had resisted the disease before. Could they resist it again? In desperation, growers grafted European vines upon American roots and by the success of the experiment, saved the wine industry of both continents. Years of hard labor were necessary since all the vines had to be completely replaced. But ever since, winegrowers in France, California and other wine-producing countries have been grafting European grape cuttings onto American roots.

THE NEWEST STATES

"... dry and cool, energetic and somewhat crazily high-keyed in an agreeable way under the constant compulsion of the weird Arctic sun."

Edna Ferber
"Ice Palace", 1958

"... these islands were a crucible of exploration and development."

James Michener
"Hawaii", 1959

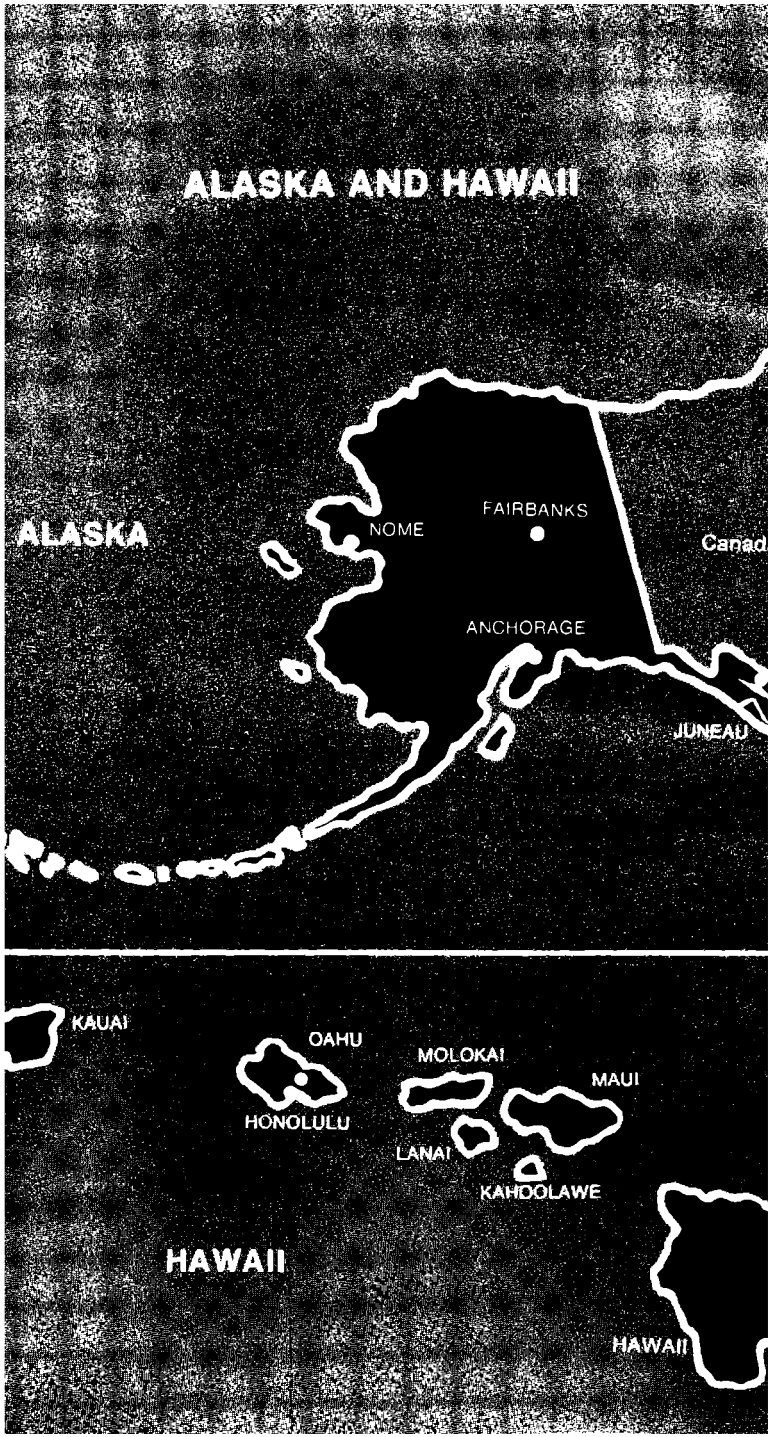
ALASKA

In 1959 Americans welcomed Alaska into the Union as the 49th state, symbolizing a change of attitude from that held in 1867, when the peninsula was purchased from Russia. Then, most Americans had little interest in 1,500,000 square kilometers "of icebergs and polar bears"—beyond Canada's western borders, far from the settled areas of the United States.

In those sections of the state which lie above the Arctic Circle, Alaska still is a land of icebergs and polar bears. Ice masses lie buried in the earth, which is permanently frozen to a depth of 90 or more meters. From early May until early August, the midnight sun never sets on this flat, treeless region, but the sun cannot melt the icy soil more than two-thirds of a meter down.

Alaska is America's largest state, but only about 325,000 people live there. According to estimates, 800,000 hectares of its land area are fit for plowing but only about 640,000 hectares are being cultivated.

The Japan Current of the Pacific warms Alaska, and the Arctic chills it. The temperature may drop as low as -43 degrees centigrade in some places, and may rise to 30 de-



grees in others. In any given year, more than 11 meters of snow may fall in the north, and more than two meters of rainfall may descend upon the city of Juneau in the South.

Alaska lies between about 71 degrees and 56 degrees north latitude, stretching southward from the Arctic Ocean to the Pacific. This immense peninsula is sharply divided into three distinct regions. In the north, Arctic Alaska reaches from the Arctic Ocean to the steep glacier-cut peaks of the Brooks Range. Central Alaska lies between the Brooks Range and the Alaska Range, where Mount McKinley rises 6,187 meters—the highest peak in North America. From the western face of the Alaska Range, the mainland slopes down toward the Bering Sea and Russia, and the island chain of the Aleutians extends far to the southwest. The 640-kilometer strip of coastal land known as the "Panhandle of Alaska" thrusts to the southeast, bordering Canada's Province of British Columbia. Alaska contains some of the largest remaining wilderness areas in the United States, and much of the state's rugged landscape and wildlife is protected in a network of national parks, forests and wilderness preserves.

Arctic Alaska has been the home of Eskimos for countless centuries. It is believed that the Eskimos moved there from Mongolia or Siberia, probably crossing Bering Strait, named for Vitus Bering, the Danish sea captain who discovered Alaska on his voyage for Russia in 1741. The Eskimos, the Aleuts of the southwest, and the Indians of the southeast are the state's earliest known inhabitants. Russian fur traders established settlements but, by the time Alaska was sold to the United States, most of the traders had departed.

Then, in 1896 gold was discovered near the Klondike River in Canada just across the Alaskan border. Thousands of Americans rushed to the region on their way to the Klondike; some never left Alaska, and some returned there after the region experienced a "rush" of its own.

Alaska was never completely cut off again, although even today transportation is a major problem. There are only two motor routes from the U.S. mainland, and within the state, roads and railroads are relatively limited, although nearly every town has its own airfield. Planes fly passengers, mail and freight to the most distant villages.

The gold rush that changed life so suddenly for Alaska was soon ended, and although many stories about mining camps have become part of American literature, the gold from

Alaskan earth contributed less to economic progress than the fish from Alaskan waters. The fish caught in a single year range in value from $80 million to $90 million. Fur-bearing animals are plentiful in the forests and streams, and valuable fur seals inhabit the waters. Since 1911, Canada, Japan, Russia and the United States have jointly agreed to control the hunting of seals. The herd has been rebuilt to its former size of about 1.5 million.

After fishing, the state's chief industry is lumber and the production of wood pulp. In recent years, Alaska's single most important resource has become oil. The 1,286-km Alaskan pipeline extends southward from arctic tundra of the North Slope to the port of Valdez on Gulf of Alaska. The pipeline carries a flow of 1.2 million barrels a day; tankers then transport the Alaskan crude to West Coast refineries. Apart from the North Slope, seismic exploration and preliminary drilling has located new large-scale onshore and offshore oil fields in Alaska. The state also has large deposits of coal, copper, gold and other minerals.

To secure the land necessary for the pipeline, and to insure the economic future of Alaska's 78,000 Eskimos, Aleuts and Indians, the federal government granted the state's natives the most generous land settlement in U.S. history: 18 million hectares and nearly $1 thousand million. The bulk of this land and money has gone to 13 regional and 225 village corporations owned and operated by the natives themselves. Several of these regional corporations are now among the largest businesses in Alaska.

HAWAII

In the fifth or sixth century A.D., daring Polynesian voyagers in outrigger canoes sailed to Hawaii across thousands of kilometers of the Pacific and are believed to have been the islands' first inhabitants. Not until British Captain James Cook accidentally landed there in 1778, did the world learn of Hawaii's existence. Traders, planters and missionaries soon followed.

About 845,000 people inhabit the island chain's land area of 16,700 square kilometers. By origin, they are most closely related to the countries of Asia and the Pacific—chiefly Japan, the Philippines, China and Korea—while only about one-sixth of the population originated in Europe or America.

Politically, Hawaiians have been related to the United States since 1900 when, as a result of their request for American citizenship, their former kingdom became an organized territory. In 1959 the territory was admitted to the Union as the 50th state—a state separated from the mainland by about 3,200 kilometers of ocean.

The eight major islands and over 100 small islets of Hawaii—like a chain of beads some 2,575 kilometers long—lie upon the Pacific, southeast to northwest. Although the state is located in the tropical zone, its climate is comfortable because of the ocean currents that pass its shores and the winds that blow across the land from the northeast. The temperature usually remains close to the annual average of 24 degrees centigrade.

Rough, black rocks of lava jut out of the water along parts of the coastline. In some places, cliffs rise almost straight up from the water's edge. Along the gently sloping land areas to the southeast are beaches of yellow, white and black sands.

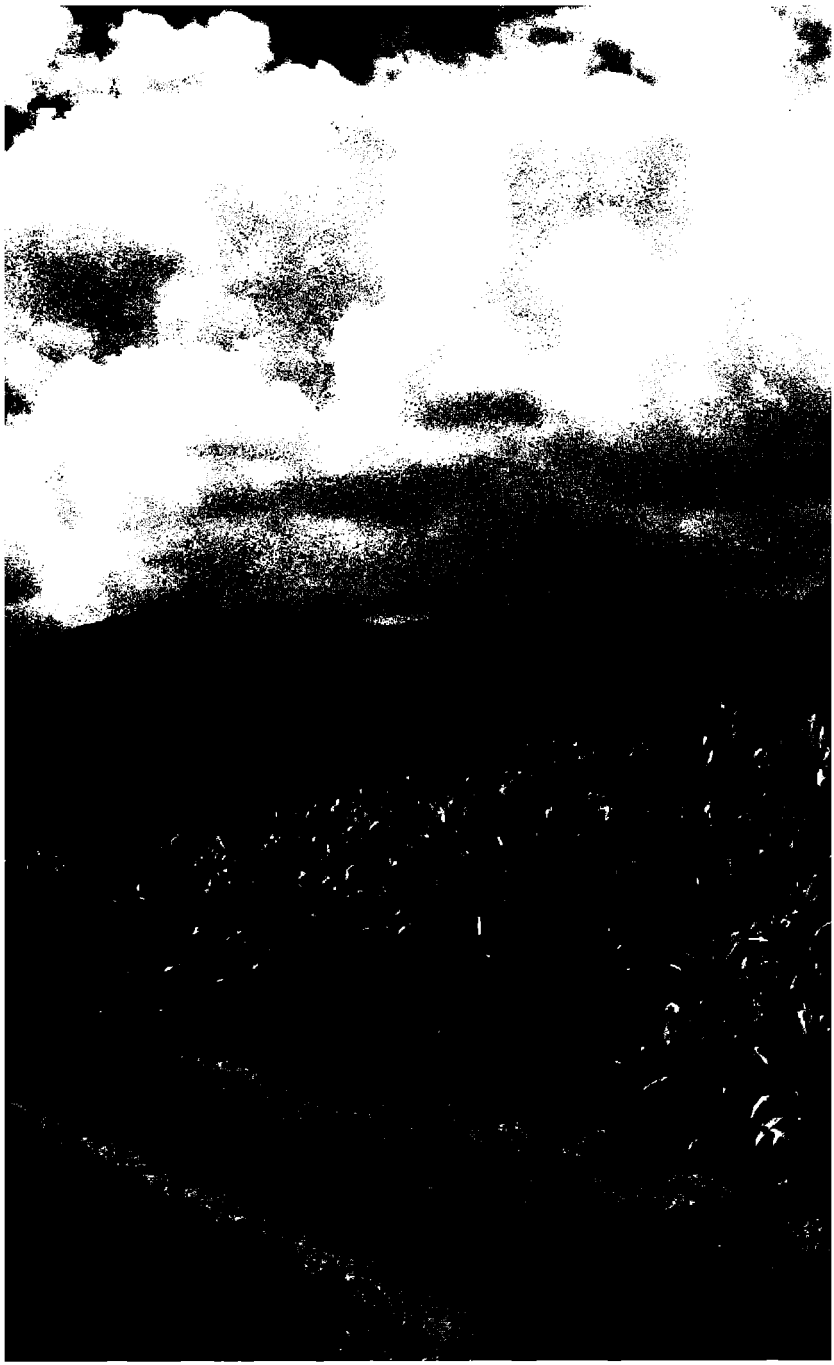
The largest island, Hawaii, lies at the southeastern end of the chain and is almost twice as large as all the others combined. Five volcanoes gave the island its form; two are still active: Kilauea and Mauna Loa. Mauna Loa, the world's largest active volcano, towers above the scenic Hawaiian National Park which stretches from the 4,250-meter mountain peak across the sea to neighboring Maui, the valley island. Tropical plants, sandy desert, waterfalls, craters and caves make the 780-square-kilometer park a tourist attraction.

The best known of all the islands is the third largest, Oahu. A diamond-shaped plot of earth no more than 64 kilometers long and 42 kilometers wide, it is the center of Hawaiian life. Honolulu, capital, largest city, and home to more than half of all Hawaiians, spreads out over 218 square kilometers of land at the foot of the volcanic Koolau mountain range. Eleven kilometers away lies Pearl Harbor, where the U.S. Pacific Fleet is based. Waikiki Beach, enjoyed by Hawaii's kings in ancient times and by world visitors today, extends along the shore from Honolulu to Diamond Head, an extinct volcano.

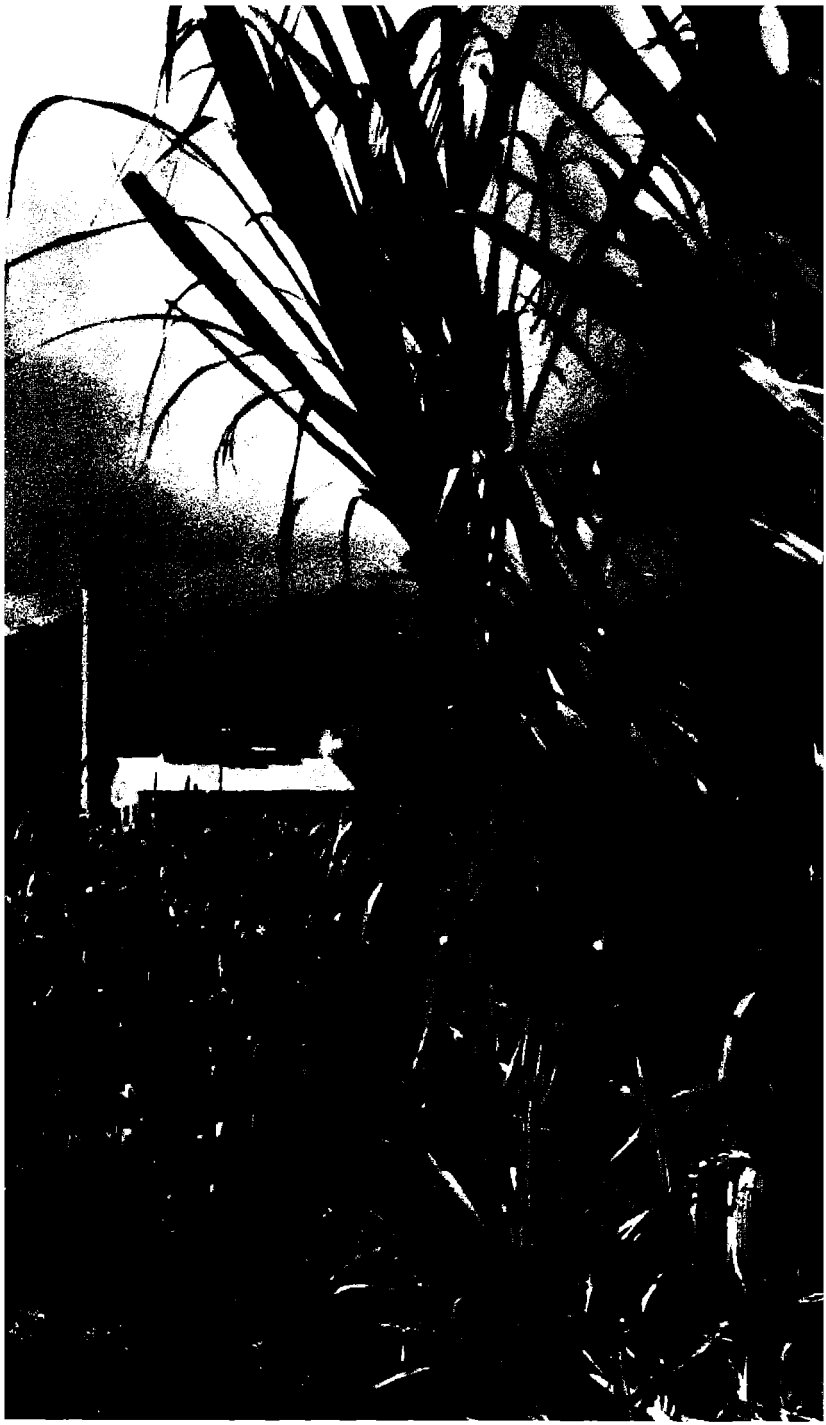
Honolulu's harbor is a port of call for more than 1,000 ships a year, and the international airport, with nearly a half-million flights a year, is the busiest in the Pacific. About 2,260,000 people a year visit the island and provide more

The sea affects nearly everyone in Alaska, a leading state in the value of its fishing

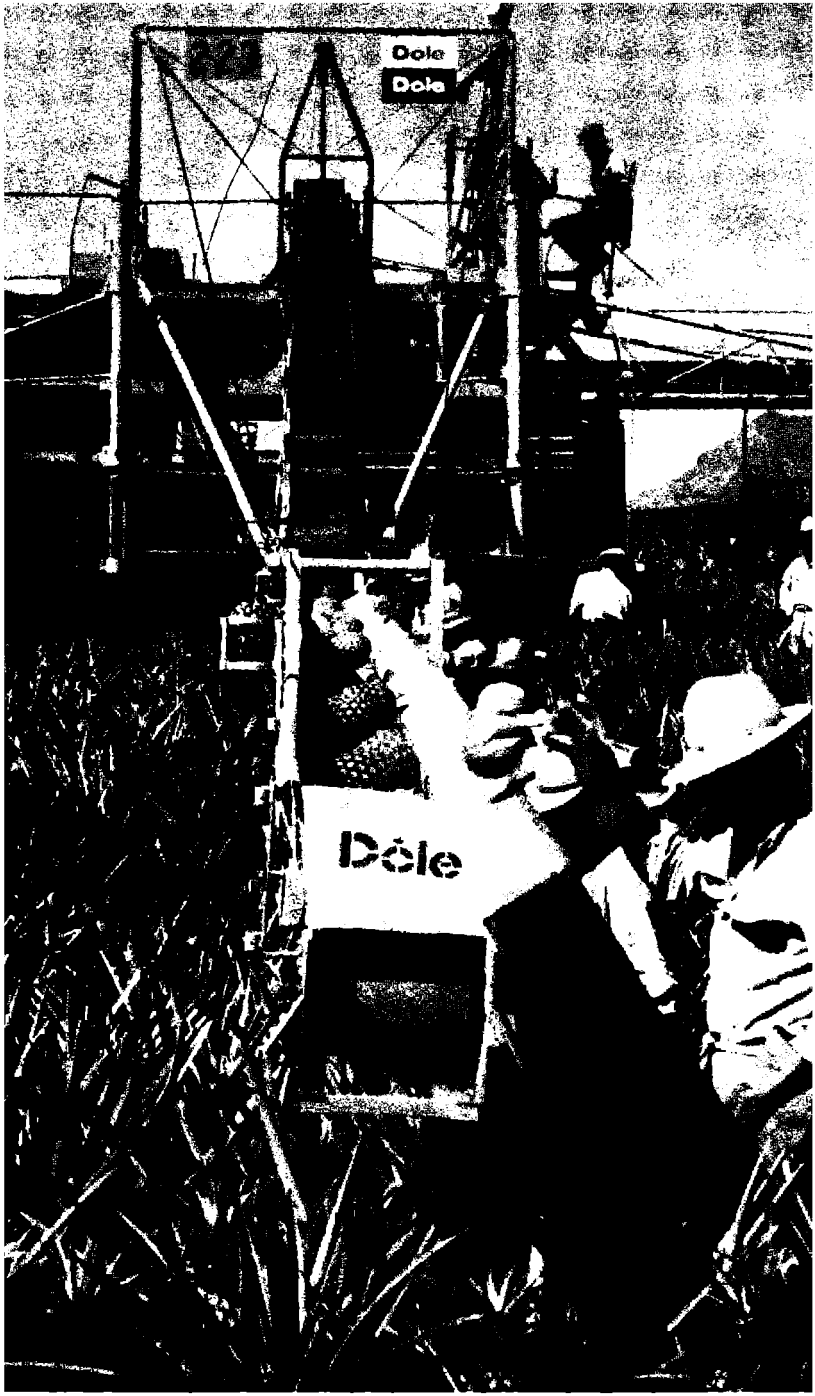
Salmon, halibut, herring, cod and shellfish are found in its waters.



This field in Oahu's central fertile plain is typical of the 96,000 hectares of



Hawaii's harvested cropland devoted to sugarcane, the islands' most important crop.



Harvesting pineapples in Hawaii which produces about one-fifth of the world's crop

than $890 million of Hawaii's annual income.

Although the islands are world famous for their thrilling scenery, each major member of the chain has its distinctive character. On green Kauai, probably the oldest, is Mount Waialeale, an extinct volcano and one of the rainiest places on earth with an average annual precipitation of 1170 centimeters.

Molokai has two main agricultural regions: the dry western plateau dotted with cattle ranchers, and a fertile central plain, home of pineapple farms. Lanai, once thinly blanketed with dry, brown grass, now is one vast pineapple plantation. Perhaps more pure-blooded Hawaiians live in Niihau's 187 square kilometers than in any other part of the chain. Kahoolawe, close to Maui, is barren, waterless, and uninhabited.

The rich volcanic soil of the islands has been made to flourish through scientific agriculture and man-made waterways. Hawaii's farm workers are among the highest paid in the world. Although there are no fuel resources and few useful minerals except sulfur, there are many industries, and Honolulu alone makes more than 160 different kinds of products.

The first official ties between Hawaii and the United States were created through trade in sugar. In 1876 the United States granted tax-free entry to Hawaiian sugar and thereby helped its cultivation. Today, 17 sugar companies cultivate more than 96,000 hectares of sugarcane on four of the islands.

Pineapple, the second most important crop, is grown on five islands on a total area of more than 25,000 hectares. Other important crops include coffee, fruit and vegetables.

THE NATION UNITED

"... Americans—a new breed, rooted in all races, stained and tinted with all colors, a seeming ethnic anarchy."

John Steinbeck
"America and Americans", 1966

THE CONQUEST OF DISTANCE

In 1848, pioneers who crossed the continent in their covered wagons made the trip in 109 days—if they were fortunate and strong. Today a New York family can drive by automobile to San Francisco in less than a week, or make the trip in several days by train, or fly there in five hours. Transportation has conquered the vastness of the land and brought together people living thousands of kilometers apart.

As in other, older civilizations, the first lines of settlement followed the rivers. Where there were no rivers, roads had to be built over land. The first of the big westward arteries was the Cumberland Road, which ran for 960 kilometers from Cumberland, in western Maryland, over the mountains to Ohio and Illinois.

More than rivers or highways, however, the railroads played a major role in uniting the far reaches of the continent. In 1830 there were only 37 kilometers of railroad track in the United States; in 1850, there was not yet a kilometer of track west of the Mississippi River. But, as the railroads were built across the eastern states, the internal river routes were joined to the coast cities. And wherever railroad lines joined, a new town quickly sprang into life.

By 1863, two companies proposed to connect the Atlantic and Pacific coast by a railroad all the way across the continent. Advancing eastward from California, the Central

Pacific pushed forward across the desert; the Union Pacific moved slowly westward over the mountain plateaus. Finally, in 1869, the tracks of the two railroads met, and a golden spike was driven into the ties to celebrate the completion of this first transcontinental railroad—the first real link between east and west.

From this time on, an expanding network of railroads connected the growing towns and villages. Over these rails, fresh apricots from California are brought to a New York store, and the newest fertilizer from an Alabama factory is sent to fields in the Northwest. Within a few days, goods are brought from one part of the country to another.

Although the railroads brought towns and cities together, they could not go everywhere. The "iron horse," or locomotive, accomplished much; but the "horseless carriage"—the automobile—did still more.

In many parts of America, distances are so great that automobiles are necessities, not luxuries. As we have noted, most American farmers do not live in villages but are sometimes kilometers from their nearest neighbor and even hundreds of kilometers from a town. Large-scale farming is common in many parts of the United States today, but it did not become profitable until there were trucks and tractors. Trucks carry the farmers' grain to storage elevators, milk to creameries and vegetables to market. Trucks and cars go wherever there is a road and the more than six million kilometers of roads bring every field and barn into the circle of civilization.

The family automobile has helped to bring people of the United States two other things—two things which can seldom exist at the same time: community life, and the privilege of privacy. In the early days of industrialization, factory workers lived close together, within walking distance of their jobs. As industries grew, more and more working class families lived together in crowded conditions. But, with the construction of longer and better roads and with the greater availability of automobiles and other means of rapid transportation, proximity to the factory was no longer a necessity. New residential areas, suburbs, grew up outside the big cities and, increasingly, industry and commerce concentrated in the cities. Every morning, millions of Americans drive their automobiles to work in the city, sometimes a distance of around 100 kilometers. At night, they drive home

to houses and apartments outside the cities, surrounded by trees and lawns. But the cities themselves have also remained the homes for millions of other Americans who, due to improved mass transportation systems, have been able to travel to their work in a short time and also enjoy the cultural amenities of big-city life.

Automobiles and other methods of rapid transportation are also changing American industry. Instead of continuing to concentrate in the big cities, industry is building factories in previously undeveloped areas. Because the means of transportation are available, it is not hard to transport people—as well as materials—to the places where they are needed. This factor was largely responsible for the remarkable growth of the Pacific Coast during and after World War II. As industries built new factories in the Far West, Americans from all over the country moved west to take advantage of new jobs and new opportunities. Between 1970 and 1980 the populations of Washington, Oregon and California increased by 5 million people. In this same ten-year period —while the population of the United States as a whole increased by 11.4 percent—the state of Arizona doubled in numbers.

The airplane, too, has played a major role in uniting Americans. Only 70 years after the Wright brothers made the first successful airplane flight, the United States had more than 277,000 kilometers of regular flight routes. People and goods can now travel to every part of the country in less time than ever before. Human beings have conquered the distances which lie between them. But distance is not the only thing which keeps them apart.

WORKING TOGETHER

Distance in the United States could never have been conquered if Americans had not learned to work together. The greatest barriers are not canyons or mountains, but fences and borders. Neither roads nor machines can remove these man-made obstacles. But trust and understanding can.

In the great loneliness of 18th-century America, each person was self-dependent. He made his own tools, his own shelter, and grew or hunted his own food. But then, as now, this self-sufficiency was limited. People had to cooperate because they could not survive alone.

The first European settlers needed the guidance of friendly Indians who knew the climate and knew which crops would grow in the strange soil. As they traveled across the trackless plains, they learned to form their wagons into a circle at night for protection against Indian attacks. In this and countless other ways, Americans learned the value of cooperation. They learned that one helps a neighbor today because he may need that neighbor's help tomorrow.

After the 13 colonies had won their independence from Great Britain, they became 13 virtually independent states loosely tied together—but each was still jealous of its own power. It was soon reasoned, however, that this situation was not conducive to the general welfare. Many leading spokesmen from each of the states realized that the problems of states were the same as the problems of individuals. Each person who came to America had left his homeland because he wanted something not available there. Some wanted religious freedom. Others wanted to follow a new profession and to break through the confines of fixed social classes. Still others wanted to own land and to enjoy the fruits of their own labor. Faced with the difficulties of frontier life, these people gave up total independence to achieve the greatest amount of self-realization.

And so, long before the first railroad track was laid, the Constitution of the United States was drafted. Written by representatives from the 13 states "in order to form a more perfect union," it became the supreme law of the land in 1789, when it was approved by a majority of the states. The government of the United States rests, quite simply, on this association of 50 states in a common federal union.

THE FORCES OF UNITY

There is no one scene which alone represents America. The dark northern pine and the slender southern palm, the green meadow and the windswept rock, the lonely farmhouse and the city of a million homes—all these are America. The blackhaired fruit picker who speaks Spanish; the blond wheat-farmer whose grandfather came from Norway; the Italian truck-farmer; the coal miner whose parents came from Poland; the black from New York's Harlem; the merchant who dances under a dragon in the Chinese New Year's parade—all these are Americans.

Every human being who has ever lived in the United States has been an immigrant or the descendant of one. Even the American Indian left his home in Asia thousands of years ago to begin life in a new land. Since the first European saw the American continent, people from every country of the world have made their homes in America. Yet, this vast land is one country, whose people speak the same language, share the same general cultural pattern and are subject to the same laws.

We have seen how the United States is divided into regions which have different ways of living and working and their own characteristics and problems. And each has its own groups of people whose parentage and traditions make them different from any of the others. However, out of these diversities the American people were able to create a political and social system in which all of these regions and groups were not only contained, but represented.

How this was done is the story of people working together to form one nation out of many parts.

BRIEF READING LIST IN AMERICAN GEOGRAPHY

Adams, Ansel Easton
The Tetons and the Yellowstone, Five Associates, 1970

Akin, Wallace E.
The North Central United States, D. Van Nostrand Company, Inc., 1968

Barnett, Lincoln Kinnear
The Ancient Adirondacks, Time-Life Books, 1974

Blacklock, Les
The High West. Photographs by Les Blacklock and text by Andy Russell, Viking Press, Inc., 1974

Bowen, Ezra
The Middle Atlantic States: Delaware, Maryland, Pennsylvania, Time-Life Books, 1968

Dykeman, Wilma
The Border States: Kentucky, North Carolina, Tennessee, Virginia, West Virginia, Time-Life Books, 1968

Ehrlich, Arnold
The Beautiful Country, Maine to Hawaii, Viking Press, Inc., 1970

Estall, Robert
A Modern Geography of the United States: Aspects of Life and Economy, Quadrangle/The New York Times Co., 1972

Farb, Peter
Face of North America: The Natural History of a Continent, Harper & Row, 1963

Faulkner, Harold Underwood
American Economic History, 8th ed., Harper & Row, 1960

Feibleman, Peter S.
The Bayous, Time-Life Books, 1973

Findley, Rowe
Great American Deserts. Photographed by Walter Meayers Edwards, National Geographic Society, 1972

Fite, Gilbert Courtland
The Farmer's Frontier, 1865-1900, University of New Mexico Press, 1973

Gates, Paul Wallace
The Farmer's Age: Agriculture, 1815-1860, Harper & Row, 1960

Goetzmann, William H.
Exploration and Empire: The Explorer and the Scientist in the Winning of the American West, Alfred A. Knopf, 1966

Goodwyn, Lawrence
The South Central States: Arkansas, Louisiana, Oklahoma, Texas, Time-Life Books, 1967

Jones, Evan
The Plains States: Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota, Time-Life Books, 1968

Keating, Bern
The Mighty Mississippi. Foreword by Melville Bell Grosvenor. Photos by James L. Stanfield, National Geographic Society, 1971

Lent, Henry Bolles
Agriculture U.S.A.; America's Most Basic Industry, E.P. Dutton, Co., Inc., 1968

McCarthy, Joe
New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont, Time-Life Books, 1967

McLaughlin, Robert
The Heartland: Illinois, Indiana, Michigan, Ohio, Wisconsin, Time-Life Books, 1967

Morgan, Neil Bowen
The Pacific States: California, Oregon, Washington, Time-Life Books, 1967

National Geographic Society
Life in Rural America, 1974

National Geographic Society
Wilderness U.S.A. Introd. by Sigurd F. Olson. Essays by Edward Abbey and others. Chapters by David Hiser and others. Drawings by Dill Cole and George Founds. Photos by Lowell Georgia and others, 1973

Osborne, John
The Old South: Alabama, Florida, Georgia, Mississippi, South Carolina, Time-Life Books, 1968

Rhodes, Richard
The Ozarks, Time-Life Books, 1973

Rotkin, Charles
The U.S.A.: An Aerial Close-up, Crown Publishing, Inc., 1968

Smith, Richard Austin
The Frontier States: Alaska, Hawaii, Time-Life Books, 1968

Sprague, Marshall
The Mountain States: Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming, Time-Life Books, 1967

U.S. News and World Report
Our Country!, 1972

Warren, Kenneth
The American Steel Industry, 1850-1970; A Geographical Interpretation, Oxford University Press, 1973

Watkins, Tom H.
The Grand Colorado; The Story of a River and its Canyons, American West Publishing Co., 1969

Williams, Richard Lippincott
The Northwest Coast, Time-Life Books, 1973

PICTURE CREDITS: Cover: top, Colorado Department of Public Relations; center, Ray Atkeson; bottom, Union Carbide Corporation. First Color Section, Opposite Page 16: Plate 1, Dick Durrance II, © National Geographic Society; 2, New Mexico Department of Development; 3, David Hiser, © National Geographic Society; 4, B. Anthony Stewart, © National Geographic Society; 5, Thomas J. Abercrombie, © National Geographic Society; 6, James L. Stanfield, © National Geographic Society. Page 27, Fred Ward, Black Star; 28, Sonya Bullaty; 29, Kosti Ruohomaa, Black Star; 30-31, Dick Durrance II; 32, Laurence Lowry, © National Geographic Society; 41, Tony Kelly; 42, top, David F. Penney; 43, top, U.S. Department of Agriculture; 42-43, bottom, Hopkins Photography Co.; 44-45, E.W. Cole. Second Color Section, Opposite Page 48: Plate 1, Massachusetts Department of Commerce and Development; 2, Roy Morsch; 3, Richard Noble, TIME-LIFE Books; 4, top, James P. Blair, © National Geographic Society; 5, bottom, James L. Stanfield, © National Geographic Society; 6, right, Ocean Spray Cranberries; 7, James L. Stanfield, © National Geographic Society; 8, Northwestern Bell Telephone Company; 9, Northern Gas Company. Page 57, Grant Heilman; 58, Dan Guravich, Exxon Company USA; 59, top, Burlington Mills; 59, bottom, American Electric Power Service Corporation; 60, Grace Middleton, Florida Cyprus Gardens, Incorporated; 61, Emory Kristoff, © National Geographic Society; 62, International Paper Company; 63, Thomas Nebbia; 64, Louisiana Department of Commerce and Industry; 74, James P. Blair, © National Geographic Society; 75, Lowell Georgia; 76-77, top, James P. Blair, © National Geographic Society; 76-77, bottom, Ed Smyth, © National Geographic Society. Third Color Section, Opposite Page 80: Plate 1, William Albert Allard, © National Geographic Society; 2, Florida Citrus Commission; 3, top, International Harvester; 4, bottom, Louisville Courier-Journal; 5, James L. Stanfield, © National Geographic Society; 6, David Hiser, © National Geographic Society; 7, Bruce McAllister; 8, Grant Heilman. Page 87, Herbert Lanks, Pix, Inc.; 88, Union Pacific Railroad; 89, U.S. Department of the Interior, Bureau of Reclamation; 90-91, Dean Conger, © National Geographic Society; 92-93, Jay Steinberg; 103, Bates Littlehales, © National Geographic Society; 104-105, James Collison; 106, George Gerster. Fourth Color Section, Opposite Page 112: Plate 1, Mike Moore; 2, William Albert Allard, © National Geographic Society; 3, Dean Conger, © National Geographic Society; 4, Joseph Muench; 5, Black Star/Charles Moore; 6, David S. Boyer, © National Geographic Society; 7, Jerry White; 8, Ray Atkeson; 9, Woodfin Camp/Roger Werth, © 1975 Island Heritage Limited; 10, Ralph Crane, LIFE; 11, Emory Kristoff, © National Geographic Society. Pages 118-119, Wigutoff, Alaska Fish and Wildlife Service; 120-121, Bishop National Bank of Hawaii; 122, Dole Pineapple Company. Fifth Color Section, Opposite Page 128: Plate 1, Adam Woolfitt, © National Geographic Society; 2, James Collison; 3, top left, Susan McCartney; 4, bottom left, Christopher Springmann; 5, right, Burk Uzzle, Magnum; 6, top left, Edgar J. Cheatham; 7, top right, Robert Phillips; 8, bottom, Otis Imboden, © National Geographic Society; 9, right, James L. Amos, © National Geographic Society; 10, top left, James Collison; 11, top right, Kaiser Steel Corporation USA; 12, bottom, James P. Blair, © National Geographic Society; 13, right, William Albert Allard, © National Geographic Society; 14, David Alan Harvey, © National Geographic Society.

94-027E

ed States Information Agency
United States of America