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THE RESOURCES OF THE CUMBERLAND PLATEAU AS EXEMPLIFIED BY CUMBERLAND COUNTY, TENNESSEE: A GEOGRAPHIC ANALYSIS

A THESIS

Submitted to
The Graduate Council
of
The University of Tennessee
in
Partial Fulfillment of the Requirements
for the degree of
Doctor of Philosophy

by

George Willis Webb

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33/1

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G. W. W.

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CHAPTER I

INTRODUCTION

The Problem and the Purpose of the Study

> Possibly no other area in Anglo-America shows better the relation between man and a restrictive environment than the Cumberland Plateau. Certainly no other presents a more interesting social and geographic picture: here dwells /sic/ some of the best racial stock in the United States (much of it pre-Revolutionary) and at the same time the largest number of illiterate and poverty-stricken people in the nation. What they are, no doubt, is more a matter of natural environment than of anything else. . . .[1]

The above statement is the introduction by White and Foscue to their discussion of the Cumberland Plateau. The basis for this dissertation is embodied within the ideas expressed in this statement, for herein lies the heart of a problem: the prosperity of a people has been limited by a restrictive environment.

To be sure, people of all regions are limited by their respective environments, but as a result of differences in physical setting, the types and amounts of the limitations vary from place to place. Extreme examples are readily brought to mind. The Eskimos living along the Arctic Coast of Alaska cannot grow fruit and vegetables, and therefore find it necessary to subsist largely on meat and fish. The

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[1] C. Langdon White and Edwin J. Foscue, Regional Geography of Anglo-America (New York: Prentice-Hall, Inc., 1943), p. 209.

nomadic tribesmen of the Sahara must drive their flocks and herds afar from one sparse grazing area to another in order to find feed for their animals; then they must exchange animal products for agricultural products of the oases if they vary their diet. In these instances life is harsh, for within the framework of culture, adjustments to environment are exacting.

The upland areas of the Cumberland Plateau have not been blessed with resources comparable in market value to those of many other regions of the United States. With the use of an equal amount of labor and capital, the people of this upland are unable to produce yields of grain equal to those produced in the corn belt. More dollars per acre are realized even from timber land in the valleys of the plateau than from the uplands. The intermittent, thin beds of coal in the central Cumberland Plateau are now being passed over for more profitable production in the thicker, more extensive beds to the north and south.

Per capita income is one of the best measures of productivity and economic well-being of a region. In 1947, the average per capita income for Cumberland County, Tennessee, was $398, whereas that for Tennessee as a whole was $869,[2]

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[2]John L. Lancaster, County Income Estimates for Seven Southeastern States (Charlottesville, Virginia: Bureau of Population and Economic Research, University of Virginia, 1952), p. 112.

and that for the United States was $1,316.[3] Thus the per capita income of Cumberland County, which stood lowest in rank, was less than one-third that of the average for the United States, which fact serves to demonstrate the relative economic position of the Cumberland Plateau.

The Cumberland Plateau consists of areas of great dissection, as well as extensive flat-topped tracts. This study deals with a sample of the flat-topped part of the plateau. The people living on the tablelands are less isolated by the immediate relief of the land than are those in the more dissected sections. Also, the larger areas of level land of the former provide its inhabitants with more land unhampered by steep slope than is possessed by the people of the latter. Since isolation and land with slope too steep to be suited to cultivation are two of the more obvious factors usually credited with contributing to the lower standard of living of hill people, the reasons for the lack of prosperity in the flat-topped section of the plateau are less apparent than they are in dissected areas.

Many regional problems that are in need of solution are possessed by the flat-topped section of the Cumberland Plateau. Although some of these problems are the same as those found in the dissected areas, there are also problems

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[3] Road Maps of Industry, No. 1033 (New York: The Conference Board, October 14, 1955).

uniquely associated with the flattish uplands. The flat-topped plateau is not so internally isolated by the immediate relief, but this very absence of dissection has left a soil whose parent materials are principally the resistant sandstones which cap the region. This soil is deficient in some of the soluble minerals most needed by crops. In the dissected areas valleys have been eroded into the underlying limestones; even though limited in extent, these valleys offer a better base for food production.

The entire Cumberland Plateau, including the flat-topped sector, is externally isolated by the regional physiography. The Cumberland Escarpment on the east and the almost equally steep escarpment on the west, into which steep-sided valleys have been carved, have diverted the main lines of through traffic around this physiographic barrier.

The people of the flat-topped part of the Cumberland Plateau find themselves in one of the less highly endowed physical settings: soil which needs special husbandry to make it productive, depleted timber which has not been of highest quality, coal seams which do not figure in the current tonnage production of the nation, and, in places, relief which results in isolation. In this physical setting the people have not realized the degree of prosperity which has accrued in most other parts of our land; however, by a more thorough use of the available resources, the people

could enjoy a higher standard of living.

In order better to use the resources of a region, it is necessary that the kind, quantity, and condition of these resources be known--that is, an inventory must be made. The purpose of this study is to make, summarize, and analyze such an inventory. The problem is, therefore, to determine what are the resources, in what quantities do they exist, in what condition are they found at present, how have they been used, and how are they being used today.

Definition of the Area

The flat-topped part of the Cumberland Plateau is defined as that part which has not been appreciably dissected by stream action, so that rather extensive areas of relatively level land remain. The largest practically continuous expanse of such land is found partly in Cumberland County, Tennessee, the only plateau county which does not have much of its area either: (1) off the plateau on the east or the west, (2) occupied in appreciable extent by Sequatchie Valley, (3) covered by rather rough hills or mountains composed of the remnants of younger and higher rocks, or (4) deeply entrenched by streams. Cumberland County, the third largest county in Tennessee, having a total area of 655 square miles, has a high percentage of plateau surface. Over most of this county, slope and relief are in sharp contrast to both the

roughly eroded or mountainous northern sector in Tennessee and the maturely dissected, hilly southern sector. The area under study, mostly gently undulating to rolling, is a true tableland (Fig. 1).

Areal Limitations of the Study

Although some of the flat-topped part of the plateau lies outside the boundaries of Cumberland County, Tennessee, the study has been limited to this political unit for two reasons: firstly, much quantitative data compiled especially by the Bureau of the Census becomes readily usable; secondly, due perhaps to the external isolation, the counties of the Cumberland Plateau possess a remarkable degree of social unity, and therefore, function as large rural communities.

Method of Procedure and Sources of Data

A number of studies limited to particular topics have been made in the area; for example, Lebrun made a thorough study of the agricultural possibilities of the entire Cumberland Plateau in 1942,[4] and various government bureaus have reported on individual resources of the region, but no summary of what is known about all the resources of Cumberland County

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[4]Edmond J. Lebrun, "The Cumberland Plateau, Its Agricultural Situation and Possibilities" (Unpublished M. A. thesis, Department of Agricultural Economics, The University of Tennessee, Knoxville, August 1942).



Figure 1. Characteristic terrain of the flat-topped part of the Cumberland Plateau.

has been made. The method of procedure used in this study was to draw together the applicable information from the existing reports, and, with the addition of information gathered by field investigation, summarize and analyze the knowledge about the resources.

The data employed were procured from many types of sources. Extensive field work was done during the year 1955: all sections of the county were observed that could be entered by automobile; mines, quarries, manufacturing plants, farms, saw mills, and recreation areas were visited, and interviews were held with their managers; the land use of the town of Crossville was mapped. Liberal use was made of the limited library materials, particularly government documents. Base maps were compiled from a number of sources. Various data were mapped and their patterns analyzed.

Organization of the Study

The problem under study here has grown out of the relationship between the people of the area and their restrictive environment; therefore, it will be necessary first to portray the physical setting. This will be done in Chapter II. Chapter III will contain an analysis of the population and their settlement pattern. The succeeding chapters will study the various natural resources, their quality, quantity, and use.

CHAPTER II

THE PHYSICAL SETTING

Regional Location

The northern sector of the Appalachian Plateaus, the relatively undisturbed westernmost province of the Newer Appalachians, is known as the Allegheny Plateau, whereas the narrower southern sector is known as the Cumberland Plateau. Cumberland County, Tennessee, is located in the central part of the Cumberland Plateau (Fig. 2). No natural boundary separates the Cumberland from the Allegheny; in fact, the boundary is arbitrary. The Cumberland Plateau is generally considered to include "all that part of the province which lies in the drainage basin of the Kentucky River and south of it," extending across Tennessee to the Gulf Coastal Plain in northern Alabama.[1]

The eastern boundary of the Cumberland Plateau is sharply defined by the Cumberland Escarpment, whereas the western boundary is the inland margin of the Appalachian Highlands. The Cumberland Escarpment stretches as a continuous wall along the entire eastern border of the Cumberland Plateau. The west-facing escarpment, although not so

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[1]Nevin M. Fenneman, Physiography of Eastern United States (New York: McGraw-Hill Book Company, Inc., 1938), p. 333.

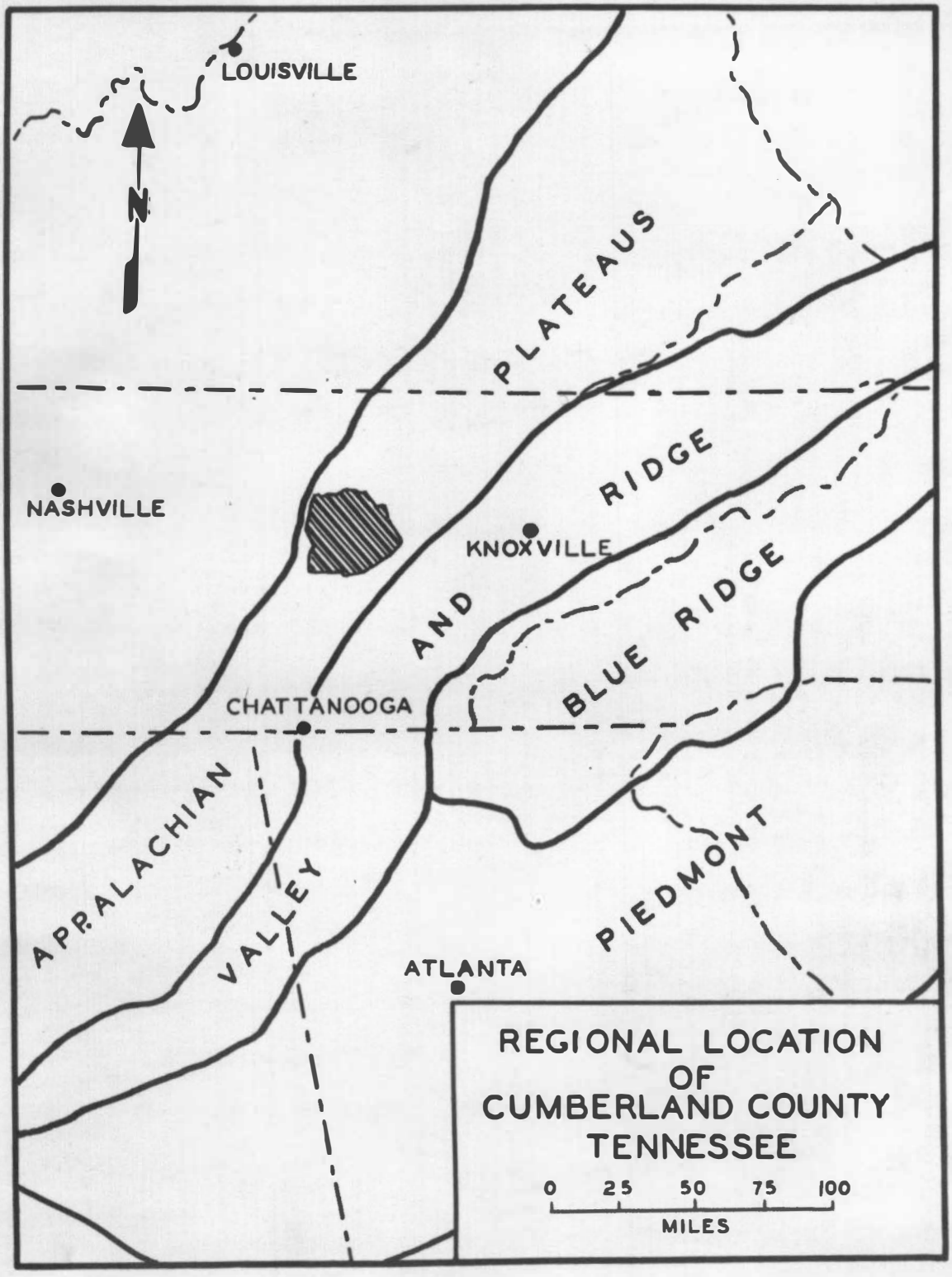


Figure 2. Location of Cumberland County, Tennessee, with respect to the major physiographic provinces.

stark as that on the east, "is everywhere conspicuous until it is gradually lost in Alabama by its diminishing height."[2] This western border, although straight in general, is made irregular in detail by young valleys which are being etched into the upland (Fig. 3).

The Bedrock and Its Structure

The Paleozoic rocks of the Plateau consist of a great series of sediments many thousands of feet in thickness.[3] These sediments have been consolidated into beds of sandstones, shales, conglomerates, limestones, and coals. The general level of the present surface of this tableland is due to peneplanation, but this fact is of little geographic consequence, for the rocks, which have been but slightly disturbed, lie nearly horizontal, dipping only gently to the west.[4]

The Cumberland Plateau is underlain largely by Pottsville sandstones and shales of early Pennsylvanian age, mostly the Rockcastle group in Cumberland County, however the younger Duskin Creek formation appears in the north-

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[2] Ibid., p. 335.

[3] Wallace W. Atwood, The Physiographic Provinces of North America (Boston: Ginn and Company, 1940), p. 117.

[4] Fenneman, op. cit., p. 337.

east.[5] Under these lie Mississippian limestones and shales that are exposed only in the coves, gaps, and valleys.

Surface Features

The submaturely dissected undulating surface that prevails over most of Cumberland County gives way to mountains and deep valleys in the east. The Appalachian Revolution not only "raised out of water the horizontal rocks of the interior" of North America, but folded the long narrow Sequatchie Anticline into the Cumberland Plateau.[6] "Like the more extensive and complex Allegheny and Cumberland Mountains, this anticline represents the propagation into the plateau of the compressive stress by which the Ridge and Valley province was folded."[7]

The northern end of this northeast-southwest trending fold is only partly eroded. Here the Crab Orchard Mountains rise, in places, a thousand feet above the general level of the plateau (Fig. 4). With the cutting of valleys through the overarching sandstone, the limestone was exposed to

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[5]Richard G. Stearns, The Cumberland Plateau Overthrust and Geology of the Crab Orchard Mountains Area, Tennessee, Bulletin 60 (Nashville, Tennessee: Division of Geology, 1954), p. 28.

[6]Fenneman, op. cit., p. 279.

[7]Ibid., p. 334.



Figure 3. One of the many deep valleys which has been eroded into the western escarpment of the Cumberland Plateau.



Figure 4. The Crab Orchard Mountains from a point about five miles north of Sequatchie Valley.

solution, and the narrow Sequatchie Valley was eroded into the anticline. The north end of this valley barely penetrates Cumberland County on its southern border. A number of coves, some of which are completely surrounded by mountains, are found in the Crab Orchard Mountains area. The largest of these is Grassy Cove whose flat floor is five hundred feet below the plateau surface (Fig. 5). Crab Orchard Cove provides a pass through the mountains, and the gap at its eastern end was historically important in the migration from the Great Valley into Middle Tennessee. Today, this gap is utilized by the Tennessee Central Railroad, which runs from Harriman, located in the valley at the foot of the eastern escarpment, to Nashville, in the Central Basin of Tennessee. This is the only railroad which crosses the plateau in Tennessee. The gap also serves as a pass for U. S. Highway 70, the only cross-country highway traversing the central part of the upland (Fig. 6).

The eastern mountainous and dissected section of Cumberland County, although proportionally small in area, provides a surface which is markedly different from the flat-topped part of the plateau (Fig. 7). Lane describes this section as follows:

> The general relief of this rugged district is varied. Steep ridges project above the tableland, and nearly vertical escarpments overlook flat and undulating cove floors. Many permanent and intermittent streams are actively cutting downward and have eroded deep valleys. The bottoms of these valleys, such as



Figure 5. Grassy Cove surrounded by the Crab Orchard Mountains.



Figure 6. The gap in the Crab Orchard Mountains at Crab Orchard Cove which has been the historic passageway for the main routes of travel across the central part of the Cumberland Plateau.



Figure 7. The craggy canyon country in the vicinity of Ozone Falls.

> Daddys Creek, lie 100 to 200 feet below the general plateau level. . . . These differences in elevation occur within distances of one-half to three-fourths mile and thus cause rugged relief around the coves and streams. There are, however, numerous interfluves that maintain relatively flat surfaces.[8]

Drainage

As stream erosion proceeded in this part of the Cumberland Plateau, throughout most of the area a simple dendritic pattern of drainage developed. The flow of water from Cumberland County is shared by two drainage systems. Most of the county drains to the northeast through Daddys Creek and the Obed River into the Tennessee River, while the remainder drains either to the east directly into the Tennessee River or to the west by way of the Caney Fork River into the Cumberland River. Grassy Cove and some of the other coves, although in the Daddys Creek area, are not drained by that stream. Streams in the coves lead to sinks where the water passes underground and emerges again in the Sequatchie Valley to be drained by the Sequatchie River into the Tennessee River.[9]

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[8]Charles F. Lane, "Physiography of the Grassy Cove District, Cumberland County, Tennessee" (Unpublished Ph.D. thesis, Department of Geography, Northwestern University, Evanston, Illinois, August 1951), p. 10.

[9]Fenneman, op. cit., p. 399.

Climate[10]

General Characteristics

The Cumberland Plateau lies within the Humid Subtropical climatic region of North America. There are three reasons, however, why its climate is not typical of the region: (1) it lies well within the interior of the continent; (2) its position is toward the northern margin of the region; (3) except for the Blue Ridge, the Cumberland Plateau is 1000 feet higher than the remainder of the climatic region. The interior position of the area under study would reduce the total amount of precipitation, as compared with coastal areas, were this result not counteracted by the altitude of the Cumberland Plateau. The interior position of the county, furthermore, would bring about higher summer temperatures, as well as lower winter temperatures, than prevail close to the sea, but the altitude also tends to reduce the summer temperatures. The effect of the poleward position is especially to produce lower winter temperatures than are found in more tropical latitudes of Humid Subtropical climatic regions.

Temperature

In Cumberland County, as well as the remainder of the

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[10]Unless otherwise stated, the climatic data have been taken from the 1941 Yearbook of Agriculture, U. S. Department of Agriculture, Climate and Man (Washington: Government Printing Office, 1941).

physiographic province in which the county is located, the long, hot summers generally associated with the Humid Subtropical type climate are somewhat alleviated by the altitude of the plateau, but the usually sharply contrasting winters are made longer and colder. The average temperature for the coldest month, January, in Cumberland County is 38.2°F, while that for the warmest month, July, is 73.6°F (Fig. 8). Lower average temperatures are found in Tennessee only in the mountains to the east. The minimum temperature recorded at Crossville is -14°F. Zero temperatures are likely to occur several times each winter, and more frequently than in the parts of the climatic region having lower altitudes.

Temperatures exceeding 100°F are only occasionally recorded on the plateau, while on an average they reach 95°F or above at the lower levels on about fifteen days during the period June to September, inclusive. The maximum temperature recorded at Crossville is 103°F. This is also a lower maximum than that experienced in the lowlands, and such high temperatures occur on the plateau only rarely. It is in summer that the greatest differences between highland and lowland temperatures occur. The nights especially are cooler; people living on the plateau need blankets most summer nights.

These lower summer temperatures are advantageous for human comfort, but they help to reduce the length of the frost free period. The average date of the last killing

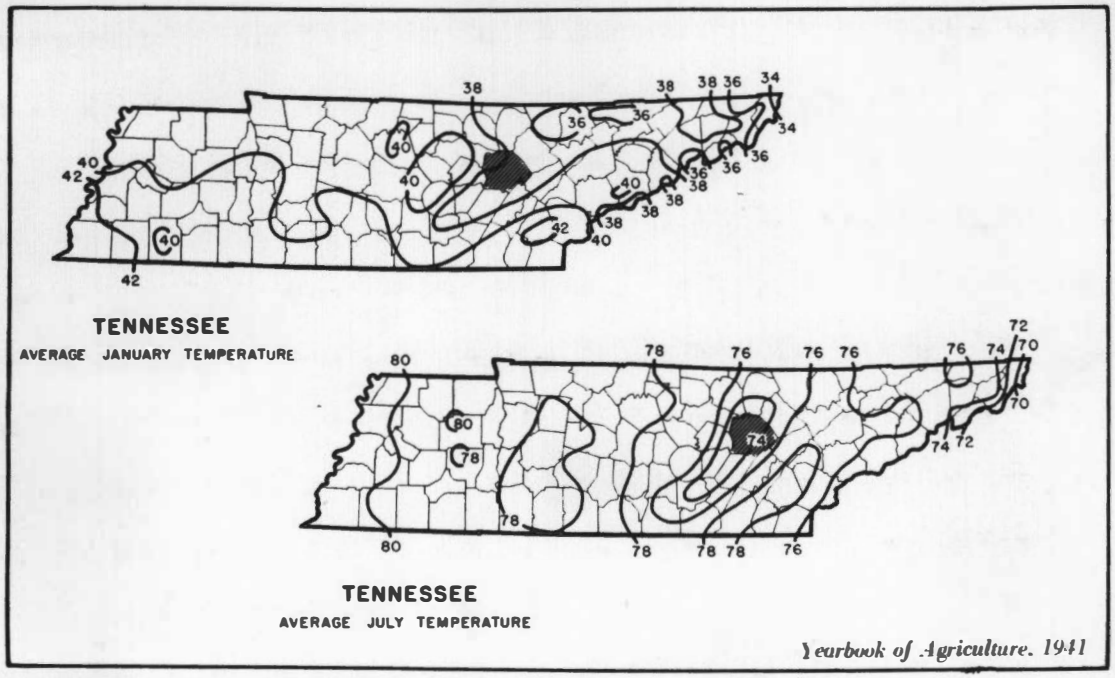


Figure 8. Average January and July temperatures for Tennessee.

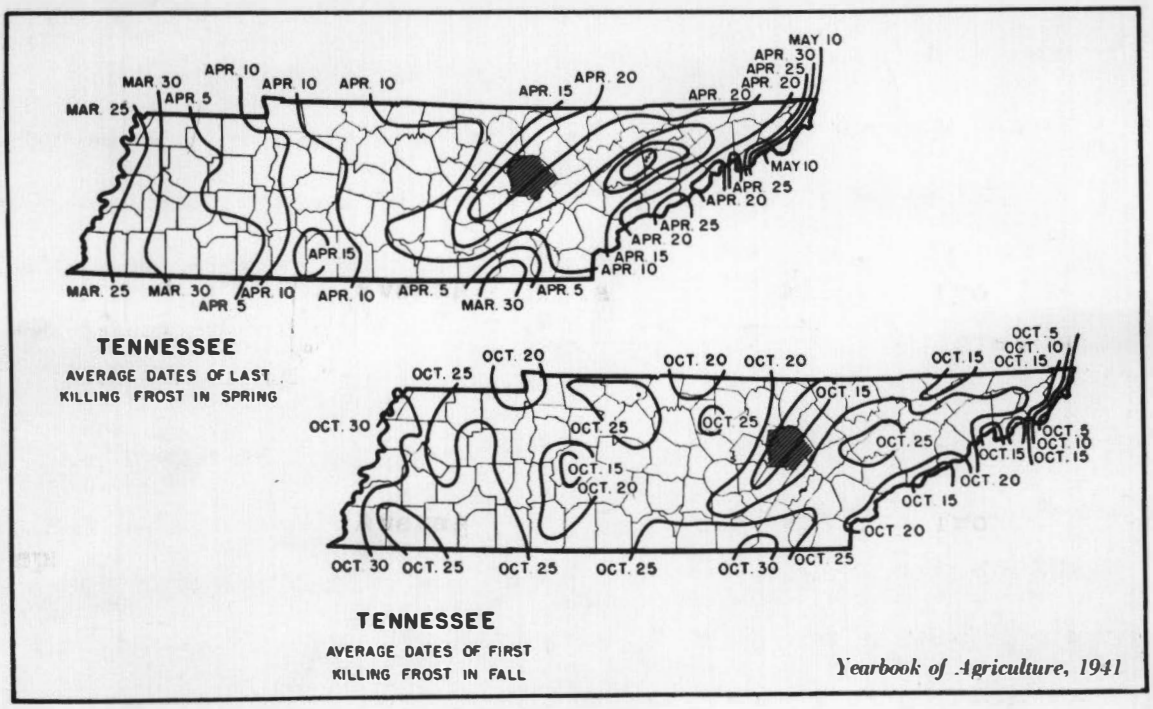


Figure 9. Average dates of last killing frost in spring and first killing frost in fall for Tennessee.

frost in the spring is April 20, while that of the first in the fall is October 12 (Fig. 9). These dates allow for an average growing season of only 175 days (Fig. 10). A shorter growing season than this in Tennessee is attained only in a small section of the mountains in the northeastern part of the state. This period is noticeably shorter than the 230 days found in the southwestern corner of the state.

Rainfall

Cumberland County, like the Humid Subtropical climatic region in general, usually receives an ample amount of rainfall reasonably well distributed throughout the year (Figs. 10 and 11). The average annual precipitation of fifty-six inches recorded at Crossville is surpassed in the state only by a small area in the Great Smoky Mountains. Most of this precipitation falls as rain, the ground rarely being covered with snow for more than a few days at a time. Although March is the rainiest month, with 5.75 inches, this amount is not much greater than the 4.51 inches which is the monthly average for the whole year. Furthermore, at least one month in each of the four seasons of the year has over five inches of rain. Heavy rains, amounting to 2.5 inches or more in twenty-four hours, occur occasionally.

Even though, on the average, the rainfall is fairly well distributed through the year, droughts lasting from twenty to thirty days do occur. These droughts come mostly

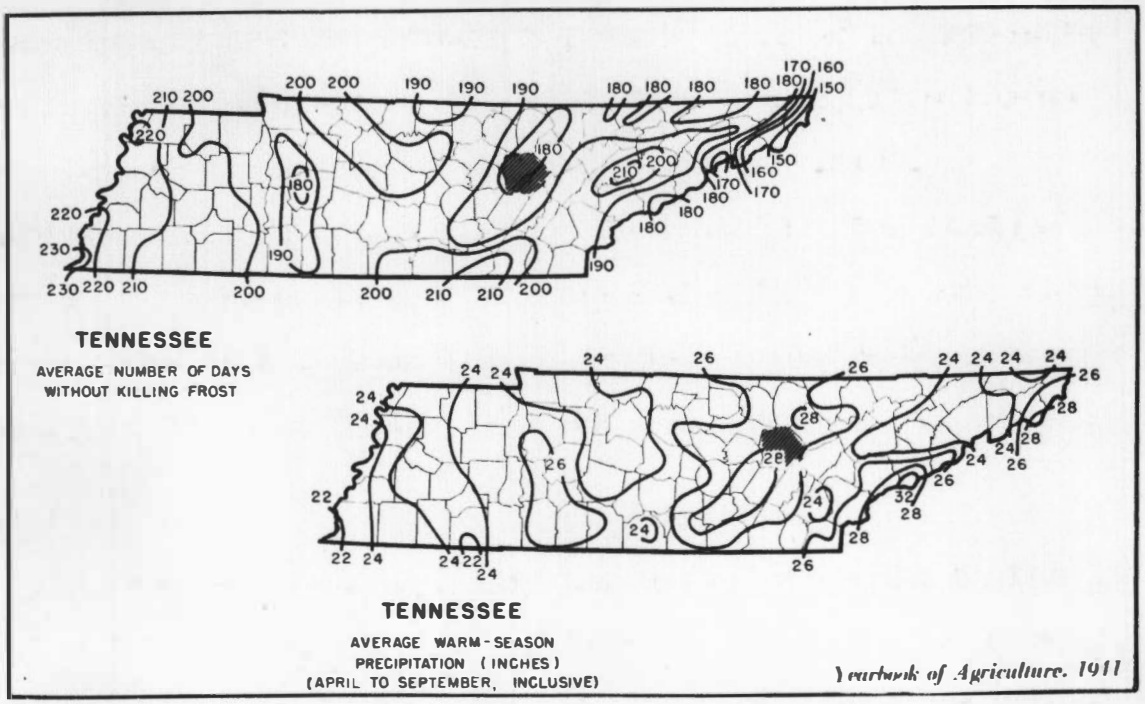


Figure 10. Average number of days without killing frost and average warm-season precipitation for Tennessee.

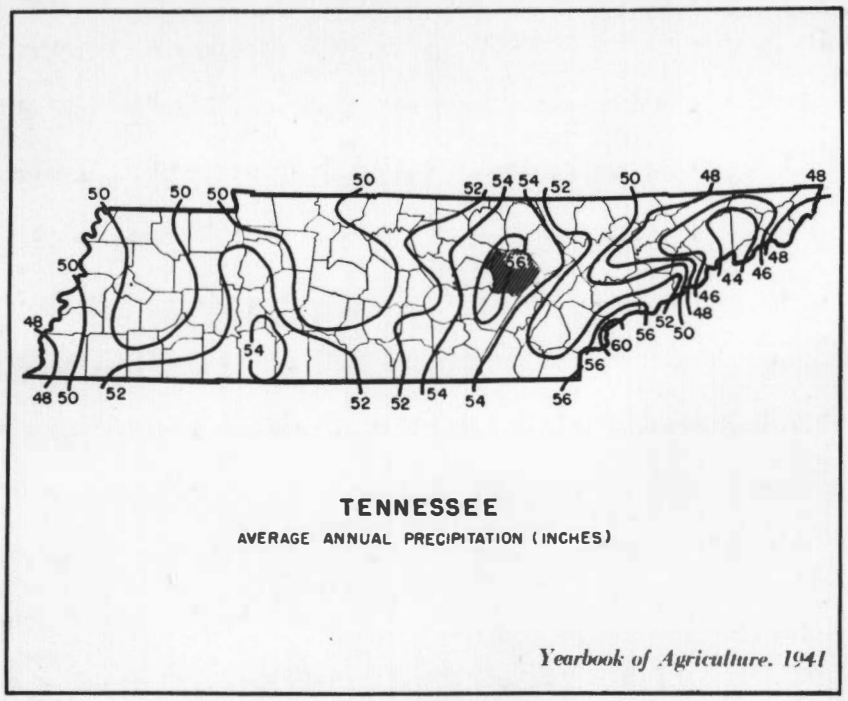


Figure 11. Average annual precipitation for Tennessee.

in the late summer and fall. The three months, September, October, and November are, on the average, noticeably drier than the remainder of the year. The 3.3 inches monthly average for this drier period is 1.6 inches less, or about 34 per cent less, than the 4.9 inches which is the monthly average for the remainder of the year.

Storms

Cumberland County, like the more poleward parts of the Humid Subtropical climatic region in general, comes under the influence of the cyclonic storms that move generally from southwest to northeast across the eastern half of the United States. Most of the winter rains are due to the frontal developments in these migrating low pressure areas. The summer rains are attributed largely to convectional thunderstorms; however, orographic effects will result from the plateau altitudes at all seasons. Although changes in the general weather conditions are neither as frequent nor as radical as they are in the Humid Continental climatic region to the north, they are considered to be characteristic of the winter season of all but the Florida peninsula portion of the Humid Subtropical region of the United States. Apparently due to the diverting effect of the Cumberland Plateau, tornadoes which occur rather frequently over the lowlands to the west are almost nonexistent on this upland.

Natural Vegetation

Forest Area and Types

The natural vegetation of Cumberland County, like that of the entire Cumberland Plateau, is a forest association. The area lies within the broadleaf and mixed broadleaf-coniferous forest region. The entire area, with the exception of a minor amount consisting of very small spots, was originally covered with forests. Forests still occupy 86 per cent of the area of the county, covering 353,700 of the total 434,560 acres.[11] The remainder of the land, made up of cultivated fields and pasture and hay land, has been cleared of its forest.

Today the upland hardwood is by far the most extensive forest type, comprising over two-thirds of all the woodland.[12] The second ranking forest type is the mixed yellow pine-hardwood. Scattered througout the mixed type areas are occasional pure stands of southern yellow pine.

Soils[13]

General Characteristics

The soils of Cumberland County, like those of the

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[11]William H. Ogden, Forest Resources and Industries of Cumberland and Morgan Counties, Tennessee (Norris, Tennessee: Tennessee Valley Authority, Division of Forestry Relations, 1953), p. 1.

[12]Ibid., p. 9.

[13]The information about the soils has been taken

entire southeastern part of the United States, belong to the Red and Yellow great soil group. In this county the soils have developed under a cover partly of coniferous and partly of deciduous trees, the deciduous, mainly oak, covering most of the land; however, in limited spaces pine is dominant. The thorough leaching and eluviation of the soils are the results of ample rainfall and high temperature working in conjunction with this vegetation cover.

Although the soils of the Red and Yellow great soil group are generally lateritic, Cumberland County lies toward the northern border of this zone, and consequently its soils have been subjected to podzolization processes, making them more like the Gray-Brown Forest soils to the north. These processes have been aided by the temperature and vegetation which are the result partly of the altitude of the plateau.

Because of the limited area, and the uniformity of the climate, natural vegetation, and bedrock throughout the county, the soils are fairly uniform in color, texture, structure, and natural fertility. They are nearly all residual soils. About 95 per cent of them have formed in place directly from weathered sandstone and shale, principally sandstone, about 3 per cent from transported materials derived from sandstone, and only about 2 per cent from weathered limestone

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from: U. S. Department of Agriculture, Soil Survey of Cumberland County, Tennessee (Washington: Government Printing Office, 1950).

or from transported materials derived from limestone.[14] Since the soils are formed mostly from sandstone they are usually sandy, but not sands.

In more than 95 per cent of the county the soils in their virgin condition are low in content of phosphate, lime, organic matter, and possibly other constituents necessary to proper plant growth.[15] Most of the soils are medium to very strongly acid. Though low in some plant requirements, the texture and structure of these soils are conducive to good tilth in most places, and consequently they are favorable to farming operations. The texture is prevailingly fine, about 88 per cent of the soils consist of fine sandy loams, with loam, silt loam, and silty clay loam making up the remainder.

Although most of the soils are similar in many respects, they differ widely in suitability for use. The depth to bedrock ranges from a few inches to about six feet, and the slope from almost level to more than 30 per cent. In some areas there are no stones, but in many others the soils are stony to very stony.

The use of the soils for general agriculture, therefore, depends largely on depth to bedrock, slope, and

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[14] Ibid., p. 24.

[15] Ibid.

stoniness. About 60 per cent are unsuited to cultivation due to one or more of these handicaps.[16] Only 22 per cent of the soils of the county have slopes of 5 per cent or less and are free enough from stones so as not to interfere materially with cultivation. Only a small percentage of the soils has been severely eroded, which for the most part possibly results from the fact that a very large part of the county has never been cleared of its forest.

Soil Types and Their Distribution

In this county the yellow podzolic soils consist of the Hartsells, Crossville, Jefferson, and Holston series.[17] These soils occupy the areas having nearly level and slightly undulating to rolling surfaces. The vegetation under which they developed consisted largely of deciduous forest. The parent materials of these soils contained much siliceous matter.

The soils of the Hartsells series, covering most of the county other than the southeastern mountainous section, have developed from parent materials of weathered horizontally-bedded sandstone, under a vegetation mainly of oak trees. The vegetative cover has probably contributed to the strong acidity of these soils, oak leaves being lower in bases and higher in

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[16] Ibid.

[17] Ibid., p. 100.

lignin than are leaves of most of the other deciduous trees.[18]

The soils of the Crossville series were developed under vegetation and climatic conditions similar to those of the Hartsells soils. They differ from the Hartsells soils in being browner throughout the profile and thinner over the bedrock, but the parent material is similar.

Soils of the Jefferson series have developed on foot slopes of mountains from colluvial and local alluvial materials.[19] The colluvial material consists of fragments and other waste derived mainly from sandstone. These soils have a yellowish-gray A horizon. The surface layer of Jefferson soils is a fine sandy loam of rather low organic matter.

The Holston Soils have developed from old alluvium consisting of materials derived from uplands. Like the other yellow podzolic soils, the Holston Soils have developed from materials that are low in bases and are therefore acid.

The red podzolic soils are members of the Dewey and Talbott series.[20] They have formed under similar vegetative and climatic conditions. The surfaces of the Dewey soils range from slightly undulating to rolling and that of the

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[18] Ibid.

[19] Ibid., p. 101.

[20] Ibid., p. 98.

Talbott from undulating to steep. Both Dewey and Talbott series soils have formed from the residue of limestone, but those of the Dewey contain more insoluble materials, especially silica, than the limestones giving rise to the soils of the Talbott series.[21] The major differences between the soils of these two series seem to result from differences in parent materials.

Soils of the Talbott series have formed from the residue of weathered limestone containing clayey matter. They differ from Dewey soils especially in having less depth to bedrock. In some places there are enough outcrops of rock to make the land stony. Their fairly low position on the landscape and shallowness to bedrock indicate that the parent limestone weathered rapidly and left a relatively small quantity of insoluble material. These soils erode readily when cultivated, and erosion is much more active than on Dewey soils. The red soils cover much less area of Cumberland County than do yellow soils, for there are only limited outcroppings of limestone in the southeastern mountainous section of the county.

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[21] Ibid.

CHAPTER III

THE PEOPLE AND THEIR SETTLEMENT PATTERN

Early migration into Middle Tennessee followed two routes: an overland route across the Cumberland Plateau, and a water route by way of the Tennessee River.[1] At that time the route across the Cumberland Plateau passed through Cumberland Gap and thence southwest along the Cumberland River. Both ways were hazardous and long. More direct routes were later developed from Indian trails. Two of these routes passed through what is now Cumberland County. The first of these, Avery's Trace, opened in 1787, ascended the Cumberland Escarpment and entered the area by way of Emory Gap, where Harriman is now located, and thence westward across the plateau.[2] In 1799, an act passed by the legislature provided for the Walton Road. This road climbed to the plateau through Kimbrough Gap,[3] near the present site of Rockwood, and by following a route roughly like that now followed by the Tennessee Central Railroad and U. S. Highway

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[1] John B. Knox, The People of Tennessee (Knoxville: The University of Tennessee Press, 1949), p. 5.

[2] W. C. M'elwee, "The Old Road," The American Historical Magazine, 8:348, 1903.

[3] Ibid., p. 353.

70,[4] crossed the plateau intersecting Avery's Trace at a point a little north of where Crossville is now located. These roads helped much in bringing people to Cumberland County. Taverns and "stands" were established at convenient distances along the routes of migration. Such stopping points became the nuclei for the early settlements.

The first inn in the territory that is now Cumberland County is believed to have been that built in 1800 at Crab Orchard and kept by a Mr. Sidmore.[5] Robert Burke built the noted Brick Inn at Crab Orchard about 1826. Burke ran a large plantation, farming it with slaves. He also served as postmaster, and operated a turnpike from Kimbrough Gap in Roane County to Sparta, with a toll gate near his inn.[6] In 1830, John Lowery bought some land just south of Crossville, on which he later built a "stand" which contained thirteen log cabins.[7] That same year, Weatherstun Greer moved from Virginia to Grassy Cove where be bought about three hundred acres of land on which he established an inn

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[4] Ibid., p. 354.

[5] Kiwanis Club of Crab Orchard, Tennessee, "A Short History of Cumberland County" (Unpublished, 1952), p. 20.

[6] Ibid.

[7] Ibid.

providing accommodations especially for stockmen of the area.[8]

The origin of the people who settled Cumberland County was the same as that of the people who settled Tennessee in general. The state was settled by migrants who came down the Valley of Virginia or over the mountains from the Carolinas. Many of the settlers came from western North Carolina.[9] The white population was principally of English extraction with lesser numbers of Scotch, German, and Irish.[10]

Some of the earliest grants of land were made shortly after Avery's Trace was put through the area. In 1796, a grant of land at the head of Caney Fork River, covering an area a part of which is now Mayland, was made to Thomas Wade.[11] That same year, a tract of land in Crab Orchard Cove was granted to Stockly Donaldson and William Tyrell.[12]

The present population of the county consists largely of the descendents of the early settlers. Only forty foreign-born white people were residing in the county in 1950.[13] For

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[8] Ibid., p. 19.

[9] Knox, op. cit., p. 9.

[10] Ibid.

[11] Kiwanis Club of Crab Orchard, Tennessee, op. cit., p. 19.

[12] Ibid.

[13] U. S. Bureau of the Census, United States Census of Population: 1950, Vol. II, part 42 (Washington: Government Printing Office, 1952), p. 92.

many years Cumberland County, like the Cumberland Plateau in general, has been a region from which people have gone out in search of better conditions rather than a home for immigrants.

From the time of earliest settlement Tennessee contained Negroes as well as white people, but only a few Negroes have ever made Cumberland County their home. In 1950 only seven Negroes lived there.[14]

Origin of the County

Whenever people settle permanently in a new region a government naturally results. Distances and early modes of travel made a far-removed county seat unsatisfactory and impractical. These reasons furnished the idea for a new county to be carved out of portions of six other counties: White, Rhea, Bledsoe, Morgan, Fentress, and Putnam. On November 16, 1855, the State Legislature passed an act establishing Cumberland County.[15]

Population Growth

Since 1870, at which time Cumberland County had a

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[14] Ibid.

[15] J. B. Killebrew, Resources of Tennessee (Nashville: Tavel, Eastman, and Howell, 1874), p. 662.

population of only 3,460, the number of people living there has been multiplied over five times (Table I). There were 18,877 people reported as living in the county in 1950. This represents a faster growth than occurred in Tennessee as a whole, where the number was multiplied slightly less than three times. In spite of the comparatively rapid increase of people in Cumberland County the number living there in 1950 resulted in a density of only twenty-eight per square mile as compared with seventy-nine per square mile in Tennessee as a whole.

The average per decade rate of increase in population for Cumberland County during the period since 1870 was 23.9 per cent, whereas that for Tennessee was 14.5 per cent. This growth, however, has not been at a steady rate. The percentage increase during the decades ranged from a low of 12.2 per cent for the period 1900-1910 to a high of 54.6 per cent for the previous ten year period.

Since the period of the early settlements the growth of the population has resulted more from natural increase than from immigration from other regions. On the one hand, the unsuitability of the land for farming must soon have been recognized, for people did not move rapidly in and clear away the forest as they did in the Central Basin, and, on the other hand, a high birth rate was maintained. The result has been that the Cumberland Plateau became a region of emigration

TABLE I

POPULATION OF CUMBERLAND COUNTY AND TENNESSEE, 1860-1950[a]

Year	Cumberland County		Tennessee	
	Population	Per Cent Increase Last Decade[b]	Population	Per Cent Increase Last Decade[b]
1860	3,460		1,109,801	
1870	3,461	----	1,258,520	13.3
1880	4,538	31.9	1,542,359	22.7
1890	5,376	18.5	1,767,518	14.6
1900	8,311	54.6	2,020,616	14.3
1910	9,327	12.2	2,184,789	8.1
1920	10,094	13.3	2,337,885	20.1
1930	11,440	13.3	2,616,556	11.9
1940	15,592	36.3	2,915,841	11.4
1950	18,877	21.1	3,291,718	12.9

[a]Sources: U. S. Bureau of the Census, Fourteenth Census of the United States, Vol. I, Population: 1920 (Washington: Government Printing Office, 1921), and United States Census of Population: 1950 (Washington: Government Printing Office, 1952).

[b]Percentages computed from Census data.

rather than one of immigration.

On the basis of 1930 figures, it was estimated that if the birth and death rates for the years 1925-1930 were to continue, the population would more than double itself in each generation of about thirty years. At that time a population that was just maintaining itself would have required only 440 children under five years of age per 1,000 women twenty to forty years of age. The median number of children for the plateau counties was over twice that number, or 909.[16] This estimated rate of growth of the population has almost been maintained in spite of emigration (Table I).

Not only has the population growth not been at a steady rate, it has not been uniform throughout the county. Civil District 1 has experienced the greatest increase with 64.6 per cent during the decade 1930-1940, and 52.8 per cent during the succeeding decade (Table II). Much of the increase during the first period can be accounted for by the establishment of the Cumberland Homesteads project which brought a number of people into the county; the growth of the town of Crossville contributed much to the last period.

In keeping with the decline in population that has come to a number of rural counties in Tennessee and rural

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[16] Edmond J. Lebrun, "The Cumberland Plateau, Its Agricultural Situation and Possibilities" (Unpublished M. A. thesis, Department of Agricultural Economics, The University of Tennessee, August 1942), p. 32.

TABLE II

POPULATION OF CUMBERLAND COUNTY, TENNESSEE, AND INCORPORATED PLACES, 1930-1950[a]

	1930	1940	Per Cent Change 1930-1940[b]	1950	Per Cent Change 1940-1950[b]
Cumberland County	11,440	15,592	36.3	18,877	21.1
Civil district 1	3,135	5,162	64.6	7,990	52.8
Civil district 2	1,603	2,471	54.3	3,094	25.3
Civil district 3	1,452	2,094	44.9	1,464	-30.0
Civil district 4	1,227	1,568	27.8	2,127	35.7
Civil district 5	1,171	1,153	- 1.5	933	-19.1
Civil district 6	1,031	948	- 8.0	1,349	30.0
Civil district 7	291	363	34.0	246	-32.2
Civil district 8	1,550	1,833	18.3	1,674	- 8.7
Crossville	1,128	1,511	33.9	2,291	51.6
Pleasant Hill	165	178	----	152	----

[a]Source: U. S. Bureau of the Census, United States Census of Population: 1950, Vol. II, Part 42 (Washington: Government Printing Office, 1952).

[b]Percentages computed from Census data.

regions in the nation, some civil districts of Cumberland County have experienced a decline in population while that of the county in general was growing. Civil District 5, in the southwestern corner of the county, has continued to lose people since 1930. During the period 1940-1950, it realized a decrease of 19.1 per cent (Table II). The decline in coal mining in the northwestern part of the district contributed to this loss of people. Civil Districts 3, 5, 7, and 8 lost people during the decade 1940-1950.

Some Characteristics of the Population

Incomes

It has frequently been stated that the level of living on the Cumberland Plateau is relatively low. Some definite conditions have contributed to this position: the subsistence type agriculture which has been practiced generally in the past; the depletion of the better saw timber; shifts in the bituminous coal mining industry; and lack of development in manufacturing.

Incomes afford one measure of the level of living. Per capita incomes for Cumberland County, Tennessee, and the United States were shown in Chapter I to have been $398, $869, $1,316 respectively in 1947. Table III shows the comparative family incomes for 1950. The median family income for Cumberland County is only $1,281, which is $700, or 36 per

TABLE III

COMPARATIVE FAMILY INCOMES, 1950[a]

	Cumberland County	Tennessee	United States
Median family income	$1,281	$1,983	$3,073
Per cent of families having less than $2,000 income	70.4	50.4	29.2
Per cent of families having more than $5,000 income	3.6	10.5	20.1

[a]Source: U. S. Bureau of the Census, County and City Data Book, 1952 (Washington: Government Printing Office, 1953), p. 355.

cent less than that for Tennessee as a whole, and only about one-third of that for the United States.

School Enrollment

Proponents of education have presented statistics to show the positive correlation between educational attainment and amount of earnings. Even though this relationship exists, the low incomes in Cumberland County cannot be attributed entirely to lack of educational achievement, for earning opportunities have been peculiarly limited by the conditions mentioned above.

The comparative position of Cumberland County with respect to school attendance is shown in Table IV. Cumberland County compares favorably with Tennessee and the nation with respect to the percentage of children in attendance at grade schools, but when it is noticed that one-fourth of the people of Cumberland County twenty-five years of age and over have completed less than five grades, it can be seen that a large part of the people do not graduate from the eighth grade. Furthermore, the 13.2 per cent of the adults who have completed high school or more is only about one-half the proportion which has attained that level of schooling in Tennessee, and only about one-third that for the United States.

Occupational Experience

Although all the people of Cumberland County are

TABLE IV

COMPARATIVE SCHOOL ATTENDANCE, 1950[a]

	Cumberland County	Tennessee	United States
	(Figures are given in per cent)		
Persons 7-13 years old in school	93.0	94.8	95.7
Persons 14-17 years old in school	75.3	77.4	83.7
Persons 25 years old and over who have completed less than five grades	24.6	18.7	11.1
Persons 25 years old and over who have completed high school or more	13.2	24.7	34.3

[a]Source: U. S. Bureau of the Census, County and City Data Book, 1952 (Washington: Government Printing Office, 1953), p. 355.

classified as rural by the United States Census definition, they are by no means all farmers. Even when the 2,291 people living in Crossville in 1950 are excluded, an appreciable percentage of the remainder is composed of non-farm population. There were 8,761 rural non-farm people in Cumberland County in 1950,[17] making up 46.4 per cent of the total population. If the people within the corporate limits of Crossville are considered not to be farmers, then there are 6,470 non-farm people living outside Crossville. In this manner it can be computed that at least 39 per cent of the people living outside of the one town in the county are not farmers.

The percentage of the population occupied in selected industrial groups is given in Table V. Although nearly half of the people of the county are not farmers, the data presented there show that only a small proportion, 15.4 per cent, of the employed people are occupied in manufacturing.

On the Cumberland Plateau mining, lumbering, and the wood products industries have been the chief employers of the non-farm laborers historically. With the depletion of the more readily available coal and the better saw timber, employment in these two primary industries has declined until the former occupies only 11.7 per cent and the latter only 9.5 per cent of the employed people. In spite of the

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[17] U. S. Bureau of the Census, United States Census of Population: 1950, op. cit., p. 122.

TABLE V

OCCUPATIONAL DISTRIBUTION IN CUMBERLAND COUNTY, TENNESSEE, 1950[a]

Selected Industrial Groups	Number Employed	Per Cent[b]
Agriculture	1,621	31.5
Mining	599	11.7
Construction	322	6.3
Manufacturing	790	15.4
Furniture, lumber, and wood products	487	9.5
Textile mill products	134	2.6

[a]Source: U. S. Bureau of the Census, United States Census of Population: 1950, Vol. II, Part 42 (Washington: Government Printing Office, 1952), p. 100.

[b]Percentages are computed.

large percentage of non-farm people living outside of Crossville, agriculture is still the leading occupation, engaging 31.5 per cent of all occupied workers.

Housing Conditions

Housing conditions are one indication of how well a people in a modern industrial nation have fared, and how well equipped they are with tangible assets to grasp new opportunities. The data in Table VI show that in both the state of repair of their dwellings and the extent to which their homes are equipped with modern devices, the people of Cumberland County compare unfavorably with those of Tennessee as a whole or with those of the United States. Only 16.3 per cent of the houses of Cumberland County are not in a dilapidated condition and have a private bath and hot running water, as compared with 26.7 per cent for the Tennessee rural non-farm dwellings, 46.4 per cent of the United States rural non-farm dwellings, or 24.3 per cent of the United States farm dwellings.[18]

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[18]Since all of Cumberland County is classified as rural, and a larger percentage of the people are farmers than are in that category in Tennessee or the United States, these classes make a more equitable comparison with Cumberland County than would the total population of Tennessee or the United States. Furthermore, since housing conditions are generally poorer in rural areas and on farms than in urban regions, Cumberland County would compare even more unfavorably with the total population of Tennessee or the United States.

TABLE VI

HOUSING CHARACTERISTICS, 1950[a]

Characteristics	Cumberland County	Tennessee Rural Non-farm	Tennessee Farm	United States Rural Non-farm	United States Farm
	(Figures given in per cent)				
Not dilapidated:					
With private bath and hot water	16.3	26.7[b]	8.9[b]	46.4[b]	24.3[b]
With private bath and only cold water	2.4	1.9[b]	0.7[b]	3.6[b]	2.1[b]
Dilapidated:					
Lacking private bath and hot water	28.5	20.2[b]	25.4[b]	11.8[b]	16.6[b]
No piped running water	67.4	50.6	76.7	28.6	54.6
With central heating system	3.4[b]	9.9[b]	3.3[b]	31.1	18.1
No bath tub or shower	75.2[c]	67.8	87.4	46.6	69.8
With electric lights	62.5[c]	83.1	70.7	90.3	77.7
With mechanical refrigeration	44.5[c]	61.8	52.1	72.3	62.7
No refrigeration equipment	45.8[c]	24.2	33.1	16.1	25.5
No kitchen sink	76.5[c]	52.5	72.9	26.5	45.2
With radio	76.8[c]	93.6	93.7	93.1	92.0

[a]Source: U. S. Bureau of the Census, United States Census of Housing: 1950, Vol. I, General Characteristics, Part 5 (Washington: Government Printing Office, 1952).

[b]Only the occupied dwellings included.

[c]Percentages computed from Census data.

Conversely, Cumberland County maintains the same relative position with respect to the state of repair of the homes. Table VI shows that 28.5 per cent of the houses in the county are dilapidated and lack a private bath and hot running water, whereas only 20.2 per cent of Tennessee's rural non-farm houses, 23.4 per cent of Tennessee's farm houses, 11.8 per cent of the rural non-farm houses of the United States, and only 16.6 per cent of the farm houses of the United States are in this condition.

When the position of Cumberland County with respect to modern conveniences in the home is examined, it is found that it fares no better than it does in the state of repair of the homes. Only 3.4 per cent of the homes of the county have central heating systems, 67.4 per cent have no piped running water, 75.2 per cent have no bath tub or shower, 45 per cent have no refrigeration equipment, and 76 per cent have no kitchen sink. In nearly every aspect Cumberland County compares unfavorably with both Tennessee and the United States.

Some of the rural non-farm dwellings are the poorest. Many of these are miners' homes, or are homes of people who once were miners (Fig. 12), however, some of the farm homes are equally poor (Fig. 13). On the other hand, some of the finest homes in the county are non-farm dwellings outside of Crossville. A number of superior houses have been built since

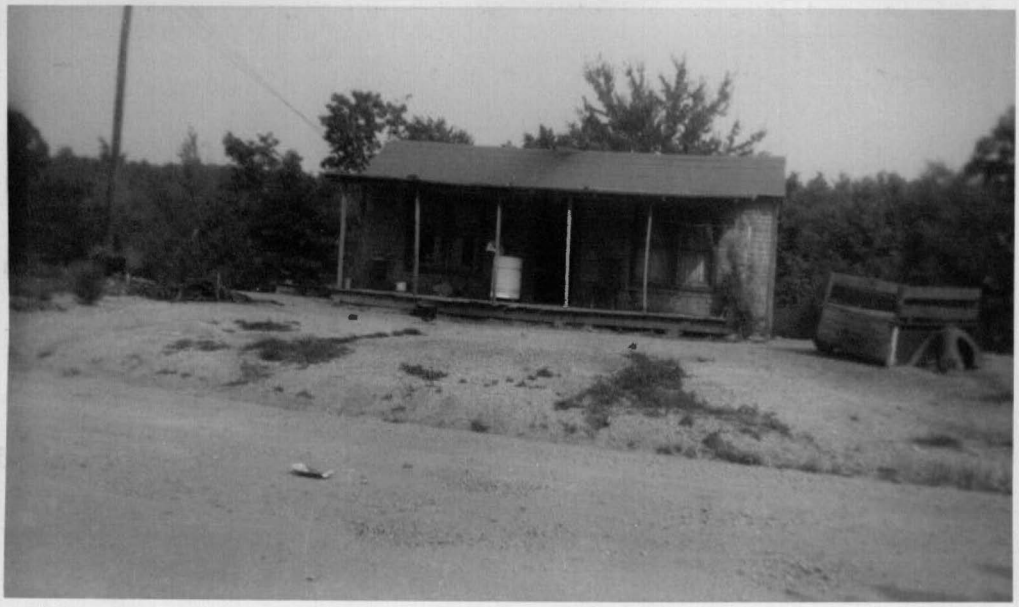


Figure 12. One of the poorer rural non-farm homes in the Crab Orchard Mountains area.



Figure 13. One of the poorer farmsteads in a section of Cumberland County where fields have been allowed to go uncultivated for several years.

World War II in a restricted subdivision outside the corporate limits of Crossville to the south (Fig. 14).

The position of Cumberland County with respect to housing conditions does not necessarily reflect any lack of aspiration or ambition on the part of the people. Rather it reflects the economic handicaps with which the people have been burdened. And these handicaps grow out of the general economic situation of the Cumberland Plateau.

The Settlement Pattern

The General Distribution of the Population

The pattern made by the distribution of the people in Cumberland County is like that made by the roads. This could be said for most civilized areas of the world. There is a problem worthy of consideration, however, for if there are peculiarities in the road pattern there will be peculiarities in the settlement pattern.

Topography is a strong factor shaping road patterns. The pattern found on the Appalachian Plateaus stands in sharp contrast to that of the Central Lowlands. The roads of the plateaus are winding and without apparent system, a result of following the easiest courses over an irregular terrain, whereas a uniform rectangular arrangement is permitted by the plains of the lowlands.



Figure 14. A typical home in Volunteer Heights, a modern subdivision south of the Crossville city limits.

Even in the parts of the plateaus which have been relatively little dissected so that the surface is only rolling, the dendritic drainage pattern which has developed has made itself felt in directing the routes of travel. The part of the Cumberland Plateau included in Cumberland County has mostly a youthful topography, and consequently the roads seek the more level land of the interfluves.

In a region with an irregular surface that is mostly in timber the cleared areas will tend to be on the land with least slope. If the topography is youthful, least slope will be found on the interfluves. The cleared land in Cumberland County generally follows this pattern; the exception being in the coves of the Crab Orchard Mountains section. This makes it easy for the clearings to cling to the roads, and for the people to live both on their clearings and along the roads. Thus we find the people of Cumberland County distributed along the roads, with some relatively large virtually unpopulated areas between the principal routes of travel.

Since there is relatively little variation from one part of the county to another in the average number of people per dwelling unit, the distribution of the people must correspond to the distribution of dwellings. Certainly the pattern made by the dwellings is the pattern of settlement (Fig. 15).

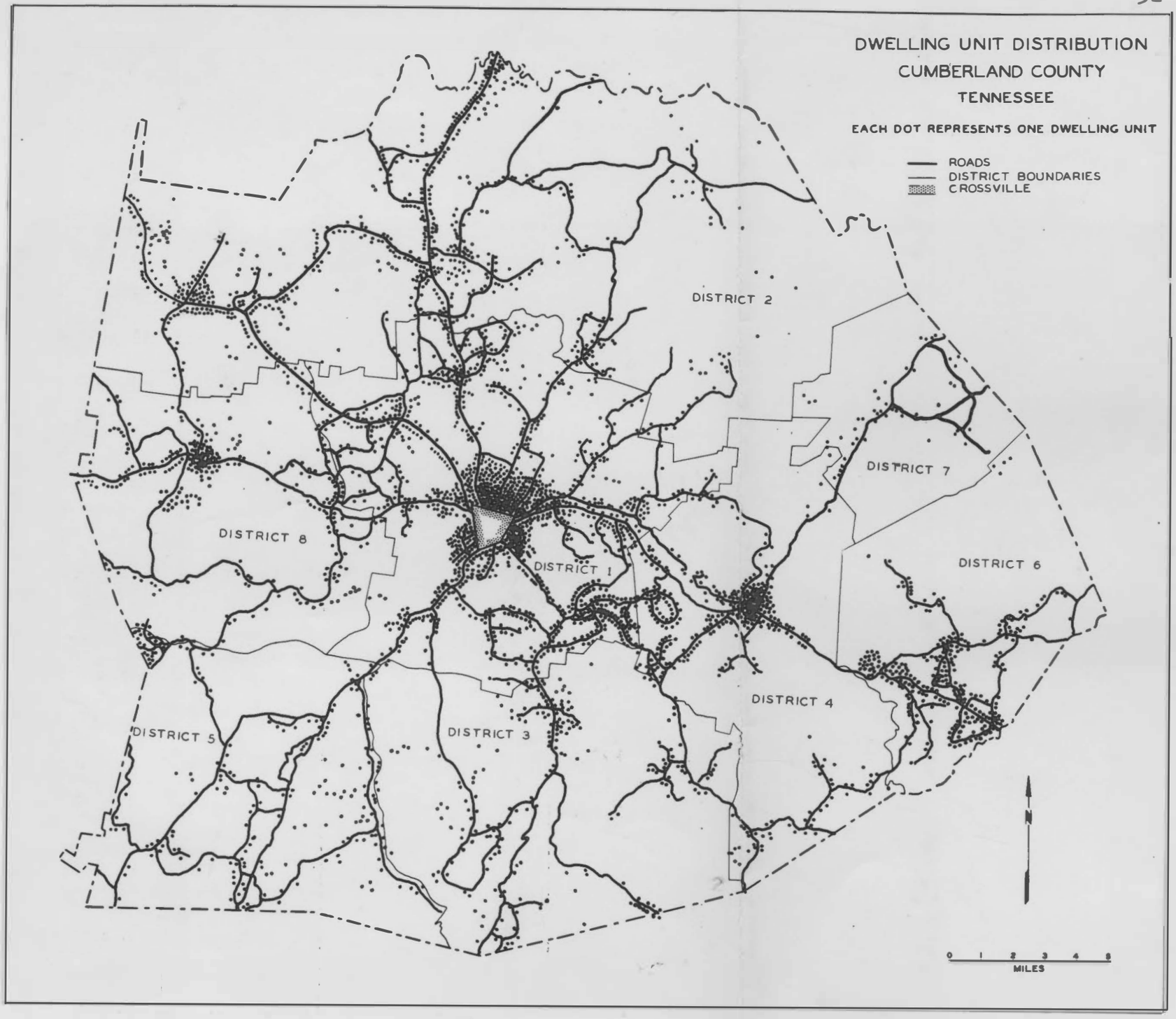


Figure 15. The settlement pattern and civil districts of Cumberland County.

If the topography of Cumberland County were in a later stage of erosion, so that broader valleys had been developed or so that the valleys had been cut into the underlying limestone which would have furnished more fertile soils, valley settlement would have obtained. A valley settlement pattern in a young region would have resulted in more internal isolation, for communication from one young valley to another is always handicapped. Neither would a valley settlement pattern have permitted the easy access to a central trading center and market like that which has developed in Cumberland County with the existing ridge settlements. Furthermore, it is likely that inter-regional relations would have been less well developed with valley settlements, for, even though the valleys would have led to the Great Valley on the east or the Central Basin on the west, modern through highways and railroads would not have followed the circuitous courses of streams.

The chief variation from the ridge or interfluve settlement pattern occurs in the southeastern sector of the county in the coves of the Crab Orchard Mountains area and in the northern tip of Sequatchie Valley to the southwest. Here broader valley bottoms with soil developed from limestones have attracted settlements.

The people are not uniformly distributed throughout Cumberland County. As the roads converge upon Crossville, their mileage density increases generally with distance

from the periphery toward the center of the county, and the population density increases in like manner (Fig. 15). The roads that lead into Crossville like crooked spokes of a wheel are relatively evenly spaced with the exception of the northeastern quadrant of the county. In this sector, because of dissected mountains, slope and relief increase toward the border of the county, with the result that there is less land suitable for clearing or road building, and consequently less need for roads. Furthermore, much of this part of the county is occupied by the Catoosa Wildlife Management Area. Thus the population is sparse in this sector. This area, consisting of Civil Districts 2 and 7 (Fig. 15), which contain about one-third of the area of the county, has only approximately one-sixth of the people (Table II, p. 37).

The lower density of population which occurs in District 2 as a whole exists even though the western part of the district is one of the most densely populated parts of the county. This area contains two of the principal roads and the largest expanse of level land, and consequently, one of the most important farming sections of the county.

An area containing a unique and unnatural appearing road pattern, and consequently settlement pattern, is found a few miles southeast of Crossville. This is the Cumberland Homesteads community, a planned settlement. The peculiarity of the pattern here resulted from the desire to have the houses clustered as closely together as possible and yet

have them on individual tracts of land.

Villages and Towns

According to the Bureau of the Census definition, Cumberland County's population is completely rural. Only one populated place, Crossville, with its 2,290 people in 1950, contains the aspects and provides the functions which are usually associated with a town. The only other incorporated place in the county, Pleasant Hill, with 152 inhabitants in 1950, has failed to develop into a genuine town; it actually lost some of the 178 people who made it their home in 1940, and even more of the 227 who were there in 1910.[19] One other place, Crab Orchard, located east of Crossville on U. S. Highway 70, once gave promise as a lumbering center of growing into a town, but as the timber was cut away it too declined. Crab Orchard now consists of an unincorporated trading center with a few stores, garages, and churches. At the present time it is largely dependent upon a nearby limestone mine where members of many of the approximately one hundred families of the neighborhood find employment. The economic development of the county at this time seems to be sufficient to support only one town.

Crossville. Crossville, the seat of the county government, is situated nearly in the center of this

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[19]U. S. Bureau of the Census, Fourteenth Census of the United States, Vol. I, Population: 1920 (Washington: Government Printing Office, 1921), p. 30.

political unit. The central location is responsible for its being chosen as the county seat, for the act which established the county stipulated that the county seat should be within five miles of its center. Had Crossville not been made the county seat, Mayland, a village northwest of Crossville on U. S. Highway 70 N., or Crab Orchard, might have grown into the principal trading center of the area, for both points were important stopping places on the old Walton Road and once were much more populous and active than now.

Even though Crossville has only 2,290 people it is still the largest town on the Cumberland Plateau in Tennessee. Its central position on the upland, and its location on U. S. Highway 70 and the Tennessee Central Railroad have encouraged its development as a market center which, for some products, serves areas beyond the borders of the county. This "metropolis of the plateau" grew from a settlement that developed at the crossing of two early roads through the area. These roads which followed much the same routes as are now followed by U. S. Highway 70 and Tennessee State Highway 28 which intersect here.

Crossville, in addition to being the main supply center for most of Cumberland County, serves two other principal functions. It is the outlet for many of the products of the central part of the plateau, and the processing point for some of the county's raw materials. Lumber, pulpwood, acid wood, and railroad ties are

concentrated here for shipment. Sandstone from numerous small quarries is brought here for distribution by the larger producers who have contacts with the outside markets. A stockyard and sales barn serve the plateau as a livestock marketing center.

The processing plants render a vital service to the economy of the plateau. Hickory timber from one hundred miles around is turned into striking tool handles. Oak wood from a number of surrounding counties becomes woven-seat chairs. Here, rough lumber from many widely scattered, small sawmills is planed into finished lumber. Complete housing structural materials are made from Cumberland County's pine. Strawberries, green beans, and peppers are canned for outside sales.

Crossville has spread out in nearly all directions from the public square where the courthouse is located (Fig. 16). The streets generally follow a grid pattern. Away from the central business district, some angular variation from a simple rectangular arrangement results from the directions taken by the railroad and early roads. As a result of the attraction of the railroad and U. S. Highway 70, the town has expanded more toward the northwest. Rough topography has been a deterrent to development along these routes in their other direction. Only immediately to the northeast of the public square has the town noticeably failed to expand. Here also, slope and relief have been handicaps.

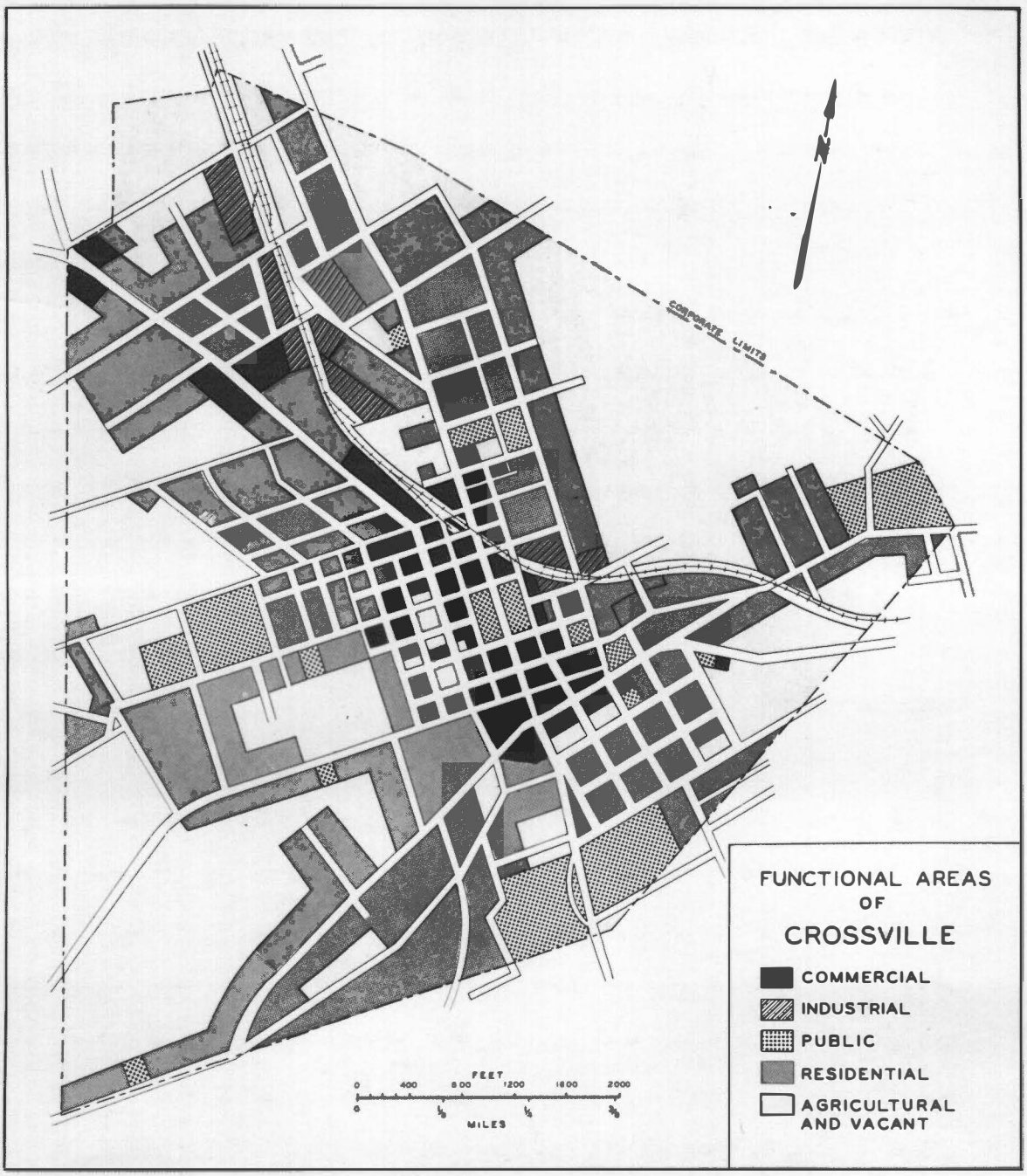


Figure 16. The functional areas of Crossville, Tennessee.

The pattern of the functional areas of Crossville is like that of the average American county seat (Fig. 16). In the center of the town is the public square about which the commercial core has developed. A small variation from the normal occurs in the public square itself. In the average county seat the courthouse is likely to be in the middle of the square, or the square might have only a monument in its center with the remainder of the area consisting of open pavement. In the case of Crossville the public square is divided by the main thoroughfare into two parts with the courthouse on one side and the U. S. Post Office and a small park area on the other.

The business district of the town has pushed out more toward the northwest and the southeast than toward the other two general directions. This extension results from the fact that the town first spread out along an old road, the old road becoming the main street. One of the oldest frame structures, dating back almost a century, still stands on a prominent corner of the main street in the center of the business district (Fig. 17). The main street of the business district, throughout most of its length, however, is lined with modern buildings constructed of native sandstone, and it reflects some of the prosperity of the war and post-war years (Fig. 18).

Crossville's industrial areas begin with a handle mill immediately behind the courthouse, while other plants are



Figure 17. One of Crossville's early structures located on a prominent corner in the central part of the business district.



Figure 18. The principal street in Crossville's business district.

scattered along the Tennessee Central Railroad toward the northwest. Two factors have contributed to the location of a manufacturing plant adjacent to the public square: the railroad passes through the center of town; and, the mill was established in 1920 when Crossville was a village with a population of only 948.[20]

Much of the public land area of Crossville is taken up by schools and a hospital. The community is served by a modern grade school and high school (Fig. 19). Cumberland County is fortunate in having one of the most modern and best equipped hospitals in Tennessee (Fig. 20).

The residential part of Crossville also has not grown an equal amount in the various directions away from the center of town. Northwest and southwest from the commercial core are the areas which have had most growth. These areas of development are along principal roads: U. S. Highway 70 and Tennessee State Highway 28 to the northwest, and the Lantana Road, a major county road, to the southwest. A northeast-southwest trending low ridge extends across the southeastern part of town. This higher land has been used for some of the better residences, the older ones immediately southeast of the business district, and the more recent ones farther out to the southwest.

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[20] Ibid., p. 301.



Figure 19. Cumberland County High School.



Figure 20. Cumberland Medical Center.

A section of poorer residences lies to the west of the business district. The low land in this area has been less desirable for home sites. Westward and northeastward from the center of town the land has been used less for residential development as well as for other urban functions. Lower land and less level land have made these areas less desirable. In these sections a considerable area within the corporate limits is either vacant or used as farmland.

The people of Crossville today are, like those of the county in general, composed almost entirely of descendants of the early settlers. There were only six foreign born people, and no Negroes, reported in 1950.[21]

Communities and Neighborhoods

The term rural community has come to be used by sociologists to indicate the relationships existing between people and institutions in the area composed of a village and its surrounding farms.[22] Such rural communities are typical of American agricultural regions in which farm families are dispersed over their lands about a village or town which serves as a center for their buying, marketing, church-going,

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[21]U. S. Bureau of the Census, United States Census of Population: 1950, op. cit., p. 74.

[22]Carl C. Taylor, et al., Rural Life in the United States (New York: Alfred A. Knopf, 1949), p. 56.

recreation, and other common activities.[23] This conception has been of a town-country community, supplied with specialized trade and social agencies. As such it would have specialized stores, a bank, a high school, garages, and marketing or shipping facilities. Because of these services and because of a feeling of unity furthered by such factors as the interests of the civic organizations, Cumberland County functions in many respects as a single community.

This concept of a rural community must be modified, however, for the Cumberland Plateau counties, where in some instances the only bank, specialized store, or any one of a number of other functions is located in the county seat. This is true in the case of Cumberland County, even though many of the institutions necessary for the proper functioning of the total community are found only in Crossville; for there are twelve areas within the county which are considered to be communities and which are even formally organized in some cases for such purposes as "community improvement."[24]

How, then, are the people of Cumberland County organized into social groups on some areal basis smaller

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[23] Ibid., p. 57.

[24] H. J. Bonser and R. G. Milk, "Neighborhoods and Communities of Cumberland County, Tennessee," Monograph No. 129, Rural Research Series (Knoxville: Department of Agricultural Economics and Rural Sociology, The University of Tennessee, 1941), pp. 1-14. (Unpublished)

than the entire county? The unit next larger than the family that functions in rural regions is the neighborhood. The neighborhood consists of a group of families, living in a more or less continuous area, who have frequent face to face contact with each other, and in which a consciousness is felt of belonging to a group.[25] Members of neighborhoods in Cumberland County have a strong feeling of belonging to a group, to a particular neighborhood.

These neighborhoods all have formal names, fifty-four of which appear on the General Highway Map of Cumberland County published by the State Highway Department, names which are locally used and, in some instances, are rather widely known (Fig. 21). The neighborhoods on the Cumberland Plateau are frequently referred to as settlements; the term settlement is used synonymously with neighborhood possibly because of the origin and/or the isolated condition of some of the neighborhoods.

The neighborhoods of Cumberland County vary considerably in size, service agencies, and degree of self sufficiency. With respect to number of members, they vary from as few as ten families in several instances to as many as 150 families in the case of Daysville in the eastern part of the county.[26]

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[25]Taylor, op. cit., p. 57.

[26]Bonser and Milk, op. cit., p. 9.

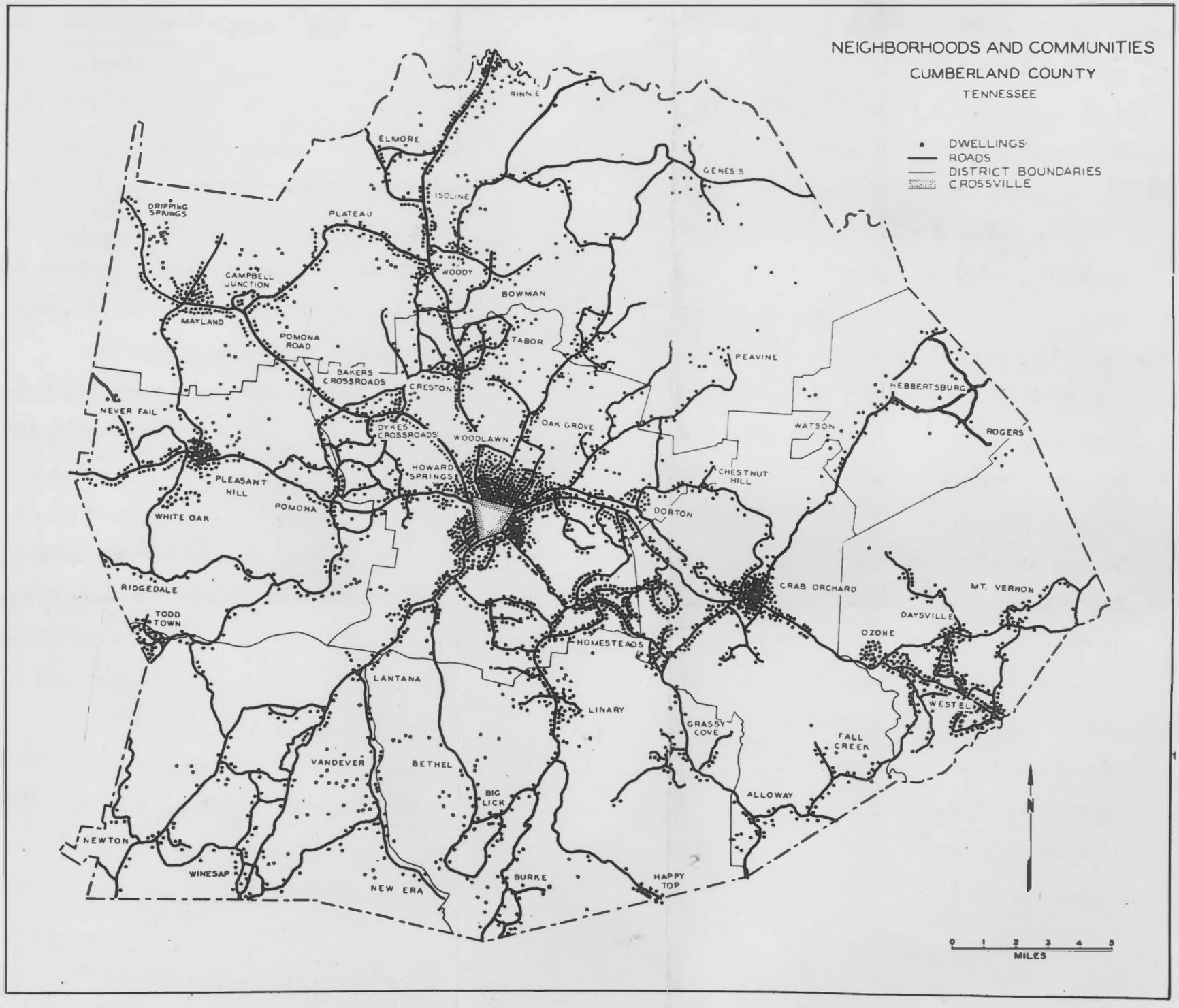


Figure 21. Neighborhoods and communities of Cumberland County.

The neighborhoods tend to focus upon a church, a school, or a store which serves as the principal point of contact for the member families. A church and some kind of store may be found in nearly all of them, and most of them had schools at some time in the past. Consolidation, permitted by better roads, has eliminated the schools from many; however, twenty-six of the neighborhoods still have schools.[27]

Nearly half of the neighborhoods, or at least twenty-five of them, once had U. S. Post Offices. Isolation of the neighborhoods resulting from the lack of roads once made rural free delivery impractical in this region, but improved roads and modern modes of travel have caused the rural post office to vanish along with the one-room school. Only four U. S. Post Offices remain in the county outside of Crossville.

Although church buildings may be found in most of the neighborhoods, many of them have only Sunday schools that convene weekly. For worship services the people of these neighborhoods depend upon "circuit riding" ministers whose Sundays are shared with other churches.

In some instances a grist mill was the chief attraction bringing people together at the focal point of the neighborhood. Some of these old mills may still be seen, as the one

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[27]Interview with Mr. Glen Martin, County Superintendent of Schools, March 1956.

in the Linary neighborhood, south of Crossville on Tennessee State Highway 28 (Fig. 22).

Because of the limited services rendered by many of the neighborhoods, their members have associations with other neighborhoods. Thus, in many cases there is a functioning social group which includes several neighborhoods; this is the rural community of the Cumberland Plateau. About forty-five neighborhoods are combined to make up the twelve rural communities of the county.[28]

The extent to which neighborhoods can be grouped together into communities is dependent upon means of transportation. Families financially able to own an automobile may drive a considerable distance to trading centers where wider selections of goods can be had, whereas those dependent upon walking must trade either at the local neighborhood store or with "rolling stores."[29] Retail stores may be the strongest force shaping community structure, but the same general pattern will be maintained by the other community functions. The size of the area served by a church, for instance, will be no greater than the distance people feel they can afford to travel to the services.

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[28]Bonser and Milk, op. cit., pp. 1-14.

[29]Rolling stores consist of trucks, loaded with groceries and sundry household items, which make scheduled trips over regular routes, through rural areas, stopping from house to house.



Figure 22. An old grist mill located between Crossville and Sequatchie Valley on Tennessee State Highway 28.

The communities, as do the neighborhoods, occupy given areas, and thus have a spatial concept. They both tend to have recognized focal points, however, which, as was pointed out above, may be either a store, a church, a school, or a combination of these. The focal points are likely to be located at crossroads, which points bear the neighborhood or community name. Although a community consists of a group of neighborhoods, the name by which the community is known is the name of one of the neighborhoods comprising it. This condition results from the nature of the development of the rural communities; the centripital forces of superior or more extensive services of one neighborhood lead families of other neighborhoods to have associations with it.

Even though, in areas where resources are greater and travel is easier, the families from a number of neighborhoods may conveniently converge upon one place for certain community functions, in some of the poorer areas of Cumberland County it is difficult for a significant proportion of the families to get to places other than their own neighborhood centers. Thus there are approximately twenty neighborhoods in Cumberland County whose member families have little association with other neighborhoods other than their infrequent contacts with Crossville; consequently, they are recognized as independent neighborhoods, and are not grouped with others in forming communities.[30]

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[30]Bonser and Milk, op. cit., p. 14.

Contrasting with the other communities, and for that matter with the independent neighborhoods, the Cumberland Homesteads area, consisting of approximately two hundred families, is considered to be a community, even though it has no separate neighborhoods. This group of families occupies an area which is recognized by the people as a separate community in spite of its proximity to Crossville, and in spite of the fact that the families must carry on their banking, their marketing, and most of their shopping in Crossville. The uniqueness of this community results from the fact that it did not develop naturally like the others, but rather was established by a governmental agency.

The Cumberland Homesteads Community

Establishment. Some rather unusual circumstances surrounded the establishment of the Cumberland Homesteads. In the early 1930's, economic conditions on the Cumberland Plateau were strained to the extent that even subsistence was difficult. Depression prevailed throughout the country, and unemployment was severe.

Several factors contributed to the especially crucial situation on the plateau. With the coming of the Tennessee Central Railroad near the turn of the century, much of the timber of the area was cut and marketed. It was estimated that at one time nearly one-third of the population earned

its living by working in the timber industry.[31] In 1933, with the nation in depression and the timber gone, this was no longer possible.

A further reason for the critical economic conditions on the plateau was the plight of the soft coal mining industry. Bituminous coal mining had been one of the hardest hit industries by the depression. Furthermore, much of the readily available coal on the plateau had been mined. Several mines had been abandoned, and the workers were left stranded in a non-agricultural territory without funds with which to move.

These were the general conditions that led to the establishment of a subsistence homesteads project on the Cumberland Plateau,[32] one of thirty-three subsistence homesteads which were scattered over the country.[33] The subsistence homesteads projects were built around part-time farming and part-time rural industry. The basic concept of the plan

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[31] James E. Montgomery, "Two Resettlement Communities on the Cumberland Plateau, An Introductory Study of Recent Utopian Reforms" (Unpublished M. A. thesis, Department of Sociology, Vanderbilt University, 1941), p. 77.

[32] "The subsistence homesteads projects were first established by the Subsistence Homesteads Division of the Department of Interior under the provisions of Section 208 of the National Industrial Recovery Act. Administration of these projects was transferred to the Resettlement Administration in 1935, and was finally lodged with the Department of Agriculture in 1937 as one of the many functions of the Farm Security Administration." Russell Lord and Paul H. Johnstone, "A Place on Earth, A Critical Appraisal of Subsistence Homesteads (Washington, D. C.: Bureau of Agricultural Economics, U. S. Department of Agriculture, 1942), p. iv. (Unpublished)

[33] Montgomery, op. cit., p. 74.

was that unemployed families would be established on small subsistence farms, and that they would supplement their incomes by part-time employment in industries which were already there or would be established in the communities.

The Cumberland Homesteads project was centered a few miles southeast of Crossville (Fig. 23). Much of the land in this area was held in large tracts; consequently, when a search began for a tract of at least 10,000 acres for such a project, it was easy to find it in this section of the plateau. The first purchase, consisting of 10,000 acres, was made in 1934 from the Missouri Land and Coal Company.[34] In 1936, an additional tract of 420 acres that was practically surrounded by the original purchase was bought from a local owner for $30,000.[35] The purchase of another tract of land totalling about 838 acres was authorized by the board of directors in 1937.[36] There were about 300 acres of this tract which had already been cleared so that it could be cultivated that year. The total acreage of land in the

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[34] Crossville Chronicle, January 4, 1934, p. 4.

[35] The average selling price of land in the area at that time was about $7.00 per acre. Some could be purchased for as little as $1.00, and according to Fleming, none should have cost more than $20.00 per acre. Arklie Lee Fleming, "Economic Set-up of the Cumberland Homesteads, Crossville, Tennessee" (Unpublished M. A. thesis, Department of Economics, George Peabody College, 1941).

[36] Crossville Chronicle, January 28, 1937, p. 5.

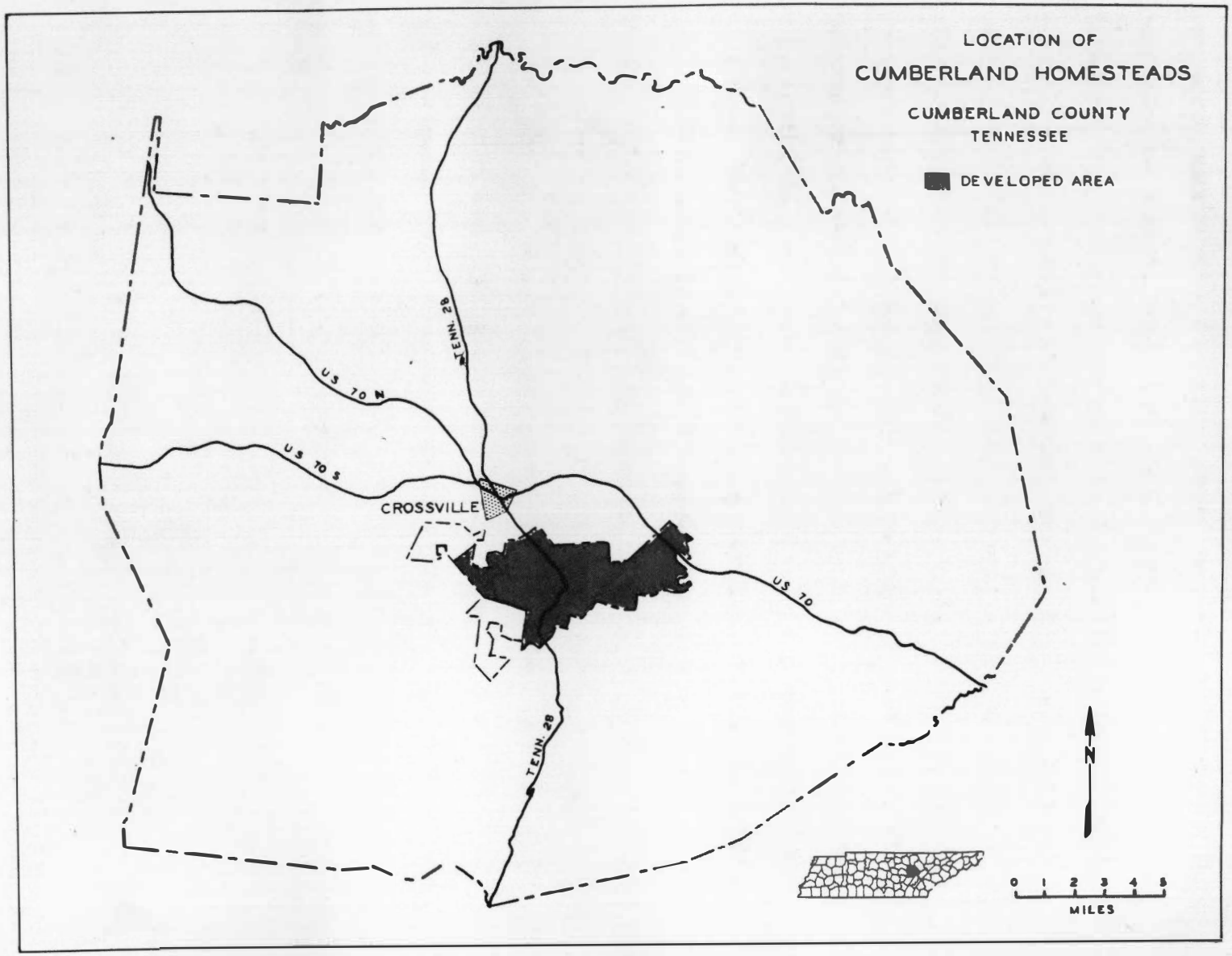


Figure 23. Location of the Cumberland Homesteads.

project amounted to 27,803, including 5,055 acres owned by a cooperative association which was established, and 1,300 acres which became Cumberland Mountain State Park. Part of the land consisting of about 5,000 acres was considered coal land on which a coal mine was later opened.[37]

Most of the land purchased for the Cumberland Homesteads had been cut over but it had never been cultivated, however fifteen farms were already in operation within the area when the project was started. Approximately 3,000 acres were cleared by the government at a cost of $65 to $150 per acre. The average cost for clearing to the farmers of that area was $7.00 per acre.[38] It should be noted, however, that in the government clearing, all stumps, sticks, and stones were removed so that the ground could be cultivated with great ease, whereas ordinarily farmers left the stumps to be removed after the first year or two of cultivation.

The work of clearing the land brought considerable immediate relief to the county. By July 1935, there were seven hundred men employed clearing the land and building roads,[39] and later as many as 1,400 were working at one

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[37] Crossville Chronicle, July 28, 1938, p. 1.

[38] Fleming, op. cit., p. 12.

[39] Crossville Chronicle, July 4, 1935, p. 1.

time.[40] The monthly payroll reached $30,000 in April 1936.[41]

The project was settled by 253 families who moved into homes constructed from native stone and timber obtained on the Homesteads property, and built by the homesteaders themselves.[42] The farm units ranged from seven and a half acres to 150 acres, averaging thirty-five acres each. The farms were equipped with barns and tools, and stocked with animals.

At a central point in the project area a grade school, a high school, a gymnasium, and a community center were constructed. These buildings still serve the community (Fig. 24).

Characteristics of the settlers. The families selected for the homesteads were stranded miners, displaced lumbermen, and some farmers from submarginal land. Many of them had been on relief for three or four years. About 50 per cent were selected from Cumberland County, 35 per cent from adjoining counties, 10 per cent from the remainder of the state, and 5 per cent from outside of the state.[43]

The selectees had previously been employed in various

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[40] Lord and Johnstone, op. cit., p. 86.

[41] Crossville Chronicle, April 2, 1936, p. 1.

[42] Crossville Chronicle, July 28, 1938, p. 4.

[43] Lord and Johnstone, op. cit., p. 34.

manners. Of the 228 family heads listing their former occupation on their application forms, 40.3 per cent gave their most common occupation as unskilled labor, of this number many had been doing unskilled labor in local coal mines; 31.3 per cent of the total had owned and operated farms or small businesses; 11.6 per cent classified their occupation as skilled labor; and 9.0 per cent as semi-skilled labor. Nine of these family heads were professional people, including a physician and a former member of a university faculty.[44]

The heads of the families who settled the project were relatively young. Almost 60 per cent of the husbands and 75 per cent of the wives were under thirty-five years of age; less than 8 per cent of the men and 7 per cent of the women were forty-five years old or older.[45] This selection of younger families was done deliberately, based on the belief that younger families would more readily make adaptations to the new ways, and that they would have a better opportunity of completing the long term contract which would be necessary in order to pay for the homes.

In many of the families formal schooling had been comparatively meager. Almost 68 per cent of the husbands

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[44] Ibid., p. 84.

[45] Ibid., p. 85.



Figure 24. The Cumberland Homesteads community center.



Figure 25. A typical home in the Cumberland Homesteads project.

and 67 per cent of the wives had attended no more than grammar school, and about half of these had not completed the eighth grade. Approximately one-fourth of all parents had attended high school, about 10 per cent having completed all four years. About 4 per cent had college degrees.[46]

Although many of the men had had well-paying occupations in former years, they were definitely on the lower income level during the year preceding their selection. Many of the selectees were taken directly from relief rolls. Others were unemployed, some having had no earnings for months.[47]

Method of payment for homestead improvements. The average homesteader was bound to the government for forty years, at the end of which time he was to receive a quit-claim deed to his home. If the government decided the client would make a good homesteader, at the end of ten years he was to receive a deed to his property provided he had paid all debt to the government. The homesteader could make all payments save one as early as he chose, but the government was not obligated to receive the last payment until the end of the forty year period.[48]

The homesteaders who occupied their property prior

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[46] Ibid.

[47] Ibid.

[48] Fleming, op. cit., p. 82.

to the completion of the project construction did so under a temporary agreement. Under this contract rental payments were charged amounting to about $11.00 per month. Each lease contained an option to purchase the property which could be exercised at any time by a single payment of $10.00 or more, with the other payments to be made by the homesteaders in amounts of $10.00 or more at any time they saw fit within forty years.[49]

Upon completing the construction of the project the cost was prorated among the individual homesteads, and a final contract was drawn up in which the total amount due was set forth. The average total cost per unit was $7,335, which was far more than the homesteaders could afford to pay for them.[50] In 1937, all homesteads were appraised at their agricultural value by independent appraisers. The units consisting of small farms were offered at an average valuation of $1,927, whereas some of the units having full-time farms were evaluated as high as $4,360.[51] The units were appraised and sold to the homesteaders at approximately 20 per cent of the cost of construction.[52]

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[49] Crossville Chronicle, January 19, 1939, p. 1.

[50] Montgomery, op. cit., p. 85.

[51] Crossville Chronicle, January 19, 1939, p. 1.

[52] Fleming, op. cit.

Type of dwellings constructed. There were twelve different plans for the dwellings, ranging from four to seven rooms each. All were equipped with electricity and modern plumbing. Attractiveness rather than economy and efficiency seems to have been the dominant criterion for building (Fig. 25). As a result the houses are not well adapted to farm use. Few of them have basements in which to store farm products, however storage houses were built separately. The kitchens are as small as those of urban dwellings, and many bedrooms are so small double-deck beds are required.

Homesteads farming. During the first two years of the projects operation, little attention was given to the farming possibilities of the land. Except for small gardens, major efforts and attention were directed toward construction. But as the construction drew to a close, attention slowly shifted to the development of the land. At that time relatively little was known about the production capacity of the soil in that immediate vicinity. Most of the land of the project had never been touched by the plow.

The University of Tennessee and the Tennessee Valley Authority assisted in the agricultural program of the homesteads. The Agricultural Experiment Station carried on a program of "Home Production of Food Supplies" designed primarily to determine the most suitable crops, from an economic point of view, for the conditions which existed.

The year 1936 was utilized largely in getting the various cropping systems under way and in making various experiments with the more important crops. A few homesteads were selected as experimental farms and the operators were paid to follow the directions of the experiment station.[53]

Cooperative enterprises. When the construction was finished and these pay rolls brought to an end, the homesteaders had no means of supplementing their incomes. No provisions had been completed for a lasting economic base for the people on the project. For a time the hope had prevailed that by some form of subsidy some privately operated industry could be induced to move into the community, but no industrialist was found who was willing to establish a plant there. Not only was the nation still in depression, but the local handicaps were many: few of the homesteaders were skilled, markets did not exist or were distant, local raw materials were limited in type, transportation facilities were inadequate, and freight rates were high.

"The device of the cooperative was finally hit upon as an expedient that would permit the establishment of the all-important economic base without which the project was doomed to immediate collapse."[54] The Cumberland Homesteaders

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[53] Lord and Johnstone, op. cit., p. 89.

[54] Ibid., p. 87.

Cooperative Association was thus formed in 1935. A board of directors was selected from among the homesteaders and local people.[55] The Cooperative secured a charter from the state permitting it to function as a non-profit organization for the buying and selling of products arising in operating the homesteads. Perfection of this organization made possible large-scale buying of seed, fertilizer, and other materials, as well as the cooperative selling of the products of the homesteads.[56]

A number of cooperative enterprises were attempted in the early days of the project: a trading post, a hog enterprise, a coal mine, a crafts shop, a lunchroom, a woodshop, a poultry enterprise, and a cannery. All of these enterprises ultimately failed.[57] This left the homesteaders with only their subsistence units with which to pay for their homes.

The cannery seems to have been temporarily the most successful of the various enterprises. It required four hundred men and women on its day and night shifts during the summer of 1937, the first season of operation, making it necessary to bring in many workers from other

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[55] Crossville Chronicle, July 4, 1935, p. 1.

[56] Ibid.

[57] Fleming, op. cit., p. 53.

communities.[58] Blackberries, beans, tomatoes, and beets were canned. The capacity was 3,600 cans per minute, and it was estimated that it could handle production from 1,200 acres. The output from the cannery was sold through a wholesale marketing agency which handled the output of other similar government agencies.

Yet even this once-bustling canning industry failed. Many homesteaders were not farmers, and their production of vegetables suffered by reason of lack of experience. Not enough vegetables were produced to keep the cannery in steady operation. Then there were labor troubles in the plant itself. The extra laborers needed temporarily were required to join a labor union. The extreme trade union position of securing a closed shop is reported to have contributed substantially to the eventual failure of the plant. Furthermore, even the reduced output of the cannery had difficulty in finding a market. As a result of this combination of difficulties, the enterprise was operated part of two seasons and then abandoned.

By the middle of 1938, both the homesteaders and the Farm Security Administration officials, under whose supervision the project had come, were convinced that there was little likelihood of establishing a functionally sound industry on a cooperative basis, as one cooperative enterprise

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[58] Crossville Chronicle, July 29, 1937, p. 5.

after another ended in failure.[59]

Various reasons have been given for the failure of the cooperative association in its enterprises. Homesteaders laid the failure to government supervision and red tape. Many believed that some of the enterprises would have been successful had more responsibility been delegated to the people, which the officials were unwilling to do, for inhabitants of the Cumberland Plateau had had little experience with cooperatives.

The establishment of private industry. Convinced that the cooperative enterprises would not furnish employment for the homesteaders, the administration again searched for a privately operated industry that might be interested in building a plant in the area. The association could subsidize it. Funds could be advanced for building and equipment on a favorable basis. Full management could be retained by the industry, the only reservation being that the homesteaders would have preference in employment and, through the association, a share in the profits.[60]

Finally a firm in Pennsylvania that manufactured full-fashioned hosiery was interested in the location. The concern

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[59]Lord and Johnstone, op. cit.

[60]Ibid.

was granted a loan by the association of $750,000 to cover the cost of the building and approximately sixty knitting machines. The plant was large enough to employ two hundred people when in full operation. A tract of land of twenty-two acres was set aside for the building.[61] Work on construction of the plant started in December of 1938.[62] This plant is still in operation, the business being owned by Mozur Lace, Inc., making various knit goods from synthetic fibers (Fig. 26).

Other small industries were subsequently established in the area. In 1941, a furniture factory was constructed.[63] Under the sponsorship of the association this company installed machinery for the cutting of porch and lawn furniture. The plant was operated for about three months, but was closed during the summer of 1941 because of a decrease in sales. Later more machinery was installed for the manufacture of book cases, but the business finally failed. The Rex Products Company opened a plant in 1950 for the manufacture of yardsticks (Fig. 27). This business is still operating on a profit-making basis. In 1955, the Five Star Shirt Company began operations on a small scale

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[61] Crossville Chronicle, November 3, 1938, p. 1.

[62] Crossville Chronicle, December 22, 1938, p. 1.

[63] Lord and Johnstone, op. cit., p. 92.



Figure 26. The Mozur Lace knitting mill located in the Cumberland Homesteads project area.



Figure 27. The Rex Products yardstick factory.

in a plant constructed in the community. These three plants, along with large sandstone quarries located nearby, help greatly toward making the community self sustaining as it was originally intended by the government; but local employment opportunities are still inadequate, and some of the residents of the community have secured jobs as far away as Oak Ridge to which they commute daily.

Success or failure of the project. To some people, the Cumberland Plateau must have seemed an ideal place for a subsistence homesteads venture. Here were many of the very kind of people the Rural Resettlement Administration was supposed to rescue. There was an abundance of unused land, mostly timbered, that was cheap. Part of the soil at least was considered satisfactory for certain truck crops. The need for some kind of relief was desperate, however the measure of need was in part a reflection of the already unfavorable man-land ratio. The desperate need was an indication that the available natural and industrial resources were insufficient for the population already located in the area. Furthermore, a basic fallacy seems to have existed in the establishment of the subsistence homesteads during such a period. The homesteaders were expected to find part-time employment in factories during a depression when there was widespread unemployment as a result of plants being shut down.

Final judgment of the Cumberland Homesteads project can be summed up in the words of Russell Lord as follows:

> Cumberland Homesteads cannot be called a success; neither can it justly be called a failure. As a temporary relief proposition, it has had its merits and its faults. It has afforded work and food and shelter to more than 200 families, many of whom, at least at the time the project was begun, were destitute and desperate or almost hopeless. It has given these people the chance to become small owners, and by one or another expedient has kept them going.
>
> On the other hand, the basic economic problem has not yet been solved. There is still no established economic base big enough and solid enough to insure the continued welfare of the community. . . .
>
> This continuing and as yet unsolved problem of a sufficient economic base suggests that fundamentally it may have been unwise to apply the subsistence homesteads program in this situation. It may be that, instead of tying people down in an area not rich in natural resources and without definite advantages for industrial development, it would have been wiser in the long run to try to bring about their removal to areas of greater potentiality. It appears probable that the inescapable basic disadvantages of the situation in which this project was originally placed were so great that later efforts to establish an economic foundation were bound to meet at least partial failure.[64]

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[64] Ibid., p. 96.

CHAPTER IV

AGRICULTURAL DEVELOPMENT

Type of Farm

Although agriculture has long been a major source of income for the people of Cumberland County, on the whole it has always been of a self-sufficient rather than of a commercial character. Luebke, *et al.* classified the agriculture on the Cumberland Plateau as "very small general and part-time farming."[1] That Cumberland County belongs in this category can quickly be seen by a cursory perusal of Table VII. The extent of part-time farming is indicated by the fact that 42 per cent of the farm operators reported working one hundred days or more off the farm, and 61.7 per cent of the farms reported other incomes exceeding the value of farm products sold. The small size of the farms even in an area where 86 per cent of the land is in forest, and where much range-type livestock raising is practiced, is attested by the fact that 35.3 per cent of the farms contain less than thirty acres, and 77.4 per cent contain less than one hundred acres.

The trend has been toward smaller and smaller farms

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[1] B. H. Luebke, S. W. Atkins, and C. E. Allred, *Types of Farming in Tennessee*, Bulletin No. 169 (Knoxville: The University of Tennessee Agricultural Experiment Station, 1939), p. 79.

TABLE VII

SELECTED FARM CHARACTERISTICS FOR CUMBERLAND COUNTY, TENNESSEE, 1950[a]

Characteristics	Number of Farms	Per Cent of All Farms
Total number of farms reporting	1,898	
Farm operators reporting work off farm	1,104	58.1
Farm operators reporting work off farm 100 days or more	797	42.3
Farms reporting other income exceeding value of farm products sold	1,173	61.7
Farms of less than 30 acres	676	35.3
Farms of less than 50 acres	984	51.8
Farms of less than 100 acres	1,471	77.4
Farms reporting less than 10 acres of harvested cropland	828	43.6
Farms reporting less than 20 acres of harvested cropland	1,307	68.8
Farms reporting less than 50 acres of harvested cropland	1,662	87.5
Farm operators who are full owners	1,674	88.2

[a]Source: U. S. Bureau of the Census, United States Census of Agriculture: 1950, Vol. I, Part 20 (Washington: Government Printing Office, 1952), p. 65.

for many decades (Table VIII). In 1880, the average size farm was 205.1 acres. The acreage became progressively smaller until it was only 62.5 acres in 1940. Not until 1950, at which time it was 83.3 acres, did the federal census show an increase in the acreage of the average size farm.

During the same period while the acreage of the average size farm was decreasing, the total number of farms was increasing. There were only 715 farms in 1880. The number increased to the maximum of 2,063 farms in 1940 (Table VIII). The inverse relationship between the number of farms and the average size of farm suggests that farms have been subdivided because of inheritance or sold to farmers moving into the area. No doubt both factors have made contributions, but since there has been little immigration from other regions, the former consideration rather than the latter appears to be the explanation for the decreasing size of farm.

The inverse relationship between the number of farms and the average size of farms is even greater than a simple proportion, at least until 1930, for Table VIII also shows that during the period under consideration, the proportion of the total area of the county in farms was decreasing. Less than half as much of the county area was in farms in 1930 as in 1880. After 1930, however, the proportion of

TABLE VIII

FARMS AND ACREAGES IN CUMBERLAND COUNTY, TENNESSEE, FOR STATED YEARS[a]

Year	Number of Farms	Per Cent of County Area in Farms	Average Size of Farm
1880	715	41.8	205.1
1890	800	40.0	175.5
1900	1,035	43.5	147.3
1910	1,198	28.0	98.0
1920	1,267	28.7	95.0
1930	1,034	20.0	81.1
1940	2,063	29,7	62.5
1950	1,898	36.4	83.3

[a]Source: Computed from data given in the United States agricultural census for the stated years.

the total area of the county in farms has increased some.

The total number of acres in the farm renders only a partial picture of the size of the farming operation, for 43 per cent of the farms reported less than ten acres of harvested cropland, 68.8 per cent reported less than twenty acres, and 87.5 per cent reported less than fifty acres so employed (Table VII).

The relative extent of mechanization of agriculture can perhaps be measured better by the number of tractors than by any other one machine on the farm. Only 10.4 per cent of the farms of the county had tractors, whereas 25.8 per cent of those of Tennessee, and 67.2 per cent of those of the United States had this type power in 1950 (Table IX).

The relative position of Cumberland County when compared with Tennessee and the United States with respect to farm income and dependence upon farming for the income is shown in Table IX. The average value of farm products sold per farm in the county is only a little less than one-third of that for Tennessee, and only about one-eighth of that for the United States. Nearly twice the proportion of farm operators in Cumberland County reported working one hundred days or more off the farm as did so in either Tennessee or the United States.

TABLE IX

COMPARATIVE SELECTED FARM CHARACTERISTICS FOR CUMBERLAND COUNTY, TENNESSEE, AND THE UNITED STATES, 1950[a]

	Cumberland County	Tennessee	United States
Average value per farm of farm products sold[b]	$589	$1,470	$4,116
Per cent of farm operators reporting 100 days or more of work off farm	42.3	22.5	23.2
Per cent of farms operated by tenants	5.1	29.2	26.8
Per cent of farms with tractors	10.4	25.8	67.2

[a]Source: Computed from data given in U. S. Bureau of the Census, County and City Data Book (Washington: Government Printing Office, 1953), pp. 360-1.

[b]For 1949.

Land Tenure

The small general and part-time farming of the county has been accompanied by an unusually high proportion of farms being operated by their owners. In 1950, the operators of 88.2 per cent of all farms were full owners (Table VII, p. 90), and the federal census reported that 125 of the 224 remaining farms were operated by part owners.

A low ratio of tenancy is consistent with a high proportion of operators owning their farms. Only 5.1 per cent of the farms of the county were operated by tenants of all kinds, whereas 29.2 per cent of those of Tennessee, and 26.8 per cent of those of the United States were so operated (Table IX). The total of ninety-six farms being operated by tenants contain examples of several kinds of tenancy, among which were twenty-eight croppers, eleven cash tenants, twenty-two "crop-share" tenants, and thirty-five other and unspecified tenants.[2]

General Land Use

Not only are the farms small and contain few acres of harvested cropland, but Table X shows that there is little

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[2]U. S. Bureau of the Census, United States Census of Agriculture: 1950, Vol. I, Part 20 (Washington: Government Printing Office, 1952), p. 65.

agricultural development relative to the total land area. Only 36 per cent of the total land area of the county is in farms, and of this only 36.1 per cent is in cropland, and 17.8 per cent is in harvested cropland. On the other hand, 86 per cent of the total land area is in forest, and 57.6 per cent of the farmland is in woodland. There is one apparent overlapping of statistical values which results from the fact that 18.6 per cent of the farm woodland is also considered to be pasture.

The general picture presented by the landscape of the county where one ventures far from the principal roads, and in some places even along the principal roads, is that of a forested region (Fig. 28). This is no surprise when it is noted that only 13 per cent of the total land area is in cropland, less than half of which is harvested, so that only 6 per cent of the total land area is in harvested cropland (Table X).

The general land use pattern is comparatively uniform over the county. On the plateau proper, the forests are only sparsely intermingled with cultivated fields and pastures. In a few places, however, such as around Crossville, in Grassy Cove, and in Crab Orchard Cove, open lands are comparatively extensive. Other scattered clearings are confined mostly to areas along the principal highways. In the southeastern mountainous section, the valley floors have

TABLE X

SELECTED LAND USES IN CUMBERLAND COUNTY, TENNESSEE, 1950

Per cent of total land area in farms	36
Per cent of total land area in cropland	13
Per cent of total land area in forest	86
Per cent of total land area in harvested cropland	6
Per cent of total land area in pasture	10
Per cent of farm land in cropland	36.1
Per cent of farm land in harvested cropland	17.8
Per cent of farm land in woodland	57.6
Per cent of farm land in pasture	25.9
Per cent of cropland harvested	48.0
Per cent of cropland used only for pasture	32.5
Per cent of harvested cropland in corn	36.5
Per cent of harvested cropland from which hay was cut	51.1

[a]Source: Computed from data given in U. S. Bureau of the Census, United States Census of Agriculture: 1950 (Washington: Government Printing Office, 1952), p. 59.



Figure 28. A dense stand of oak timber west of Crossville along U. S. Highway 70 North.

been cleared, but the slopes remain almost completely forested.

Some changes in area and location of non-forested land are occurring. About 20,000 acres have been cleared within the past fifteen years,[3] an appreciable portion of which is accounted for by the Cumberland Homesteads project. This has been compensated for to some extent by forest plantings and natural conversion of abandoned fields to forests. Because of changes in type of farming, and better yields resulting from experimentation with fertilizers and new type crops, it is probable that some decrease in total forest area may occur as the cycle of land clearing and land reversion to forest continues.

It has already been pointed out in Chapter III that the cleared land tends to be confined to areas relatively close to the roads; also that the northeastern quadrant of the county was rather sparsely settled. Since on the rural Cumberland Plateau people and cultivated land tend to be distributed similarly, this northeastern quadrant, especially north of the Daysville Community, has relatively less cropland. A major item affecting the low proportion of land in farms, in cropland, and in harvested cropland in this sector of the county is the presence of the Catoosa Wildlife

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[3]William H. Ogden, Forest Resources and Industries of Cumberland and Morgan Counties, Tennessee (Norris, Tennessee: Division of Forestry Relations, Tennessee Valley Authority, 1953), p. 8.

Management Area; were it not for the topography, and consequently the forest remaining, this land probably would not have been given over to a game management program.

An examination of Table XI shows that, with minor exceptions in the cases of the proportion of the cropland used only for pasture and the proportion of farm land in harvested cropland, the general use of the farm land varies little from one section of the county to another. This uniformity in distribution is also true of the various crops and other agricultural products of the county.

The farmers of the Cumberland Homesteads Community are turning gradually to more of a grass-livestock type agriculture (Fig. 29). This sets them free more for work off their small, part-time farms. Since the northeastern mountainous sector of the county has relatively little land suitable for crops, it has a small percentage of the farm land in harvested cropland.

A notable increase in agricultural activity in the last twenty years is shown by the data given in Table XII. Since 1929, the total land area in farms and the amount of cropland has almost doubled. The amount of cropland harvested, however, has not increased in equal proportion. The lack of a proportional increase in cropland harvested is in keeping with the increase in the amount of cropland used only for pasture.

TABLE XI

DISTRIBUTION OF FARM LAND USES IN CUMBERLAND COUNTY, TENNESSEE, 1950[a]

	Farm Land in Cropland	Farm Land in Harvested Cropland	Farm Land in Pasture	Farm Land in Woodland	Cropland Used Only for Pasture
	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
County	36.1	17.8	25.9	57.6	32.5
District 1	38.5	18.9	36.5	53.3	39.6
District 2	34.4	18.0	22.9	59.0	23.9
District 3	38.7	12.3	25.8	54.8	40.0
District 4	39.2	20.8	24.5	56.2	26.1
District 5	37.6	18.8	26.7	57.1	42.4
District 6	23.8	19.5	16.0	63.0	12.9
District 7	43.8	8.9	20.8	53.7	13.1
District 8	28.5	13.7	18.4	68.5	36.3

[a]Source: Computed from U. S. Bureau of the Census, United States Census of Agriculture: 1950, for minor civil divisions. (Unpublished)

TABLE XII

FARM LAND USE IN CUMBERLAND COUNTY, TENNESSEE, FOR STATED YEARS[a]

Land Use	1929 Acres	1939 Acres	1949 Acres
Total land in farms	83,812	128,874	158,163
Cropland	29,548	50,722	57,091
Cropland harvested	20,940	31,318	28,210
Cropland used only for pasture	3,470	10,532	18,560
Woodland	47,982	71,908	91,152
Pasture[b]	6,282	6,244	5,489

[a]Source: U. S. Bureau of the Census, agricultural census for the stated years.

[b]All pasture other than cropland used only for pasture and woodland pastured.

One phenomenon among the farming practices on the small part-time farms which takes place to a limited extent on the plateau is some local shifting of the cultivated land from year to year. Land may be cleared of its timber, cultivated a few years, then when productivity decreases it will be left to grow up in weeds and sprouts, while the limited cropland is moved to some other part of the farm (Fig. 30). In former years, sometimes cultivation would be given up entirely and the land returned to forest.

The Soil Factor

A prime cause of the lack of agricultural development in the county is the deficiency of the soils in plant nutrients. Although lime can be supplied from beds within the county, and rock phosphate from within the state at prices that are not prohibitive, because of the absence of a good road system, until recently delivery costs have been high enough that these deficiencies have been real handicaps. Like the whole of the flat-topped part of the Cumberland Plateau, because of low productivity of the soils this area was found to be unfavorable for agriculture by the early pioneers. Even in their virgin state, without the use of mineral fertilizers, the soils could not be profitably cultivated commercially, and the use of these mineral fertilizers was practically unknown by the early settlers.



Figure 29. Beef cattle on a Cumberland Homesteads farm.



Figure 30. An abandoned field in the northwestern part of Cumberland County.

Thus, with the exception of subsistence cultivation, the land was left with its forests. As long as an abundance of fertile land was available farther west, there was little incentive for the pioneers to develop farms on the plateau.

Crops

The agriculture of the county consists chiefly of the production of crops, although livestock and livestock products are a growing source of cash income. Corn and hay form the basis of the cropping system for the subsistence type of agriculture found on the general farms. Corn and hay occupy 36 per cent and 51 per cent respectively of the harvested cropland acreage. In recent years, however, other crops, particularly vegetables, are being relied upon more and more for a cash income. They have always been important for home consumption on the small farms. Now, with improved roads, and a local cannery making markets available, commercial vegetables are becoming a part of the general farming scene. As a result of the increase in importance of cash vegetable production, the trend is gradually away from a subsistence to a commercial form of agriculture. The acreages of the principal crops for the census years 1919 and following are given in Table XIII. Some changes in acreages occupied by various crops will be mentioned as these crops are discussed in turn.

TABLE XIII

ACREAGES OF PRINCIPAL CROPS IN CUMBERLAND COUNTY, TENNESSEE, FOR STATED YEARS[a]

Crop	1919 Acres	1929 Acres	1939 Acres	1949 Acres
Corn for grain	8,753	7,272	11.915	10,116
Oats threshed	95	26	135	677
Wheat	162	59	326	301
Rye	72	---	85	5
Hay, total	10,508	11,236	14,907	14,399
Clover or timothy	1,765	3,701	3,017	4,650
Alfalfa	18	11	35	415
Small grains cut for hay	2,212	1,375	625	767
Lespedeza	---	---	---	7,688
Silage	71	22	26	24
Corse forage	3,662	224	274	152
Sorgums cut for silage or fodder	---	34	71	1
Sorgums harvested for sirup	358	84	116	12
Irish potatoes	744	847	1,379	735
Sweetpotatoes	195	174	277	74
Vegetables harvested for sale	102	36	32	195
Tobacco	10	8	22	152
Strawberries	3	11	19	58

[a]Source: U. S. Bureau of the Census, agricultural census for the stated years.

Corn

Corn is grown mainly as feed for livestock and food for man rather than as a commercial crop. Although 98 per cent of the corn is harvested for grain, only 6 per cent of it is sold, and the market is local.[4] Even though it is produced primarily for consumption on the farm, corn occupies 36 per cent of the harvested cropland, a larger proportion than is occupied by any other crop excepting hay.

Corn acreage relative to the total harvested cropland acreage is about average in rank among the counties of the state, although the yield on the Cumberland Plateau is less than that of the state average. The average yield of the acreage harvested for grain in Cumberland County in 1949 was 33 bushels per acre. Nevertheless, corn is the leading crop mainly because no more profitable food and feed crop has been found. If the soil is properly fertilized and drought does not occur, a fair crop of corn can be grown (Fig. 31).

Most of the corn grown is harvested for grain. In 1949, of the 10,292 acres grown for all purposes, 10,116 acres were gathered in this form, leaving only twenty-four acres to be cut for silage and 152 acres to be hogged or cut for fodder.[5] The growing of corn for rough fodder has

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[4]U. S. Bureau of the Census, op. cit., p. 99.

[5]Ibid.



Figure 31. Corn on a farm in the Cumberland Homesteads area.

greatly decreased since 1929, in which year 3,662 acres of land were used for that purpose (Table XIII).

Hay

Hay, the leading crop in terms of acreage, occupied 14,400 acres, or 51 per cent of the harvested cropland in 1949.[6] Lespedeza has rapidly gained acreage in recent years until now it is the most important hay crop. There were 7,688 acres of it in 1949, or nearly as much as of all kinds of hay combined (Table XIII). Lespedeza is followed in importance by red clover and mixed timothy and clover. Hay of these kinds was harvested from 4,650 acres in 1949. These hays are usually grown together, however red clover is sometimes grown alone.

The increased use of lime and phosphate has encouraged the growing of more legumes for hay. Thus far though, the growth of alfalfa has been developed but little, there being only 415 acres of it in 1949. Crimson clover is increasing in popularity as a cover and green-manure crop as well as for hay and pasture. Soybean acreage is also on the increase; in 1949, there were 448 acres grown, 419 acres of which were cut for hay (Fig. 32).

Most of the hay is fed to livestock on the farms where grown, though some may be sold locally. The use of machinery

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[6] Ibid.

for bailing hay in the field is increasing (Fig. 33).

Small Grains

Oats and wheat, ranking in that order in acreage, are the only small grains of importance. In 1949, there were 1,013 acres of oats either thrashed or cut for feeding unthrashed; approximately one-third of the amount was consumed in the latter manner.[7] The 677 acres of oats thrashed produced 21,613 bushels, resulting in a yield of about 32 bushels per acre. A large part of the oats grown in the county are accounted for by one farm. This farm had approximately 350 acres of oats in 1955.[8] In 1949, there were three hundred acres of wheat thrashed in the county. The three hundred acres of wheat produced 3,913 bushels of grain, an average yield of about thirteen bushels per acre.

Other Crops

Irish potatoes. Potatoes were the leading cash crop in 1949. This crop had reached that rank by 1939, and maintained its position in total money income for the county even though during that period land devoted to that crop decreased from 1,379 acres to 735 acres. The decrease in

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[7] Ibid.

[8] Interview with Mr. Dennis V. Patton, County Agricultural Agent, April 1956.



Figure 32. Soy beans in the Cumberland Homesteads area.



Figure 33. Baled hay on a farm west of Crossville.

acreage of potatoes has come as a result of other crops having been found to be more profitable, even though, of the major crops, only Irish potatoes produce yields higher than the state average.[9] As a result of their texture and structure the fine sandy loam soils are suited to potatoes. The abundant rainfall and the slightly lower temperature resulting from the altitude also favor this crop.

In the decade 1930 to 1940, much effort was put forth in the way of experimentation and other activities to encourage potato production, especially seed potatoes. During that period the acreage was increased, but since then, market conditions and competition from other regions have discouraged growing the crop in Cumberland County. In 1955, the county agricultural agent reported that other than on one specialized farm, growing potatoes commercially was no longer important in the county.

Because of the presence of this one farm, the census statistics give a distorted picture of the importance of potatoes among the farmers of the county as a whole. The Knoxville Fertilizer Company operates a 2,300 acre potato farm a few miles north of Crossville. Of the 1,500 acres of this farm that were cultivated in 1955, potatoes occupied three hundred acres (Fig. 34). This farm harvests only two crops, potatoes and oats, and accounts for a large part of

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[9]Luebke, Atkins, and Allred, op. cit., p. 80.



Figure 34. Potatoes on the Knoxville Fertilizer Company's farm north of Crossville.

the potatoes as well as oats grown in the county.

Tobacco. Until recently, tobacco has not been considered an important crop in the county. Acreage decreased from the turn of the century until after 1930 (Table XIII). Following 1940, the amount grown increased greatly so that in 1949 the crop was grown on 151.8 acres, and in 1955, on 168 acres.[10] In 1939, only seventy-one farms reported growing tobacco, whereas in 1949 the crop was produced on 294 farms. The following reasons for the great increase in tobacco acreage were listed by the county agricultural agent:

1. The increased price of tobacco due to the federal tobacco control program.

2. Many farmers changed from potatoes to tobacco because potatoes were not so profitable.

3. Some farmers moved to the county from Tennessee Valley Authority reservoir areas, and most of them had previous experience with tobacco.

4. In the past most people on the plateau thought tobacco could not be grown successfully there.

The increase in tobacco acreage has also been assisted by the increased use of commercial fertilizers. In their natural state the soils of the county would not produce large enough yields to make tobacco a profitable crop, but

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[10]Interview with Mr. Dennis V. Patton, County Agricultural Agent, April 1956.

when properly fertilized, a good crop can be grown (Fig. 35). The tobacco grown is almost entirely burley (Fig. 36), dark-fired tobacco was grown on only six-tenths of an acre in 1949.

Vegetables. Vegetable production for sale has greatly increased on the small general farms of Cumberland County since 1949. Farmers have learned that by the use of commercial fertilizers the soils of the plateau can be made economically productive especially for such high value per acre crops as vegetables and tobacco. From 1939 to 1949, the land area in the county given over to the production of vegetables for sale increased from thirty-two acres to 195 acres (Table XIII). An additional fifty-eight acres were used for strawberries in 1949.[11] Following 1949, strawberry production expanded rapidly until, in 1955, there were five hundred growers in the county employing six hundred acres of land for this crop. The one-fourth million dollars worth of berries produced that year resulted in their becoming the leading cash crop.[12]

Increased vegetable production led the Monticello Canning Company to establish a cannery in the county in

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[11]Because of the nature of this small fruit it is being considered here with the vegetables.

[12]Interview with Mr. Dennis V. Patton, County Agricultural Agent, April 1956.



Figure 35. Burley tobacco on a farm northwest of Crossville.



Figure 36. A barn filled with Burley tobacco for air curing on a farm in the Cumberland Homesteads area.

1954. The plant is located a few miles west of Crossville on U. S. Highway 70 S. The leading vegetables in acreage grown are green beans followed by strawberries and pimento peppers (Figs. 37 and 38). The green beans go mostly to large companies, Stokelys, Bush Bros., Winter Garden, and Southern Freezers, whose plants are located outside of the area.[13] The local cannery handles only a small part of the bean crop. The pimento peppers, however, are grown under contract with the canning company, and their commercial production is a result of this local demand. A limited amount of the strawberries go fresh to markets outside of the area, but most of the crop is canned and fresh-frozen. Freezer companies, other than the Monticello Canning Company, who buy berries, are Winter Garden, Iceland Gardens, and Southern Preserving and Freezing Company. The majority of the beans, peppers, and strawberries processed at the local cannery are sold under the company's own trade mark to wholesale grocers, the remainder is canned for other companies.

Truck gardening for the local Crossville market has not assumed the importance it well might have. Aside from the commercial production just discussed, the quantity of fruit and vegetables produced in the area is not sufficient to meet the needs of the town, consequently vegetables and fruit must be shipped in.[14]

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[13] Ibid.

[14] Ibid.



Figure 37. Green beans with pickers at work on a farm south of Crossville.



Figure 38. Pimento peppers on a farm south of Crossville.

Fruits. Fruit growing has never been of great importance in the county. Apples and peaches are the main fruits and these have been generally on the decline throughout the past forty years. In 1949, the number of bearing apple trees decreased to less than one-third the number for 1909, and the number of bearing peach trees was reduced to almost one-fourth the number for the earlier year (Table XIV). A decline has also occurred in all the other tree fruits. The number of grape vines has fluctuated from time to time with no notable changes or apparent trends.

Pasture Land

Permanent pasture land has always occupied a relatively small total acreage in the county (Table XII, p. 102). Only 10 per cent of the total land area and 25.9 per cent of the farm land was in pasture in 1950 (Table X, p. 97). Not much of this acreage was permanent pasture, for 32.5 per cent of the cropland was used only for pasture, a fact which means that a major part of the pasture is plowable or rotation pasture. A large part of the permanent pasture of the county is in Grassy Cove and Sequatchie Valley. Most of the pasture in other sections of the county is rotation pasture. The permanent pasture grasses are comprised mostly of fescue, orchard grass, timothy, red top, and bluegrass. These grasses are usually mixed with white clover, ladino

TABLE XIV

NUMBER OF BEARING FRUIT TREES IN CUMBERLAND COUNTY, TENNESSEE, FOR STATED YEARS[a]

Kind of Tree	1899	1909	1919	1929	1939	1949
Apples	61,215	66,253	35,670	24,964	30,613	19,346
Peaches	5,621	10,125	9,945	9,575	7,815	2,928
Pears	335	1,608	830	532	714	547
Plums	575	1,432	947	721	684	447
Cherries	559	1,362	1,873	1,416	1,711	1,036
Grapes (vines)	4,772	2,246	3,747	2,448	5,495	4,990

[a]Source: U. S. Bureau of the Census, agricultural census for the stated years.

clover, or lespedeza.[15]

The small amount of permanent pasture results from a number of factors. The sandy soils of the plateau, without the use of large amounts of lime and fertilizer, are not suited to the growth of grasses and legumes. At least up until 1948, most of the forested land of the county was grazed, even though it sustained rather scanty pasturage. Until recent years, a range-type of livestock production was practiced. Not until 1948 was there a general fence law in Tennessee.[16] Before that date there were only individual county laws which had not been passed in the sparsely settled Cumberland Plateau counties. This law has led to a great increase in the amount of pasture and hay crops.[17]

The amount of cropland used only for pasture has grown rapidly from 3,470 acres in 1929 to 18,560 acres in 1949, while the amount of other kinds of pasture remained about the same (Table XII, p. 102). The rotation or plowable pasture consists generally of the same kinds of grasses

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[15] Ibid.

[16] The general fence law, passed on February 25, 1947, to become effective twelve months later, provided for fines for any person deliberately permitting his livestock to roam on the road. It further provided that any person damaged by livestock in violation of the act shall have a lien upon said livestock. Crossville Chronicle, February 27, 1947, p. 1.

[17] Interview with Mr. Dennis V. Patton, County Agricultural Agent, April 1956.

and legumes as are found in the permanent pastures.[18]

Some lack of uniformity exists in the distribution of pasture over the county. Table XI shows a larger percentage of farm land in pasture in Districts 1, 3, 4, and 5 than in the other four districts. In Districts 1, 3, and 4, most of the variation is accounted for by the Homesteads Community, Sequatchie Valley, and Grassy Cove, respectively. A permanent pasture-livestock type agriculture fits in well with the part-time farms of the Homesteads Community. The soils of Sequatchie Valley and Grassy Cove, having developed from limestones, are better suited to the growth of grasses and legumes than are the soils of the uplands.

Farm Woodland

Woodland is an important feature of the farms of the county with respect to acreage, for it covers 57.6 per cent of the farm land area (Table X, p. 97), and one-fourth of the county's forest land is on farms. During the past twenty years there has been little change in the proportion of farm land in woodland (Table XII, p. 102).

The proportion of farm land in woodland is rather uniformly distributed over the county. Only in District 6, a mountainous eastern section of the county, and District 8, in the western part of the county where an unusually large

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[18] Ibid.

percentage of the total land area is in farms, is there a noticeably larger proportion of the farm land made up of woodland. Other sections of the county may have larger proportions of their total land area in forest but much of the forest will not be on farms, instead it is owned by timber or mineral companies, or it is publicly owned.

The farm woodlands have always been an important source of farm income, though they are underdeveloped as an income producer. In 1949, the average farmer sold from a typical wooded acre only 78 cents worth of forest products.[19] Farmers do, however, cut fuelwood, fence posts, and lumber for use on the farm, and thus reduce cash expenditures for these necessities.

Farm woodlands have also been important as grazing lands. Only 18.6 per cent of the farm woodland was reported in the 1950 Census of Agriculture as pastured, but it is likely that a much larger proportion is actually grazed. Recent figures show that farm woodland grazing is on the increase. One important factor in the increase has been the general fence law. Before 1948, open range grazing had been a common practice. The fencing in of livestock after that date has meant that the stock is confined away from the non-farm forests.

Grazing woodlands results in damage to the timber.

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[19]U. S. Bureau of the Census, op. cit., p. 139.

Some of the conditions usually found on grazed areas are scarcity of tree restocking, exposed and injured tree roots, compacted top soil, sparse litter, and active soil erosion.

An active program of land management is needed. Some of the grazed woodland would have a much greater cattle-carrying capacity and would produce a larger income if cleared and made into permanent pasture. Other woodlands are not suited to pasture and should be used exclusively for timber production. The farmers could increase both livestock and timber crop returns by producing them on separate pieces of land.

Livestock and Livestock Products

Livestock on the farms of the county consist chiefly of cattle, swine, sheep, and chickens (Table XV). Because of the nature of the plateau agriculture, large numbers of draft animals have not been required, even in the days before the farm tractor, consequently horses and mules have been relatively few in number. An examination of Tables VIII, p. 92, and XV, p. 125, shows that the farms have averaged only about one draft animal each.

Census data show that the number of cattle decreased after 1920, but rose again following 1940, resulting in a maximum number in 1950. Both dairy and beef types are raised.

TABLE XV

NUMBER OF LIVESTOCK ON FARMS IN CUMBERLAND COUNTY, TENNESSEE, FOR STATED YEARS[a]

Livestock	1920[b]	1930[c]	1940	1950[g]
Horses	1,087	691	965[d]	1,095
Mules	1,235	1,124	1,188[d]	1,170
Cattle	8,085	6,164	7,019	8,425
Swine	12,619	6,964	10,361[e]	9,052
Sheep	7,280	9,552	5,971[f]	1,878
Goats	571	438	162[e]	(h)
Chickens	33,351	27,816	44,655[f]	58,269

[a]U. S. Bureau of the Census, agricultural census for the stated years.

[b]All ages on January 1.

[c]All ages on April 1, except chickens--over three months.

[d]Over three months old on April 1.

[e]Over four months old on April 1.

[f]Over six months old on April 1.

[g]All ages, except chickens--four months old and over.

[h]Number not available; fifty-one farms reported having goats.

Of the total number of cattle reported in the 1950 census, 3,100 were listed as milk cows, and 1,622 were heifers born before January 1. From these figures, it is concluded that the cattle are divided approximately evenly between the beef and dairy types.

Dairying has never been a major activity on the plateau, however there are some dairy farms in the county, and a number of farmers depend upon the sale of milk for an important part of their cash income. Most of the dairy cattle are grade Jersey and Guernsey. The dominance of forest in the general land use, the unsuitability of the soils in their natural state for the growth of grasses, the general sparseness of the population, and, until recently, the want of a good system of rural roads, are factors which have contributed to the lack of development of the dairy industry.

Most of the milk produced is consumed locally. Some thirty dairymen in the county produce grade-A milk for the Crossville market. Grade-C milk is produced by a few farmers for a Carnation Company cooling plant in Sparta, Tennessee, which sends the milk on to a condensery in Murfreesboro. The separation of cream to be centralized for butter manufacturing has not been practiced by the plateau farmers.[20]

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[20]Interview with Mr. Dennis V. Patton, County Agricultural Agent, June 1955.

Grade and purebred Hereford and Aberdeen Angus dominate the beef cattle breeds. Hereford is most common on the uplands (Fig. 39), whereas Angus is more prominent in Grassy Cove (Fig. 40).

In former years upland cattle secured most of their feed from the open range. The change from this method of production, and the accompanying changes in pasturage were discussed under pasture and farm woodland. These alterations have been factors influencing an increase in the number of purebred animals among the beef as well as the dairy herds in recent years. The marketing of beef cattle will be considered below.

Sheep and a few goats have long been a part of the farm scene in the county, but generally they have been fewer in number than cattle even when combined. In the past, sheep, like cattle, obtained their feed primarily from the open range, consequently sheep-killing dogs have been a major cause of the apparent lack of interest in sheep. Most of the sheep are grade Hampshire and Shropshire (Fig. 41). Goats were reported on fifty-one farms in 1950. Among other uses for goats, they are frequently employed to help clear land for cultivation (Fig. 42).

Swine constitute the largest number of animals of any kind (other than chickens) on the farms of Cumberland County. The breeds raised are mostly grade Hampshire, Poland China,



Figure 39. A herd of purebred Polled Hereford on a farm south of Crossville.



Figure 40. Aberdeen Angus in Grassy Cove.



Figure 41. Sheep on pasture north of Crossville.



Figure 42. Goats clearing the underbrush before cultivation; the dead trees in the background have been girdled.

and Duroc-Jersey. The number of hogs raised has fluctuated from period to period, partly as a result of market conditions. Hogs, also, have had to depend upon the open range for feed, but they are usually fattened on corn before being sent to market. Those raised for sale are trucked principally to Knoxville.

Only thirteen farms in the county were classified as poultry farms by the 1950 agricultural census, however, chickens are kept in small flocks on most farms. Their number has been increasing appreciably since 1930 (Table XV). The surplus eggs from the small flocks are bartered locally for groceries. During the spring and early summer there is an excess of eggs for local needs, but at other times it is often necessary to bring in eggs to supply the local demand. When there are surpluses of poultry or eggs they are trucked to markets in Nashville or Knoxville.

Marketing of Farm Products

The self-sufficient character of the agriculture on the small general and part-time farms of the plateau provides an economic setting for a marketing system which is relatively decentralized and which serves principally consumers who reside in the area. However, some of the products from the farms which are more commercialized, and some livestock as well, are shipped to surrounding markets outside the area.

The products shipped out are usually hauled by truck to the markets in the areas where they are consumed, or they are taken over by shippers who send them on to larger markets.

With the exception of potatoes and tobacco, as each of the crops was discussed above, if produced for sale, its marketing was considered. There is no tobacco sales floor in the county, for tobacco as an important cash crop on the plateau is rather new, therefore it has to be trucked to markets outside of the region. Most of the tobacco is trucked to sales floors in Knoxville; however, some goes to widely scattered markets on either side of the plateau: Sparta, Carthage, Sweetwater, Tazewell, and Greeneville. The tobacco from the county, like burley in general, ultimately finds its way principally into the cigarette industry. The one large commercial potato farm disposes of its crop through wholesale channels.

Livestock Markets[21]

There is a stockyard and auction barn at Crossville that serves much of the central part of the plateau as a market center for livestock. Beef cattle, lambs, and hogs are the principal livestock produced in Cumberland County for market. The main classes of cattle marketed are feeder, stocker, and slaughter. The feeder and stocker cattle are

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[21] Ibid.

shipped mostly to other sections of the state where they are fed, however some go to feeding areas in other states, especially Kentucky. The slaughter cattle are shipped mostly to Nashville, Knoxville, Chattanooga, Cincinatti, and Louisville. Top hogs and fat steers are usually sold to buyers who haul them to Knoxville. Butcher cows go to Knoxville and Nashville. Cattle classed as canners and cutters are shipped mostly to Knoxville.

On the whole, the production of hogs in the county is below local needs, so that some of the pork products consumed must be brought in from other areas.

Even though agriculture is the major source of income for Cumberland County generally, it is still self-sufficient rather than commercial in character. As the comparative data show, this has resulted in a low average cash income for the farmers and for families in general. Agriculture of this type cannot give adequate support to the people of the county. This fact throws emphasis upon sources of income based on other resources. Other resources of the county will be discussed in the succeeding chapters. The forests, which are so prominent in the landscape and occupy such a large proportion of the land area, are a renewable resource and therefore a potential source of continuous income.

CHAPTER V

THE FOREST RESOURCES AND THEIR USE

The proportion of the total land a ea in forest manifests the prominence of the forest among the resources of Cumberland County. At present, because of the lack of sustained yield management, the forest does not hold the position of an income producing resource that it has in the past. The county once supported much more timber of generally better quality than is found there now.

In 1950-51, the Tennessee Valley Authority conducted a forest inventory designed to provide the necessary facts about special areas in which the development of forest resources appeared to be vital to economic betterment. The results of this inventory of Cumberland County were published in the TVA, Division of Forestry Relations, Bulletin No. 20.[1] Following this, in 1953, TVA made an analytical report on the forest resources of Cumberland and Morgan counties, which, among other things, had the pu pose of interpreting the findings of the 1950-51 inventory.[2] These two reports provide

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[1]Tennessee Valley Authority, Division of Forestry Relations, Forest Inventory Statistics for Cumberland County, Tennessee, Bulletin No. 20 (Norris, Tennessee: Tennessee Valley Authority, Division of Forestry Relations, 1952).

[2]William H. Ogden, Forest Resources and Industries of Cumberland and Morgan Counties, Tennessee (Norris, Tennessee: Tennessee Valley Authority, Division of Forestry Relations, 1953).

the most recent and comprehensive and, with one exception,[3] virtually the only detailed documentary data about the forest of Cumberland County. Most of the information in this chapter, consequently, has been taken from these two reports, the latter in particular.

The Forest Area

Forest occupies 86 per cent of the area of Cumberland County, covering 353,700 of the total 434,560 acres.[4] Few counties of the state are so heavily forested. The forest pattern is one of uniform distribution with some open lands scattered throughout the county (Fig. 43). In the mountainous sections of the eastern part of the county, the valley bottoms have been cleared but the mountain sides remain almost completely forested. Crop and pasture lands predominate on the floors of Crab Orchard and Grassy coves. On the plateau proper, the forest is generally only sparsely intermingled with clearings, however cleared lands are rather extensive near Crossville and along Tennessee State Highway 28 to the north.

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[3] W. Foster Cowan, The Forest Resources of Tennessee, a cooperative project of the American Forestry Association and the Tennessee State Division of Forestry, 1946. (Unpublished)

[4] U. S. Bureau of the Census, United States Census of Agriculture: 1950, Vol. I, Part 20 (Washington: Government Printing Office, 1952), p. 59.

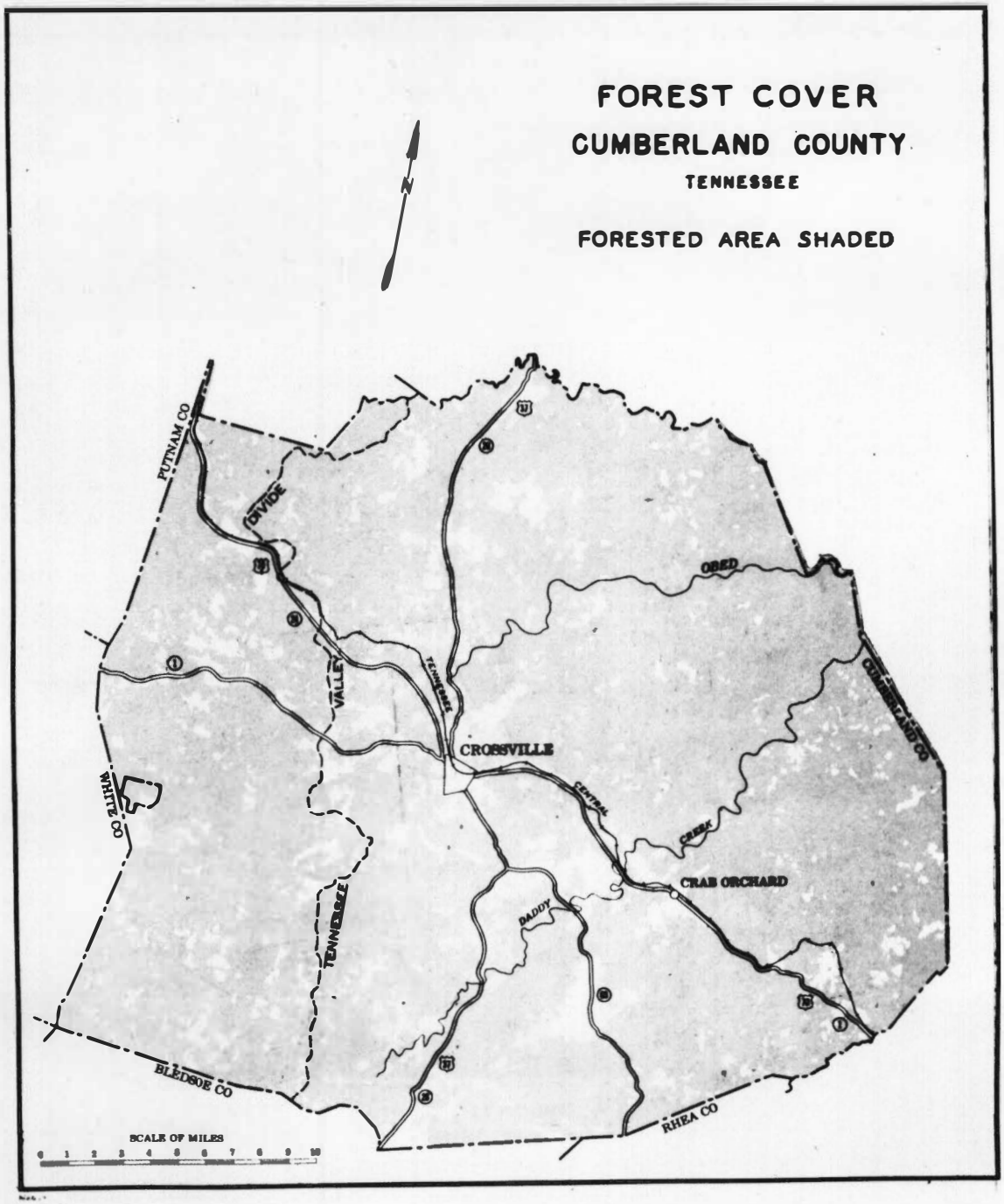


Figure 43. The extent of forest cover of Cumberland County.

Forest Types[5]

The upland hardwood are by far the most extensive type forest in Cumberland County (Fig. 44), comprising 78 per cent of all forest land (Table XVI). This type is composed primarily of oaks, hickory, and a variety of other hardwoods. Among the oaks, scarlet and white predominate, but black, chestnut, and post rank close to the leader.[6] The remaining hardwood types, namely, bottomland and cove, occupy only about 3 per cent of all forest lands (Table XVI). These types include, however, a relatively high proportion of the more valuable species like northern red oak, yellow poplar, basswood, hard maple, ash, and walnut.[7]

The second ranking type forest is mixed yellow pine-hardwood, which occupies 14 per cent of the total forest area (Table XVI). This type is usually found on the drier south slopes or on abandoned agricultural land. Shortleaf and Virginia pines are the principal softwoods in this type,

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[5]The TVA forest inventory of Cumberland County classified all forest stands according to the species composition of the dominant and co-dominant trees. If 75 per cent or more of the trees were softwoods, the stand was so designated. If from 25 to 75 per cent were softwoods, the stand was defined as mixed. If less than 25 per cent were softwoods, the stand was classed as hardwood. Ogden, op. cit., p. 56.

[6]Ibid., p. 9.

[7]Ibid.

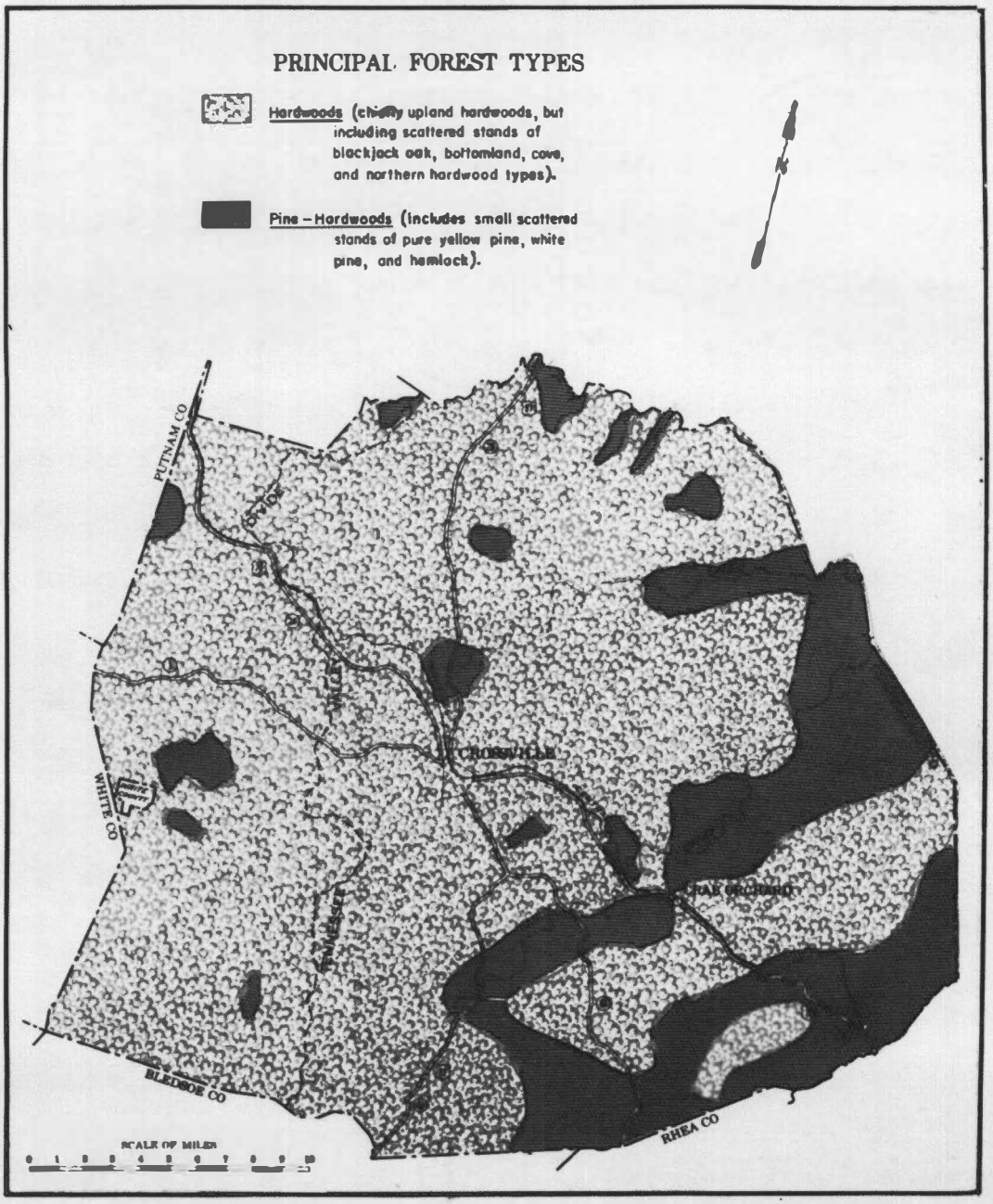


Figure 44. The principal forest types distribution in Cumberland County.

TABLE XVI

FOREST AREA BY TYPE IN CUMBERLAND COUNTY, TENNESSEE, 1950[a]

Forest Type	Acres	Per Cent of All Forest Land
Upland hardwoods	276,700	77
Yellow pine-hardwoods	50,800	14
Yellow pines	8,800	3
White pine-hardwoods	5,200	2
Bottomland hardwoods	5,200	2
Cove hardwoods	3,500	1
Hemlock-hardwoods	3,500	1
All types	353,700	100

[a]Source: Tennessee Valley Authority, Division of Forestry Relations, Forest Inventory Statistics for Cumberland County, Tennessee (Norris, Tennessee: Tennessee Valley Authority, Division of Forestry Relations, 1952), p. 3.

with Shortleaf twice as abundant as Virginia.[8] Other mixed types--hemlock-hardwoods and white pine-hardwoods--cover about 3 per cent of the forest land (Table XVI). They are found along streams and in mountain coves.

Scattered throughout the mixed-type areas are occasional pure stands of yellow pine. The survey showed that this type occupies about 3 per cent of all forest land (Table XVI).

The 1950 TVA survey showed a definite increase in the area of hardwood types since 1940, while during the same period the mixed-type area decreased. "One reason for this change is the fact that the pine in most mixed stands is being cut heavily while the hardwoods are frequently left. With inherent natural advantages, these hardwoods crowd out the remaining pine and eventually succeed as the climax type."[9]

Stand-size Classes

Stand-size classes serve two purposes: they are a measure of minimum timber volume per acre, and they also indicate approximate size of timber. The 1950 TVA survey recognized four classes: large sawtimber, small sawtimber,

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[8] Ibid., p. 10.

[9] Ibid., p. 9.

pole timber, and other.[10] According to the survey, 11 per cent of the forest land was in the large sawtimber class, 31 per cent was in the small sawtimber class, 38 per cent was in the pole timber class, and 20 per cent was other (Table XVII).

The large sawtimber stands averaged approximately 4,300 board feet per acre and therefore contained a total volume of over 165 million board feet of sawlogs.[11] Most of this class is upland hardwoods; relatively little area contains enough softwoods to meet the mixed type specification. This is also the case with the small sawtimber and pole timber stands. The county does not have sufficient pine to sustain the present rate of use.

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[10] Large sawtimber: "Stands having a volume of at least 1,500 board feet per acre in live sound trees with more than one-half of this volume 15 inches d.b.h. [diameter at breast height] or larger."

Small sawtimber: "Stands having a net volume of at least 1,500 board feet per acre in live sound trees with one-half or less of this volume in trees 15 inches d.b.h. or larger."

Pole timber: "Stands with less than 1,500 net board feet per acre having at least 30 sound trees of pole size or larger of which at least 15 are pole size."

Other: (Understocked and reproducing.) "Any stand not qualifying as either sawtimber or pole timber." Ibid., p. 56.

[11] Ibid., p. 10.

TABLE XVII

FOREST AREA BY STAND-SIZE,
CUMBERLAND COUNTY,
TENNESSEE, 1950[a]

Stand-size[b]	Acres	Per Cent of All Forest Land
Pole timber	134,800	38
Small sawtimber	108,600	31
Large sawtimber	38,500	11
Other	71,800	20

[a]Source: Tennessee Valley Authority, Division of Forestry Relations, Forest Inventory Statistics for Cumberland County, Tennessee (Norris, Tennessee: Tennessee Valley Authority, Division of Forestry Relations, 1952), p. 3.

[b]See footnote 10, p. 140, for definitions.

Twenty per cent, or 71,800 acres, of the county's forest fail to qualify as either sawtimber or pole timber. Some of this area having low class timber is in seedlings and saplings, "but there is also a large area of badly depleted and understocked woodland. In their present condition these areas are practically non-productive. Cumberland County has nearly 72,000 acres of such land."[12]

Stocking

The TVA survey recognized four categories of stocking based on the per cent of ground area shaded by the crowns of trees of all size classes: satisfactory (a crown coverage of 70 per cent or more), fair (40 to 70 per cent), poor (10 to 40 per cent), and denuded (less than 10 per cent).[13]

In Cumberland County about one-half of the forest does not meet the satisfactory stocking standard. And much timber improvement work could be done even in stands that rate satisfactory stocking. Trees of low quality and undesirable species may predominate. Spacing of individual trees is usually erratic and far from ideal.[14]

Only approximately one-third of all woodlands have

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[12] Ibid., p. 11.

[13] Ibid.

[14] Ibid.

fair stocking. This means that tree crowns actually shade only about one-half of the ground area. Timber production in these areas could be doubled by building up the stocking standards to a satisfactory level.[15]

Site Quality

"Site quality (the ability of a site to grow timber of specific height in a given period of time) depends on the combined effect of such factors as soil, moisture, aspect, drainage, climate, and elevation."[16] The 1950 TVA survey classed forest stands on the basis of average merchantable height attained by mature trees. Five classes were used: excellent, good, average, fair, and poor.[17]

Little of the forest area in Cumberland County rates good to excellent. Average sites include nearly nine-tenths of all woodland. Eight per cent of the woodland rates as poor sites.

Timber Volume

The 1950 TVA survey provides volume estimates for all live standing trees five inches d.b.h. (diameter at breast height) or larger. Three categories of trees were recognized:

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[15] Ibid.

[16] Ibid., p. 12.

[17] Ibid., p. 57.

"(1) sawtimber growing stock (sound softwood trees 9 inches d.b.h. or larger and hardwood 11 inches d.b.h. or larger), (2) total growing stock (all sound trees 5 inches d.b.h. or larger, i.e., combined pole and sawtimber growing stock), and (3) cull trees."[18]

Sawtimber Growing Stock

Cumberland County has an estimated 543.5 million board feet of sawtimber, of which 37.7 per cent is large sawtimber, and 62.3 per cent is small sawtimber (Table XVIII). The major part, or 84.8 per cent, of all sawtimber is hardwood; 15.2 per cent is softwood. The red oaks, chiefly scarlet, are the most abundant species; the white oak group ranks second. Yellow pine, mostly shortleaf, ranks third; hickory follows closely thereafter.[19]

Although the total supply of sawtimber growing stock exceeds one-half billion board feet, "only a fraction of this is merchantable under present conditions. The market for low-grade hardwood sawlogs is continually saturated. The demand for species like hickory is weak when compared with the abundant supply."[20]

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[18] Ibid., p. 13.

[19] Ibid.

[20] Ibid., p. 14.

TABLE XVIII

TIMBER VOLUME BY TYPE AND STAND-SIZE CLASS, CUMBERLAND COUNTY, TENNESSEE, 1950[a]

Type	Large Sawtimber	Small Sawtimber	All Sawtimber	
	Million Bd. Ft.	Million Bd. Ft.	Million Bd. Ft.	Per Cent
Softwoods	28.0	54.8	82.2	15.2
Hardwoods	177.1	283.6	460.7	84.8
Both types	37.7 per cent	62.3 per cent	100 per cent	

[a]Source: Tennessee Valley Authority, Division of Forestry Relations, Forest Inventory Statistics for Cumberland County, Tennessee (Norris, Tennessee: Tennessee Valley Authority, Division of Forestry Relations, 1952), p. 6.

Quality of Sawtimber

Of all hardwoods, only 18 per cent graded "No. 1 Common" or better, 31 per cent graded "No. 2 Common," and 51 per cent was made up of low grades. Hardwood sawtimber in the county averages poorer in quality than the average of that from the whole of the Tennessee Valley.[21]

Another indication of the poor quality of much of the forest in Cumberland County is the volume of timber and proportion of trees classed as cull. Cull in the sawtimber growing stock includes that portion of the tree stem between the stump and the top limit of merchantability which is deemed unmerchantable because of rot, excessive limbiness, or other defects. Of the county's sawtimber growing stock, 15.5 per cent of the volume in terms of board feet is classed as cull, nearly all of which is hardwood.[22]

The timber rates still poorer in terms of the proportion of cull trees. One out of every five hardwood trees eleven inches d.b.h. or larger is a cull, i.e., at least one-half of its volume is defective. These culls account for 23 per cent of the total stand based on area. Among the hardwoods from five to eleven inches d.b.h., one out of every six is a cull. Cull trees in the Cumberland County area are about twice as prevalent as the average for all the

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[21] Ibid., p. 15.

[22] Ibid., p. 16.

Tennessee Valley stands.[23] Factors contributing to the large number of cull trees are repeated burning, the prevalence of inherently low-quality species, and cutting the best trees while leaving the poor ones.

The above information on forest area and volume and quality of timber reveals, among others, these important points: the present forest area is not well enough stocked; there are too many trees of low quality, and too few of the more valuable species. Correction of these inadequacies by the adoption of good forest management practices would greatly increase the supply of marketable timber.

Forest Condition

Watershed Protection

The major portion of Cumberland County is drained by Daddys Creek, the Obed River, and Clear Creek into the Emory River. Periodic floods on the Emory River have inflicted severe damage. Flood control from the point of view of stream flow will be considered in the following chapter with the discussion of surface water.

Because of the moderating influence of the forest on run-off and stream flow, this aspect of the forest merits consideration. The condition of the forest, as well as its

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[23] Ibid., p. 18.

extent, determines its effectiveness in checking run-off. "Poorly stocked, burned over forests and trampled woodland pastures have only a fraction of the water-holding capacity of fully stocked, protected forests."[24] Some of each of these abuses, especially burning, have been active in Cumberland County.

The 1950 TVA survey classified the Emory Valley forest soils by infiltration ratings of excellent, good, fair, and poor. These were based on a combination of such factors as canopy coverage, exposure, and forest floor conditions. According to the survey, the Cumberland County soils rated as follows:

> About three-fifths of the woodlands rate fair or poor. This situation is primarily the result of repeated burning and grazing--factors that can be controlled. Contributory but unalterable factors--shallow soil and steep topography--aggravate the situation and create an even greater need for adequate soil-and-water-holding cover.[25]

Forest Fires

Forest fires are the number one problem in the forest of Cumberland County. The 1952 fire record was one of the worst in the area's history (Fig. 45). The Tennessee Division of Forestry estimates that approximately 17 per cent of the Cumberland-Morgan County forest area burned over. According

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[24] Ibid., p. 20.

[25] Ibid., p. 21.



Figure 45. Second growth oak timber west of Crossville burned over in 1952.

to the 1950 TVA survey, "the average annual burn between 1945 and 1950 was 10 per cent. One-fourth of 1 per cent is the generally accepted maximum which can be tolerated by timber growing investors."[26]

Ogden describes the fire situation in Cumberland County as follows:

> Forestry agencies recognize the area as one of the most hazardous and difficult fire situations in the Tennessee Valley region. The continuous forest pattern (see Forest Cover Map), rugged topography, lack of access roads and fire breaks (even natural barriers, streams and the like, are not numerous on the Plateau) [sic] are some of the physical difficulties. The situation is further complicated by certain human elements as pointed up by available records on fire causes. Records for 1949-51 show that incendiary fires, including range burning, accounted for 59 percent [sic] of all known forest fires; hunters and debris burners another 25 percent [sic].[27]

Further analysis of the record reveals three areas of high fire occurrence in Cumberland County. The "hot spots" are: Lantana, Dogwood, and Slate Springs (Fig. 46). These three "hot spots" contain 23 per cent of the county's area, but have 64 per cent of the fires.[28] Delineation of these "hot spot" areas make it possible to concentrate fire prevention and control efforts where they are most needed.

In a study of the cause of forest fires in the Big

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[26] Ibid., p. 22.

[27] Ibid.

[28] Ibid.

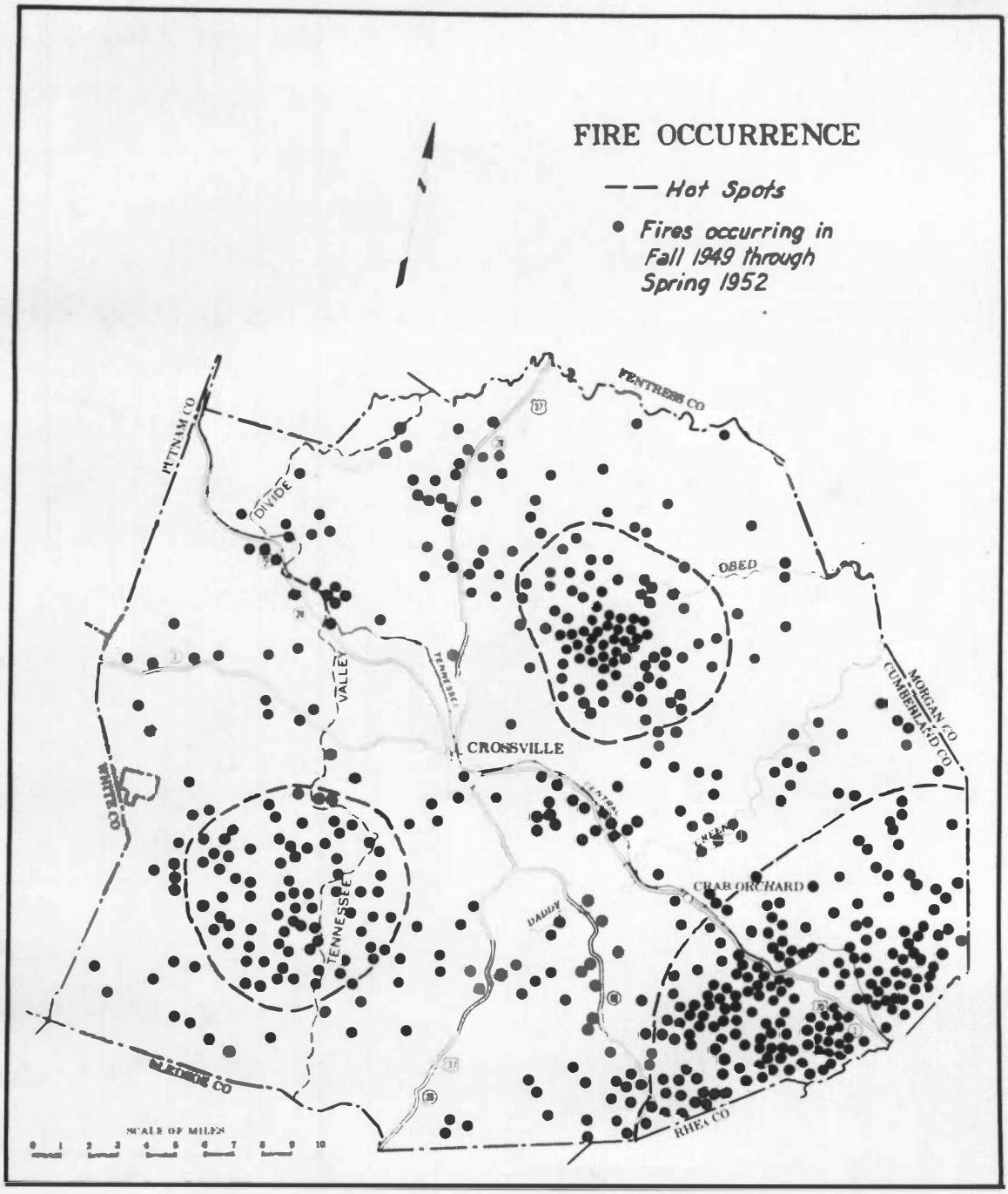


Figure 46. Fire occurrence in Cumberland County.

Lick Community, most fires were attributed to range burning.[29] Not only does range burning destroy timber and the forest floor, but it actually damages the grazing quality of the range. Observant stockmen of the plateau have long known that grazing conditions are not improved by burning.[30] An illusion is merely created when new grass in the spring is more in evidence if the ground has been burned bare. True, in the spring cattle will rush first to the burned areas, for the same illusion which deceives the herder deceives the cattle.

Since 1949, fire control efforts have increased substantially. In that year the county government recognized the need for forest fire protection and appropriated $2,000 for fire control work. It is now the policy of the state government to expand forest protection as rapidly as possible until all state and privately owned forest lands are receiving reasonable protection from fire.[31]

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[29]The Forestry Committee of Big Lick Community, The Tennessee Agricultural Extension Service, The Tennessee Division of Forestry, and Tennessee Valley Authority, Division of Forestry Relations, "The Big Lick Community Forestry Demonstration" (1937), p. 9. (Unpublished)

[30]Tennessee Division of Forestry, Does It Pay to Burn the Range?" Circular No. 11 (Nashville: Tennessee Division of Forestry, 1927), p. 6.

[31]Tennessee Division of Forestry, "A State Forestry Policy and Program" (1953), p. 3. (Unpublished)

In his analysis of the Cumberland-Morgan County forest area, Ogden described the recent fire control efforts as follows:

> The State now maintains the following organization in Cumberland and Morgan counties: two fire control assistants (they also serve Anderson, Roane, and Putnam counties), 12 mobile crews, and 9 lookout towermen. Each mobile crew consists of a crew leader and 4 crew members. Each is equipped with a pickup truck and fire fighting tools. In addition, a fire plow unit including a tractor, a fire plow, and a truck is maintained near Sunbright.
>
> This organization operates as a part of the 19-county North Cumberland District, which is supervised by a District Forester located at Harriman. Present public expenditures for protection in the Cumberland-Morgan area average annually about 6 cents per wooded acre.[32]

Reforestation

In addition to the 353,700 acres of natural forests, there were in Cumberland County 1,422 acres of forest plantings in 1952. The plantings are chiefly pine (Fig. 47). Most of the work has been done since 1947; only seventy acres had been planted before that date. During the period 1950-52, approximately 1,100 acres were planted.[33]

Ownership

The ownership has had an effect upon the present

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[32] Ogden, op. cit., p. 23.

[33] Ibid., p. 25.



Figure 47. A young pine planting on a knob in Grassy Cove.

conditions found in the forest, and it will influence their future use. Forest management practices can be more freely applied to publicly-owned lands. The plans of farmers for the use of their woodlands may differ greatly from those of mineral companies. Some data are available regarding the kind and size of ownership, but knowledge of such subjective factors as owners' aims and attitudes is meager. Land ownership is first divided into the two classes, public and private.

Publicly-owned Lands[34]

Approximately 12 per cent of the forest land, 42,800 acres, in Cumberland County is publicly owned. The State owns 41,300 acres (Cumberland Mountain State Park excluded), and the City of Crossville has 1,500 acres in its municipal watershed. There are no national forests. The major portion of the State lands is composed of the Catoosa Wildlife Management Area. The Plateau Experiment Station holds second place in acreage, and a tip of Bledsoe State Forest reaches into the southwestern corner of the county. These State lands are administered by the Game and Fish Commission, The University of Tennessee, and the Division of Forestry, respectively.

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[34]See Figure 48 for all publicly-owned lands in Cumberland County.

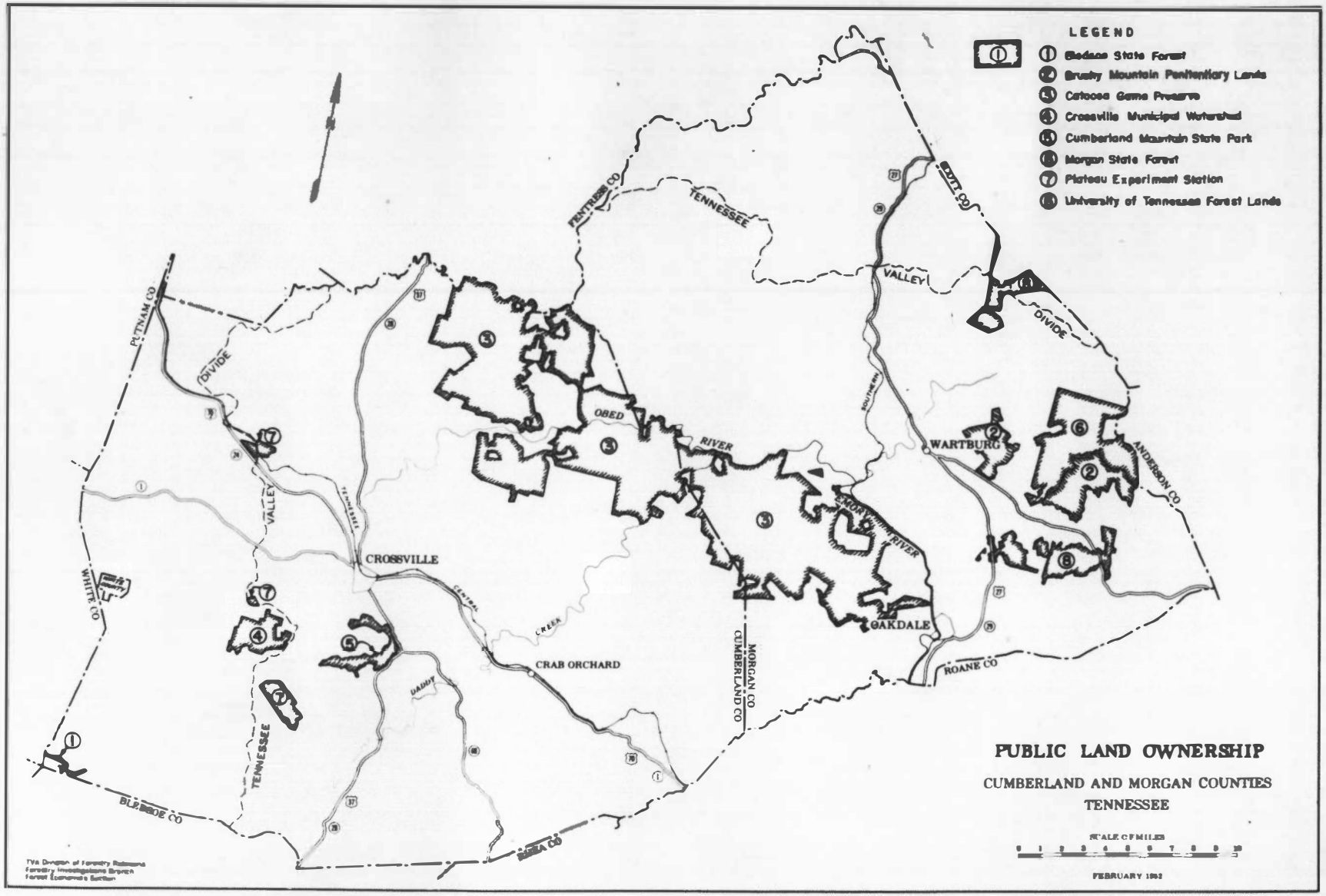


Figure 48. The publicly-owned land in Cumberland and Morgan counties.

Although the primary interest of two of these agencies is other than timber production, they have the opportunity to practice forest management on these large holdings and thus increase their income. The forest lands of the Plateau Experiment Station can serve as a laboratory, the results from which would be generally applicable to the forest lands of the whole Cumberland Plateau. In 1951, the Game and Fish Commission and the University of Tennessee inventoried a total of 75,000 acres in Cumberland and Morgan counties for the purpose of developing timber management.[35]

Forest management on the Catoosa Area.[36] Half in Cumberland County and half in Morgan, the 78,000 acre area stretches twenty-six miles across the plateau from Clarkrange on the west to Oakdale on the east. The circumstances of this area differ from those of the usual forest management instances in that it is retained primarily for wildlife production.[37] Because of its large area, however, less than 1 per cent will

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[35] Ogden, op. cit., p. 26.

[36] Only one-half of the area is in Cumberland County; the other half lies in Morgan County, but since the State manages it as a unit, it will be so treated here. Because the area is maintained primarily for wildlife production, the history and game management aspects will be discussed in Chapter IX under recreation.

[37] At the time of writing there was only one documented source of information about the area: State Game and Fish Commission, The Catoosa Wildlife Management Area (Nashville, Tennessee: State Game and Fish Commission, 1954). The material for the discussion of the area has been taken entirely from this publication.

be used for wildlife food crops. Thus practically all of the area is available for timber production. Here, there is an excellent opportunity for the Game and Fish Commission, in whose custody the area rests, to demonstrate the mutual advantages of wildlife and timber production. Timber sales can add materially to the economy of the region and help provide adequate wildlife management and recreational facilities.

The plan for the Catoosa area is "an essential part of a proposal for developing the total forest resources of Cumberland and Morgan counties through an integrated harvesting-utilization arrangement between landowners and the timber industry."[38]

The Game and Fish Commission bulletin of the management of the forest of the area gives the following description of the general physical conditions of the forest:

> The recently developed system of roads, together with old logging roads and trails, makes most of the area accessible for timber operations. In those few inaccessible areas, timber sales will aid in further road development. Before the area was acquired in 1942, it was similar to many other heavily cut, burned over tracts, and only now are results of protection and restricted cutting beginning to show.[39]

The 1951 survey mentioned above brought out, among others, the following facts. The area is almost entirely

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[38] Ibid., p. 4.

[39] Ibid., p. 6.

forested (Fig. 49). About 53 per cent is in hardwoods, 42 per cent in mixed pine-hardwoods, and 5 per cent in pure yellow pine. About 65 per cent of the area is considered to have good stocking; only 2 per cent is poorly stocked. Enough timber is available to permit an annual cut of four million board feet.[40]

The Catoosa area is fairly well situated with respect to markets for forest products. Timber processing industries in Jamestown, Sunbright, Crossville, Harriman, and Knoxville can use materials from the area. Crosstie and pulpwood concentration yards are located at various points along the Tennessee Central and Southern railroads.

Privately-owned Lands

About 310,900 acres, or 88 per cent, of the 353,700 acres of forest land in Cumberland County is privately owned. Of this, mineral companies, lumber companies, and other non-farm owners hold 219,700 acres, or 77 per cent. Some 1,900 farms contain woodlands totaling 91,200 acres.[41]

The forest management problem is different with each class of ownership and operation. In Cumberland County there is a high proportion of resident farm operators who own their land. This condition lends itself to the practice

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[40] Ibid., p. 5.

[41] Ogden, op. cit., Table II, p. 63.



Figure 49. A dense stand of mixed forest in the Catoosa Wildlife Management Area.

of sustained yield management on the farm woodlands. Whether or not such a program can quickly be put into effect depends upon how readily these owners will adopt an educational program.

If every community in the county were to organize for the purpose of development and use of the forest resources as has the Big Lick Community, the problem would be well on the road to solution for both the farm and non-farm owners. The forestry demonstration project here was a result of the combined efforts of the Forestry Committee of the community, the Agricultural Extension Service, the Tennessee Division of Forestry, and the Tennessee Valley Authority, Division of Forestry Relations.[42]

The Big Lick Community embraces about 6,000 acres in sixty-five ownerships in the southern part of the county. The forestry plan for the community involves making use of the forest in such a manner that it will become more valuable and more productive. The plan calls for local production of all timber requirements plus production of a surplus for sale. Logging is done by local farm labor. Milling and processing is done at community-owned facilities. Timber is cut selectively. Woods fires are held to a minimum, and seedlings are

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[42]The Forestry Committee of Big Lick Community, The Tennessee Agricultural Extension Service, the Tennessee Division of Forestry, Tennessee Valley Authority, Division of Forestry Relations, "The Big Lick Community Forestry Demonstration" (1947), p. 3. (Unpublished)

interplanted. Timber harvesting and the operation of a sawmill and a fence post treating plant provide off-season jobs for the farmers.

Forest Products Industries

The forest products industries are those that produce, concentrate, treat, or manufacture products derived from the forest. These industries may be divided into three broad groups on the basis of place of employment and manner of adding value to the raw material: (1) those that require working in the woods and produce rough lumber and such other primary products as logs, bolts, poles, and ties--usually not considered to be manufacturing, however sawing rough lumber or crossties from logs is processing, i.e., adding value by changing the form of the material; (2) those that furnish yard employment and concentrate materials, best illustrated by pulpwood concentration yards--the activity is neither primary, in the extractive sense, nor processing, but rather a phase of marketing, for value is added by storage and the facilitation of channeling materials to consumers; (3) those that furnish mill employment, receiving primary forest products as raw materials and add value by processing it--definitely manufacturing. Only the first two of these groups will be considered here; the third group will be treated in Chapter IX under manufacturing.

Accurate and meaningful data on the first two groups are difficult to obtain. Employment and occupational statistics are misleading due to the fact that so much of the work is done by men who work only part-time on these jobs and list their occupation as farming.

Primary Forest Products Industries

The primary forest products of Cumberland County include such commodities as sawlogs, pulpwood, acid wood, handle bolts, mine timbers, fence posts, charcoal wood, fuel wood, poles, and as grouped here, rough lumber and crossties. Many people in the county, including farmers, truckers, and wage earners, find part-time or full-time work cutting and marketing these products.

Sawmills and rough lumber production. If sawmills were large, stationary plants located in towns they would be considered manufacturing plants, but the typical mill is a small, portable, circle saw rig, operated in the woods as a part-time business (Fig. 50). Most mills operate less than one-fourth of the time. Many are marginal enterprises and change hands frequently.

Most sawmill operators still buy "stumpage by the boundary," and cut pole growing stock along with sawtimber, particularly in pine and mixed stands. During the period 1945-47, a majority of the average annual production in the county was rough softwood lumber. Of the average 12.2 million



Figure 50. A small portable mill sawing pine logs in the Catoosa Wildlife Management Area.

board feet, 7.6 million were softwoods, primarily southern yellow pine.[43] Oak, the leading hardwood, was the second ranking variety sawed. Some of the hardwood is sawed into crossties.

A high proportion of the hardwood lumber is low grade, resulting especially from insects following fire damage. Low value species is also a contributing factor. Regarding the demand for hardwoods, Ogden states that,

> Probably the chief problem of the hardwood producer is marketing this low-grade material. Flooring mills at Oneida, Harriman, Crossville, Cookeville, Knoxville, and even as far away as Sevierville, take limited quantities. Some is used by farmers, but the total demand is weak, unstable and wholly inadequate to encourage expansion of oak lumber production.[44]

Pulpwood. About two-thirds of the pulpwood being produced in the county in recent years is hardwood. The hardwoods accepted for pulpwood include oak, black gum, red maple, yellow poplar, and sourwood. The product consists of sound peeled bolts, five feet in length, and varying in diameter from five to twenty inches.[45] Cumberland County's forests can supply large quantities of such hardwood each year.

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[43] Ogden, op. cit., p. 32.

[44] Ibid., p. 33.

[45] Ibid., p. 34.

Concentration Activities

Pulpwood concentration. Pulpwood concentration yards and loading points are found at various points along the Tennessee Central Railroad. The main yards are at Crossville, Crab Orchard, and Mayland. A large yard at Crossville is operated by the Mead Corporation, a paper making company (Figs. 51 and 52). They buy maple, gum, and poplar for their Kingsport, Tennessee, mill which turns out white paper. Oak is taken for their cardboard mill at Harriman.[46]

Crosstie concentration. There are two tie concentration yards at Crossville. According to Ogden, about 85 per cent of the ties are oak; the rest are gum and a few other species.[47] Practically all ties are sawed and most of them come from the portable mills scattered over Cumberland County.

Charcoal wood production and concentration, and charcoal production. Nearly all of the area's charcoal wood goes to a single plant in West Tennessee which manufactures large quantities of charcoal. A concentration yard at Crossville handles most of the shipments. Oak, hickory, and other hardwoods in round bolts are accepted if three to five inches in diameter; bolts six to eight inches in diameter must be quartered.

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[46]Interview with company employees, June 1955.

[47]Ogden, op. cit., p. 35.



Figure 51. A pulpwood concentration yard in Crossville.



Figure 52. A pulpwood concentration yard at Mayland on the Tennessee Central Railroad.

Producers in 1952 received $8.00 per cord for their charcoal wood. Since the charcoal industry can take poorer quality wood, this price was about $3.00 less per standard cord than the price on unpealed pulpwood. All shipments are made via the Tennessee Central Railroad. Owing to the fact that the West Tennessee mill has had to pay about $4.00 per cord in freight, and has other available supplies nearer its plant, this market is being held with difficulty.[48]

Most charcoal wood is a by-product of land clearing, and production costs have practically equaled sale price. Ogden states that, "The woodland owner is often satisfied to trade his stumpage for a clearing operation."[49]

The Big Lick Community, in the southern part of the county, has taken steps to counteract the lack of profit in their charcoal wood production. Their solution to the problem has been to produce the finished product, charcoal, rather than merely the primary raw material. The industry was started in 1953 under a cooperative plan. The following year a charter was granted by the state to the Daddys Creek Charcoal Producers, Inc. In December 1955 there were twenty-one stockholders with fourteen kilns already constructed.[50]

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[48] Ibid.

[49] Ibid.

[50] Interview with Mr. W. A. Smith, treasurer of the corporation, December 1955.

Production of charcoal by this organization is primarily an adjunct to farming. The kilns are small, about five feet by seven feet by twelve feet, and made of cinder blocks filled with sand. They produce about one to one and one-half tons of charcoal per burning. The kilns are stacked with oak or hickory wood after which the doors are sealed. A fire is then started in kindling which was previously put along the sides of the cordwood. The fire is allowed to burn for fifty-two to fifty-six hours. When the burning is completed, the time being determined by the color of the smoke, the kiln is sealed off and allowed to stand for three days before being opened. The finished charcoal is screened and bagged in three, five, ten, and twenty pound bags. In 1955, the corporation sold eighty-five tons under its own trademark to wholesalers in Tennessee, Alabama, Georgia, Kentucky, and Illinois.[51]

Growth and Drain of the Forest

A comparison of growth and drain estimates give some indication of what is happening to the timber supply of Cumberland County.

Sawtimber Growing Stock

Hardwood sawtimber supplies are building up at a rate

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[51] Ibid.

rapid enough to double it in twenty years, while softwoods are decreasing. Hardwood growth is nearly four times that of softwood, while softwood drain exceeds hardwood drain by 11 per cent. This condition is due to the demand for softwood sawlogs and a low softwood timber inventory rather than growth rate differences.[52]

Total Growing Stock

The county's total growing stock of sound trees five inches d.b.h. or larger is increasing (in excess of drain) at a rate that would double the wood inventory in about thirty years. Unfortunately, a large share of the growth is on species that are low in demand. Nearly one-fourth of the growth is on such inferior oaks as scarlet, blackjack, post, and chestnut.[53]

Consideration of the agriculture and the forest of the county conclude a study of the resources resulting directly from the surface of the land. Attention will next be turned to the minerals and water supply, those physical resources found in and beneath the surface of the earth.

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[52] Ogden, op. cit., p. 38.

[53] Ibid., p. 41.

CHAPTER VI

MINERAL AND WATER RESOURCES

Coal

Regional Location and Extent of Deposits

Cumberland County contains reserves of three minerals which either have been or are of economic importance: coal, sandstone, and limestone. Coal was the first of the three to be exploited, and for half a century it has been important in the economy of the county. Shifts in coal mining have reduced production from Cumberland County, but the reserves are large enough to be worthy of consideration in the long range outlook.

The coal bearing area (composing the southern end of the Appalachian Coal Field) of the Cumberland Plateau, has been divided by the industry into the Northern and Southern Fields, with the boundary being placed along the Tennessee Central Railroad. The reason for this division is the different geological conditions existing in the two areas.[1] Cumberland County, with estimated reserves of nearly 3,000,000 tons, contains the largest reserves in the Southern

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[1]It is not the purpose of this study to go into the geology of the coal bearing formations or the analysis of the different coal beds. These topics are thoroughly considered in Bulletins 33-A and 33-D of the Tennessee Division of Geology.

field.[2]

Although small mines, which are worked either intermittently, or have been worked in the past, are scattered over most of the county, the principal coal producing area is now the Crab Orchard Mountains district.[3] In this area deep stream dissection has exposed the coal seams at many points, a condition affording the easiest access to the coal.

History

Coal was mined for shipment in most of the surrounding counties at an earlier date than in Cumberland County. Production for local use began in Roane County as early as 1814, and coal was shipped from a mine in the Rockwood area in 1823, but it was not until after 1899, when the Tennessee Central Railroad was built, that Cumberland County was opened for commercial production.[4] A number of mines were opened in the years immediately following the completion of the railroad, and during the first decade production increased up to the peak year of 1907.[5]

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[2]Tennessee State Planning Commission, Industrial Resources of Tennessee, Forests, Agriculture, and Minerals, Vol. II (rev. ed.; Nashville: Tennessee State Planning Commission, 1948), p. 73.

[3]Ibid., p. 7.

[4]Wilbur A. Nelson, The Southern Tennessee Coal Field, Bulletin 33-A (Nashville: Department of Education, Division of Geology, 1925), p. 3.

[5]Ibid.

Since this date the soft coal industry has been almost constantly beset by some economic problem, and Cumberland County mining has been unavoidably affected by conditions in the industry in general. Production fell off during the few years preceding World War I. With the beginning of the war in 1914, the uncertainties of that period held production back until 1918.[6] A strike in 1919 again curtailed production. Next, the post-war business recession of 1921 seriously affected the coal industry. During the 1920's the industry improved, only to be set back by the great depression of the 1930's, out of which the industry was unable to climb until the demands of World War II restored prices to a profitable level. Following the close of the war and the United Nations' "police action" in Korea, demand for Cumberland Plateau coal again fell off. The result of these conditions has been that throughout the history of coal mining in Cumberland County, the volume of production has fluctuated noticeably. Production figures for selected years from 1923 to 1933 are given in Table XIX.

Recent Production: Methods and Disposition

In the past few decades a number of shifts have occurred in the nation's coal industry. With respect to Cumberland County, the major shifts have resulted from mechanization of

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[6] Ibid., p. 8.

TABLE XIX

COAL PRODUCTION IN CUMBERLAND COUNTY FOR THE STATED YEARS[a]

Year	No. of Operators	Output in Tons	Average Price Per Ton
1923	4	15,651	$2.17
1930	1	53,752	1.60
1935	5	33,841	1.42
1940	14	232,168[b]	2.00
1945	10	8,661	3.40
1950	15	65,030	----

[a]Source: Annual reports of the Department of Labor, State of Tennessee, Division of Mines, for the stated calendar years.

[b]The large production this year was accounted for by the Haley Mountain Company at Crab Orchard which alone produced 216,200 tons.

production. The innovations in machinery have tended to divert production to the areas with thicker, more extensive coal seams, and seams lying closer to the surface.

Easy access to the coal resulting from stream erosion has permitted mining by the "drift" method. With this system, openings are made where the coal outcrops and "rooms" are developed immediately. This method has been generally used throughout the dissected plateau. No vertical shaft mining is done on the Cumberland Plateau, however, one slope mine is in production at Isoline in the northern part of Cumberland County (Fig. 53). This was at one time one of the largest mines in the county, and had a spur line of the Tennessee Central Railroad running to it (Fig. 54).

Since World War II, strip mining has temporarily replaced the drift method as the means producing the bulk of the tonnage. Strip mining, a more efficient type operation where the coal beds are close enough to the surface is, however, not generally suited to the Cumberland Plateau where the coal outcrops on valley sides and is otherwise found beneath thick strata of younger Pennsylvanian sandstone.

Even though coal seams are exposed frequently in the Crab Orchard Mountains area, since they outcrop on valley sides, in most instances only a few strips can be taken with a power shovel before the overburden becomes so thick that further stripping operations are economically prohibitive.

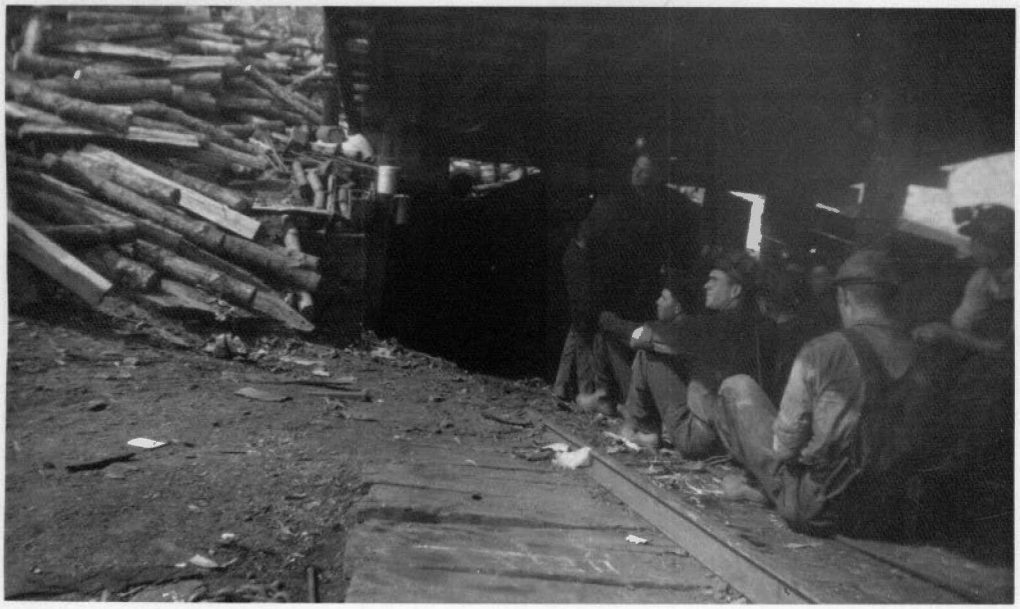


Figure 53. The entrance to the "slope" mine at Isoline in the northern part of Cumberland County.



Figure 54. The coal loading tipple for the mine at Isoline.

Consequently, using present methods, strip mining will be short lived in Cumberland County.[7] When the limit of a stripping operation is reached, small-scale production is usually continued by the drift method (Fig. 55). A number of small drift mines are being worked to produce fuel for local consumption, but at the present time the commercial output comes mostly from a few stripping operations. The stripped coal goes mainly to the steam-electricity plants at Watts Bar Dam and Kingston.

Whether coal is removed by the drift method or the strip method, the number of men employed per mine in the county is small. Table XX shows the amount of product from and the number of men employed in the operating mines in the county in 1953. The drift mines are generally operated by three or four men and a mule; and, even though more men are usually employed, stripping production can be carried on with one man clearing away the surface with a bulldozer and another scooping off the remainder of the overburden and loading coal directly into trucks with a power shovel (Figs. 56 and 57).

When the supplies of the other mineral fuels are exhausted, coal will increase in relative importance. Furthermore, coal is a versatile mineral. It is not only a source

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[7]Interview with Mr. B. L. Harris, Harris Coal Company, Crossville, Tennessee, May 1955.

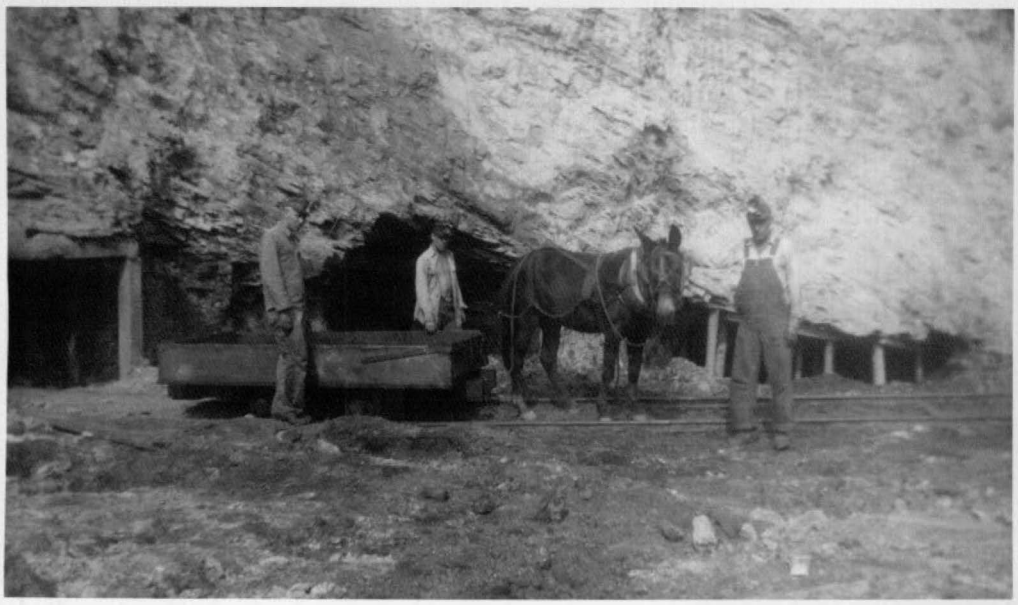


Figure 55. A drift coal mine which was started where stripping operations were discontinued.



Figure 56. Clearing the surface in preparation for stripping in the western edge of the Crab Orchard Mountains area.



Figure 57. Loading coal in a strip mine in the western edge of the Crab Orchard Mountains area.

TABLE XX

COAL PRODUCTION IN CUMBERLAND COUNTY FOR FISCAL YEAR 1953[a]

Operator	Location	No. of Men Employed	Output in Tons
Baisley Coal Company	Crossville	2	960
Bohannon Coal Company	Clifty	4	3,333
Clear Creek Coal Company	Crossville	6	2,160
Curvin Coal Company	Crab Orchard	3	1,440
Essoline Coal Company	Crossville	3	960
Green and Carter Coal Company	Waldensia	4	1,800
Haley Mountain Coal Company	Crab Orchard	4	2,400
H. & H. Coal Company	Crossville	3	1,400
Hayes Coal Company	Waldensia	3	960
Keyes Coal Company	Crossville	3	1,200
McCloud Coal Company	Crossville	4	1,800
Page Coal Company	Pleasant Hill	2	1,440
Hotsinpiller Coal Company	Crossville	3	1,200
Belvin Coal Company	Grassy Cove	3	1,440
Total		47	22,533

[a]Source: State of Tennessee, Division of Mines, Annual Report of the Department of Labor (Nashville: Tennessee Department of Labor, 1953), p. 30.

of heat and power, but in addition it is an important raw material from which many products are derived for our growing chemical industry.

When areas of more readily available, high quality coal are depleted, the central part of the Cumberland Plateau will again grow in importance. Until that time arrives, production in Cumberland County will depend upon general economic conditions, and the demands of such local markets as the nearby TVA steam plants.

Sandstone

The beautifully colored sandstone quarried in the area around Crossville, Tennessee, has developed into a two million dollar business annually, the leading industry of Cumberland County. On the Cumberland Plateau of Tennessee, commercial production of sandstone to be shipped out of the region for building purposes is limited to Cumberland County, there being only a small amount of much less highly-colored stone quarried for local use in adjoining counties. The principal producing district lies between Crossville and Crab Orchard, to the south of U. S. Highway 70, although small quarries are widely scattered over Cumberland County, especially to the west and east of the main area. The largest quarries are located about four miles southeast of Crossville which is seventy miles west of Knoxville and 125 miles east of Nashville.

Geology

The Crossville-Crab Orchard sandstone district is on the Cumberland Plateau west of the Crab Orchard Mountains. Most of the area has an undulating surface varying from 1,700 to 1,900 feet in elevation with the heart of the producing district lying at the 1,800 feet contour level. This section of the plateau drains eastward through Daddys Creek into the Tennessee River; however, some of the quarries to the west of Crossville lie outside of the Tennessee River basin and are drained by tributaries of the Caney Fork River into the Cumberland River.

In an earlier study of this building stone, Benjamin Gildersleeve stated that "The surface rock over most of the district is the Rockcastle sandstone . . ." giving Butts and Nelson as his authority,[8] and stated further that the principal quarries were in Rockcastle sandstone. Butts and Nelson limited their description to the Crossville quadrangle,[9] while the district under consideration lies mostly outside the Crossville quadrangle to the east in the Dorton quadrangle. The geologic map of the Crab Orchard Mountain area

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[8]Benjamin Gildersleeve, "Building Stone of the Crab Orchard District, Tennessee," Mining Engineering, 187:883, August 1950.

[9]Charles Butts and Wilbur A. Nelson, Geology and Mineral Resources of the Crossville Quadrangle, Tennessee, Bulletin 33-D (Nashville: Tennessee Division of Geology, 1925).

by Stearns, Jewell, and Rascoe, shows most of the surface rock of this district to be of the Duskin Creek formation,[10] the layer of the Pottsvillian series of the Pennsylvanian system lying immediately above the Rockcastle sandstone. This map shows the principal quarries to be in Crossville sandstone, which is stratigraphically the next to the lowest member of the Duskin Creek formation, and the only member to which a name has been given. Some of the quarries west of Crossville are no doubt in the Rockcastle sandstone, and, as Gildersleeve points out, the westernmost operations on the plateau have been opened in the Bonair sandstone,[11] but these are outside the Crossville-Crab Orchard district which is the area under consideration here.

Born gave a description of the sandstone quarried between Crossville and Crab Orchard in his report in 1936, in which he stated that this stone was "tentatively correlated with the Rockcastle formation."[12] In 1938, the Rockcastle sandstone was considered the youngest Lee formation by the U. S. Geological Survey,[13] although Nelson had named the

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[10]"Geologic Map of the Crab Orchard Mountain Area," accompanying Richard G. Stearns, The Cumberland Plateau Overthrust and Geology of the Crab Orchard Mountain Area, Tennessee (Nashville: Tennessee Division of Geology, 1954).

[11]Gildersleeve, loc. cit.

[12]Kendall E. Born, Resources of Tennessee, Second Series 1936, Summary of the Mineral Resources of Tennessee (Nashville: Tennessee Division of Geology, 1936), p. 83.

[13]M. Grace Wilmarth, Lexicon of Geologic Names of the

Duskin Creek formation, in 1925, as a still younger subdivision of the Lee;[14] however, Nelson believed that, "On the Cumberland Plateau west of Sequatchie Valley, no strata above the Rockcastle appears; . . ."[15] Later investigation by Wanless established that, "In Cumberland County west of Crab Orchard Mountain there is another shallow syncline in which is preserved about 100 feet of strata younger than the Rockcastle."[16] Wanless stated that,

> This interval includes at its top an evenly bedded hard sandstone with a remarkable development of color banding due to Liesegang structure. This sandstone, which has been extensively quarried as a building and ornamental stone near Crossville, is known commercially as the Crab Orchard sandstone. It is proposed that it be called the Crossville sandstone member of the Duskin Creek formation since the name Crab Orchard has been previously applied to a Silurian shale in Kentucky.[17]

Stearns' study includes the area of most important production of this building stone. In his discussion of the stratigraphy of the area he mentions commercial use of sandstone only in the case of the Crossville sandstone where he

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United States, U. S. Geological Survey Bulletin 896 (Washington: Government Printing Office, 1938), p. 1826.

[14] W. A. Nelson, The Southern Tennessee Coal Field, op. cit., p. 53.

[15] Ibid.

[16] Harold R. Wanless, Pennsylvanian Geology of a Part of the Southern Appalachian Coal Field, Memoir 13 (New York: The Geological Society of America, 1946), p. 36.

[17] Ibid., p. 37.

states, "Such beds are known as Crab Orchard stone and are sought as building stone."[18]

The Crossville sandstone varies in thickness from seventy feet to more than one hundred feet; however, in most of the area containing surface rock of the Duskin Creek formation, the Crossville sandstone is the youngest unit present so that due to erosion it is often thinner. Stearns states that it is usually massive and cross-bedded, but in some localities the bedding is even and flaggy.[19]

The quarrymen in the district market their product as quartzite, and geologists in general are perhaps justified in being reluctant to publish statements to the contrary. Gildersleeve states that, "The building stone of the Crab Orchard district is a fine-grained, thin-bedded sandstone which is so strongly cemented by silica that it may be classed as quartzite."[20] According to Born, "Mineralogically the stone is a medium to fine-grained silica-cemented sandstone of almost quartzitic character. . . ."[21] Stearns says that this member is characterized by, "Fine-grained, quartzose,

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[18]Richard G. Stearns, The Cumberland Plateau Overthrust and Geology of the Crab Orchard Mountain Area, Tennessee (Nashville: Tennessee Division of Geology, 1954), p. 28.

[19]Ibid.

[20]Gildersleeve, op. cit., p. 883.

[21]Born, loc. cit.

non-conglomeratic sandstone. . . ."[22]

It is true that there is no sharp distinction between quartzites and sandstones, and whereas the extremes of soft sandstones and hard quartzites are very different, the determination of intermediate rocks is more or less arbitrary. The simplest description of quartzite, and methods of distinguishing it from sandstone are given in Kemp's Handbook of Rocks.[23] It is customary to call a rock quartzite where the cement is so firm that the rock breaks through the sand grains instead of around them. The stone under consideration here will not stand up as quartzite under this test.

Characteristics and Use

The stone is of extreme hardness and durability, ranking high as a building stone because of its strength and imperviousness. A decided feature is its beautiful color range of pastel shades: tan, buff, gray, and blue-gray, with blending shades of yellow, brown, and pink. Especially the upper strata most affected by weathering have

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[22]Stearns, loc. cit.

[23]"The quartzites are metamorphosed sandstones, and differ from the latter principally in their greater hardness, and to a certain extent in their fairly pronounced crystalline character. These qualities result from an abundant silicous cement which is crystalline quartz, and which is commonly deposited around the grains of the original sandstone, enlarging the quartz grains so that they are interlocked with adjoining grains. . . ." James Furman Kemp, A Handbook of Rocks (6th ed.; New York: D. Van Nostrand Company, 1940), p. 237.

been highly discolored by iron compounds, creating many color designs in the form of ripples, swirls, and eddies.[24]

The stone lies in strata usually ranging from three-eighths of an inch to six inches in thickness, with a few layers running up to twenty-two inches. The beds are straight and uniform in thickness, and the smooth surfaces do not become slippery with wear or when wet. The United States Bureau of Standards rates the stone highest in non-slip value. As a result of this characteristic, the stone does not take on a very high polish. It can be furnished to consumers in sheets of almost any dimension up to the limits of transportation (Figs. 58 and 59). It has a wide variety of uses including veneer, roofing, flagging, coping, wainscot, exterior and interior wall surfaces, and decorative panels.

Quarry Methods[25]

The Crossville sandstone, being the youngest rock over most of the surface of the area where the principal quarries are located, is the upper layer, stratigraphically. These quarries are, therefore, found on the ridges. The valleys have been eroded into the underlying Rockcastle sandstone

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[24]Born, loc. cit.

[25]Excepting where otherwise noted, the information dealing with quarry methods, fabrication, labor, and marketing of the stone was supplied by Mr. R. N. Pelot, President, Crab Orchard Stone Company, Inc., in interviews during May 1955.



Figure 58. Large flags of sandstone ready to be transported to market.



Figure 59. A stockpile of sandstone at the main quarry of the Crab Orchard Stone Company.

which the quarrymen of the district say is poorer quality stone. A mixed oak and pine timber covers the ridges. This, along with the overburden consisting of the sandy soil and partly disintegrated sandstone, is removed by bulldozers well ahead of the actual quarrying. The overburden ranges in thickness from practically nothing along the slopes where the rock is likely to outcrop to ten or twelve feet toward the crests of the ridges.

Since the quarries vary in size from the small operations of an individual part-time farmer to the large-scale works of such firms as the Crab Orchard Stone Company, Inc., employing 180 men and working a quarry floor now covering about fifty acres, the amount of machinery used also varies widely (Fig. 60). In spite of this, the quarry methods employed are simple and rather uniform. The quarries are developed laterally by a series of benches (Fig. 61). The stone is readily separated along its bedding planes, and it may be removed in large sheets. Wedges are driven between the beds at short intervals along the seams. The strata are then loosened and lifted by the use of crowbars and mattocks.

To assist in making straight cross breaks in the thinner beds, a gad is struck successive blows with a sledge hammer along the desired lines. In the thicker beds, holes are drilled at intervals into which plug-and-feather wedges are sledged. Where the end product is to be mainly rubble, and shattering is of little concern, operations can be



Figure 60. The fifty-acre sandstone quarry of the Crab Orchard Stone Company.



Figure 61. Loosening beds of sandstone with mattock and crowbar.

speeded up considerably by drilling the holes through a number of strata all of which will be blasted away from the quarry wall at once.

Fabrication

The principal marketing classifications of the stone are: flagstone, rubble, ashlar facing, and cut stone. Flagstone may be furnished sawed from dimension blocks, usually in two-inch thicknesses, but the majority is natural ledgestone as it comes from quarries. Most quarries furnish it either in random irregular sizes, or broken to definite or pre-determined dimensions. The majority of flagstone is used for walks and flooring.

Rubble is produced by breaking flagstone into standard widths of approximately four inches and random lengths from six to eighteen inches (Fig. 60). The stone breaks easily in any direction perpendicular to the bedding. Strip rubble is the form now being most used for the exterior walls of homes (Fig. 62). The strips are laid like brick with the bedding planes together and the rougher split surfaces exposed.

Strictly speaking, any exposed stone facing made from broken or cut stone, set at random or in uniform courses, is an ashlar facing. In this sense, cut stone may be set as ashlar facing, or the word ashlar may apply to various forms of facing with stone which is not measured and cut according



Figure 62. A heavy strip rubble sandstone house.

to shop drawing specifications, but is set on the job at the discretion of the stone mason. Ashlar facing may be of several surface finishes, usually either split face, sawed face, or pitch face. Split face is sawed through the beds and then set so that the surface face of the stone exhibits the natural texture of the bedding planes. Sawed face is a plain stone, the exposed surface of which is the sawed finish. Pitch face is similar to split face, except that the face of the stone is pitched to a given line and plane, producing a bold appearance rather than the flush face obtained in split face. Ashlar facing is seen especially as the exterior walls of large public buildings and churches.

Cut stone includes all stone cut or machined to a given size, dimension, or shape, and produced in accordance with working or shop drawings which have been developed from the architect's structural drawings. Buildings completed in stone will usually require some cut stone work. Cut stone may be employed as monuments, or it might be used for purely decorative work.

The Sylvara Stone Company, with its headquarters in Pennsylvania and a branch near Crossville, produces a veneer siding. By the use of a machine which puts a groove in the edges, flagstone can then be hung by hooks and nails to any wall surface. The face corners are pitched so that the surface will appear to be that of strip rubble or ashlar facing rather than a veneer. This stone is frequently used to

refinish exterior walls.

The job of breaking the flagstone into the desired widths is done either by hand or by the use of a guillotine machine which is operated by a hydraulic pressure system (Fig. 63). Several of the producers employ these machines. Both diamond circle saws and wire saws are used to turn out dimension stone or sawed face ashlar or flagging, but only two producers of this stone have saws (Fig. 64). The wire saws are made of twisted steel and are operated like belts with carborundum dust made to flow with water into the openings in the stone.

The use of hand tools is still a major means of fabrication, although the guillotine has stepped up output. The hand method of breaking the stone is similar to the process used in cutting glass. After the pieces are laid flat on a work bench they are marked along the desired line with a tracing chisel (Fig. 65). The stone is then turned over and a flat-edged chisel is sledged along a line opposite that of the marking.

Labor

The labor supply comes from farms scattered through the area and from the nearby town of Crossville. A majority of the workers are part-time farmers or are members of farm families. The added jobs afforded by this industry have been a decided boon to a people in an isolated rural region which has a high birth rate. This excess of births over



Figure 63. A hydraulic guillotine for breaking sandstone flags into strip rubble.



Figure 64. A wire saw for cutting stone.



Figure 65. The fabrication mill of the Crab Orchard Stone Company; a stonecutter's bench is in the foreground.

deaths has resulted in a surplus of laborers who have been faced with limited employment opportunities. In recent years the cultural aspects of the area are indicative of the improved standard of living being allowed by this new source of income.

Marketing

The stone is sold under different trade names by the several producers, such as "Crab Orchard Stone,""Tennessee Variegated Stone," and "Tennquartz." Born states that, "The name 'Crab Orchard Quartzite' has been applied to this stone commercially,"[26] and as was noted above, Wanless too says that it is known commercially as Crab Orchard sandstone, but also as was noted above, Stearns, in describing the Crossville sandstone, merely says that, "such beds are known as Crab Orchard stone. . . ."[27] It is correct that the building stone quarried in the Crossville-Crab Orchard district has become rather widely known popularly, but not commercially, as Crab Orchard stone. It should be pointed out that the name "Crab Orchard Stone" is the registered trade mark of the Crab Orchard Stone Company, Inc., and therefore may not be used by any other producer. Producers other than this firm are limited to advertising that their stone comes

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[26] Ibid.

[27] Stearns, loc. cit.

from the Crab Orchard district. This they can do, since the unincorporated place called Crab Orchard with a U. S. post office does exist.

It is unfortunate for five reasons that this stone has not become popularly known as "Crossville" stone rather than "Crab Orchard" stone: (1) the principal quarries are much closer to Crossville than they are to Crab Orchard; (2) the rocks in the basin in which Crab Orchard is located are Mississippian limestones and shales rather than sandstones,[28] the younger Pennsylvanian rocks having been removed by erosion after the uplife of Crab Orchard Mountain; (3) the principal quarries are in Crossville sandstone; (4) as was mentioned above, the name "Crab Orchard" has previously been applied to a Silurian shale in Kentucky, and (5) also as stated above, "Crab Orchard Stone" is the registered trademark of a particular firm.

Marketers of the stone vary in type of operation from part-time farmers, with small quarries on their land, to brokers who work no quarries at all, but instead buy to specifications, while different shades of combinations of the two exist between the extremes. All of the major fabricators, even though they work their own quarries, buy stone from the small quarrymen who have no contact with ultimate consumers of the stone.

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[28] Stearns, loc. cit.

The principal market area lies to the north and east, in the Middle Western and Middle Atlantic States, although the stone is widely sold throughout the eastern and central part of the country from Florida to Chicago and eastward, and is sold all over the United States, with some even being exported to Canada, Cuba, and Bermuda. The aerial extent of the market has been widened by the fortunate central location of the district relative to the populous part of the country. Part of the stone is sold to individual consumers outside the area, but the bulk of the product is handled by builders' supplies dealers.

It is estimated by the quarrymen that about 95 per cent of the product leaves the district by rail (Fig. 66). The area is handicapped by inadequate facilities in this type transportation, it being directly served only by the Tennessee Central Railroad. Movement of this product as well as other products out of the region would be greatly enhanced by a north-south rail line connecting the district with such points as Chattanooga and Louisville.

The stone is priced according to its market classification, thickness, and finish. Strip rubble ranges in price from $8.50 to $36.00 per ton; strata faced ashlar from $1.00 to $2.50 per square foot; and flagging from $0.25 to $1.00 per square foot for natural ledgestone and $1.00 to $2.25 per square foot for sawed face stone.



Figure 66. The loading dock of the Crab Orchard Stone Company at Dorton a few miles east of Crossville on the Tennessee Central Railroad.

Production and Growth of the Industry

The earliest producer of note was the Crab Orchard Stone Company, Inc., which began operations in 1929. In 1934, production for building purposes amounted to 34,660 tons, and was valued at only $70,000. At that time only ten quarries reported operations.[29] As late as 1940, at which date the industry began its period of rapid growth, there were only three major companies working in the area. The post-war building boom gave the sale of this building stone its greatest impetus and brought most of the present producers into the field. By 1949, it was estimated that the industry employed approximately 450 men, and that the annual production of over 36,000 tons was valued at nearly one million dollars.[30] The three major quarries still produced 90 per cent of the output. Following 1950, the industry continued its rapid expansion so that in 1955 it was estimated that the 1,500 to 1,600 men employed were producing at the rate of over 150,000 tons annually, valued at approximately two million dollars. No quarryman interviewed was willing to estimate the total number of quarries, including the small farm operations, now being worked, but even though the industry is no longer dominated by three producers,

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[29]Born, op. cit., p. 84.

[30]Gildersleeve, op. cit., p. 885.

the five largest of the ten or twelve major producers still account for 60 per cent of the output.

This source of income has made a signal contribution to the prosperity of the area which has resulted in a much more economically healthy community than existed there prior to the development of the industry, or than exists now in many other sections of the Cumberland Plateau. In view of the present condition of the timber and the natural characteristics of the soil, and therefore the limitations placed upon agricultural activities, Cumberland County is fortunate in having a superior marketable resource which allows it to share in the general prosperity of the nation.

The producers are most optimistic about the future of the industry and proclaim that they can sell at a profit every piece of stone they can deliver, and that the present size of the market is limited only by the capacity of the production facilities.

Building Sand

There are large quantities of soft sandstone in various parts of Cumberland County that could be quarried for sand (Fig. 67). This sand is considered quite satisfactory for use in mortar and concrete. Residual deposits derived from the high-silica, sharp sands suitable for steel molding could be produced from the Sewanee Conglomerate, and



Figure 67. A sand pit located toward the western edge of the Cumberland Plateau.

the Bon Air and Sewanee formations are considered favorable for producing glass sand.[31] Up to this time, production has been limited principally to that for local use, but in 1953 the Southern States Sand and Gravel Company was reported as producing sand at Crab Orchard.[32]

Limestone

The surface rocks of Cumberland County are generally sandstone, but due to uplift and subsequent erosion in the Crab Orchard Mountains area there are some notable exceptions. The floors of Crab Orchard, Grassy, Little, and Swagerty coves, and the head of Sequatchie Valley have reached limestone rocks below the overlying sandstones. Also in the southwestern corner of the county, Bee Creek, a tributary of the Caney Fork River, has cut into limestone.

Of the above named areas, only Big Rock Mountain on the north side of Crab Orchard Cove has had a notable commercial production. A quarry was opened here in 1909 by the Southern States Lime Corporation. This quarry has since developed into an underground mine. Trucks are driven for loading into rooms approximately fifty feet high which ex-

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[31]Tennessee State Planning Commission, op. cit., p. 92.

[32]State of Tennessee, Department of Labor, Division of Mines, Annual Report of the Department of Labor (Nashville: Department of Labor, 1953), p. 14.

tend into the side of the mountain (Fig. 68). The mining is done on a checker board system; rooms fifty feet square are taken out while pillars fifty feet square are left.

The chief uses of the limestone mined at Crab Orchard are for chemical lime, road metal, construction concrete, agricultural lime, blast furnace flux, and cement. In addition to the Tennessee market, lime from this mine is sold in a half dozen surrounding states. Among the customers are glass plants at Kingsport and Chattanooga, Tennessee, and Charleston, West Virginia; paper mills of the International Paper Company at Mobile, Alabama, and Charleston, South Carolina; and the blast furnace at Rockwood, Tennessee.[33] The volume of product and its value and uses for the fiscal year 1951 are given in Table XXI.

A lime plant for crushing and grading the limestone is operated in conjunction with the mine (Fig. 69). The mine and lime plant employ about fifty men. This plant is one of seven in Tennessee. It, like all the others except those in Knoxville and Watauga, uses limestone of the upper Mississippian age, including the Gasper, Ste. Genevieve, and St. Louis formations.[34] These formations range up to 140 feet in thickness.

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[33]Interview with Mr. Fred Silvers, plant superintendent, Southern States Lime Corporation, April 1955.

[34]Tennessee State Planning Commission, op. cit., p. 85.



Figure 68. Entrance to the Southern States Lime Corporation mine at Crab Orchard.



Figure 69. Limestone crushing mill of the Southern States Lime Corporation works at Crab Orchard.

TABLE XXI

LIME AND LIMESTONE PRODUCTION IN CUMBERLAND COUNTY, 1951[a]

Uses	Amount in Tons
Road making	181,000
Blast furnace flux	40,500
Glass	15,560
Agricultural lime	11,800
Cement	3,600
Railroad ballast	2,100
All others	8,600
Total	263,160

[a]Source: State of Tennessee, Department of Labor, Division of Mines, Annual Report of the Department of Labor (Nashville: Tennessee Department of Labor, 1951), p. 97.

The limestone obtained from the rocks of this age are exceptionally pure and commonly average more than 98 per cent calcium carbonate, with insoluble materials less than 1 per cent.[35] According to officials of the Southern States Lime Corporation, in March of 1950 the stone from their Crab Orchard mine analyzed as follows:[36]

Calcium carbonate	97.17 per cent
Magnesium carbonate	1.22 per cent
Silicon	.98 per cent
Iron and aluminum oxide	.22 per cent
Sulphur	.03 per cent

With the growing need for agricultural lime on the plateau, Cumberland County is fortunate in having such a large deposit of high grade limestone available.

Oil Prospecting

Oil and gas production in Tennessee has thus far been limited to areas in the northern part of the Highland Rim and Scott and Morgan counties on the Cumberland Plateau.[37] Beginning in 1944, however, major oil companies became

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[35] Ibid.

[36] Interview with Mr. Fred Silvers, plant superintendent, Southern States Lime Corporation, April 1955.

[37] Tennessee State Planning Commission, op. cit., p. 85.

interested in more southerly parts of the plateau, and in that year leased some 100,000 acres in Cumberland County near Crossville,[38] where for a long time some favorable conditions have been known to exist. Several test holes have been drilled in the area but, up to this date, no oil has been produced.

Water Resources

With their possibilities for power and municipal and industrial water supplies, one of the most important resources of any region to be considered is the water supply, both surface and underground. A great deal of data, although much of it is old, is available on the surface water supply of the Cumberland Plateau.

Surface Water

Cumberland County is drained by two river systems, the Tennessee and the Cumberland (Fig. 70). The dividing line between the two drainage basins runs generally north and south through the western part of the county, passing between Crossville and the county border. The Caney Fork River and its tributaries carry away the surface waters from most of the area in the Cumberland River drainage basin.

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[38] Ibid., p. 86.

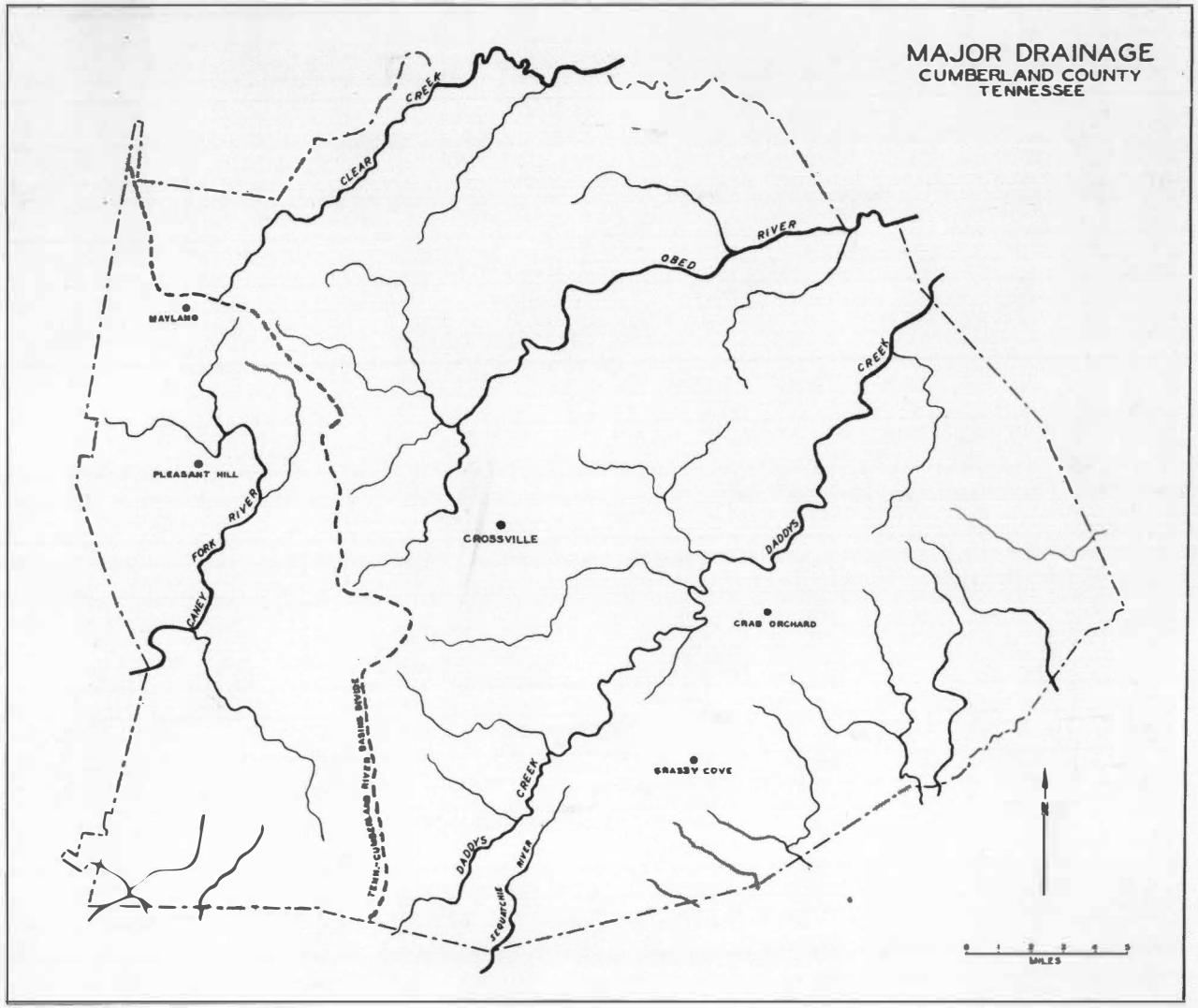


Figure 70. The major streams of Cumberland County.

Fully three-fourths of the county drains eastward into the Tennessee River. Along the eastern escarpment of the Cumberland Plateau there are many streams flowing southeastward and emptying into the Tennessee River, but most of them are small and short. A number of these streams rise in Cumberland County on the southeastern facing slopes of the Crab Orchard Mountains. The largest area in the county, however, drains northeastward through Daddys Creek, Obed River, Clear Creek, and other tributaries of the Emory River which reaches the Tennessee by way of the Clinch River. The Obed River is the largest of these streams. Only a very small area in the southern part of the county is drained southward by the Sequatchie River.

Stream flow. Stream flow data is valuable information about the water resources of a region. Industrial firms using much water dare not start development without knowing, not only the average amount of water available, but also the smallest flow in dry seasons and the highest floods. In Cumberland County, gauging stations have been maintained for many years near Clifty on the Caney Fork River and near Grassy Cove and Crab Orchard on Daddys Creek.[39] Records from these stations are kept by the State Division of Geology. The Division's

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[39]Warren R. King, Surface Waters of Tennessee, Bulletin 40 (Nashville: Tennessee Division of Geology, 1931), p. 6.

Publication, Bulletin No. 40, gives the figures available up to 1930 for drainage area; year of discharge records available; maximum and minimum gauge height; and the maximum, minimum, and mean discharge in second-feet for these places.[40] The mean weekly discharge in cubic feet per second for the five year period 1926-1930 for Daddys Creek, near Grassy Cove, is also given in this publication.[41]

Hydroelectric power and flood control possibilities. All the streams reaching the Tennessee River from the Cumberland Plateau have steep gradients, and if their flow characteristics were similar to those of the streams which reach the Tennessee from the east they would be excellent water power streams. Studies show that such is not the case, however; and that their yield of water per square mile of drainage area is markedly less during the dry months.[42] The figures show a minimum flow that results from a run-off per square mile of drainage area which is much less for the Obed River than even for the Clinch River. This difference cannot be accounted for by differences in rainfall; for actually the rainfall is greater in the Obed drainage basin. A possible explanation for the lower flow in the Obed River during drier seasons is that a larger part of the rainfall in that

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[40] Ibid., p. 8.

[41] Ibid., p. 142.

[42] J. A. Switzer, A Study of Some of the Smaller Undeveloped Water Powers of Tennessee, Bulletin 30 (Nashville: Tennessee Division of Geology, 1923), p. 10.

drainage basin runs off immediately, allowing for less to become ground water which could contribute to stream flow at a later date.

In Cumberland County, the Corps of Engineers, United States Army, has proposed dam and reservoir projects on Daddys Creek and the Obed River.[43] Since the Obed River, with its drainage area of 530 square miles, is the larger of the two streams, dams built on it would be the more important. According to Switzer's report, a head of 180 feet could be secured on the Obed River, and with it substantial storage, by placing a dam at one favorable site and using a penstock four and one-half miles long. By accepting the available flow data at their face value, this arrangement "would yield 5,000 horsepower of firm power (50% load factor), and that an installed capacity for 10,000 horsepower could be made."[44] Whether the cost of this development would come within economic limits had not been determined at that time.

Storage reservoirs on these tributaries of the Emory River would have the added value of helping appreciably to reduce flood damage on that stream. Periodic floods have occurred particularly at Harriman on the Emory River, the

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[43] King, op. cit., Plate 19.

[44] Switzer, op. cit., p. 12.

most disastrous of which was that of March 23, 1929.[45] In 1939, TVA's Water Control Planning Department published the following description of the Emory River flood conditions:

> It is estimated that if the 1929 flood were to recur under conditions existing today, the total damage in the Emory Valley would be $2,130,000. . . . The probability of extreme floods in this vicinity is perhaps greater than in any other small local area in the Tennessee Valley. . .the shape and topography of the Emory Basin are unusually favorable to rapid concentration of flood runoff at the most populous section of Emory Valley.[46]

Even though this report concluded that at that time control of the Emory River would not be economical, and that an equal expenditure on some other tributaries of the Tennessee River would yield greater benefit, it seems that control of this stream would ultimately become part of the TVA development program.

Present Municipal Water Supply Development

Crossville developed an adequate municipal water supply in 1937 by building a dam across Meadow Creek, a tributary of Caney Fork River, a few miles southwest of the city (Fig. 71). The concrete structure, which is thirty feet high and has two spill ways fifty feet long, cost approximately $35,000. This dam created a reservoir, known

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[45] King, op. cit., p. 69.

[46] Tennessee Valley Authority, Water Control Planning Department, Flood Control on the Emory River, Report No. 0-2041 (Knoxville: Tennessee Valley Authority, 1939), Introduction, no page number.

as Meadow Park Lake, which covers about 470 acres.[47] This storage basin, with its average depth of ten feet, giving it a capacity of approximately 5,000 acre-feet of water, would permit an appreciable industrial expansion in the Crossville area. The modern filtration plant constructed in connection with the system has allowed for an approved water supply (Fig. 72).

Ground Water

Less is known about the ground water than about the surface water of the county. No reports have been published on the ground water of the Cumberland Plateau, however a reconnaissance study of this resource was undertaken as a part of the cooperative program of ground water investigations by the United States Geological Survey and the Tennessee Division of Geology, and a report on this study was made.[48] The information contained below has been taken entirely from that report.

Ground water is an important source of water supply for Cumberland County. Wells and springs supply towns, industries, and practically all domestic uses. The data

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[47] Crossville Chronicle, January 14, 1937, p. 1.

[48] Roy Newcome, Jr., and Olie Smith, Jr., "Ground-Water Resources of the Cumberland Plateau in Tennessee" (Nashville: Tennessee Division of Geology, 1956). (Unpublished)



Figure 71. The Crossville municipal water system reservoir dam.



Figure 72. The filtration plant of the Crossville municipal water system.

obtained by the survey indicate that ground water is available everywhere on the plateau, but the quantity that can be obtained is usually not enough to supply large industries adequately.[49]

Occurrence. Ground water in the Cumberland Plateau occurs almost exclusively in permeable sandstones which are interbedded with shales. Most of the ground water is under artesian pressure, so that in many wells the water rises to within a few feet of the land surface. Pumping is necessary, however, with nearly all wells.

Total depth of wells and depth of water varies appreciably. The depth of twenty-two wells studied in Cumberland County ranged from twenty-four to four hundred feet, and averaged 169.4 feet. In sixteen wells of the county, in which water-level measurements could be made or reasonably estimated, the average depth to water was 43.7 feet.[50]

Discharge. According to the report of Newcome and Smith, accurate data on the yield of the wells of the plateau are difficult to obtain.[51] The wells are either equipped with buckets or pumping systems, so that the best

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[49] Ibid., p. 11.

[50] Ibid.

[51] Ibid., p. 8.

available information on yield was that reported by the owners. The seven wells in Cumberland County which had yield reports made ranged from three to twenty gallons per minute, averaging 8.8 gallons per minute.[52] The most common remark reported about wells in the county was that yield was insufficient, or at least insufficient during the dry season.

Recharge. The following quotation is Newcome and Smith's description of the recharge of ground water of the Cumberland Plateau:

> The sources of ground-water [sic] recharge in the Cumberland Plateau are penetration of precipitation and infiltration of streamflow. The general southeast dip and subsequent beveling of the rocks by erosion have resulted in the surface exposure, to some degree, of all the beds underlying the Cumberland Plateau. Rain, falling on the outcrop areas, recharges the sandstone beds, and streams flowing across the outcrops lose some of their water to the rocks forming their channels. The water, flowing downdip in the permeable sandstones, is confined by overlying and underlying shale beds. As a result, the ground water is under artesian pressure and rises in wells when the confining bed is penetrated.[53]

Chemical quality. An important characteristic of a water supply is its chemical quality. One of the most common characteristics of ground water of the plateau is its high iron content.[54] The samples analyzed from two wells in

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[52] Ibid., computed from data given in a table accompanying the report.

[53] Ibid.

[54] Ibid., p. 11.

Cumberland County, however, showed only a trace in one case and six-tenths parts per million in the other.

In general the ground water of the plateau is of the calcium bicarbonate type, calcium being the principal basic constituent and bicarbonate the principal acidic constituent. The water from one of the wells in the county had a calcium analysis of 103 parts per million, the next to the highest analysis, and a bicarbonate analysis of 244 parts per million, the highest of all the wells analyzed on the plateau. The water from this well also analyzed a hardness ($CaCO_3$) of 273 parts per million.[55] These high mineral contents make water less suitable for certain industrial purposes.

The basic natural resources of Cumberland County have now been considered. The quantity, quality, and condition of these resources suggest that it is vital to the economic well-being of the people that every possible known avenue for development of the resources be encouraged, and that new use discoveries be made where possible. Resource uses other than the traditional ones require both a consideration of the resources from the point of view of the effect of some of the cultural features of the community, and a consideration of these cultural features themselves. For example, the use which can be made of resources is related to the available

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[55] Ibid., Table II, p. 12.

transportation facilities, and frequently to manufacturing plants located near the resources which allow them to be processed.

CHAPTER VII

TRANSPORTATION FACILITIES

Connections With Other Areas

With respect to through transportation routes, Cumberland County is handicapped by being located on the Cumberland Plateau. Miller and Parkins state that, "The Appalachian Plateaus and their east-facing escarpments are the most formidable barriers to transportation in the eastern United States."[1] The result has been that the principal through routes, both east-west and north-south, have skirted the Cumberland Plateau. Only one major cross-country route of any kind, U. S. Highway 70, passes through Cumberland County.

Railroads

No major railroad crosses the plateau in Tennessee. The Nashville, Chattanooga, and St. Louis line from Nashville to Chattanooga finds a relatively easy route through the plateau near the Alabama state line. The Tennessee Central Railroad, completed in 1899, provides the only means of rail

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[1]George J. Miller, Almon E. Parkins, and Bert Hudgins, Geography of North America (New York: John Wiley and Sons, Inc., 1954), p. 277.

transportation for Cumberland County. By its junction with the Louisville and Nashville and the Nashville, Chattanooga and St. Louis Railroads at Nashville on the west and the Southern Railroad at Harriman on the east, this road does, however, furnish rail connections with the major railroad systems of the country.

The principal siding and loading yard on the Tennessee Central in Cumberland County is at Crossville (Fig. 73). Others are located at such points as Mayland, Dorton, and Crab Orchard (Fig. 74). The leading commodity shipped from these sidings in terms of number of carloads is sandstone brought from the fabrication mills or directly from the quarries of the county.[2] The second ranking product loaded at these points is bolt wood destined for the pulp, acid, and charcoal industries with plants located outside the area. Other than the manufactured products of the Charles Thomas Chair Company and part of the output of the Turner, Day, and Woolworth Handle Corporation plants, little else moves from the county by rail. Very few shipments come into the county by this method of transportation. Most of the consumers goods as well as raw materials for the factories are brought in by truck.

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[2]Interview with Mr. W. C. Wiggins, Tennessee Central freight agent, May 1955.



Figure 73. The Tennessee Central Railroad siding at Crossville.



Figure 74. The crosstie concentration yard and Tennessee Central Railroad siding at Mayland.

Highways

U. S. Highway 70 South enters Cumberland County about midway of the county's western boundary and extends eastward to Crossville in nearly the exact center of the county. U. S. Highway 70 North enters the county's northwestern corner and, after paralleling the Tennessee Central Railroad, joins 70 South at Crossville (Fig. 75). After the two routes unite, U. S. Highway 70 continues in a general southeasterly direction, parallel to the railroad, until it crosses the county's boundary approximately three miles west of the Cumberland Escarpment.

Since U. S. Highway 70 is a major cross-country route it carries a substantial amount of traffic, much of which has traveled from the great cities of the middle Atlantic states down the Great Valley of East Tennessee and is then diverted westward at Knoxville. This highway is kept in good repair and affords Cumberland County good connections with Knoxville and Nashville as well as points farther east and west.

The second most important highway is Tennessee State Highway 28 which bisects the county from north to south (Fig. 75). This route, which enters Cumberland County from the north by way of Jamestown, in Fentress County, forms a junction at Albany, Kentucky, with other routes leading to points of importance in the Middle West, while to the south, after

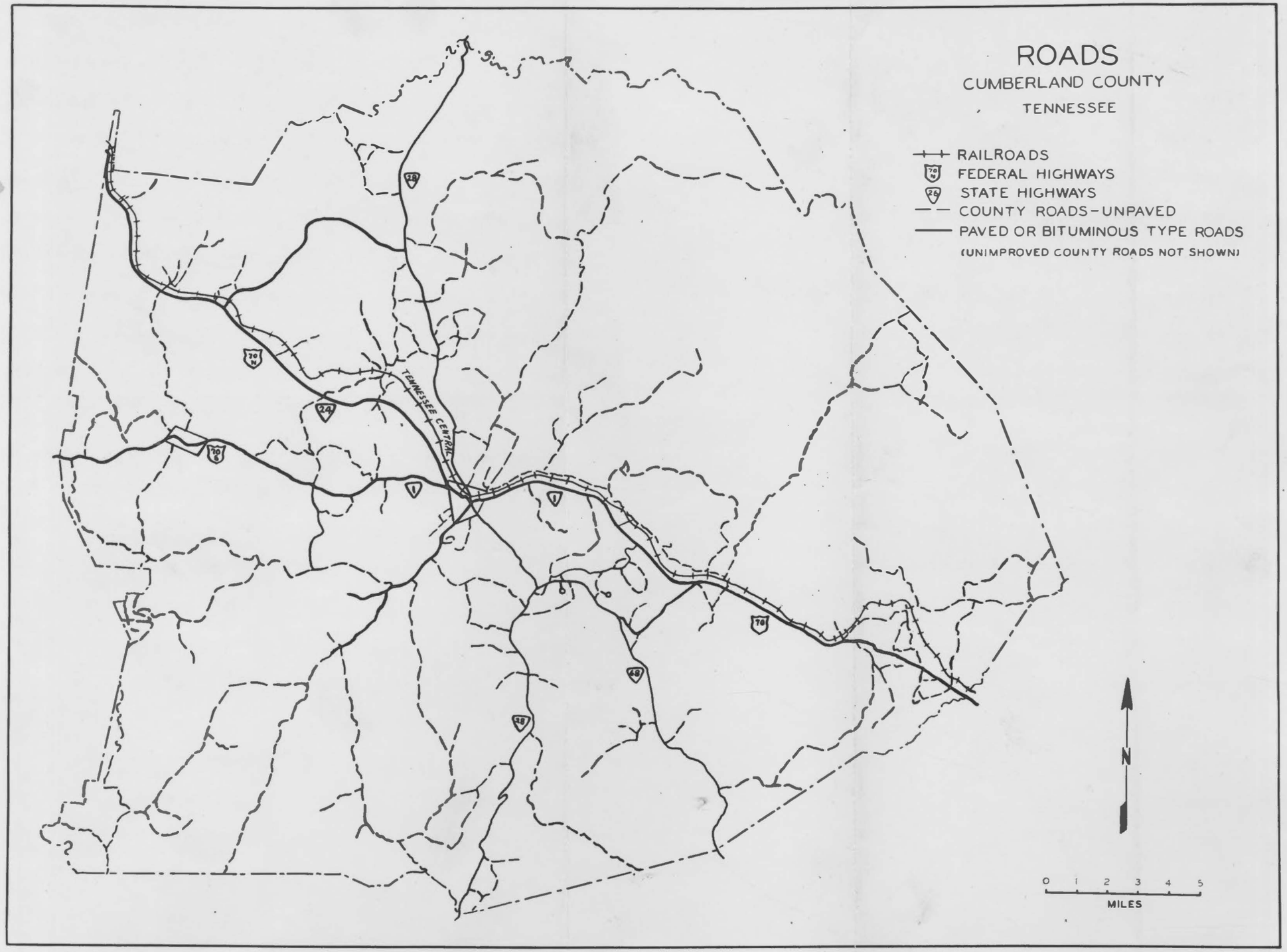


Figure 75. The roads of Cumberland County.

descending into Sequatchie Valley, it continues on toward Alabama where it makes connections with such major highways as U. S. 41, 64, and 72 leading into Chattanooga or on down the Tennessee Valley. As a federal aid primary highway, this road is well maintained and provides access to Chattanooga and other cities to the south and, by its junction with highways in Kentucky, furnishes direct connections with points of importance northward.

The one other state highway, Number 68, leaves Number 28 about four miles southeast of Crossville, and after passing through Grassy Cove, descends from the plateau to join U. S. Highway 27 at Spring City. Tennessee State Highway 68 also receives financial assistance from the federal government by virtue of being a federal aid secondary highway. This road provides an alternate route to Chattanooga and is sometimes usable during the winter season when, because of ice and snow, Number 28 is not considered safe for travel.

Air Transportation Facilities

The Crossville Municipal Airport provides an airfield which serves owners of private planes who wish to use this method of travel to enter or leave the area. Although the airfield, located about three miles west of Crossville on U. S. Highway 70 South, is on major cross-country airways, because of limited population in the area, stops by

commercial airlines are not warranted. Since it is a Civil Aeronautics Authority emergency landing field it has an airways beacon and can be fully lighted at night. The two sod landing strips are 3,100 feet and 2,000 feet long respectively by 325 feet wide, which allow the field to handle planes up to the C47 class.[3] Although the field has limited facilities, the Civil Aeronautics Authority maintains an airways communication station here.

The Local Road System

The county roads have, in recent years, been developed into a local road system which compares favorably with that of other counties in the state (Fig. 75). Some of the county roads are federal aid secondary highways, part of which have been macadamized. The condition of the county roads varies all the way from those which receive federal financial assistance and are thusly well maintained, to some unimproved roads in the less populous parts of the county.

The local county roads are of most consequence to the farmers. The degree of satisfaction of this part of the transportation system can best be appraised by noting how many farm homes are located on unimproved roads and how far

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[3]Interview with Mr. Ed. Donnelly, airport manager, April 1956.

farmers have to travel over dirt or unimproved roads to reach a trading center. Table XXII shows that whereas 28 per cent of the farms of the county are located on hard surfaced roads, 21 per cent are located on dirt or unimproved roads, while the major portion, 51 per cent, are located on gravel or shale roads. Table XXII also shows that 52 per cent of the farmers reporting must travel only two-tenths of a mile or less over dirt or unimproved roads to reach a trading center, and that 38 per cent must travel one mile or more over such roads for that purpose.

In summary, the county's position on the Cumberland Plateau has been a handicap; no major railroad has been built across the plateau in Tennessee. The limited railway transportation facilities will exclude some industries from Cumberland County. With respect to highways and local roads, however, the county is much better supplied. In collaboration with the state, reasonably adequate highway connections to other areas have been developed, and with the assistance of federal aid funds, the people of the county are provided access to markets and trading centers by a comparatively good system of local roads.

It will be seen in the study of manufacturing that the federal and state highways are of much more importance than is the one railroad to the processing industries of Cumberland County. Furthermore, the highways are scenic

TABLE XXII

LOCATION OF FARMS RELATIVE TO ROAD TYPES AND DISTANCES FARMERS TRAVEL TO TRADING CENTERS OVER DIRT ROADS IN CUMBERLAND COUNTY, 1950[a]

	No. of Farms Reporting	Per Cent of Farms Reporting
Kind of road on which farm is located:		
Hard surface	525	28
Gravel or shale	957	51
Dirt or unimproved	392	21
Distance over dirt or unimproved road to trading center:		
0.0 to 0.2 miles	835	52
0.3 to 0.9 miles	160	10
1.0 to 4.9 miles	493	31
5.0 miles or over	127	7

[a]Source: U. S. Bureau of the Census, United States Census of Agriculture: 1950, Vol. I, Part 20 (Washington: Government Printing Office, 1952), p. 77.

routes which are being used by a rapidly increasing number of tourists who, instead of by-passing the plateau, are purposely climbing its escarpments in order to view its points of interest and to enjoy its recreational facilities.

CHAPTER VIII

MANUFACTURING DEVELOPMENT

A lack of development in the processing industries in Cumberland County is attested to by the fact that in 1950, only 15.4 per cent of the employed people were occupied by manufacturing (Table V, p. 43); however, a notable increase in the number of manufacturing plants occurred in recent years. In 1939, there were only five manufacturing establishments reported by the U. S. Census, whereas in 1947, the number had grown to twenty-five.[1]

The Basis of the Manufacturing Industry

The factors of production are land, labor, and capital, and no "production" can take place until some of each of these three items have been combined. Production is possible when these basic elements have been brought together, but assuming that business men act rationally, no production will take place unless a demand is at least believed to exist--i.e., market must necessarily be brought into the picture. Bringing raw materials (a type of capital) together, and moving finished goods to consumers, require

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[1]U. S. Bureau of the Census, Census of Manufactures: 1947, Vol. 3 (Washington: Government Printing Office, 1950), p. 569.

transportation. Furthermore, some kind of energy other than that furnished by man is generally used in manufacturing. Consequently, from the point of view of economic geography, the most important elements to be taken into consideration in the manufacturing industries are: raw material, labor, power, transportation, market, and capital. Because, in manufacturing, land serves only as a site for the plant, the exact location will usually be a minor point of consideration on the Cumberland Plateau where ample land is available. Although in such a setting the precise location of a plant is not a critical factor, the abundance of low-rent land is an attracting force for locating plants in the general region. Capital is usually the least important of the items listed, for within a national boundary capital will ordinarily flow readily to points where the other elements are favorable.

Such manufacturing as is found in Cumberland County has its origin principally in the availability of an abundant supply of a few raw materials from the local and nearby areas and a surplus labor supply. These two factors have been the only active attracting forces, and it will be seen as the various establishments are studied that the labor supply has been a greater attraction than has raw materials for locating plants on the plateau, for the majority, and in some cases all of the materials processed by the plants are produced in other

regions. Even most of the wood using industries require lowland hardwoods, and if raw materials were the governing factor, they would be better located elsewhere.

The importance of raw materials from this general section of Tennessee, however, is manifested by the fact that twenty of the twenty-five establishments that existed in 1947 were producing wood products other than furniture.[2] In 1955, only the Mozur Lace, Inc. plant and the Five Star Shirt Company plant were not consuming raw materials from either the plateau or nearby areas.

Unemployment of a substantial segment of the population most of the time during the past thirty years, and migration of workers to other regions, furnish evidence of a surplus labor force and therefore the need for added jobs within the area. This condition has resulted mostly from natural increases in the population and the decreasing employment opportunities in mining and lumbering.

The Present Manufacturing Establishments

The manufacturing establishments are comparatively small. In 1955, of the ten major plants in continuous operation, only four employed over twenty-five persons, and only one employed over fifty persons. The 1947 Census of

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[2] Ibid., p. 575.

Manufactures reported the average total number of production workers to be 189 for the twenty-five plants, which allowed for an average of 7.6 employees per plant;[3] however, most of these firms have grown since that date.

Turner, Day, and Woolworth Handle Corporation[4]

The Turner, Day, and Woolworth Handle Corporation began operations under another name, about 1920, in a plant located virtually in the center of the town of Crossville (Fig. 76). In 1936 the plant changed hands and a program of expansion was initiated which has led it to the position of the largest wood products manufacturing establishment, in terms of number of employees, in the county. The fastest growth has occurred since World War II, during which period it has doubled its capacity and output. A new plant located a few miles east of Crossville on the Tennessee Central Railroad and adjacent to U. S. Highway 70, is at present being completed. About ninety local men are employed by this firm. The stability of the business and the continuity of its operations is displayed by the fact that 50 per cent of the employees have been with the firm for five years or more.

Hickory, which constitutes 99 per cent of the wood used, is turned into one product--striking tool handles.

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[3] Ibid.

[4] Interview with Mr. Horace C. Wyatt, Manager, April 1955.

Approximately one-half of the raw material comes from Cumberland County, and the remainder comes from the parts of the surrounding counties within a radius of one hundred miles. Even though hickory is the second ranking hardwood on the plateau and Crossville is located nearly in the center of this physiographic province, because of the quality requirements about 50 per cent of the raw material comes from areas off the plateau. The short logs and split or sawed dimension stock are brought in mostly by truck (Fig. 77).

The market for the finished handles is world-wide. The exports go mainly to Canada, Mexico, and the Central American countries. A smaller amount goes to Europe. The domestic supply is marketed through wholesale channels principally as replacements. Only a small amount is sold to tool manufacturers. The domestic shipments are made by truck, while the exports leave the plant in carload lots by rail.

Charles Thomas Chair Company[5]

The Charles Thomas Chair Company is a relatively new firm, having first gone into production in 1947. About thirty men and twenty women, mostly from the county, are employed in making woven-seat chairs and rockers in a plant located at the northwestern edge of Crossville (Fig. 78).

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[5]Interview with Mr. Charles Thomas, owner, May 1955.



Figure 76. The handle mill of the Turner, Day, and Woolworth Handle Corporation.



Figure 77. The stockpile of short hickory logs for the Turner, Day, and Woolworth Handle Corporation plant.



Figure 78. The Charles Thomas Chair Company plant.

The hardwood lumber and dimension stock used by the plant are composed principally of beech, oak, hickory, and maple. These woods are brought by truck from the Highland Rim. Little material from the plateau can meet the requirements of this industry.

The finished product leaves by rail and goes to wholesale houses. The bulk of the sales are made in southwestern states, however some is sold in all parts of the United States.

Rex Products Company[6]

In March 1950, the Rex Products Company opened a yardstick making business in a plant that had been constructed about 1935 in the Cumberland Homesteads area (Fig. 27, p. 86). The company's principal product is still yardsticks used as advertising media, 6,700,000 of which were produced in 1954; however paint paddles, also used for advertising, and furniture dimension stock are now being turned out.

The raw materials, the softer of the hardwoods, poplar, basswood, and buckeye are trucked in mostly from the eastern Highland Rim, some come from as far north as Kentucky and as far south as Alabama. Very little comes from Cumberland County, or from anywhere on top of the plateau.

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[6]Interview with Mr. Rex Gaston, manager and co-owner, June 1955.

About twenty-five men on an average are employed by this firm. They come mostly from the Cumberland Homesteads Community, and a number of them are part-time farmers.

The customers for the yardsticks are of varied sorts, some are retail firms and some are jobbers. The finished product moves out by truck to all parts of the United States. A limited amount of exports go to Cuba, Hawaii, and the Philippine Islands.

Crossville Lumber Company[7]

The county's largest planing mill and lumber concentration yard is operated by the Crossville Lumber Company. Their plant is located just outside the Crossvillecity limits on the Tennessee Central Railroad and Tennessee State Highway 28 (Fig. 79). The firm has been in continuous operation for almost twenty years, having been started in 1937.

The raw material for this mill is rough lumber, 80 per cent of which is pine; the remainder is oak and poplar. Most of the pine, comprising approximately 65 per cent of all the lumber used, comes from the small portable mills of Cumberland County. The hardwoods come from the valleys of surrounding counties, as well as Cumberland County. Whether from the home county or the neighboring ones, the lumber all reaches the mill by truck.

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[7]Interview with Mr. Newton Draper, owner, May 1955.



Figure 79. The Crossville Lumber Company mill.

From fifteen to twenty-five men are employed producing finished lumber, and interior trim. The output is trucked principally to contractors and wholesale lumber dealers in states to the north, mostly Kentucky, Ohio, and Indiana.

Mozur Lace, Inc.[8]

A hosiery mill was constructed in the Cumberland Homesteads area in 1939 (Fig. 26, p. 86). In 1952 the plant was taken over by Mozur Lace, Inc., for the purpose of making knit goods from synthetic fibers. This modern mill produces unfinished cloth of nylon and acetate, nylon "Raschel" netting, and orlon sweaters, from yarns which are brought in by truck.

The cloth and netting operations employ forty-five men, while the sweater section of the plant requires about seventy-five women. The finished products are trucked to New York where they are marketed through brokers.

Monticello Canning Company, Inc.[9]

Increased vegetable production led to the construction of a cannery in the county in 1954. The plant, which is located a few miles west of Crossville on U. S. Highway 70 S., is operated by the Monticello Canning Company, Inc. (Figs.

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[8]Interview with Mr. W. H. Rodenhouser, Manager, May 1955.

[9]Interview with Mr. Victor Russell, President, June 1955.

80 and 81). Strawberries, green beans, and pimento peppers are processed here, the strawberries are canned and then fresh-frozen.

The volume of business of the cannery depends upon the quantity of vegetables produced in the area, but the annual average is about two million pounds of pimento peppers and one-half million pounds of strawberries. No estimate has been made of the amount of green beans processed. Approximately 90 per cent of the vegetables canned are grown in the county. Some are canned for other companies, but the majority is marketed through jobbers under the cannery's own trade-mark. The transportation required for the product is furnished 60 per cent by motor truck and 40 per cent by rail.

The labor is furnished principally by part-time farmers from Cumberland Plateau counties. About forty to forty-five employees are required during the season of processing strawberries and green beans, and 150 are needed for canning peppers. Approximately 50 per cent of the labor force are women, housewives from farms, when strawberries and green beans are being processed, and 75 per cent are women during the season of pepper canning.

Trade-A-Plane Service, and Rock and Dirt[10]

One of the most unusual of publishing companies is

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[10]Interview with Mr. Cosby Harrison, owner, June 1955.



Figure 80. The Monticello Canning Company plant.



Figure 81. The steam boilers and unloading docks of the Monticello Canning Company plant.

located in the town of Crossville. In 1937, Mr. Cosby Harrison, the first man in Cumberland County to own and fly an aeroplane, realized the need of a method for bringing into contact with each other people having aeroplanes and parts for disposal and individuals desiring such items. Mr. Harrison founded and put into circulation a paper which prints only advertisements of and want ads for planes, parts, and aviation equipment. The publication appears three times each month, and the only subscription charge is the cost of postage. Copies, under the title Trade-a-Plane Service, go all over the world.

In 1950, this firm entered the field of advertising for businesses dealing in earth moving and related machinery. The new publication also goes out three times monthly, with no subscription charge other than postage, to those engaged in any business concerned with the materials being advertised. This publication, under the title Rock and Dirt, renders the same service to this type customer as Trade-a-Plane Service renders to its customers. Thirty employees are required to publish the two papers.

Other Manufacturing Establishments

In 1955, the Five Star Shirt Company began production in a new plant located on Tennessee State Highway 68 in the Cumberland Homesteads Community.[11] Nylon, orlon, and dacron

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[11]Interview with Mr. G. C. Young, manager, May 1955.

bolt goods which are trucked in are consumed by the plant's operations. Early expansion, for which the plant has the capacity, was anticipated, but in the initial period only three men and twenty-two women were employed in producing boys' sports shirts.

C. R. Graybeal and Sons, a firm which is engaged in other lines of business, including wholesale operations, is now producing complete house construction materials in a small plant located within the city limits of Crossville (Fig. 82). Pine lumber from Cumberland County and finished hardwood flooring make up the bulk of the materials used. This small-scale operation employs only five men. The customers are mostly contract builders and the market is limited principally to Cumberland and the surrounding counties. Motor trucks satisfy the transportation needs.

Some Factors Affecting Potential

Manufacturing development in a given area has two facets: the expansion of existing industries and the attraction of new enterprises. New industry may develop in an area as a result of the discovery or realization of a new source of raw material or a new process of manufacturing. These ideas can be illustrated with Cumberland County examples by the recognition of the value of the county's sandstone as a building material, and the development of new tools and techniques



Figure 82. The C. R. Graybeal and Sons house construction materials plant.

for processing sandstone, which in the latter instance allowed for the entrance of the Sylvara Stone Company's veneer plant (see p. 193). Analyzing the potential for the expansion of manufacturing requires the consideration of factors which will affect such expansion.

Raw Material

The raw materials of the county, as they are known today, consist principally of wood, coal, limestone, sandstone, and agricultural products. The forests have great potential for an increasing and continuous supply of raw materials for wood using industries. The chief limitation on the future supply of forest products will be set by the measure of success of a program of sustained yield management.

Local coal is available for such industries as might use it as a raw material, however the water supply has been found insufficient to support a large-scale industry of this type. The limestone and sandstone exist in practically unlimited quantities. The gradual shifting from a self-sufficient to a commercial type farming with the introduction of vegetable production is providing an increasing quantity of agricultural products for processing.

Power

Proximity to abundant supplies of suitable coal, from either local or nearby sources, affords a cheap source of fuel for steam plants. Being virtually encircled by the Tennessee

Valley Authority system and the developments on the Cumberland River drainage system, the whole Cumberland Plateau is well situated with respect to supplies of hydroelectric power.

Transportation Facilities

A lack of railroad transportation exists in the county, a condition resulting from the fact that the plateau is cut off by physiographic conditions from easy access to other regions. Many types of industry require rail transportation, and will not locate where such facilities are inadequate. The one minor railroad through Cumberland County is insufficient for industries dependent on rail shipments. A point of intersection of major routes is a prerequisite for the location of many factories.

Labor

A given labor supply can serve as either an attracting or a retarding factor. The surplus labor supply which still prevails in the county is an attracting force, and has already been influential in the location of plants. The location of industries that use raw materials brought in from distant regions is based entirely on the surplus labor supply.

Labor as a retarding factor has two aspects: its attributes and the total amount. The data in Table IV, p. 41, show that a large percentage of the population is lacking in general education, a condition which would restrict their usefulness in industry. Table V, p. 43, shows that

only a small proportion of the labor force has had manufacturing experience, and on the basis of such data it can be concluded that the existing reservoir of experienced industrial labor is small.

The sparse population density on the plateau, compared with most other regions of the eastern part of the United States, and the small actual total population, means that, in spite of a surplus of labor as indicated by unemployment, the total labor force is necessarily small. This will limit the number and size of factories which might be established.

In view of some of the limitations placed on manufacturing development, the people of Cumberland County might well turn to the use of some of their resources in which they have a comparative natural advantage over many areas of the manufactural belt. The physical environment of the plateau possesses characteristics which will allow it to compete with a greater measure of success in the field of recreation.

CHAPTER IX

RECREATIONAL RESOURCES

Resources of Cumberland County which are adaptable to recreation have been utilized less than have the minerals, soil, and timber. With the need in the county for full development of all the resources, the value of the physical environment as potential recreational assets should not go unrealized. Because of a number of factors these resources promise much for the future. Outdoor recreation has been gaining in popularity. More people are turning to such activities as boating, fishing, and simply driving or hiking through scenic areas for the aesthetic enjoyment of viewing dense forests or rugged terrain.

Some Natural Advantages

Location

The Cumberland Plateau is favorably situated with respect to a number of population centers and the flow of people from them; however, the plateau's proximity to the Great Smoky Mountains is a locational disadvantage. Yet the region affords the nearest "mountainous" and densely forested area of appreciable size to many industrial cities of the Middle West.

Though main highways from those areas avoid the plateau, the highland is frequently sought out by

vacationists enroute to such destinations as the beaches of our southeast coast. U. S. Highway 70 leads many cross-country travelers into the heart of the plateau. More and more people will come to spend time here rather than in the heavy traffic of areas farther east where commercial developments are designed for tourists.

Climate

Night-time summer temperatures are noticeably cooler on the Cumberland Plateau than in surrounding regions, a virtue of the higher altitude of the table land. Fig. 8, p. 20, shows the average July temperature to be lower on the plateau than anywhere else in Tennessee except in a very limited area of the mountains of the northeastern part of the state. As the temperature conditions on the plateau become more widely known, their value as an attracting feature will increase. The fact that summer resorts flourished on the plateau in the past demonstrates that people from the surrounding lowlands seeking relief from the heat found it here.

Vegetative Cover, Animal Life, and Topography

So much of the Cumberland Plateau is forested that its highways provide many miles over which motorists may enjoy tree-covered vistas. Some of the plateau plants, which thrive in the deep gorges of the mountainous eastern

section, are not known outside of here where they flourish. For example, a kind of pondweed, which is good food for ducks and other water fowl, is found only in the clear streams between Rugby and Crossville, and a type of magnolia "with leaves three feet long" is found in the shaded ravines of the plateau, but not elsewhere.[1]

Wildlife of a great variety, including deer, turkey, raccoon, bobcat, squirrel, and quail have been present in the area since before the arrival of white man. Although, with the changing of the habitat by increased human use of the land many species of wildlife became scarce, restocking and protection have allowed game again to become abundant. Controlled hunting of deer and turkey as well as small game is now permitted.

The high ridges and deep ravines, especially of the eastern part of Cumberland County, present a setting for many miles of pleasant motoring. Crossville, which has good hotels and modern motor courts and is centrally located on the plateau, is used by visitors as a base from which a number of interesting trips are taken. East to west the plateau is bisected by U. S. Highway 70, the direct route from Knoxville to Nashville. This highway begins the ascent of the Cumberland Escarpment at Rockwood, fifty miles from

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[1] Tennessee Conservationist, 20:20, February 1954.

Knoxville, and reaches the center of the plateau at Crossville where it intersects Tennessee State Highway 28. A particularly picturesque area along this route is that around Ozone Falls (Fig. 7, p. 16), and to the north of this point of attraction is found the deep canyon of Daddys Creek (Fig. 83).

Other especially scenic drives may be taken over Tennessee State Highway 28, in either direction from Crossville. Northward, the route dedicated as the Alvin York Highway, leads to Jamestown in Fentress County, the home area of the famous World War I hero. Southward from Crossville, Highway 28 winds its way down into beautiful Sequatchie Valley where it forms a junction with Tennessee State Highway 30 at Pikeville. From Pikeville, over Route 30, Falls Creek Falls State Park, occupying parts of Van Buren and Bledsoe counties, can be reached about twenty-seven miles southwest of Crossville.

Fish and Fishing

A number of streams and lakes in Cumberland County as well as in nearby areas provide excellent fishing. Meadow Park Lake and the lake in Cumberland Mountain State Park, as well as other smaller private lakes and such streams as Obed River and Daddys Creek, have been stocked with game fish.

Daddys Creek and Byrds Creek in Cumberland County



Figure 83. Daddys Creek canyon in the Catoosa Wildlife Management Area.

contain Muskellunge, the most highly regarded game fish in Tennessee. Muskellunge is usually considered a northern fish, and is found mostly in lakes in colder climates. The Tennessee variety (esox masquinongy ohioensis)[2] represents the most southerly range of distribution of this species, and in this area it is limited almost entirely to streams of the northern part of the Cumberland Plateau.[3]

The Present Public Recreation Facilities

The Catoosa Wildlife Management Area[4]

The Catoosa Wildlife Management Area is a forested tract of 78,000 acres lying half in Cumberland County and half in Morgan County (Fig. 48, p. 156). The area was originally purchased from the Tennessee Mineral and Lumber Company in 1942 as a Federal Aid Wildlife Restoration Project. As part of the wildlife restoration program, fire protection was immediately instituted.

In 1949, with Federal Aid funds, the Tennessee Game and Fish Commission started a development program within the

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[2]Kuhne, Eugene R., A Guide to the Fishes of Tennessee and the Mid-South (Nashville, Tennessee: Division of Game and Fish, 1939), p. 73.

[3]Tennessee Conservationist, 17:22, March 1952.

[4]Excepting where otherwise noted, the information about the area has been taken from The Catoosa Wildlife Management Area (Nashville, Tennessee: State Game and Fish Commission, 1954).

Catoosa area. As nearly as possible, within the financial limitations, "ideal conditions" are being created under the management plan. Road and trail construction was started to provide access for habitat development work and recreational activities, watering holes were excavated, and food and cover plantings were made.

Species of wildlife included in the management plan are: deer, turkey, grouse, quail, fox squirrel, gray squirrel, rabbit, and raccoon. Since the state first acquired the area, it has been stocked with over three hundred deer and more than eight hundred wild turkey, and these numbers have increased as nature has permitted. The goal of the plan is to produce the best hunting possible on a sustained basis. "Hunting will be managed in order to assure the harvesting of the yearly surplus crop of each species of wildlife." The first managed hunts were held for raccoon and birds and other small game in 1952. In the spring of 1953, a managed hunt for turkey was held. In 1955, the first managed deer hunt was held.[5]

Fish are also included in the game management plan of the Catoosa area. Rock dams have been built at the mouth of Daddys Creek and on Obed River to decrease the migration of "rough fish" from Watt's Bar reservoir into the upper portion

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[5]Interview with Mr. Ralph Plum, Senior Area Manager in charge.

of these streams, and the streams have been stocked with game fish.

Cumberland Mountains State Park

The most attractive of all the state parks, from an architectural point of view, is Cumberland Mountain State Park, located a short distance south of Crossville on Tennessee State Highway 28 (Fig. 48, p. 156).[6] This park has a thirty acre lake, held back by a dam over which runs an arched highway. The sandy beach which curves along the lake is the longest in the state (Fig. 84).[7] The lake is stocked with game fish, and furnishes facilities for boating and swimming as well as fishing. The park contains 1,300 acres of wooded hills where visitors can find nearly all of the varieties of trees, shrubs, and flowers known on the plateau.

Among the other recreational facilities offered by the park are a tea room and lodge, picnic area, a children's playground, and vacation cabins. The sixteen, four-person modern cabins are supplemented by a group lodge which will accommodate sixteen persons. The buildings are constructed of native sandstone and stained wood, a feature which lends much to the

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[6] Tennessee Conservationist, 19:7, April 1953.

[7] Ibid.



Figure 84. Cumberland Mountain State Park lake and beach.



Figure 85. Bathhouse at Cumberland Mountain State Park.

architectural attractiveness of the park's central recreational area (Fig. 85).

Meadow Park Lake

When Crossville developed its present municipal water supply by building a dam across Meadow Creek at a point about seven miles southwest of town, a 470 acre lake was created. This lake was stocked with game fish, and has become a very popular resort for fishing and boating (Fig. 86). The picnic area and wooded hills of the watershed are attractive features of the municipally owned land. The boat dock and picnic area are located a short distance off Lantana Road, a federal aid secondary highway which is well maintained.

Other Privately-owned, Public Recreation Facilities

A multi-purpose, privately-owned, public recreation area is at present under development about ten miles south of Crossville.[8] The principal attraction of the area is a five hundred acre lake stocked with game fish, which was created by constructing a dam across Basses Creek. This body of water with its fourteen miles of shoreline is surrounded by 3,000 acres of forested land under the same ownership as the lake. Adjoining are 5,000 more acres of forest which, along with that in the recreation area proper,

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[8]Interview with Mr. Cosby Harrison, owner, April 1956.



Figure 86. Meadow Park Lake, the storage reservoir of the Crossville municipal water system.

will furnish a habitat for deer, wild turkey, and many varieties of small game for the benefit of hunters as well as people who enjoy merely observing wildlife.

This recreation area, which has not yet been opened, will offer a number of attractions other than the lake and forests, including an amusement lodge, a swimming pool, and a golf course. A 3,600 feet sod runway will serve as a landing strip for vacationists who wish to fly in. Modern cabins will be available for rent.

A number of other privately-owned lakes, such as Lake Aloaloa, Lake Jones, Lake Waldensia, and Linger Lake, located at various points scattered over the county, are open with limitations to the public.

In view of its natural advantages and the facilities which have already been developed, Cumberland County should realize increasing benefits from its recreational resources.

CHAPTER X

SUMMARY AND CONCLUSIONS

The Physical Setting

Cumberland County, Tennessee, is located in the central part of the Cumberland Plateau which is the southern sector of the Appalachian Plateaus. The county is underlain largely by Pottsville sandstones and shales of early Pennsylvanian age, mostly the Rockcastle group, however the younger Duskin Creek formation appears in the northeast. Under these rocks lie Mississippian limestones and shales which are exposed only in the coves, gaps, and valleys.

Although a submaturely dissected undulating surface prevails over most of the county, northeast-southwest trending mountain-like ridges and deep valleys occur in the east. A simple dendritic drainage pattern developed on the tableland, whereas structural control produced a modified trellis pattern in the area of the Sequatchie anticline. Most of Cumberland County drains to the northeast through Daddys Creek and the Obed River into the Tennessee River, while the remainder drains either to the east directly into the Tennessee River or to the west by way of the Caney Fork River into the Cumberland River.

The Cumberland Plateau lies within the Humid Subtropical Climatic region; however, because of its higher

altitude it realizes lower average temperatures and a greater amount of rainfall than prevail over the climatic region in general.

The natural vegetation of the county, like that of the entire plateau, is a forest association. The area lies within the broadleaf and mixed broadleaf-coniferous forest region. Forests still cover 86 per cent of the county's acreage.

The soils of the plateau belong to the Red and Yellow great soil group. Cumberland County's soils, about 95 per cent of which are residual, were formed principally from weathered sandstones, and are prevailingly fine sandy loams. In their virgin state, most of the soils are low in content of phosphate, lime, and organic matter and are generally acid. Although low in plant nutrients, the texture and structure of the soils are conducive to good tilth, and are in that respect favorable to cultivation.

The People and Their Settlement Pattern

Since 1870, the date of the first federal census of population in the county, the number of people has multiplied over five times, yet the 18,887 inhabitants in 1950 resulted in a density of only twenty-eight persons per square mile. Population growth came about principally by natural increase rather than by immigration from other regions. In fact, a high birth rate in a setting of limited

economic opportunities has resulted in emigration, especially to the manufacturing cities of the Middle West.

The median family income for Cumberland County in 1950 was less than two-thirds of that for Tennessee as a whole, and only about one-third of that for the United States. Some factors which have contributed to this position are the depletion of the more marketable sawtimber, shifts in the bituminous coal mining industry, a generally subsistence type farming, and lack of development in manufacturing industries.

The settlement pattern in the county is identical with the road pattern, and to a large degree the location of the roads was determined by the topography. Since the plateau topography is youthful, the roads as well as the clearings have adhered to the more level land of the interfluves.

The people are not uniformly distributed over the county. The population density generally increases with distance from the periphery toward Crossville. Another departure from uniformity is found in the northeastern part of the county. In that area, because of slope and relief, there is less land suitable for cultivation, and consequently less dense population. Furthermore, that section is occupied by the Catoosa Wildlife Management Area.

Cumberland County's population is completely rural by definition of the Bureau of the Census. Crossville, with its 2,290 people in 1950, is the only agglomerated settlement which provides the functions that are ordinarily associated

with a town. The one other incorporated place in the county, Pleasant Hill, had only 152 inhabitants in 1950.

The county compares favorably with Tennessee and the nation with respect to the percentage of children in attendance at grade schools, but a large part of the children do not graduate from the eighth grade. Furthermore, the percentage of adults who have completed high school or more is only about one-half the proportion which has attained that level of schooling in Tennessee, and about one-third of that for the United States.

Non-farm people constituted 46 per cent of the total population of the county in 1950. On the Cumberland Plateau historically, mining, lumbering, and the wood products industries have been the chief employers of non-farm labor. In 1950, only 15 per cent of the employed people were occupied in manufacturing.

In both the state of repair of their dwellings and the extent to which their homes are equipped with modern devices, the people of the county compare unfavorably with those of Tennessee as well as with those of the nation.

The county is divided into twelve areas which function as rural communities, and most of these in turn contain two or more neighborhoods which have names that are well known locally. The neighborhoods and communities vary considerably in size, service agencies, and degree of self-sufficiency. Cumberland Homesteads is a unique community in the county

due to the fact that it was established by a governmental agency.

Agricultural Development

Agriculture on the plateau has always been generally self-sufficient rather than commercial. The "small general and part-time" type farming which prevails over most of the region has been accompanied by a high proportion of owner-operated farms. A large proportion of forest and small percentages of pasture and cropland characterize the general land use.

The farming activities of the plateau consist chiefly of the production of crops, although livestock and livestock products are increasing in importance as sources of cash income. Corn and hay form the basis of the cropping system on the small general farms. In recent years, however, other crops, particularly vegetables and tobacco, are more and more being grown as cash crops. The kind of agriculture which prevailed in the past resulted in low average cash incomes for farm families.

Even though agriculture is still generally self-sufficient in character, some important changes can be observed from this study. Production for market, especially of vegetables, leads a trend away from an almost completely self-sufficient to a partially commercial agriculture. Commercial potato growing has been generally replaced by

other vegetables and tobacco. A great increase in the raising of tobacco has been effected by a number of factors, among which are especially the price support program and the replacement of potatoes with tobacco as a source of cash income. A general fence law put an end to the open-range method of cattle production. Accompanying this change has been improvement in the breeds of cattle. The closing of the open range also caused a great increase in hay and pasture crops and a better system of crop rotation. No longer, excepting on very few farms, is corn grown in the same field more than two years in succession. Most farmers now practice a three- or four-year crop rotation system with corn, hay, and pasture. The development of livestock and cash crop production has promoted an increase in pasture acreage, better crop rotation practices, and higher land fertility levels.

At present, farmers are not prospering as they did during the period 1942-52. Many fields are now idle that were seeded and cared for three years ago because, in order to get the needed capital to develop their farms, a number of farmers with limited acreage have been forced to seek employment in industry. Previously, the average size of farm had become smaller and smaller. A reversal in this trend, which began during the decade 1940-50, is continuing. Farmers are enlarging their holdings by buying their neighbors' land. The larger units allow for a greater use of machinery, and thusly the farms become more economical

operating units.

Forest Resources

The study of the forest resources of Cumberland County reveals a number of important points: the forests are necessarily a major resource because they occupy such a large proportion of the total land area of the county. As a result of the lack of sustained yield management in the past, the forests are at present not producing nearly up to their potential capacity. Some forest resources have been largely depleted. Due to fire and past cutting practices, most stands are understocked. Furthermore, a high percentage of cull trees is to be found, while the growth of high quality timber is low. The supply of pine timber is diminishing annually, but there is an abundance of low-grade hardwoods, chiefly oak, available now.

The county's lumber industry is built chiefly on pine timber. Included in this industry are such activities as logging, saw-milling, concentrating, planing, and transporting businesses. With a declining supply of raw material, this industry faces the possibility of a diminution in size or of shifting to hardwood. A lumber center like Crossville has a great number of jobs at stake and can ill afford to lose the industry.

Because of repeated burning and lack of good forest management practices in general, much land is virtually idle

which could grow at a profit timber species that are in demand. A community can no better afford idle land than it can idle labor or capital. Full use of the forest land would aid greatly in the development of a more nearly balanced and prosperous economy. The potential is great, not only because of the volume of timber that could currently be produced on the existing acreage, but also because forests, unlike minerals, are renewable. This becomes a doubly important factor since wood-using industries seek locations where adequate supplies are continuously available.

A number of factors effective in the long run should encourage the development of Cumberland County's forests to the limit of their potential: (1) the plateau is well situated when looked at from the point of view of its location on the North American continent, and the conditions found there compared with many other regions--the length of the growing season and the amount and distribution of rainfall are favorable; (2) a great demand exists for forest products. That the present demand for certain products exceeds the supply in the United States is evidenced by the volume of imports of woodpulp. (3) A pressing need exists for added employment opportunities in the county. (4) Much farm land acreage is in need of more profitable use. (5) Unlike coal, forests are renewable and can provide a continuing source of income.

Mineral and Water Resources

Cumberland County is generally underlain with coal bearing strata. Throughout most of the county these strata are covered by younger sandstones. Warping and stream erosion have resulted in outcropping of the coal beds in many places, especially toward the edges of the plateau. Easy access to the coal has permitted mining by the drift method. Two characteristics of the coal layers have been detrimental to their development: (1) some of the coal is of low quality; and (2) lack of uniformity in thickness occurs--coal which appears workable at one point may "pinch out" in a short distance.

In the past few decades a number of shifts have occurred in the nation's coal industry. With respect to their significance to Cumberland County, the major shifts have resulted from mechanization of production. The innovations in machinery have tended to divert production to the areas with thicker, more extensive coal seams, and seams lying closer to the surface. Since World War II, strip mining has replaced the drift method as the means by which the bulk of the county's tonnage is produced. Strip mining, a more efficient operation where the coal beds are close enough to the surface, is, however, not generally suited to the Cumberland Plateau where the coal outcrops mostly on valley sides. Consequently, using present methods, strip

mining will be short lived in Cumberland County.

However, when areas of more readily available, high quality coal are depleted, the central part of the Cumberland Plateau will again grow in importance. Furthermore, when the supplies of the other mineral fuels are exhausted, coal will increase in relative importance.

The quarrying of sandstone in the area around Crossville has grown into a two million dollar business annually, the leading industry in Cumberland County. This source of income has made a great contribution to the prosperity of the area. Producers have been able to sell at a profit all the stone they can deliver, and are therefore very optimistic about the future of the industry. Since the size of the market is now limited only by the production capacity, there is room for expansion in the use of this resource.

The total annual rainfall of the Cumberland Plateau indicates an ample surface water supply; however, two factors limit the quantity available: (1) lack of uniformity in the distribution of rain through the year results in a drier season during the late summer and fall; and (2) the characteristics of the bedrock and surface configuration allow for rapid run-off.

The data available indicate that the quantity of ground water which can be obtained is not enough to supply large industries. According to the reports of well owners, the supply in many places is insufficient at times for farm and

domestic consumption.

Transportation Facilities

With respect to through transportation, the plateau position of Cumberland County has been a handicap. No major railroad has been built across the plateau in Tennessee north of a route that passes through it near the Alabama state line. The Tennessee Central Railroad provides the only rail outlet. However, the county has obtained reasonably adequate highway connections to other areas, and, with the assistance of Federal Aid funds, has developed a comparatively good system of local roads.

Manufacturing Development

The processing industries have been little developed on the plateau. In 1950, only 15 per cent of the employed people of Cumberland County were occupied by manufacturing. Manufacturing develops and thrives in the presence of favorable factors among which are: skilled and energetic management, abundant and capable labor, sufficient capital, available raw materials, adequate transportation facilities, and a ready source of power. These factors do not function with equal force in a given locality. Therefore it is essential that those who expect success in promoting manufacturing in a given area evaluate the several factors which would affect

manufacturing development. The limited railroad transportation facilities in Cumberland County will exclude certain industries. The water supply is inadequate for large-scale manufacturing. The labor supply has been an attraction for locating plants on the plateau, but, in spite of a present labor surplus, the small total labor force will set limits to industrial expansion. Furthermore, the lack of general education and industrial experience will have to be overcome before the complete potential of the people can be realized. The desire for more factories in Cumberland County is proper but they can be secured in an adequate number and variety only by comprehensive analysis and careful planning, followed by aggressive action.

Recreational Resources

The Cumberland Plateau's physical environment possesses a number of attributes which are not now being fully utilized, but have value as potential recreational resources. The plateau is favorably situated to take advantage of vacationists from the industrial cities of the North, however a locational disadvantage is the proximity of the Great Smoky Mountains. Natural features such as cool summer nights, vast forests, abundant wildlife, and scenic landforms are attractive features of the region.

Cumberland County has such recreational areas as the Catoosa Wildlife Management Area and Cumberland Mountain

State Park already open to the public, but in view of the natural advantages of the region, the growing demand for outdoor recreational facilities, and the need for the complete development of all its resources, the county would benefit from diverting more of its energies to this line of endeavor.

The Fundamental Problems and the Beginning of Their Solution

The continued increase in the population of Cumberland County up to the present indicates that, through the use and development of its resources, the area has been capable of maintaining an expanding economy, though at a comparatively low level of living. Basic employment opportunities during the past half century were provided by mining, lumbering, and agriculture. A major part of the problem of the plateau lies in the fact that the mines and forests, which have been the region's supporting foundation for fifty years, have declined in their ability to supply jobs. If full employment with a rising level of living is to be realized, either these resources must be revitalized, or other employment opportunities must be provided.

It is recognized that a number of other factors have contributed to the problem: poor land and sparse population furnish an inadequate base for maintaining needed educational and social institutions. Lack of transportation facilities result in economic and cultural isolation. Poverty and isolation, in turn, tend to lower physical and mental

development, and, consequently, undermine the economic efficiency of the people. Limited modern conveniences in the homes, poor housing, and similar factors further contribute to lowered productivity. Workers of low productivity are more likely to suffer from unemployment, for they are in less demand on the labor market. Unemployment of a substantial portion of the members of a community reduces the average income.

The problem of unemployment in an area may be reduced through emigration of a portion of the workers. This solution has occurred on the Cumberland Plateau. Emigration, however, is not always a satisfactory solution. It is not possible if funds are lacking. It is undesirable personally if the people do not wish to leave, and undesirable for the community relative to other solutions. The migrants are usually the young people, since they have greater mobility than the other ones. This is an economic loss to any community in the long run because it is a loss to those having better education and other marketable qualities giving them greater productivity. These attributes are important to the progress of the region from which the young people migrate.

The alterations which have occurred in the use of the resources of Cumberland County during the past twenty years suggest that, by developing a program of adjustment to the existing conditions, the people have begun to work out a more economically and socially sound solution to their problem than that of emigration. The major lines of adjustment involve a combination of changes in type of

farming and improvements in agricultural practices together with increased part-time employment in non-agricultural enterprises. Accompanying these developments are restoration and improvement of the renewable resources.

Much time will be required to cure the ills of the past, and in the rapidly changing world of today, the maintenance of a healthy economy requires that a program of adjustment be permanently active. In the meantime, there is room for continued educational effort aimed at teaching the people on the Cumberland Plateau methods of making the best of their resources, both natural and human.

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