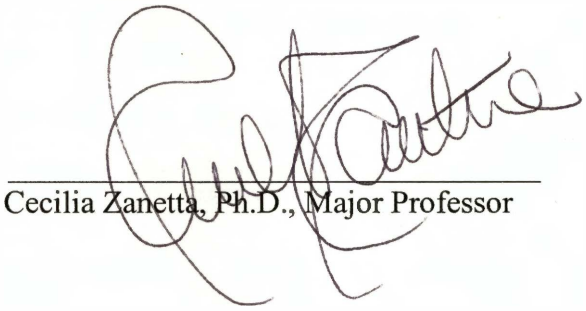
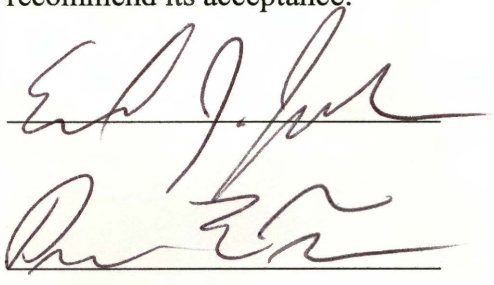
To the Graduate Council:

I am submitting herewith a thesis written by Moon-Jeong Kim entitled "Growth Patterns in Tennessee: An Analysis of the Effectiveness of Tennessee Public Chapter 1101." I have examined the final paper copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science in Planning, with a major in Planning.



Cecilia Zanetta, Ph.D., Major Professor

We have read this thesis and recommend its acceptance:



Acceptance for the Council:



Vice Provost and Dean of
Graduate Studies

GROWTH PATTERNS IN TENNESSEE: AN ANALYSIS OF THE EFFECTIVENESS OF TENNESSEE PUBLIC CHAPTER 1101

A Thesis
Presented for the
Master of Science in Planning
Degree
The University of Tennessee, Knoxville

Moon-Jeong Kim

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ABSTRACT

This thesis examines changes in population, land use, and transportation in Tennessee as they relate to urban sprawl in order to assess the Tennessee Growth Policy Act, Public Chapter 1101. Its effectiveness in controlling urban sprawl in the state is evaluated, and specific recommendations for the policy decision-making will be provided. Decennial and annual data provided by the U.S. Census Bureau, data from the USDA Natural Resources Inventory (1982-1997 period) and Federal Highway Administration (1995-2000 period) are used in analyzing population growth patterns, land use trends and transportation trends. Data are analyzed using common descriptive statistics, as well as visual inspection using maps created by geographic information system (GIS). Tennessee has shown many urban sprawl trends intertwined by transportation, land use patterns, population growth. From the county-based analysis of changes in population, counties show different growth patterns in overall Tennessee, and the population expansion in Middle Tennessee is outstanding. Tennessee's Growth Policy Act, Public Chapter 1101, has constituted a good first step toward a state-level growth policy. However, at this time, it needs to improve the appropriate requirements based on county level analysis, a regional approach, and cooperative policy decision-making in order to address and control problematic challenges for a better future for Tennessee.

TABLE OF CONTENTS

Chapter Page

CHAPTER 1 ..... **1**
INTRODUCTION AND GENERAL BACKGROUND **1**
Purpose of the Study 1
Background 1
Research Questions 3
Primary Questions 3
Secondary Questions 4
Methodology 4
Organization of the Thesis 5

CHAPTER 2 ..... **6**
LITERATURE REVIEW **6**
Growth Patterns and Urban Sprawl 6
The Issue of Urban Sprawl and Significant Data 9
Definition of Urban Sprawl 11
Factors Underlying Urban Sprawl 11
Cost of Urban Sprawl 15
Growth Management Policy 18
State-Level Growth Policy Legislation 19
TN Growth Policy Act 22
Implementation Strategy 22
Incentives and Penalties 24
Update the Implementation 24
Conclusion 25

CHAPTER 3 ..... **27**
LONG-TERM GROWTH PATTERNS IN TENNESSEE BETWEEN 1900 AND 2000 ..... **27**
A Long-term Perspective in Tennessee (1900-2000) 27
Growth Patterns before World War II (1900-1940) 29

Growth Patterns during WWII and the Post War Years (1940-1970) 31
Recent Tennessee (1970-2000) 34
Conclusion 35

CHAPTER 4 ..... **38**
SHORT-TERM GROWTH PATTERNS IN TENNESSEE BETWEEN 1970 AND 2000 ..... **38**
Growth Patterns in Tennessee between 1970 and 2000 38
Population Growth in the 1970s 39
Population Growth in the 1980s 41
Population Growth in the 1990s 44
Urban Sprawl Data in Tennessee 46
Population Trends 46
Land Use Trends 50
Transportation Trends 53
Conclusion (1970-2000) 56

CHAPTER 5 ..... **59**
THE EFFECTIVENESS OF PUBLIC CHAPTER 1101 ..... **59**
Appropriate State Intervention 59
The Appropriateness of the Same Requirements for All Counties 63
Regional Approach in Growth Policy 66
Other Factors 68
Conclusion 69

CHAPTER 6 ..... **71**
CONCLUSIONS **71**

BIBLIOGRAPHY **74**
VITA **79**

LIST OF TABLES

Table Page

Table 1. Population Growth Patterns in the United States (1900-2000) 6
Table 2. Population, Share of Nation, Net Change, and Population Change in Tennessee and the United States (1900-2000) 28
Table 3. Tennessee Population Density (1900-2000) 29
Table 4. Number of Births and Deaths, Birth Rate, and Death Rate in Tennessee (1935-1995) .33
Table 5. Components of Population Change in Tennessee 1930-1997 36
Table 6. Population, Share of State Population, Net Change, and Percent Change in Grand Division (1970-2000) 40
Table 7. Top 10 Counties based on Percent Change in the 1970s 42
Table 8. High Density and Low Growth Counties (1990-2000) 45
Table 9. Population Growth Rate in Tennessee Major MSAs (1990-2000) 49
Table 10. Cultivated Cropland and Developed Land (1992-1997) 50
Table 11. Developed Area and Rural Area in Tennessee (1982-1997) 51
Table 12. Per Capita Land Use in Urbanized Areas in Tennessee (1970-1990) 52
Table 13. Daily Vehicle-Miles of Travel in Urbanized Areas in Tennessee (1995-2000) 57
Table 14. Ranking Based on Percent Change during the Decade prior to Enactment (among states that have state-wide Growth Management Policies) 60
Table 15. Ranking Based on National Ranking of Percent Change during the Decade prior to Enactment (among states that have state-wide Growth Management Policies) 61
Table 16. A Classification Scheme of Counties and Possible Direction 65

LIST OF FIGURES

Figure Page

Figure 1. The Rural-Urban Shift in the United States (1900-2000) 7
Figure 2. Population Growth Patterns of Tennessee and the U.S. (1900-2000) 30
Figure 3. Birth and Death Rate in Tennessee (1935-1995) 33
Figure 4. Homeownership Rates in Tennessee and the United State (1900-2000) 34
Figure 5. Population Growth by Natural Increase and Net Migration (1930-1997) 39
Figure 6. Grand Division in Tennessee 41
Figure 7. Growth Patterns in Tennessee 43
Figure 8. Patterns of Population Share of Grand Division (1970-2000) 45
Figure 9. Growth Patterns in the United States (1990-2000) 47
Figure 10. Growth Patterns in Metropolitan Areas in Tennessee (1990-2000) 49
Figure 11. Relationship between Interstate System and Urban Sprawl 54
Figure 12. Interstate and Highway Systems in Tennessee 54
Figure 13. Transportation System in Nashville Metropolitan Area 55
Figure 14. State Rout 840 Plan Map 55
Figure 15. Percent Change in Population and Daily Vehicle-miles of Travel in Urbanized Areas in Tennessee (1995-2000) 57
Figure 16. Classification based on Population Growth Rate and Density 65
Figure 17. Possible Trends by Uncontrolled Development 68

CHAPTER 1
INTRODUCTION AND GENERAL BACKGROUND

Purpose of the Study

The purpose of this thesis is to examine changes in population, land use, and transportation in Tennessee as they relate to urban sprawl. Demographic growth trends during the 20th century are analyzed, and particular attention is given to the growth trends during the period from 1970-2000, with the analysis being done at the county level. Land use trends and transportation as well as growth trends in population are analyzed in terms of urban sprawl in order to assess the Tennessee Growth Policy Act, Public Chapter 1101. Its effectiveness in controlling urban sprawl in the state is evaluated, and specific recommendations for the policy decision-making are provided.

Background

During the 20th century, there have been dramatic changes in the American population's urban life styles. The emergence and spread of automobiles, the pursuit of suburbanization, federal government policies, and unrestricted development have caused urban sprawl in American cities. Continued urban sprawl has reduced open space and productive farmland, increased traffic congestion, degraded water and air quality, and increased fiscal concerns for providing services (ULI 1998). Therefore, urban sprawl has been emerging as a major public concern since 1970 in the U.S., and has caused several states to enact legislation, often referred to as "smart growth."

Tennessee is not an exception to the urban sprawl issue. A report, *"Where Are We Growing? Land Use and Transportation in Middle Tennessee,"* issued by the

Southern Environmental Law Center, says that Nashville was ranked the number one sprawling city by USA TODAY (Feb. 22nd, 2001) and "ranked as having the highest average amount of daily driving per person in the country by the Federal Highway Administration (SELC 2001)." The report also says that Tennessee is the 7th highest ranking state in terms of the amount of land lost in the nation by "401,000 acres of open space having been developed between 1992 and 1997 for projects such as new homes, businesses, roads, and parking lots (SELC 2001)." In addition, it has been estimated that Tennessee had 31% of land uses converted to developed land between 1992 and 1997 (USDA Natural Resources Inventory). Therefore, this thesis examines the evolution of demographic trends over the past century, focusing on the 1970-2000 period, in order to provide a base of knowledge for understanding Tennessee's growth patterns. In addition, land use and transportation trends in Tennessee are examined in terms of urban sprawl.

Development is not necessarily negative. The Urban Land Institute says in its book, "ULI on the Future: Smart Growth: Economy, Community, Environment," that "people want them (growth and development) without degrading the environment, raising local taxes, and increasing budgets." As a result, it also mentions that "consensus is emerging at the community level in support of smart growth." Currently, there are thirteen states which have enacted statewide growth management or smart growth legislation. In 1960, Hawaii became the first state to enact the legislation in order to recognize the need for growth management. The other states include Vermont, Florida, Oregon, Maine, Rhode Island, Georgia, Washington, New Jersey, Maryland, Minnesota, Tennessee, and Wisconsin.

Tennessee's Growth Policy Act, Public Chapter 1101, was passed by the state legislature on May 19, 1998. Under Public Chapter 1101 the state mandates that all counties except those with a metropolitan form of government prepare a projected 20-year growth plan for both the county as a whole and each municipality within the county (IPS and TACIR 1998). The State of Tennessee has spent the previous years focusing on implementation of the new legislation, and very little has been done to

assess the effectiveness of Public Chapter 1101. Therefore, this thesis addresses the effectiveness of the legislation in light of various growth patterns.

Research Questions

Primary Questions

- What have been the demographic growth patterns in Tennessee over the past century, in particular during 1970-2000 period, when disaggregated by county?
- Based on the demographic analysis, a second set of questions aimed at determining whether Public Chapter 1101 effectively addresses growth patterns in Tennessee is then examined. Specifically, the assessment focuses on the following four main aspects of the legislation:

    a. Does the intensity of growth in Tennessee warrant state intervention in the area of growth policy when compared to other states that have enacted growth management legislation?
    b. Public Chapter 1101 mandates all counties and their respective municipalities to produce growth plans with a 20-year time frame. Is it adequate to mandate all counties—except those with a metropolitan form of government—to develop 20-year growth plans?
    c. PC1101 does not include any provisions for a regional approach. Is it adequate to have the county and its associated municipalities as the planning unit?
    d. Are there any additional factors that should be taken into consideration in Tennessee's Growth Policy Act?

Secondary Questions

As part of the analysis of demographic trends over the past century, the following secondary research questions are addressed:

- What have been the specific demographic growth patterns in Tennessee over the past century, in particular during 1970-2000 period, when compared to the national level?
- What have been the population growth patterns in terms of Grand Division and county level during 1970-2000? What counties show particularly high or low growth rates? Are there any common characteristics?
- What have been the trends in population, land use, and transportation in terms of urban sprawl in Tennessee?

Methodology

Decennial and annual data that the U.S. Census Bureau provides are used for the analysis of population growth trends. Tables and figures created by using the data assist in understanding the conditions of the past, present, and future of Tennessee. Data are also analyzed using common descriptive statistics, as well as visual inspection using maps created by a geographic information system (GIS). The statistics and maps are usually based on county-level analysis. Time series from 1900 to 2000, in decade-based analysis, are used to explore growth patterns at the state level over the past century. Time series from 1970 and 2000 will be used to examine population growth patterns at the county and municipal levels.

In addition, the data of USDA Natural Resources Inventory (1982-1997 period) and Federal Highway Administration (1995-2000 period) are used in analyzing land use and transportation trends. Spatial data provided by the Tennessee Department of Transportation are used to create maps showing the current road system in Tennessee.

Organization of the Thesis

The thesis is organized into six chapters. Chapter 1 introduces the topic, the purpose of the study, research questions, and the methodology. Chapter 2 reviews literature related to population growth, urban sprawl, growth management policy, and the Tennessee Growth Policy Act. Chapter 3 contains overall population growth patterns in Tennessee during the 20th century, thereby specifying decade-level analysis. Following the analysis, Chapter 4 examines recent growth patterns in Tennessee focusing on 1970-2000 demographic trends, land use trends, and transportation trends based on the data with specific time levels. Using overall and specified analysis, Chapter 5 examines the effectiveness of the current Tennessee Growth Policy Act, Public Chapter 1101, based on the primary questions. Finally, Chapter 6 provides a summary of the overall thesis and policy recommendations.

CHAPTER 2
LITERATURE REVIEW

Growth Patterns and Urban Sprawl

During the span of the 20th century, the United States' population almost quadrupled, going from 76 million in 1900 to 281 million in 2000. Population density increased from 23.5 persons/square mile in 1900 to 79.6 persons/square mile in 2000. In the 1920s, the nation's population was already more than 100 million; by the 1970s, it had grown to 200 million (Table 1). For the entire century, the nation's average-decade growth rate was 14.0% (Source: U.S. Census Bureau, 1990 Census of Population and Housing, Census 2000 Summary File).

Table 1. Population Growth Patterns in the United States (1900-2000)

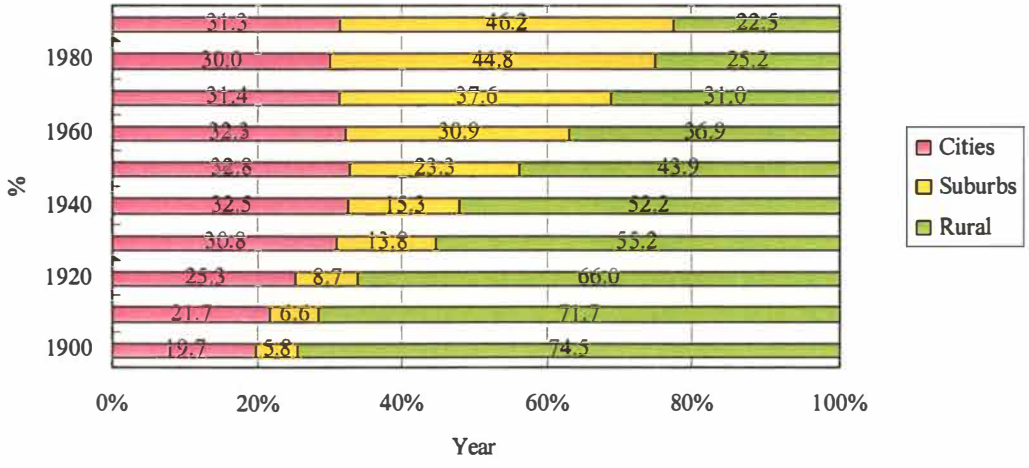
Year	Population	Popuation Density	Decade	Net Change	Percent Change
	Persons	Persons/square mile		Persons	%
1900	76,212,168	21.5			
1910	92,228,496	26.0	1900-1910	16,016,328	21.0
1920	106,021,537	29.9	1910-1920	13,793,041	15.0
1930	123,202,624	34.7	1920-1930	17,181,087	16.2
1940	132,164,569	37.2	1930-1940	8,961,945	7.3
1950	151,325,798	42.6	1940-1950	19,161,229	14.5
1960	179,323,175	50.6	1950-1960	27,997,377	18.5
1970	203,211,926	57.5	1960-1970	23,888,751	13.3
1980	226,545,805	64.0	1970-1980	23,333,879	11.5
1990	248,709,873	70.3	1980-1990	22,164,068	9.8
2000	281,421,906	79.6	1990-2000	32,712,033	13.2
			Sum	205,209,738	140.2
			Average	20,520,974	14.0

Note: 2000 population density is computed using 2000 population and land area data. Average-decade growth rate, 14.0%, is computed using the calculation of 140.2/10 decades.

Source: U.S. Census Bureau, 1990 Census of Population and Housing, Census 2000 Summary File

There have been dramatic changes in American cities and American's urban life styles. Barbara Phillips says in her book, City Lights: Urban-Suburban Life in the Global Society, that "the United States has been (rapidly) transformed from a collection of farms and small towns into a metropolitan nation (during the 20th century)," and this shift can be illustrated from rural to urban and then to metropolitan life (Phillips 1996). She argues that the pattern of urbanization due to the centralization of people and industry had been set from 1920 to 1970.

Figure 1 indicates that the huge population increase during the 20th century was concentrated in urban areas rather than rural areas; in 1900, 25.5% of the total population in the United States lived in urban areas, the figure was 34% in 1920, and then increased to 69.0% in 1970. The pattern of migration into urban areas from rural areas from 1920-1970 explains that significant economic generators existed in central cities, in particular in the largest cities, and Americans' activities were moved from rural areas to urban areas as a result.



Note: The figure is shown in the book, "City Lights: Urban-Suburban Life in the Global Society," page 158, Figure 6.3. (Barbara Phillips 1996).

Figure 1. The Rural-Urban Shift in the United States (1900-2000)

Source: U.S. Census Bureau

At the same time, another trend, called "suburbanization" or "urban sprawl," was emerging. Phillips writes that from 1920, "suburbs started growing at a faster rate than central cities, and by 1970 more people lived in suburbs than within central cities;" 37.6% of the total population lived in suburbs, while 31.4% lived in central cities (Figure 1). She mentions that the transformation of America from a central city to a suburban nation took place in only fifty years (1920-1970), much faster than the rural-urban shift.

Before the 1920s, the location of street cable car and railroad lines determined the shape of cities and the location of development, and in a way also made suburban areas more accessible. As rail routes expanded outside the old city cores, development followed, starting the trend towards suburbanization (ULI 1998). Sprawl as a problematic pattern of land development, however, has only appeared since World War II. After World War II, urban sprawl became the most significant urban issue, fueled by the spread of automobiles and federal government policies such as the Federal Aid Highway Act, Federal Housing Administration (FHA) and Veterans Administration (VA) mortgage guarantees.

Nationwide, population growth and population density have increased at the same ratio—almost four times. However, in metropolitan areas, population has increased in suburban areas more rapidly than in central cities. As a result, overall population density in urban areas has been decreasing every year. As Kelbaugh indicates in his book Common Place: Toward Neighborhood and Regional Design, the United States' metropolitan areas have shown unique aspects: American cities, in particular metropolitan areas, have managed to sprawl at very low densities with correlating problems of traffic congestion. In addition, Kelbaugh says that urban sprawl has caused many problems such as longer commuting time, environmental degradation, fiscal costs for infrastructure, and many other problems.

Phillips also mentions that "starting in the 1960s, Americans moved to a new

kind of outside central city location: technoburb, edge city, or postsuburbia, and this new form is a culturally diverse, economically viable, multicentered region that reflects various societal trends in production and consumption (Phillips 1996)."

The Issue of Urban Sprawl and Significant Data

Since The Costs of Sprawl: Environmental and Economic Costs of Alternative Residential Development Patterns at the Urban Fringe was prepared by the Real Estate Research Corporation in 1974, planners have been seriously considering the costs of urban sprawl. Though some people insist that sprawl is not a problem, and that there have been benefits from suburbanization, opposition to urban sprawl has become a significant issue across the country. Urban sprawl is not just a research topic for academics, but has also captured the attention of the general public. Sprawl has made the headlines of many mass-media publications, such as:

- The Freeman: Urban sprawl is fast becoming the most important issue among so-called "land use" experts and in many state legislatures as well (Reed 1998).
- Nation's Cities Weekly: People are getting frustrated with fast urban growth and want to preserve their communities (Dionne 1998).
- New York Times: On election day, voters from Southern California to New Jersey showed that the sprawl issue may have become a political driving force (Egan 1998).
- Insight on the News: One recent report from the federal Centers for Disease Control and Prevention (CDC) identified so-called urban sprawl as a health risk to Americans—a conclusion naturally jumped on by every environmentalist and special-interest group that would like to confine humankind to people reservations so the rest of the world's creatures can frolic unmolested (Paige 2002).

In addition, many researchers have documented significant aspects related to urban sprawl: huge population growth in suburban areas, traffic congestion, significant

land consumption compared to population growth, the decrease of farmland and open space, and so on.

- Douglas Kelbaugh: The census now counts half of the U.S.A.'s population as suburban, up from a third in 1960 and a quarter in 1950 (Kelbaugh 1997).
- Successful Farming: A new report by American Farmland Trust says 79% of the nation's production of fruit, 69% of its vegetable crops and more than half of dairy goods are threatened by urban sprawl (Anonymous 1997).
- Sierra Club: Professor Rolf Pendall of Cornell University analyzed suburban sprawl over the course of the 1980s in 282 metropolitan areas. He found that the population growth variable explains about 31 percent of the growth in land area. He also found that even those areas that experienced no population growth increased in urbanized land area by an average of 18 percent (2001).
- The Organization for Economic Co-operation and Development: Through the use of U.S. Census data, the organization found that from the 1950s to the 1990s, 522 central cities in the United States increased in area from 10,498 square miles to 27,704 square miles. But at the same time population density had been reduced from 5,873 persons per square mile in 1950, to 2,937 persons per square mile in 1990. A 1997 report from the American Farmland Trust estimated that the Unites States is losing about 50 acres an hour to the growth of suburbia and other forms of economic development.
- The Regionalist: Land consumption is outpacing population growth by a great deal. A study by former Albuquerque mayor and author David Rusk, who studied 213 urbanized areas, showed that between 1960 and 1990 population increased from 95 million to 140 million (47%) while urbanized land increased from 25,000 square miles to 51,000 square miles (107%) (2000).

Definition of Urban Sprawl

Even though Americans regard urban sprawl as a significant issue in our society, they do not know exactly what urban sprawl means or what the costs of urban sprawl are. Generally, people seem to think that urban sprawl is simply related to density, but the description is debatable. Merriam-Webster's Dictionary defines urban sprawl as 'the spreading of urban developments (as houses and shopping centers) on undeveloped land near a city (1953).' Don Chen, the director of Smart Growth America, a non-profit coalition of anti-sprawl groups, said that sprawl is about more than just density, it is the clustering of activity, the organization of density.

In his article "*A Call to Stop Buying into Sprawl,*" Roger K. Lewis, a practicing architect and a professor of architecture at the University of Maryland, defined sprawl as patterns of land development, mostly appearing since World War II, either surrounding traditional cities and towns established in the 19th century or constituting substantially all of the fabric of America's newer, 20th-century cities. He also described several distinct and common characteristics of urban sprawl: low-density residential neighborhoods, access by way of a branching system of local feeder roads, strip commercial growth along arterial and collector roads, automobiles as the only form of transportation, and non-existence of a physical image of the community (Lewis 1999). In addition, Lawrence Reed, president of the Mackinac Center for Public Policy and chairman of FEE (Foundation for Economic Education, Incorporated)'s Board of Trustees, said, "If it [sprawl] isn't understood correctly, laws enacted to deal with it are likely to become major threats to both liberty and economic well-being (1998)."

Factors Underlying Urban Sprawl

Many people have been trying to discern the reasons for urban sprawl. Kevin J. Krizek suggests in his article "*Sustainable Communities*" that urban sprawl is the

result of: 1) households desiring larger and cheaper homes in outlying areas, 2) distorted financing for infrastructure between developed and undeveloped areas, and 3) town councils eagerly adding businesses to further boost their tax base (Krizek 2001). Danzig and Saaty analyzed socioeconomic causes underlying urban sprawl in 1973 in their book The Compact City: A Plan for a Livable Urban Environment. The causes that they found include the following: 1) Overall increases in population, 2) Movement from the farms to the city, 3) High density of the inner city caused by population movement, 4) Decay of residences around the city core, 5) Rising economic means permitting residents in the inner city to move to suburbs and residents in the suburbs to move to larger homes on larger lots, 6) Development of extensive highways systems, 7) The relocation of industry, 8) The development of the multicar family, and 9) Rising urban transportation problems. From the various analyses of the reasons for urban sprawl, three general divisions could be easily understood. The divisions are as follows:

a. American Propensity

Some people propose that urban sprawl basically originated from the American population's psychological make-up. Douglas Kelbaugh said that an underlying reason for sprawl is the historical propensity of Americans toward agrarian roots and pioneer spirit. He also mentioned that another factor is "physical mobility, amplified by the easy ownership of automobiles and the highway and interstate system (Kelbaugh 1997)." Roger K. Lewis also mentioned American propensity, saying that "sprawl happens in response to the aspirations of American families seeking what they perceive to be the individualist, utopian ideal: owning a house on a piece of land, and this aspiration, rooted in our agrarian history, remains deeply engrained in our culture and psyche (Lewis 1999)."

b. Automobiles and Federal Policy

The emergence and spread of automobiles, the pursuit of suburbanization, and

key federal government policies are the most outstanding motors of urban sprawl. Since the end of World War II, urban sprawl has been fueled by the use of automobiles as transportation and by reinforcing public policies. The automobile has been identified "as the major culprit" in creating this pattern, but the automobile could not have had these effects without complementary public policies and subsidies (Atkinson and Oleson 1996). The Urban Land Institute explained the situation very well in its book, ULI on the Future: Smart Growth: Economy, Community, Environment (1998). After World War II, veterans returning from the war faced high interest rates when they tried to purchase a home. Therefore, the federal government enacted a program, the GI Bill of 1944, which subsidized homebuyers through the tax code by allowing deductions of mortgage loans. In addition, along with the popularity of the automobile in the United States, the federal government initiated programs to build road networks, which enabled suburban development. The Federal Aid Highway Act of 1956, one of these federal programs, provided federal money to construct a system for transcontinental travel.

Atkinson and Oleson also present the consequences very well. Commuting by automobile, combined with such policies as subsidized mortgages in favor of single-family detached housing and construction rather than maintenance, transformed residential patterns. The homeowner endeavored to own his own home in the suburbs, enabling him to simultaneously enjoy open space and an automobile-accessible city life. As time went by, the inconvenience of having to travel to the downtown store caused the development of suburban shopping centers and entertainment facilities, and gradually downtowns became blighted, reinforcing the move to the suburbs. This process, in turn, caused the congestion associated with shopping and commuting by automobile. Businesses also followed the pattern by pursuing the cheaper land and better roads available in the suburbs or the urban fringe (The Economist 1994).

Sprawl could not occur without affordable automobiles, inexpensive gasoline, extensive road and highway systems, cheap and ample land, readily available mortgage loans, and favorable zoning ordinances (Lewis 1999). Less obvious federal subsidies,

such as the oil depletion allowance and support of nuclear and hydroelectric power, as well as obvious federal policies, have aided suburban development with apparently cheap energy (Kelbaugh 1997). Sprawl also reflects individual choices. In a 1995 survey of personal transportation, the U.S. Department of Transportation found that "Americans' love affair with our cars may actually be a marriage of convenience. Contemporary land use patterns require the use of private vehicles, whether or not we love those vehicles."

c. Social, Racial, and Hierarchical Tension

Since the 1950s, racial tensions have caused the "white flight" to suburban communities, schools, and social institutions (Kelbaugh 1997). According to William Julius Wilson in the book, When Work Disappears, the disappearance of work in many inner-city neighborhoods was related to the decline of the mass production system available to blue-collar workers with little formal education in the 1980s. He explained that the increasing suburbanization of employment has exacerbated the problems of inner-city joblessness and restricted access to jobs. These have led to greater concentrations of poverty in inner cities as wealthier people have escaped from poor neighborhoods (Wilson 1997). He also contended that these problems, along with the problem of discrimination, ultimately led to the Los Angeles riots in 1992. Anthony Downs articulated that most Americans do not want to live in neighborhoods with people poorer than themselves for social reasons, and the poor are legally excluded from higher-income communities by local laws that deliberately raise housing costs. In the Feb. 22nd, 2001 issue of USA TODAY, Haya El Nasser and Paul Overberg also explained that "the needs for affordable housing and cheap commercial space, the wish to escape from crime and low-quality public education in the city, the desire for more parks and wildlife preserves, and the like have created urban sprawl. In addition, racial tensions and urban decay have fueled much of the flight to the suburbs in metro areas in the Midwest and Northeast (Nasser and Overberg 2001)".

Cost of Urban Sprawl

Some people insist that sprawl is not a problem, and that there have been benefits from suburbanization (For instance, Sam Staley, an Ohio economist, says that sprawl is just another name for suburbanization). Suburbanization represents a significant improvement in the quality of life: larger houses, more open space, and safer neighborhoods (Reed 1998). However, continued urban growth has degraded water and air quality, increased traffic congestion, reduced open space and productive farmland, and increased fiscal concerns for infrastructure (ULI 1998). In addition, Lawrence W. Reed points out that sprawl has to be considered in this way: "sprawl harms other people and society at large because of pollution, traffic, noise, or even a smaller food supply owing to shrinking amounts of farmland (Reed 1998)." "*The Costs of Sprawl: Environmental and Economic Costs of Alternative Residential Development Patterns at the Urban Fringe,*" prepared by Real Estate Research Corporation in 1974, analyzed economic costs, environmental effects, and personal effects based on community and neighborhood.

There have been many experts, such as planners, economists, governmental officers, and many others, indicating the costs of urban sprawl. Peter Calthorpe said that "unrestrained sprawl around our cities is generating profound environmental stress, intractable traffic congestion, a dearth of affordable housing, loss of irreplaceable open space, disinvestment in our inner cities, and life-styles which burden working families and isolate the elderly and singles (Calthorpe 1993)." Sean Paige also said that "seeking the good life in suburbia holds some serious risks that include longer commutes, more car rides (not to mention less walking) and even an increased risk of being killed in floods allegedly caused by poor zoning laws (Paige 2002)."

Molly O'Meara Sheehan focuses on the costs of urban sprawl caused by car-dependent development fostered by federal government policies. Sheehan says that car-dependent development consumes land and other resources, degrading watersheds and

air in the process. Moreover, car-centric cities harm economic productivity by increasing social inequities, wasting resources, and damaging the environment (Sheehan 2002). Douglas Kelbaugh also said that urban sprawl has significant economic, environmental, social, and architectural costs (Kelbaugh 1997). He analyzed these costs based on the progress of urban sprawl. The costs of urban sprawl can be analyzed following his divisions.

a. Economic costs

Economic costs are mainly fiscal costs for infrastructure such as roads, sewers, and schools. Douglas Kelbaugh explains that impact fees for off-site improvements such as roads, sewers, and schools are not high enough for developers to cover the marginal costs of providing off-site infrastructure for new suburban developments. Therefore, the assignment of infrastructure costs to the developer shifts to local and state governments' costs. He concluded that suburban land use and transportation patterns are not economically sustainable.

Regarding the costs driven up by cars, Molly O'Meara Sheehan said that car-centric cities require greater expenditures on transportation and other infrastructure—expenses that chip away at a region's economic potential in addition to eating up more human time and motor fuel (USA Today 2002).

b. Environmental Costs

The spread of privately owned cars in suburban areas has caused longer commutes and traffic congestion. Air pollution is a pathology of traffic congestion, which not only increases the production of pollutants but also wastes gasoline (Kelbaugh 1997). Kelbaugh also states that there are many other well-known environmental pathologies of sprawl, such as a lowered water table, excessive stormwater run-off, and loss of agricultural land. By paving over land for roads and

parking lots, metropolitan areas increase water problems (Sheehan 2002).

In addition, urban sprawl decreases open space and farm land. Urban sprawl is pushing suburbs further and further into rural areas, often pressuring farmers. (Johnson, Smith, and Morrison 1996) A new report by American Farmland Trust says that 79% of the nation's production of fruit, 69% of its vegetable crops and more than half of dairy goods are threatened by urban sprawl (Successful Farming 1997).

c. Social Costs

Another cost of urban sprawl is social divide. Since the 1950's, racial tensions have caused a "white flight" to suburban communities, schools, and social institutions. The poor are often legally excluded from higher-income communities by local laws that deliberately raise housing costs (Kelbaugh 1997). Molly O'Meara Sheehan, a research associate at the Worldwatch Institute, Washington, D.C. and the author of "City Limits: Putting the Brakes on Sprawl," said that "sprawling cities sharpen existing social divides; residents of suburban counties may enjoy the benefits of the entire metropolitan region, but strive to keep poor people out of their community by spurning links to regionwide public transportation and passing "snob zoning" laws that forbid the type of housing that lower-, and even middle-income, people can afford (Sheehan 2002)." Undoubtedly, we would be better sustained if our communities were more mixed in socioeconomic, racial, and ethnic terms (Kelbaugh 1997).

In addition, violent crime is not limited to the inner city. Douglas Kelbaugh explained that "the most obvious signs of social malaise—youth violence and substance abuse—are becoming more widespread in suburbia. Although suburbs do not in and of themselves cause gangs and youth violence, their lack of physical coherence, public space, local businesses, and palpable identity surely contribute to social trauma and failure in the suburbs (Kelbaugh 1997)."

d. Other Costs

Kelbaugh included architectural costs such as loss of architectural detail, loss of human/pedestrian scale, loss of local authenticity, and loss of building types. In addition, there are the psychological and health costs of sprawl. The psychological effects of such things as ennui and privatization are impossible to measure (Kelbaugh 1997). Molly O'Meara Sheehan said that "sprawling cities damage the environment in many ways that harm human health: for example, slow-moving traffic in a built-up area dirties the air that many people breathe. However, adding highway capacity to solve traffic congestion extends the problem further and better roads invite more cars." She said that "toxic ingredients in motorcycle and car fumes cause illness, particularly among children, whose developing lungs are especially vulnerable, and among the elderly. Lives are lost not only to illnesses from vehicular pollution, but to traffic accidents (Sheehan 2002)."

Growth Management Policy

Many people have suggested various solutions for the problems of urban sprawl. New urbanism (Landecker 1996) and denser building styles (The CQ Researcher 1997) are some of the suggested solutions. In the main groups, William L. Nolan found that there are two sides: those who believe urban growth should be controlled by governmental regulations and those who believe growth should be governed only by market forces in a free economy.

Smart growth generally involves governmental regulations that are more comprehensive than the codes and regulations currently in force in most parts of the country (Nolan 2001). Anthony Downs argued that there are four concepts on which most of the advocacy groups agree: 1. Preserving large amounts of open space and protecting the quality of the environment, 2. Redeveloping inner-core areas and

developing infill sites, 3. Removing barriers to urban design innovation in cities and new suburban areas, and 4. Creating a greater sense of community and a greater recognition of regional interdependence and solidarity.

State-Level Growth Policy Legislation

Recently, an interest in growth management has spurred a national forum. The former Clinton-Gore administration sponsored the Livability Agenda, which was aimed at promoting regional "smart growth" strategies by providing matching funds for localities to design and pursue such strategies across jurisdictional lines (CEQ 1999a, 1999b). Another example is the National Association of Home Builders, which has adopted a smart-growth policy in order to help its member builders serve their markets without encouraging sprawl (Nolan 2001).

However, it is at the state level where major processes of legislation aimed at managing urban growth are being implemented. After urban sprawl began to emerge as a major public issue in 1970 in the United States, some states positioned themselves to take the lead in growth management, with several states enacting growth-management legislations. According to the 1998 fact sheet commissioned by the American Farmland Trust, growth management laws take a comprehensive approach to regulate the pattern and rate of development and to set policies to ensure that most new construction is concentrated within designated urban growth area or boundaries (UGBs).

Currently, there are thirteen states which have enacted statewide growth management legislation: Hawaii (1961), Vermont (1970), Florida (1972), Oregon (1972), Maine (1988), Rhode Island (1988), Georgia, Washington (1990), New Jersey (1992), Maryland (1997), Minnesota (1997), Tennessee (1998), and Wisconsin (1999). These legislations, which have had different degrees of success, are described briefly below:

- Hawaii (1961): In 1961, Hawaii became the first state to enact growth management legislation and experimented with statewide land use planning when it created four zoning districts; one of the zones was dedicated to agriculture (AFT 1998).
- Vermont (1970): In 1970, Vermont passed Act 250, which requires state review of commercial, industrial and residential development projects that meet the act's criteria (AFT 1998). The legislation set up an environmental commission to review development proposals for conformance with a list of state criteria (ULI 1998). Vermont passed another state planning act in 1998 (AFT 1998). Vermont has become one of the most attractive places to live because the state promotes planning at the local level, has a special fund to preserve natural areas, and works to keep businesses in downtown areas (Nolan 2001).
- Florida (1972): The State of Florida passed its growth management program in 1972 in response to citizen concern over the equality of rapid growth occurring and its high fiscal cost (ULI 1998). The legislation required regional and state level approval of development plans (Nolan 2001).
- Oregon (1972): In 1972, Oregon enacted one of the nation's strongest growth management laws (AFT 1998). Oregon created the requirement for growth boundaries around urban centers, and all development must agree with the state's goals before approval (ULI 1998). Oregon created the country's first urban growth boundary, which was established in Portland in 1973 (Nolan 2001). The boundary encouraged denser development and limited sprawl. By restricting growth to already developed areas, Portland has expanded its boundaries by only two percent while its population has grown by 700,000 over the past two decades (International Wildlife 1998). The effect of growth management legislation on sprawl can best be seen in metropolitan Portland, which, by establishing an urban growth boundary, stopped development and preserved open space (USA Today 2001).
- Washington (1990): Washington's Growth Management Act was adopted in 1990 and strengthened in 1991. It required that fast growing counties and their cities must prepare comprehensive plans that protect natural resource areas (AFT 1998). Counties required to plan under the act are also required to designate urban growth

areas to accommodate projected urban growth over 20 years (AFT 1998).

- New Jersey (1992): The New Jersey State Development and Redevelopment Plan, released in 1992, was designed to accommodate urban growth by directing it to defined urban areas. It provides a statewide framework that is intended to guide the investment policies of state agencies (AFT 1998).
- Maryland (1997): The Maryland Economic Growth, Resource Protection, and Planning Act of 1992 outlined a set of policies to guide growth, and in 1997, the state Legislature enacted the Smart Growth Areas bill, which directs state funding to areas targeted for development (AFT 1998). The State of Maryland utilizes state funding for infrastructure to guide development into desired locations (ULI 1998). In 1997, the Maryland state legislature enacted a law that is designed to pull the plug on state subsidies for sprawl (Nolan 2001). Montgomery County, Maryland, just outside Washington, D.C., has preserved more green space—93,000 acres—than any other county in the Unites States, primarily by protecting farmland from development (International Wildlife 1998).
- Minnesota (1997): Minnesota's 1997 Community-Based Planning Act set 11 goals for developing local and regional plans, and local governments are encouraged, rather than required, to develop comprehensive plans in accordance with the provisions of the law (AFT 1998).
- Tennessee (1998): In 1998, Tennessee enacted legislation that requires local governments in the state to create urban growth boundaries (Nolan 2001).
- Wisconsin (1999): Wisconsin enacted a smart growth law that mandates that all cities, towns, and villages with a population of more than 12,500 adopt a traditional neighborhood development CIND ordinance by January 2002 (Nolan 2001).

TN Growth Policy Act

Tennessee has not been an exception to the urban sprawl issue. A recent study conducted by the SELC found that "sprawling development patterns and a transportation system heavily oriented toward new road construction and motor vehicle use are beginning to exact a heavy price, undermining the rich quality of life in Tennessee (SELC 2001)." Pursuant to 'smart growth' planning, Tennessee's Growth Policy Act, Public Chapter 1101, was passed by the state legislature on May 19, 1998. "Tennessee's Growth Policy Act: A Vision for the Future," a 2000 Staff Information Report issued by the TACIR, pointed that "Public Chapter 1101 has moved Tennessee to the forefront of states which are attempting to curb growth through legislation, and it has garnered national attention for the state (TACIR 2000)."

Implementation Strategy

Public Chapter 1101 has provisions related to issues such as growth policies for development and redevelopment, municipal boundary changes through annexation, municipal incorporations, provision of pubic services, preservation of undeveloped areas, and local government grant, loan, and tax revenues (A Joint Publication of UTIPS, CTAS, MTAS, CGT, and TACIR 1999). Public Chapter 1101 requires that Tennessee counties and their associated municipalities develop 20-year countywide growth plans. All counties except those with a metropolitan form of government are required to develop the plan.

Under Public Chapter 1101 the plans must establish three types of areas: 1) Urban growth areas—an urban growth boundary (UGB)—for each municipality within the county, 2) Planned growth areas (PGA) within the county, and 3) Rural areas (RA) within the county (English 1999, TACIR 2000). An urban growth boundary (UGB) is "the corporate limits of a municipality and adjoining territory where high-density

residential or non-residential growth is expected over the next 20 years (English 1999, TACIR 2000)." The urban growth boundary reflects a controlling of urban expansion while taking into account impacts to agricultural lands, forests, recreational areas, and wildlife management areas (English 1999). A planned growth area (PGA) is "territory outside current municipalities and urban growth boundaries, and includes the sites where high or moderate residential or non-residential growth is expected within the county over the next 20 years (English 1999, TACIR 2000)." The PGA reflects orderly development while taking into account impacts to agricultural lands, forests, recreational areas, and wildlife management areas (English 1999). A rural area (RA) is "territory which is to be preserved for agriculture, forest, wildlife and uses other than high-density commercial, industrial, or residential development (English 1999, TACIR 2000)."

The plans are to be developed by a coordinating committee, which is to be composed of the county executive, the mayor of each municipality, one member appointed by the board of the largest municipally-owned utility system in the county, one member appointed by the board of the largest non-municipally-owned utility system in the county, one member appointed by the board of the county soil conservation district, one member appointed by the board of the largest local education agency, and two members appointed by the county executive and two members appointed by the mayor of the largest municipality, to assure broad representation of environmental, construction, and homeowner interests (English 1999). The growth plan includes documents describing municipal corporate limits as well as urban growth boundaries, planned growth areas, and rural areas. When the coordinating committee has recommended a growth plan, it is to be ratified or rejected by the county and municipal governing bodies. Rejected plans may be revised and submitted for approval. If an impasse is reached, the county or any municipality may request that the Secretary of State appoint a dispute resolution panel consisting of three administrative law judges trained in dispute resolution and mediation. Ratified plans are submitted to and approved by the state's local government planning advisory committee (English 1999).

Public Chapter 1101 also requires each county to create a Joint Economic and Community Development Board, which is responsible for "fostering communication relative to economic and community development between and among governmental entities, industry and private citizens (TACIR 2000)."

Incentives and Penalties

County and municipal governments without approved growth plans will receive neither various state and federal grants, nor annexation and municipal incorporation powers (English 1999). Two state agencies—the Department of Economic and Community Development and the Tennessee Housing Development Authority—announced policies to reward counties and municipalities with approved growth plans and, beginning in Fiscal Year 2002, to impose sanctions against those without such plans (APA 2002). The Department of Economic and Community Development awards additional points on grant applications for counties and municipalities whose growth plans have been approved by the LGPAC, while communities and counties without approved growth plans (as of July 1, 2001), with a few exceptions, have been unable to apply for grants (TACIR 2000, APA 2002). The Tennessee Housing Development Authority also has an incentive with additional points on grant applications for counties and municipalities with approved growth plans for both its competitive and federal Home Investment Partnership Program (HOME) grants (TACIR 2000, APA 2002). The agency no longer offered HOME grants to any county or municipality without an approved plan (APA 2002).

Update the Implementation

As of January, 2002, 89 of Tennessee's 92 mandated counties had submitted growth plans (LGAC 2002). The TACIR has a number of substantive concerns about

the adequacy of the growth plans in the context of (1) the goals stated in the Act, e.g. the minimization of sprawl, and (2) the planning requirements outlined in Section 7. "Planning for Rural Areas in Tennessee Under PC 1101," a 2001 Staff Information Report issued by the TACIR, found the rural areas component of the mandated growth plans lacking. The paper notes that "urban growth boundaries are not enough," and suggested a number of techniques and strategies—in the areas of regulations, public infrastructure, public costs and revenue, and public and private investments in open land—that the state could use to strengthen the rural areas component.

Conclusion

After World War II, suburbanization in American urban life became an outstanding aspect. This urban growth pattern was encouraged by the spread of automobiles, and spurred on by some federal government policies such as the GI Bill (1944), the Federal Highway Act, American defense policy, Federal energy subsidies, and so on. Since the 1970's, the urban growth pattern has started to be called urban sprawl—a term that indicates problematic development—which has been regarded as a substantial urban issue. Continued urban sprawl has had many negative impacts, including environmental degradation, economic costs for infrastructure, and social problems such as social divide. The costs include traffic congestion, air and water pollution, economic costs for infrastructure such as roads, sewer systems, and schools, poor sustainability, social and racial divide, inequity by tax base, and so on.

As the public, as well as many experts from various fields, have had much concern about significant costs created by urban sprawl, the federal government has begun to take action to combat the issue (such as the Clinton-Gore administration's Livability Agenda 1999), and many states have enacted smart growth legislation, namely growth management policies. It is unique for states to take the lead in growth management. Tennessee is not an exception to urban sprawl, and it enacted Public

CHAPTER 3
LONG-TERM GROWTH PATTERNS IN TENNESSEE BETWEEN 1900 AND 2000

A Long-term Perspective in Tennessee (1900-2000)

During the 20th century, Tennessee's population underwent an almost threefold increase—opening the century with a population of 2.02 million people and closing it with 5.69 million (Table 2). For the century, Tennessee's average decade-growth-rate (11.0%) was somewhat low compared to that of the nation (14.0%). Although Tennessee's overall decade-growth-rates were also lower than those of the United States, the 1930s, 1970s, and 1990s saw higher population growth rates for Tennessee than for the nation. Although Tennessee closed the century showing a higher population growth rate (16.7%) than the national growth rate of 13.2% in the 1990s, such a low growth rate during the earlier part of the 20th century was reflected in Tennessee's loss in the national population share. Tennessee's share of the nation's total population opened the 20th century with a peak of 2.7 %, but declined to 2.1 % in 1930. Even though its share showed a slight increase from 1940 through 1950, in 1970 its share again declined to 1.9%, which was due mainly to continuing net migration losses during 1940-1970. Finally, Tennessee closed with a 2.0% share of the nation's total population as the result of an increase in net migration gains.

Despite the decreasing national population share, Tennessee's population density (118.3 persons/square mile) ranked 19th out of 50 states (excepting the District of Columbia) in 1990 (Table 3). In its geographic region of the United States (the census-defined East South Central Division), Tennessee showed a somewhat high population density compared to Alabama (79.6 persons/square mile, ranking 25), Kentucky (92.8 persons/square mile, ranking 23), and Mississippi (54.9 persons/square mile, ranking 32). In addition, Tennessee's population density in 1900 was

Table 2. Population, Share of Nation, Net Change, and Population Change in Tennessee and the United States (1900-2000)

Year	Tennessee Population	U.S.A. Population	Share of Nation	Decade	Tennessee Net Change	Tennessee Percent Change	U.S.A. Net Change	U.S.A. Percent Change
	Persons	Persons	%		Persons	%	Persons	%
1900	2,020,616	76,212,168	2.7					
1910	2,184,789	92,228,496	2.4	1900-1910	164,173	8.1	16,016,328	21.0
1920	2,337,885	106,021,537	2.2	1910-1920	153,096	7.0	13,793,041	15.0
1930	2,616,556	123,202,624	2.1	1920-1930	278,671	11.9	17,181,087	16.2
1940	2,915,841	132,164,569	2.2	1930-1940	299,285	11.4	8,961,945	7.3
1950	3,291,718	151,325,798	2.2	1940-1950	375,877	12.9	19,161,229	14.5
1960	3,567,089	179,323,175	2.0	1950-1960	275,371	8.4	27,997,377	18.5
1970	3,923,687	203,211,926	1.9	1960-1970	356,598	10.0	23,888,751	13.3
1980	4,591,120	226,545,805	2.0	1970-1980	667,433	17.0	23,333,879	11.5
1990	4,877,185	248,709,873	2.0	1980-1990	286,065	6.2	22,164,068	9.8
2000	5,689,283	281,421,906	2.0	1990-2000	812,098	16.7	32,712,033	13.2
				Average	366,867	11.0	20,520,974	14.0

Note: Share of nation is calculated using Tennessee and United States population.

Source: U.S. Census Bureau

Table 3. Tennessee Population Density (1900-2000)

Year	Population	Population Density
	Persons	Persons/square mile
1900	2,020,616	49.0
1910	2,184,789	53.0
1920	2,337,885	56.7
1930	2,616,556	63.5
1940	2,915,841	70.7
1950	3,291,718	79.9
1960	3,567,089	86.5
1970	3,923,687	95.2
1980	4,591,120	111.4
1990	4,877,185	118.3
2000	5,689,283	138.0

Note: Tennessee land area = 41,219 square miles,
Population density = Persons/square mile
Source: U.S. Census Bureau

approximately 49 people per square mile. By 1980, it had increased to over 100 people per square mile, and by 2000 had reached 138 people per square mile (Table 3).

For the purpose of analyzing Tennessee's growth tends in the 20th century, the century is divided into three periods—pre-World War II (1900-1940), World War II and the postwar years (1940-1970), and recent years (1970-2000).

Growth Patterns before World War II (1900-1940)

Figure 2 shows the comparison of population growth patterns in Tennessee and the United States. In the early part of the century (1900–1930), Tennessee grew more slowly than the nation, but the gap gradually narrowed. From 1900 to 1930, the nation's population was mainly driven by a surging industrial-manufacturing economy and sustained immigration (Rutgers Report 2000). In the 1930s, however, the nation was affected by the Great Depression, which devastated the industrial economies of the 1930s and also drastically lowered rates of immigration. According to Population

Division Working Paper No. 29 of U.S. the Census Bureau, "Historical Census Statistics on the Foreign-born Population of the United States: 1850-1990", "from 1930 to 1950, the foreign-born population of the United States declined from 14.2 million to 10.3 million, and these declines reflected the extremly low level of immigration during the 1930s and 1940s (Gibson and Lennon 1999)." As a result, the 1930 -1940 population growth rate of the nation fell to 7.3%, the smallest growth of the century.

Tennessee, however, was little affected by these trends because its primary economy was not based on industrial manufacturing, and it was not a state affected by net international migration gains; international migration is concentrated within a few states such as California, New York, Texas, Florida, Illinois, and New Jersey (U.S. Census Bureau, Population Division Working Paper No.1 1992). Therefore, even though the United States showed a huge decrease during the 1930s, Tennessee showed an 11.4% growth rate—similar to its 11.9% growth in the 1920s. Moreover, 18.4 % of net population growth resulted from net domestic migration gains (people from other states moving to Tennessee) in the 1930s.

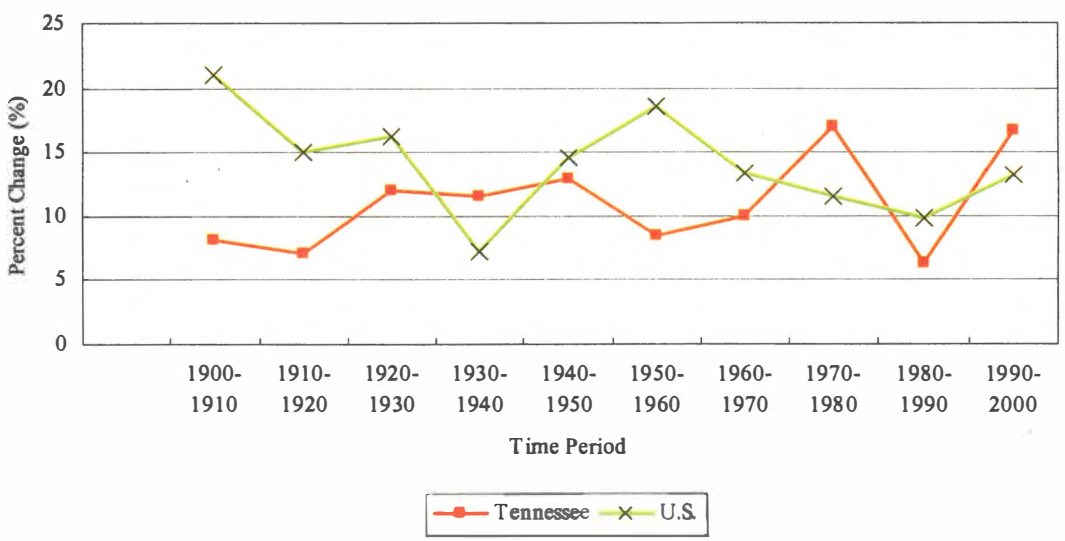


Figure 2. Population Growth Patterns of Tennessee and the U.S. (1900-2000)

Source: U.S. Census Bureau

Growth Patterns during WWII and the Post War Years (1940-1970)

After the Great Depression, the middle part of the century (1940-1970) saw Tennessee's growth pattern run counter to that of the nation. The growth resurgence in the nation quickly ensued during World War II and the postwar years (1940-1970), whereas Tennessee showed a decrease as a whole during this period. The nation's population growth rate soared to 18.5 percent in the 1960s, its highest rate during the century. Rutgers Regional Report (2000) explained that the surge in the United States population from 1940 to 1970 was "powered by vigorous consumer-driven manufacturing and early post-industrial/service employment growth. It also reflected the intense desire for suburban homeownership by the post-World War II nesting generation, whose soaring birth rates spawned the fabled baby boom--(births between 1946 to 1964)." On the other hand, immigration affecting population growth in the early century had declined during the 1930s and 1940s, and the foreign-born population in 1970 was still low, despite the rise in immigration during the 1950s and 1960s (Gibson and Lennon 1999).

The 1950s were definitive in terms of urban sprawl. Both the establishment of federal policies that spurred urban sprawl as well as expanded suburban homeownership by returning WWII veterans support Roger K. Lewis's definition of sprawl as patterns of land development mostly appearing since World War II. The U.S. Census Bureau explains that in the post-World War II period, "a booming economy, favorable tax laws, a rejuvenated home building industry, and easier financing saw homeownership explode nationally, topping 60% in just two decades." Therefore, the baby boom (births between 1946 and 1964) and an increasing homeownership pattern may be regarded as explicit signs of urban sprawl during this period. Additionally, the U.S. Census Bureau developed county-based Metropolitan Areas (MAs) for the 1950 census. Many Metropolitan Areas (MAs) have shown urban sprawl problems, and 79.4% of the nation's total 1990 population lived in Metropolitan Areas. According to the definition by the U.S. Census Bureau, a Metropolitan Area is "a core area containing

a large population nucleus together with adjacent communities having a high degree of economic and social integration with that core; the term used for Federal metropolitan areas has vaied, from standard metropolitan area (SMA) in 1950, to standard metropolitan statistical area (SMSA) in 1959, to metropolitan statistical area (MSA) in 1983, and to metropolitan area (MA) in 1990." In Tennessee, there have been 7 Metropolitan Areas since 1950.

The existence of urban sprawl trends in Tennessee during this period is illustrated by statistics regarding the presence of a baby boom as well as increasing homeownership rates. As mentioned earlier, Tennessee's post-WWII baby boom is significant, with a 20.6 birth rate in 1945, 24.4 in 1950, 24.7 in 1955, and 22.9 in 1960 (Table 4 and Figure 3). In addition, Tennessee's homeownership pattern is exactly similar to that of the nation in the period (Figure 4). Beginning in 1950, the rate surpassed 50%--actually 56.5% in the year—and by 1960 was 63.7%, showing that Tennessee experienced suburban homeownership reflective of the national trend.

Tennessee reflected the baby boom phenomenon after World War II. From 1945 to 1960, births rates in Tennessee surpassed 20.0. However, Tennessee showed a high decrease in net migration during the same period. In particular, in 1955 Tennessee recorded its highest birth rate of the century (24.7 with a relatively stable death rate as compared to other years), but the 1950s also saw 248,764 people move to other states. Tennessee's net domestic migration losses in the 1950s contributed to the low growth rate of 8.5 %. Therefore, the growth pattern of Tennessee during 1940-1970 showed a counter pattern to the nation due to net domestic migration losses.

Table 4. Number of Births and Deaths, Birth Rate, and Death Rate in Tennessee (1935-1995)

Year	Births	Deaths	birth rate	death rate
	Persons	Persons		
1935	52,827	29,425	19.0	10.0
1940	54,958	29,231	18.8	10.0
1945	64,101	27,680	20.6	8.9
1950	80,559	29,197	24.4	8.9
1955	84,713	28,886	24.7	8.4
1960	81,892	32,892	22.9	9.2
1965	72,990	35,049	19.4	9.3
1970	72,273	38,079	18.4	9.7
1975	62,265	38,522	14.6	9.0
1980	69,102	40,713	15.1	8.9
1985	66,730	43,176	14.2	9.2
1990	74,870	46,204	15.4	9.5
1995	73,139	51,167	13.9	9.8

Note: Rates are per 1,000 population.
Source: U.S. Census Bureau, Tennessee Department of Health,
Office of Health Statistics and Information

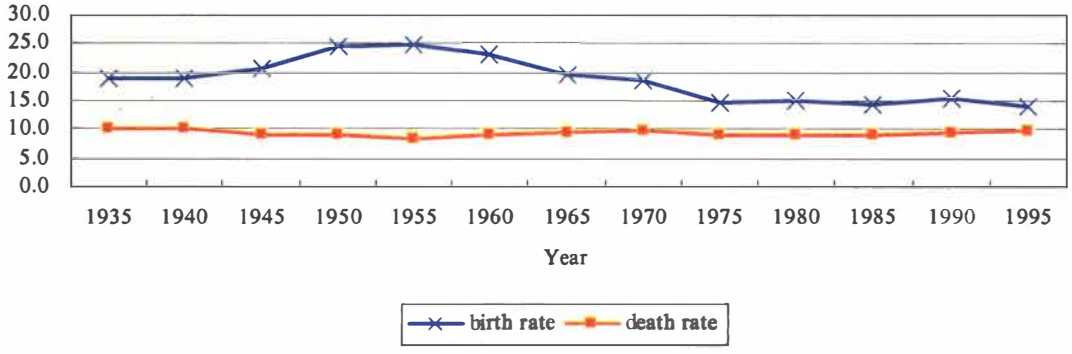


Figure 3. Birth and Death Rate in Tennessee (1935-1995)

Note: Rates are per 1,000 population.
Source: U.S. Census Bureau, Tennessee Department of Health,
Office of Health Statistics and Information

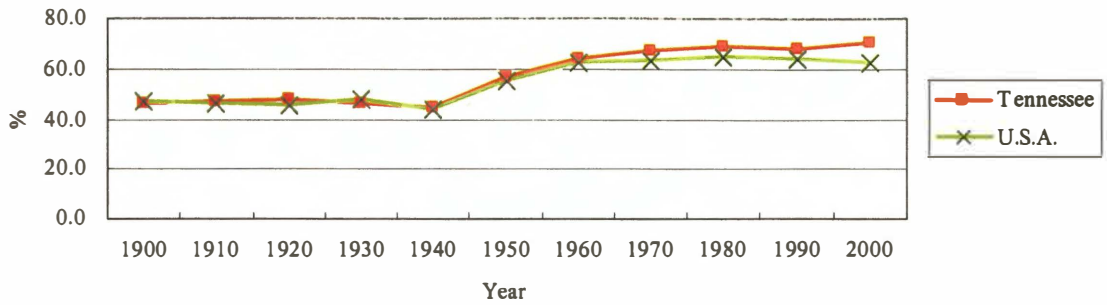


Figure 4. Homeownership Rates in Tennessee and the United State (1900-2000)

Source: U.S. Census Bureau

Recent Tennessee (1970-2000)

Tennessee's population in 2000 is the result of three decades of fast growth. While it took 7 decades for the population to double from 2 million in 1900 to nearly 4 million in 1970, it took only 3 decades (from 1970 to 2000) for the population to increase by another 2 million. During the period 1970-2000, Tennessee shows very irregular population growth rates for each decade: a huge increase in the 1970s, a sudden decrease in the 1980s, and a second surge in the 1990s. Tennessee showed its highest growth rates during this period, with increases of 17.0% in the 1970s, and 16.7% in the 1990s. These were higher than the national-level population growth rate, while the population growth of the 1980s was lower than the national level.

Regarding birth rate patterns, Tennessee stabilized at around 14 to 15 from 1970 to 2000. In addition, the death rate has remained at 8.2-10 during the entire century. Therefore, the population growth trends in this period have been primarily affected by migration gains, which indicate that more people moved into Tennessee from other states during the period. In the 1970s, the net migration number was 307,514, which was much higher than the natural increase of 269,919, and its portion was 10.1% of the base population year of 1970. Also, from 1990 to 1997 the net migration number of 333,102 people almost doubled the natural increase number of 168,146 (Table 5).

In the 1980s, Tennessee's population growth rate showed a sharp decrease, dropping to 6.2 %, its lowest value of the century. Even though birth rates in the period were slightly low—in 1984 the birth rate was 13.9—compared to those of the 1970s, the main cause of the low growth rate was a sharp decrease in net migration into Tennessee. The net migration number of 36,081 in the 1980s was even less than a tenth of the 1970s net migration number of 397,514 (Table 5).

During the period 1970-2000, Tennessee showed somewhat high population increases as a whole, and homeownership rates continued to rise. It closed the year 2000 with a homeownership rate of 69.9%, which is very high when compared to the 66.2% national level. Net migration gain—people from other states moving to Tennessee—is related to economic growth in Tennessee, thereby indicating urban sprawl. Population increase was concentrated in metropolitan areas, particularly in counties surrounding a core county with a central, urbanized city.

Conclusion

During the 20th century, Tennessee's population growth patterns as a whole were somewhat different from those of the nation. For example, the Great Depression of the 1930s that devastated the economy and dramatically lowered the population growth rate in the United States did not have an impact on Tennessee's population growth pattern. Rather, migration of people from other states into Tennessee increased Tennessee's population growth rate in the period. During the United States' post-World War II resurgence period from 1940-1970, Tennessee showed decreasing patterns in total population changes as more people moved to other states from Tennessee. In addition, from 1970-2000 there was a substantial population increase in Tennessee because of people from other states moving to Tennessee, whereas population growth rates in the nation decreased during the same period. However, the population growth pattern as caused by natural increment has been similar to the United States' population growth

Table 5. Components of Population Change in Tennessee 1930-1997

Decade	Base Population	Total Births	Total Deaths	Natural Increase	Net Migration	Final Population	Net Change	Migration Portion
	Persons	Persons	Persons	Persons	Persons	Persons	Persons	%
	(1)	(2)	(3)	(4)=(2)-(3)	(5)	(6)=(1)+(4)+(5)	(7)=(1)+(4)+(5)	(8)=(5)/(1)*100
1930-1940	2,616,556	538,925	294,780	244,145	55,140	2,915,841	299,285	2.1
1940-1950	2,915,841	723,300	284,385	438,915	-63,038	3,291,718	375,877	-2.2
1950-1960	3,291,718	833,025	308,890	524,135	-248,764	3,567,089	275,371	-7.6
1960-1970	3,567,089	726,315	365,640	360,675	-4,077	3,923,687	356,598	-0.1
1970-1980	3,923,687	660,766	390,847	269,919	397,514	4,591,120	667,433	10.1
1980-1990	4,591,120	684,140	434,156	249,984	36,081	4,877,185	286,065	0.8
1990-1997	4,877,185	515,329	347,183	168,146	333,102	5,378,433	501,248	6.8

Note: Natural increment number is calculated by subtracting total deaths from total births.
Net migration number is calculated by subtracting the natural increment number from the next decade's base population, or final population in the decade.
Migration portion is the percentage of net migration number toward base population.

Source: U.S. Census Bureau, Tennessee Department of Health, Office of Health Statistics and Information

pattern. For example, the baby boom—births between 1946 to 1964—was a major trend in both the nation as a whole and Tennessee. Therefore, the population growth pattern in Tennessee during the 20th century was mainly affected by net migration losses or gains, which has resulted in a different pattern from that of the nation.

As mentioned earlier, the 1950s were very crucial in terms of urban sprawl. The baby boom during this period shows that suburban homeownership was encouraged by veterans in Tennessee, as reflective of the nation. The state of Tennessee's economy is optimistic in that Tennessee closed the 20th century showing a huge increase in the population growth rate as compared to the national level. Chapter 4 will examine population growth patterns of the period 1970-2000 in detail, illustrating urban sprawl patterns in Tennessee. In addition, land use trends and transportation trends supporting urban sprawl aspects in Tennessee are identified.

CHAPTER 4
SHORT-TERM GROWTH PATTERNS IN TENNESSEE BETWEEN 1970 AND 2000

Growth Patterns in Tennessee between 1970 and 2000

This chapter examines growth patterns in Tennessee during the period 1970-2000 in closer detail, incorporating regional and county levels of analysis. As mentioned in Chapter 3, Tennessee's growth pattern during this period has been somewhat different from the previous periods, because it showed strong net migration gains (more people moving into Tennessee from other states). During 1970-1980, a total of 397,514 people moved into Tennessee from other states or countries (Table 5); then, net migration into the state dramatically decreased to 36,081 people in the 1980s and soared again up to 333,102 people from 1990-1997.

Although average decade-growth-rates were lower than those of the nation before 1970, Tennessee's growth rates have shown a high, though irregular, increase since 1970. From Figure 5, when considering that birth and death rates have been stable since 1970, such irregular population growth patterns during the period 1970-2000 can be said to have been affected by net migration (Figure 5). If one supposes that people tend to follow employment opportunities, then the economic outlook for Tennessee is optimistic. The state closed the last decade of the 20th century with a 16.7% population growth rate, in particular showing a 23.8% growth rate in Middle Tennessee.

Rapid growth, however, has created an unexpected consequence—namely, urban sprawl. As identified in an earlier chapter, reflecting national trends, urban sprawl trends in Tennessee began with high homeownership, which resulted from the baby

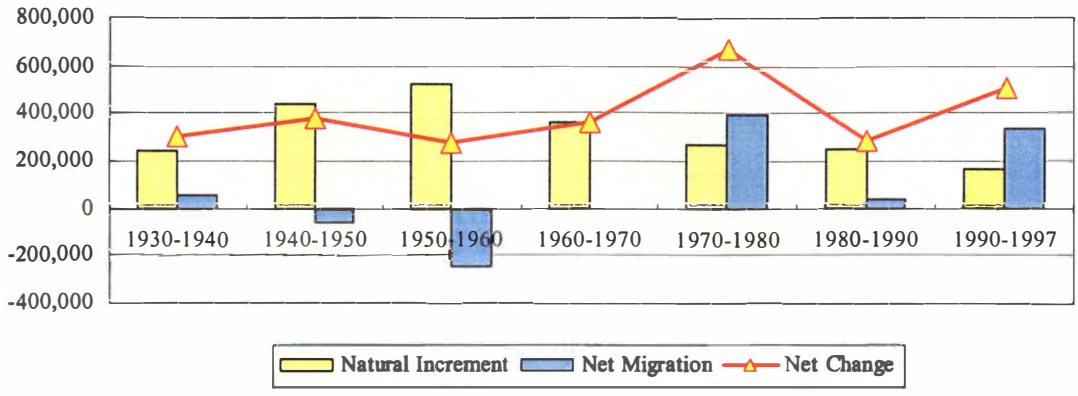


Figure 5. Population Growth by Natural Increase and Net Migration (1930-1997)

Source: U.S. Census Bureau, Tennessee Department of Health, Office of Health Statistics and Information

boom and tended to spur suburban development during 1950-1970. After this time, high population growth in Tennessee's major metropolitan areas followed, aggravating urban sprawl problems. Uncontrolled high population growth has problematic consequences related to urban sprawl. In this chapter, decade growth patterns during 1970-2000 are analyzed based on the geographic divisions of Tennessee—Grand Division: East Tennessee, Middle Tennessee, and West Tennessee (Figure 6)—and county level. Then, urban sprawl data in Tennessee are quantified using different data sources.

Population Growth in the 1970s

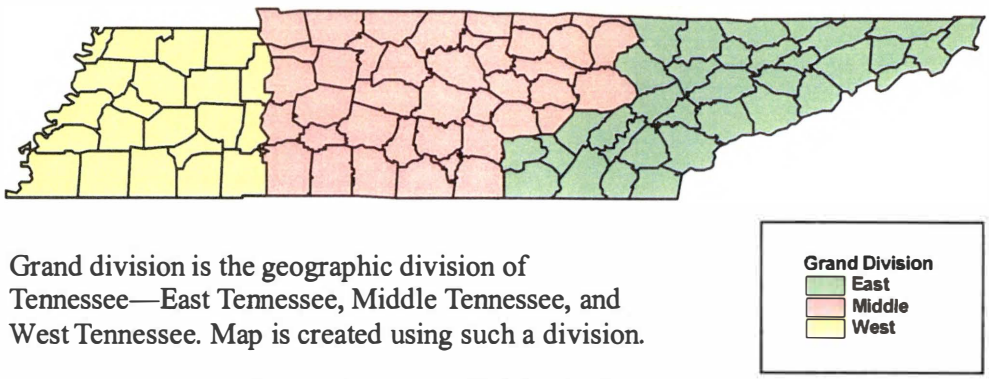
In the period 1970-1980, Tennessee's population growth rate soared to 17.0%, higher than the nation's growth rate of 11.5%. Its absolute population increase totaled 667,433 people, which was the highest growth in Tennessee in the century. As mentioned before, the total increase in the 1970s resulted from net migration gains (more people moving into Tennessee from other states). In particular, in terms of the geographic division of Tennessee, East and Middle Tennessee contributed the majority of the state's increase of population growth (Table 6).

Table 6. Population, Share of State Population, Net Change, and Percent Change in Grand Division (1970-2000)

East TN					
Year	Population	Share of State	Decade	Net Change	Percent Change
	Persons	%		Persons	%
1970	1,479,367	37.7			
1980	1,761,935	38.4	1970-1980	282,568	19.1
1990	1,819,627	37.3	1980-1990	57,692	3.3
2000	2,087,035	36.7	1990-2000	267,408	14.7
Middle TN					
Year	Population	Share of State	Decade	Net Change	Percent Change
	Persons	%		Persons	%
1970	1,245,579	31.8			
1980	1,512,363	33.0	1970-1980	267,368	21.4
1990	1,693,785	34.8	1980-1990	181,612	12.0
2000	2,097,501	37.0	1990-2000	404,113	23.8
West TN					
Year	Population	Share of State	Decade	Net Change	Percent Change
	Persons	%		Persons	%
1970	1,198,741	30.5			
1980	1,316,822	28.6	1970-1980	117,497	9.8
1990	1,363,773	27.9	1980-1990	46,761	3.6
2000	1,504,747	26.4	1990-2000	140,577	10.3
Tennessee					
Year	Population		Decade	Net Change	Percent Change
	Persons			Persons	%
1970	3,923,687				
1980	4,591,120		1970-1980	667,433	17.0
1990	4,877,185		1980-1990	286,065	6.2
2000	5,689,283		1990-2000	812,098	16.7

Note: Grand division is the geographic division of Tennessee—East Tennessee, Middle Tennessee, and West Tennessee (Figure 6). East Tennessee is comprised of 34 counties, Middle Tennessee of 40 counties, and West Tennessee of 21 counties. The figures are calculated using U.S. Census Bureau data based on county-level data.

Source: U.S. Census Bureau



Note: Grand division is the geographic division of Tennessee—East Tennessee, Middle Tennessee, and West Tennessee. Map is created using such a division.

Figure 6. Grand Division in Tennessee

In the 1970s, East Tennessee's 19.1% growth rate and Middle Tennessee's 21.4% growth rate played major roles in increasing Tennessee's overall growth rate. There were five counties in East Tennessee and nine counties in Middle Tennessee that showed over 30% of the decade-population growth rate. In particular, four counties out of nine counties in Middle Tennessee showed more than 50% of the growth rate. As seen in Figure 7-(A), counties surrounding Davidson County and Knox County showed huge increases, indicating a population expansion in Nashville and Knox County metropolitan areas. Cheatham (63.8%) and Williamson (69.3%) Counties' growth rates even surpassed 60%, nearly reaching 70%. Sumner (52.9%) and Wilson (51.5) Counties also showed very high population growth in the 1970s (Table 7). On the other hand, although the city of Nashville increased just 1.7 % in population, its population density has already reached 900.1 persons per square miles, while the Nashville metropolitan area's population density is 171.7 persons per square mile.

Population Growth in the 1980s

In the 1980s, Tennessee's population growth rate showed a sharp decrease, dropping from 17.0% to 6.2% (the lowest growth rate for the entire century). The nation

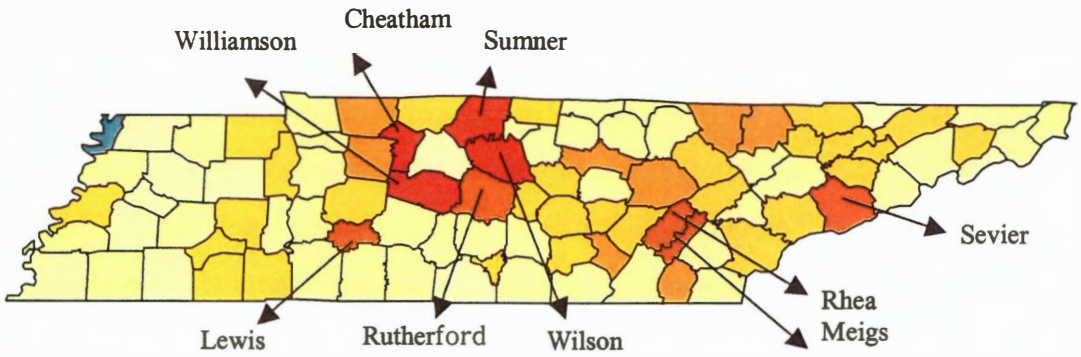
Table 7. Top 10 Counties based on Percent Change in the 1970s

Ranking	County Name	Pop. 1970	Pop. 1980	Net Change	Percent Change	Grand Division
		Persons	Persons	Persons	%	
1	Williamson	34,330	58,108	23,778	69.3	Middle
2	Cheatham	13,199	21,616	8,417	63.8	Middle
3	Sumner	56,106	85,790	29,684	52.9	Middle
4	Wilson	36,999	56,064	19,065	51.5	Middle
5	Sevier	28,241	41,418	13,177	46.7	East
6	Lewis	6,761	9,700	2,939	43.5	Middle
7	Meigs	5,219	7,431	2,212	42.4	East
8	Rutherford	59,428	84,058	24,630	41.4	Middle
9	Rhea	17,202	24,235	7,033	40.9	East
10	Cumberland	20,733	28,676	7,943	38.3	Middle

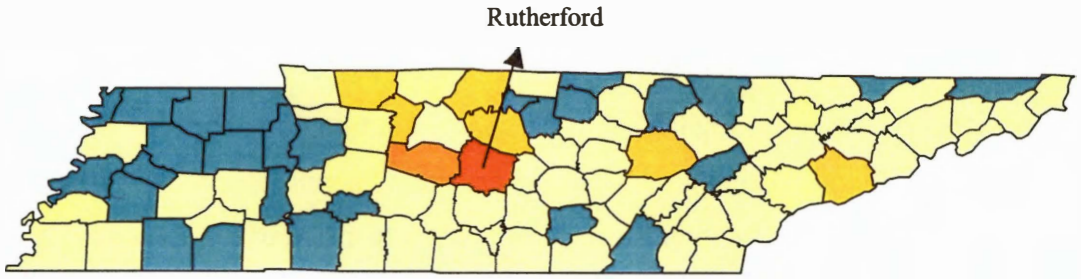
Source: U.S. Census Bureau

also showed a very low percent change (9.8%). During the period 1980-1990, many counties in Tennessee showed little population growth, with negative growth rates in 27 of the 95 counties. However, given the fact that natural increment in Tennessee was similar to that in the 1970s and that there was net migration totaling 36,081 (Table 5), there is indication of internal migration based on county-to-county moves within Tennessee. It seems that there was population migration from the counties that showed a negative growth rate into the counties surrounding Davidson County.

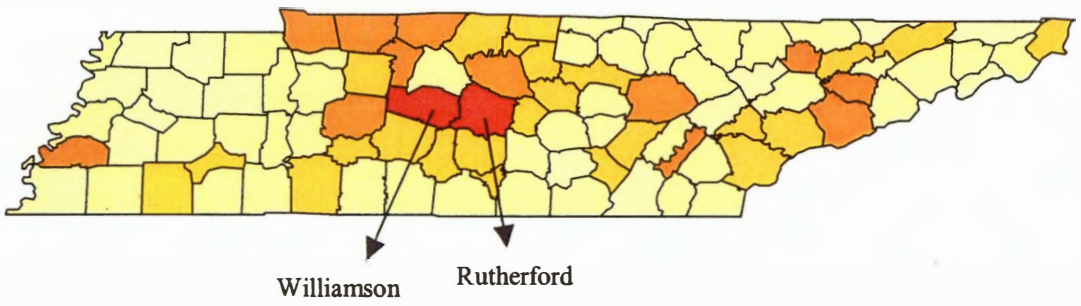
At any rate, the main cause contributing to Tennessee's drastically reduced growth rate in the 1980s was the decrease of net migration compared to the 1970s. Even though most of the counties in Tennessee showed a very low population growth, counties within the Nashville metropolitan area showed continuing, increasing population growth in the same period. In particular, Rutherford County showed continuing growth of 41.4% in the 1970s, 41.1% in the 1980s, and 53.5% in the 1990s. The population migration correlated to employment opportunities. For example, Nissan North America Inc., now providing about 6,000 jobs, located a major manufacturing plant in nearby Smyrna in Rutherford County in 1982. Such unprecedented employment opportunities caused by locating industries in cities near Nashville attracted people into the Nashville metropolitan area, as well as into the city of Nashville.



(A) Growth Patterns in the 1970s



(B) Growth Patterns in the 1980s



(C) Growth Patterns in the 1990s

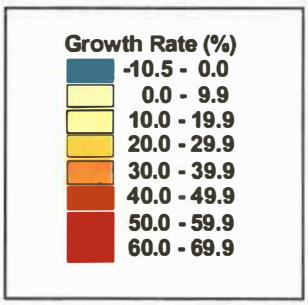


Figure 7. Growth Patterns in Tennessee

Population Growth in the 1990s

Beginning in 1990, Tennessee again showed a sharp increase, rising from 6.2% in the 1980s to 16.7% in the 1990s. The growth rate was faster than the national level of 13.2%. Based on data analyzed at the Grand Division level, Middle TN played a role in supporting the increase of population growth rate. Continued population growth in Middle Tennessee reached a rate of 23.8% in the 1990s, compared to 14.7% in East Tennessee and 10.3% in West Tennessee. As a result of the population growth in Middle Tennessee, its population share has been gradually increasing since 1970 (Table 6 and Figure 8).

As illustrated in Figure 7-(C), the counties surrounding Davidson County have shown rapid population growth. The expansion of population in the Nashville metropolitan area shows an interesting pattern. The expansion of the area appears as double-rings, illustrating that the great expansion of the area from Davidson County, in particular to the south, is progressing. Rutherford, showing 53.5% in population growth between 1990 and 2000, has a strong economy, which provided 95,330 jobs in 2000 with an unemployment rate of 2.9% in the same year (Tennessee Department of Economic and Community Development). Williamson County, showing a 56.3% population growth rate in the 1990s, also provided 68,080 jobs in 2000 with an unemployment rate of 1.8 % in the same year. The unemployment rates are very low compared to the 4.0% rate of the nation and 3.9% rate of the state.

The Nashville metropolitan area is a perfect example of sprawl. The city of Nashville's population density was 900.1 persons per square mile in 1970 and 1204.1 persons per square mile in 2000—a 33.8% increase in population density for 3 decades. On the other hand, the Nashville metropolitan area's population density was 171.7 persons per square mile in 1970 and 302.3 persons per square mile in 2000—a 76.1% increase. Therefore, Nashville, central city of the Nashville metropolitan area, increased just half in population density compared to the metropolitan area. In addition, the

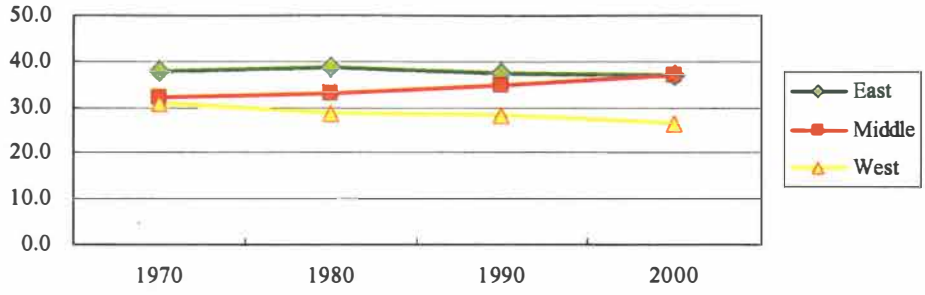


Figure 8. Patterns of Population Share of Grand Division (1970-2000)

Source: U.S. Census Bureau

Table 8. High Density and Low Growth Counties (1990-2000)

County	Population		Percent Change	Land Area	Population Density	
	1990	2000	1990-2000		1990	2000
	Persons	Persons	%	Square miles	Persons/square miles	Persons/square miles
Davidson	510,784	569,891	11.6	502.3	1,016.9	1,134.6
Hamilton	285,536	307,896	7.8	542.5	526.3	567.6
Knox	335,749	382,032	13.8	508.5	660.3	751.3
Shelby	826,330	897,472	8.6	754.9	1,094.6	1,188.9

Source: U.S. Census Bureau

counties surrounding Knox County also show increasing population growth patterns. For example, the area includes Jefferson (34.2%), Sevier (39.4%), and Union (30.0%) counties. On the other hand, compared to population density, the counties where the population growth is low are as follows: Davidson, Hamilton, Knox, and Shelby Counties (Table 8). The population is concentrated in these counties, and they are core counties in the metropolitan areas of Tennessee. In 1990 and 2000 population density was over 500 persons/square mile, and population growth was under 15.0%. The pattern indicates that urban sprawl is progressing in these metropolitan areas.

Urban Sprawl Data in Tennessee

Population Trends

In the earlier part of Chapter 4, population growth patterns in Tennessee during 1970-2000 were analyzed as a factor underlying urban sprawl. As already assessed, Tennessee's population has shown rapid growth patterns since the 1970s, particularly in metropolitan areas. During 1990-2000, the population growth rate of Tennessee (16.7%) was higher than the national level (13.2%). New research, commissioned by the Sierra Club and conducted by Professor Rolf Pendall of Cornell University, confirmed that "the importance of population growth as a driver of sprawl varies across the United States: In the West and South it is significant, often a major factor; in the East and Mid-West it is a minor and sometimes inconsequential factor." The report also mentioned that "rapid population growth even exacerbates the sprawl problems (Pendall 2001)." As the research identified, Figure 9 shows high population growth in the West and South in the 1990s, with Tennessee's growth rate of 16.7% ranking 14th out of 50 states in the United States. This high growth rate suggests that Tennessee is one of the states where population growth itself is causing urban sprawl.

Rapid population growth in Tennessee overall as well as the swift expansion of Nashville Metropolitan Statistical Area were regarded as corresponding issues related to urban sprawl. According to USA TODAY (Feb. 22nd, 2001), Nashville ranked first of the 271 metropolitan areas in the United States in terms of sprawl (Nasser and Overberg 2001). While just two density measurements—current population density and changes in population density during the 1990s—were used (a somewhat weak ranking methodology), the study indicated the potential severity of Nashville's urban sprawl issue (SELC 2001). In addition, Nashville ranked as having the highest average time of daily driving per person in the country by the Federal Highway Administration (SELC, 2001).

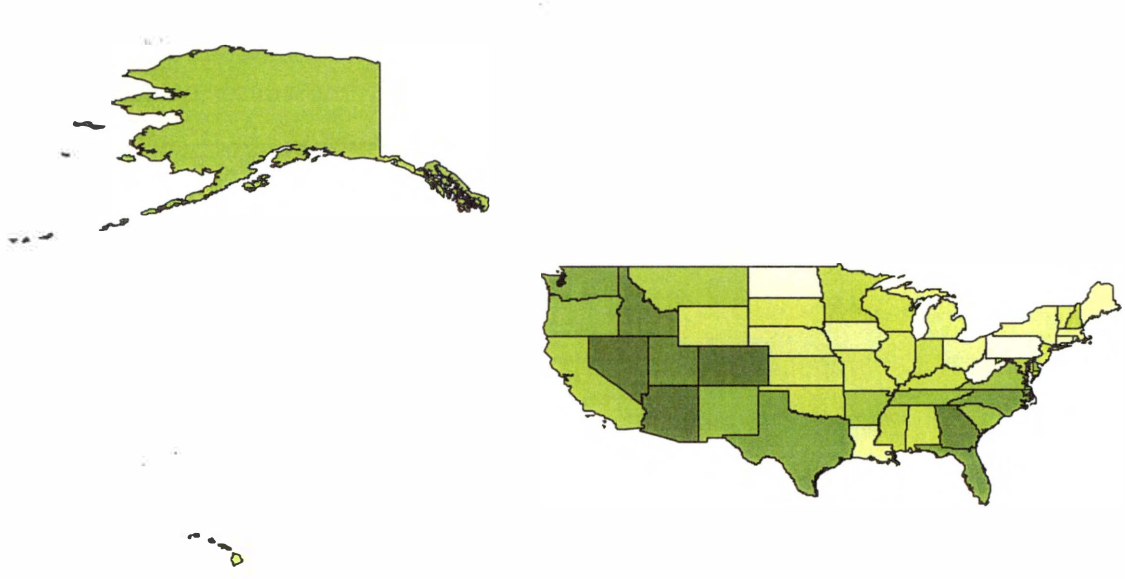


Figure 9. Growth Patterns in the United States (1990-2000)

Note: Map is created using U.S. Census Bureau, ranking tables for states. Based on growth rates in the 1990s, the higher the growth rate, the darker the color. Tennessee's ranking is 14th out of 50 states in the United States.
Source: U.S. Census Bureau, Population Division

Middle Tennessee, in particular, is experiencing tremendous growth in population (23.8 % in the 1990s). Nashville Metropolitan Area increased 25.0 % in population in the 1990s, and the two fastest growing counties in Tennessee, Williamson and Rutherford, are located in Middle Tennessee. Each increased over 50% in that period. There are also 15 municipalities that increased over 100.0%—meaning that the population doubled—and Lakeland city's growth rate was 469.9%. In some ways, population growth means a strong regional economy. Employment opportunities attract people, and such employment as in the service industry tends to follow the population (SELC 2001).

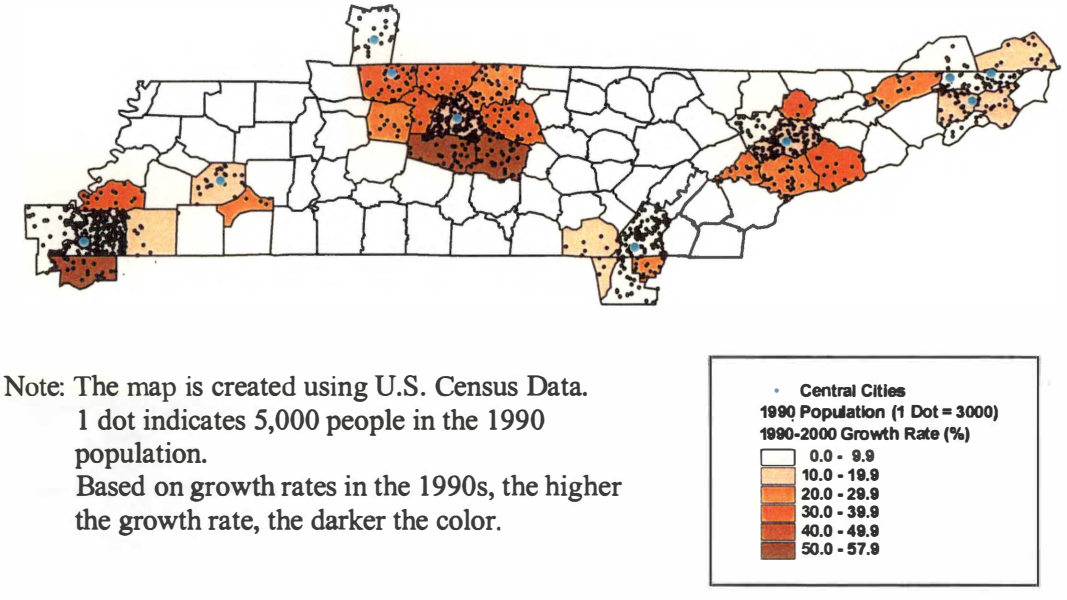
However, central cities in core counties in major metropolitan areas in Tennessee show somewhat low population growth rates. Serious discrepancies in population growth rates between metropolitan area and their central cities exist, meaning that central cities are experiencing deterioration while suburban development is progressing. Table 9 shows a comparison of population growth rates between major metropolitan areas and central cities in Tennessee. For example, Knoxville Metropolitan Area's population growth rate is 17.3%, whereas the City of Knoxville's rate is just 5.3%. That means people tend to escape from inner cities to suburban areas. The trend is similar in major metropolitan areas of Tennessee. For example, Nashville's growth rate was just 11.6%, which is less than half of the growth rate of 25.0% which Nashville Metropolitan Area experienced (Table 9).

Figure 10 shows that population growth in metropolitan areas in Tennessee between 1990 and 2000 resulted in the expansion of these areas. Based on the 1990 figures, population is concentrated in core counties; however, population increases during 1990-2000 are shown in counties surrounding the core counties. Therefore, the map describes that population density is already high in inner cities in major metropolitan areas in Tennessee, and neighboring counties show a very high population growth in recent decade.

Table 9. Population Growth Rate in Tennessee Major MSAs (1990-2000)

Metropolitan Statistical Area	Central City	Population Growth Rate, 1990-2000 %
Nashville, TN MSA		**25.0**
	Nashville-Davidson	11.6
Knoxville, TN MSA		**17.3**
	Knoxville city	5.3
Memphis, TN--AR--MS MSA		**12.7**
	Memphis city	6.5
Chattanooga, TN--GA MSA		**9.6**
	Chattanooga city	2.0

Source: U.S. Census Bureau



Note: The map is created using U.S. Census Data.
1 dot indicates 5,000 people in the 1990 population.
Based on growth rates in the 1990s, the higher the growth rate, the darker the color.

Figure 10. Growth Patterns in Metropolitan Areas in Tennessee (1990-2000)

Land Use Trends

Rapid population growth, the directionless spread of development, and dependence on motor vehicles exacerbate urban sprawl problems, resulting in the loss of farmland and open space. According to Successful Farming (1997), Tennessee is one of the states with the highest losses of farmland due to urban development. Other states ranking high in this area include Illinois, Ohio, Indiana, North Carolina, Georgia, Louisiana, Florida and California. It is estimated that 31% of land uses in Tennessee were converted to developed land between 1992 and 1997 (USDA Natural Resources Inventory). At the same time, the U.S. Department of Agriculture has estimated that 401,000 acres of open space in Tennessee were developed during the same period for projects such as new homes, businesses, roads, and parking lots, whereas cultivated cropland lost 380,600 acres during this time. Nationally, Tennessee ranked 7th in terms of land lost to development, and compared to other states in the East South Central Division, Tennessee had the highest rate of change in developed land (Table 10).

Table 10. Cultivated Cropland and Developed Land (1992-1997)

State	1997 Cultivated cropland	1992-1997 Change in cultivated cropland	1997 Developed land	1992-1997 Change in developed land
	1,000 acres	1,000 acres	1,000 acres	1,000 acres
Tennessee	3,261.7	-380.6	2,370.6	401.9
Alabama	2,614.1	-189.8	2,252.3	315.3
Kentucky	3,514.0	-109.6	1,737.5	237.1
Mississippi	4,931.5	-550.2	1,474.0	206.4

Source: USDA Natural Resources Inventory, 1997 National Resources Inventory

Table 11 shows the amount of developed and rural areas in Tennessee between 1982 and 1997. Its percent changes in developed area increased 13.9 % between 1982 and 1987, 14.8 % between 1987 and 1992, and 20.4 % between 1992 and 1997. When considering that population growth rate during 1992-1997 was just 7.3 %, the 20.4 % change in developed area during the same period was almost three times the population growth rate. These figures show that land consumption has surpassed population growth in Tennessee, whereas rural area has decreased.

A study conducted by Leon Kolankiewicz and Roy Beck and issued by Sprawl City, entitled "100 Largest U.S. Cities," says that "the statistic on per capita land consumption is a useful way to understand the combined power of numerous land use and consumption choices that lead to urban sprawl (Kolankiewicz and Beck 2000)." For example, per capita land consumption in Memphis is 0.264, that means "it takes just about one-quarter of an acre to provide the average Memphis resident with space for housing, work, retail, transportation education, religious and other private assembly, government, recreation and other urban needs." The per capita land consumption reflects various aspects ranging from governmental subsidies that encourage land consumption, urban planning and zoning, to number of people per household. The report indicates that "the increase in per capita land consumption (Per Capita Sprawl) is a major cause of overall sprawl of an urban area (Kolankiewicz and Beck 2000)."

Table 11. Developed Area and Rural Area in Tennessee (1982-1997)

				In Developed Area	
	Developed Area	**Rural Area**	**Decade**	**Net Change**	**Percent Change**
	1,000 acres	1,000 acres		1,000 acres	%
1982	1,504.7	23,498.0			
1987	1,714.6	23,264.9	1982-1987	209.9	13.9
1992	1,968.7	23,004.1	1987-1992	254.1	14.8
1997	2,370.6	22,596.6	1992-1997	401.9	20.4

Source: USDA Natural Resources Inventory, 1997 National Resources Inventory

Table 12 shows per capita land use in major urbanized areas in Tennessee between 1970 and 1990. Based on square miles of sprawl, the four largest metropolitan areas in Tennessee are among the worst offenders and they are clustered together from ranking 34th (Memphis) to 40th (Knoxville) out of 100 urbanized areas in the United States. Population and land areas in these areas have reflected annexation, therefore, per capita land consumption has increased as well. Per capita land consumption in urbanized areas in Tennessee is very high compared to per capita land consumption in other top cities for sprawl in the United States: 0.337 in Atlanta, GA, 0.259 in Houston,TX, and 0.118 in New York City, NY-NJ (Kolankiewicz and Beck 2000). For example, per capita consumption of Chattanooga is 0.553, Nashville 0.539, and Knoxville 0.459. Even though urban sprawl index is difficult to measure exactly, simple per capital consumption is a way both of measuring urban sprawl and knowing whether smart growth policy is failing or not. "If per capita consumption figure goes up markedly, it means that the effort is failing, and if the figure grows only slightly, or remains the same, and especially if it goes down, it means that the city is moving in the direction desired by the anti-sprawl leaders (Kolankiewicz and Beck 2000)."

Table 12. Per Capita Land Use in Urbanized Areas in Tennessee (1970-1990)

National Rank	Urbanized Area	Population		Per Capita Land Use		Total Land Area	
		1970	1990	1970	1990	1970	1990
(out of 100)		Persons	Persons	Acres/person	Acres/person	Square miles	Square miles
34	Memphis, TN	663,976	825,123	0.188	0.264	195.5	341.0
37	Chattanooga, TN-GA	223,580	296,955	0.334	0.553	116.7	256.8
38	Nashville, TN	448,444	573,294	0.490	0.539	343.5	483.5
40	Knoxville	190,502	304,466	0.289	0.459	86.1	218.8

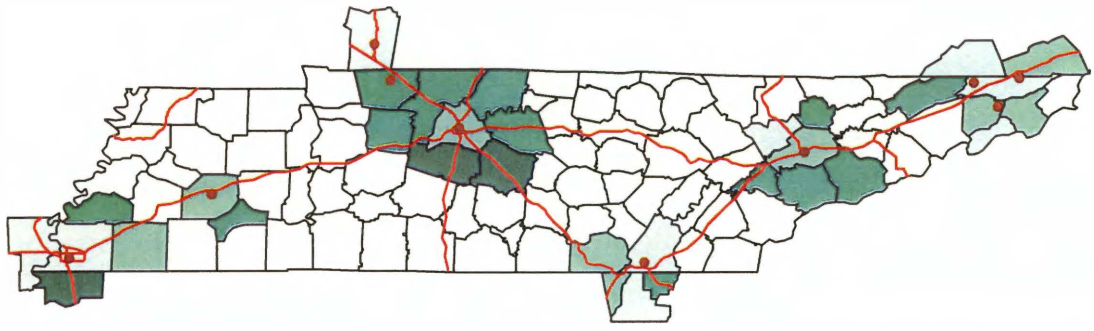
Note: National Rank is based on where city ranks in square miles of sprawl.
Source: U.S. Census Bureau, Sprawl City Report entitled "100 Largest U.S. Cities" Appendix B.

Transportation Trends

As mentioned in earlier chapters, the emergence, spread, and ownership of automobiles and government policies to support the use of them by constructing new roads are major causes of urban sprawl. Therefore, transportation, land use patterns, and urban sprawl are intertwined. Automobile ownership enables suburban life, creating the need for more highway and road construction, and causing longer commute times, more traffic congestion, and more pollutants being emitted. Increase in driving is a trend leading toward more scattered land development, namely urban sprawl. Figure 11 and 12 show interstate and highway systems in Tennessee. There is a close relationship between the location of transportation systems and the location of central cities in core counties within metropolitan areas. Intertwining interstates attract people and industries.

Thus, Davidson County, Hamilton County, Knox County, and Shelby County, core counties in Tennessee's major metropolitan areas, have already shown high population density. Then, as interstates spurred development in outlying areas, sprawl expanded and generated longer commuter travel time, resulting in a higher population growth rate in those counties.

In the case of Nashville, the centrality of the city and the infrastructure of the interstate system—interstates 65, 24, and 40—turned Nashville into a convenient and good location for industries to locate. In addition, these interstates enabled development to spread to surrounding counties and to make great economic gains in these areas. State Route 840 was proposed by Governor Lamar Alexander and approved by the Tennessee General Assembly in 1986 as part of the Better Roads Program (Figure 13 and 14). It has been under construction since 1988 to provide economic development opportunities in areas around Middle Tennessee (TDOT). Tennessee Department of Transportation stated that "a by-product of the four-lane controlled access highway is reducing traffic on the urban Nashville interstate highway system." However, the use of more road construction to reduce traffic congestion is not an appropriate solution. Rather it attracts more cars into the roads.



Note: The map is created using U.S. Census Bureau data and spatial data that ArcView 3.2 provides.
Based on growth rates in the 1990s, the higher the growth rate, the darker the color.

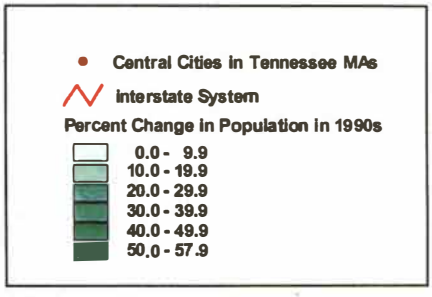
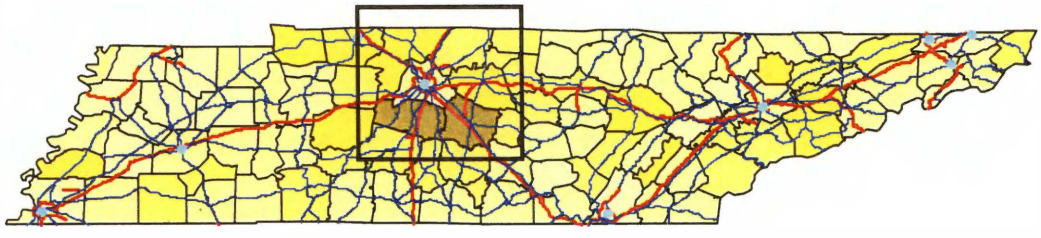


Figure 11. Relationship between Interstate System and Urban Sprawl



Note: The map is created using U.S. Census Bureau data and spatial data that ArcView 3.2 and TDOT provide.
Based on growth rates in the 1990s, the higher the growth rate, the darker the color.

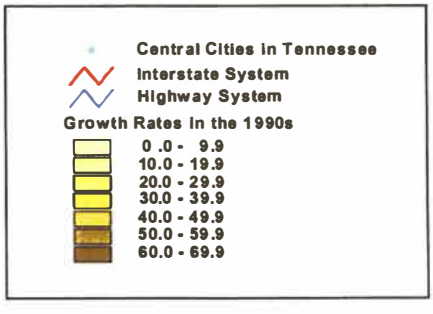


Figure 12. Interstate and Highway Systems in Tennessee

Source: U.S. Census Bureau, Tennessee Department of Transportation (TDOT)

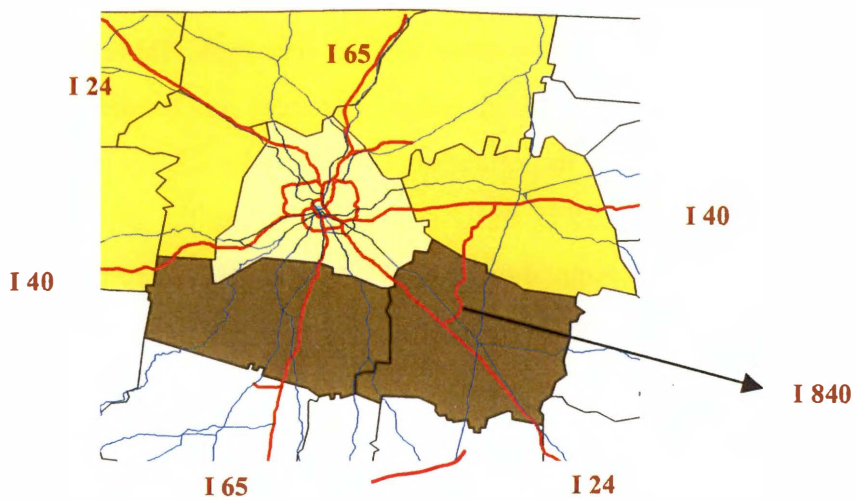
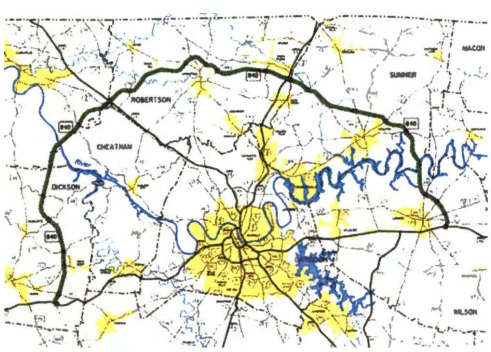


Figure 13. Transportation System in Nashville Metropolitan Area

Source: Tennessee Department of Transportation (TDOT)



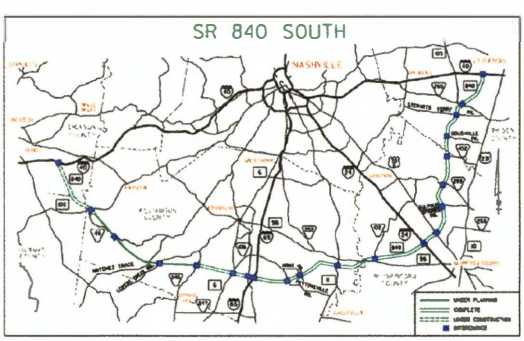


Figure 14. State Rout 840 Plan Map

Source: Tennessee Department of Transportation (TDOT)
http://www.tdot.state.tn.us/information-office/HotProjects/SR840/840Sfacts.htm

Compared to population growth rate, the increase in daily vehicle-miles of travel in major central cities in Tennessee is very high. Table 13 and Figure 15 show daily vehicle-miles of travel in urbanized areas in Tennessee during 1995-2000. Nashville increased 7.6% in population but showed a 13.9% increase in daily vehicle-miles of travel between 1995 and 2000. In Knoxville, the gap is enormous. Knoxville increased just 1.6 % in population, but 17.0 % in daily vehicle-miles of travel. In case of Memphis, it increased 4.9% in population, but 11.4% in daily vehicle-miles of travel.

National data indicate that most of the increase in vehicle miles of travel (VMT) is related not to trips to work but to trips related to shopping, visiting friends, social and recreational activities, and so on. For example, average annual VMT per household of 'to or from work' increased from 4,183 in 1969 to 6,492 in 1995, whereas that of 'shopping' increased from 929 in 1969 to 2,807 in 1995 (Hu and Young 1999). It can be assumed that in the past, within living in compact cities, people made those trips by walking, but these trips can no longer be made by walking. This trend is one impact of sprawl, and it can be said that the same pattern has existed in Tennessee.

Conclusion (1970-2000)

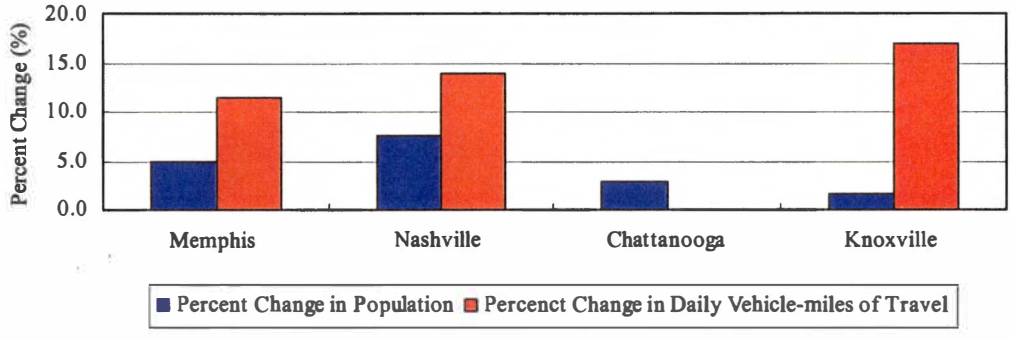
Urban sprawl in Tennessee has been shown in many ways, namely population growth patterns, land use patterns, and transportation patterns. Unrestricted population growth in Tennessee, in particular in Nashville and Knoxville metropolitan areas, has been the primary cause of rapid urban sprawl. The increased net migration into Tennessee from other states, as well as the movement of people within Tennessee to metropolitan areas, show that Tennessee, especially Middle Tennessee, is experiencing the effects of growth and changing population, providing people with many employment opportunities to draw them. Therefore, high population growth is related to a strong regional economy. On the other hand, this creates more development needs to provide services for the people moving into the areas, spurring more development in

Table 13. Daily Vehicle-Miles of Travel in Urbanized Areas in Tennessee (1995-2000)

Urbanized Area	Daily Vehicle-Miles of Travel		Net Change	Percent Change
	1995	2000	1995-2000	
	1,000 miles	1,000 miles	1,000 miles	%
Memphis (TN, AR, MS)	20,397	22,724	2,327	11.4
Nashville (TN)	19,967	22,752	2,785	13.9
Chattanooga (TN, GA)	9,778	N.A.	N.A.	N.A.
Knoxville (TN)	9,892	11,574	1,682	17.0

Note: A "Federal-aid Urbanized Area" is an area with 50,000 or more persons that at a minimum encompasses the land area delineated as the urbanized area by the Bureau of the Census. Areas are in sort by population.

Source: Office of Highway Policy Information, Federal Highway Administration, Highway Statistics 1995, 2000



Note: Percent change in daily vehicle-miles of travel of Chattanooga is unavailable.

Figure 15. Percent Change in Population and Daily Vehicle-miles of Travel in Urbanized Areas in Tennessee (1995-2000)

Source: Office of Highway Policy Information, Federal Highway Administration, Highway Statistics 1995, 2000

nearby areas. Needless to say, as related maps show, most of the counties surrounding core counties in metropolitan areas in Tennessee have shown high growth rates since 1970. In addition, highway and road construction for supporting the expanded development increases the dependence on automobiles. Longer commuter travel time and many more non-work related trips also reflect traffic congestion, causing increasing losses of farmland and open space.

In particular, many data show somewhat low population growth rates in central cities compared to high growth rates in major metropolitan areas in Tennessee. Uneven population growth between the two underlines that central cities are losing their attractiveness as residential areas even though they already show high population density. Instead, development is expanding to suburban areas as residential areas and new development sites. Urban sprawl problems are intertwined, so its various factors exacerbate its problems. Urban sprawl costs need a considerable amount of control in Tennessee. Since Public Chapter 1101 was enacted in 1998, Tennessee has attempted to control unrestricted development in many ways. In Chapter 5, Public Chapter 1101 is analyzed and evaluated, and then some recommendations are provided.

CHAPTER 5
THE EFFECTIVENESS OF PUBLIC CHAPTER 1101

Tennessee's Growth Policy Act, Public Chapter 1101, represented a new vision and solution for growth policy in Tennessee, and it significantly updated Tennessee's comprehensive planning statutes (APA 2002). Following passage of the 1998 Growth Policy Law, Tennessee has spent several years focusing on implementation of the new law (APA 2002). Based on what has been analyzed in the previous two chapters, this chapter examines whether the overall strategy embedded in Public Chapter 1101 adequately addresses growth patterns in the state. Specifically, this chapter attempts to answer a series of key question including:

- Does the intensity of growth in Tennessee warrant state intervention in the area of growth policy?
- Is it adequate to mandate that all counties—except those with a metropolitan form of government—develop 20-year growth plans?
- Is it adequate to have the county and its associated municipalities as the planning unit?
- Are there any additional factors that should be taken into consideration?

Appropriate State Intervention

Since the enactment of Hawaii's legislation in 1961, a total of 13 states have enacted state-wide growth management policies. Growth rates corresponding to the decade preceding the enactment of the legislation are compared for these 13 states, as well as the relative ranking in terms of growth rates relative to other states in the nation.

In the case of Tennessee, population grew by 16.7% percent during 1990-2000, the decade prior to the enactment of Public Chapter 1101. The intensity of growth experienced in Tennessee during the 1990s is average compared to the states with growth management legislation. Specifically, Tennessee ranks 6th based on percent change during the decade prior to enactment relative to the other states (Table 14). Florida, the highest ranking state, had a 37.2% population growth rate during 1960-1970, the decade prior to the 1972 enactment of its growth management legislation. New Jersey is at the other end of the spectrum, as it experienced 5% growth during the 1980s, before enacting its 1992 legislation. This comparison indicates that Tennessee's timing in enacting state-level growth policy legislation was well within the range of other states. Although not a forerunner, Tennessee took action earlier than other states.

Table 14. Ranking Based on Percent Change during the Decade prior to Enactment (among states that have state-wide Growth Management Policies)

Ranking	State	Year of Legislation	Decade Prior to Enactment	Percent Change	Ranking
(out of 13)		Year	Decade	%	(out of 50)
1	Florida	1972	1960-1970	37.2	3
2	Hawaii	1961	1950-1960	26.6	10
3	Georgia	1989	1980-1990	18.6	8
4	Oregon	1972	1960-1970	18.3	14
5	Washington	1990	1980-1990	17.8	10
6	Tennessee	1998	1990-2000	16.7	14
7	Vermont	1971	1960-1970	16.4	19
8	Minnesota	1997	1990-2000	12.4	21
9	Maryland	1997	1990-2000	10.8	23
10	Wisconsin	1999	1990-2000	9.6	29
11	Maine	1988	1980-1990	9.1	20
12	Rhode Island	1988	1980-1990	5.9	25
13	New Jersey	1992	1980-1990	5.0	27

Note: Table is created using U.S. Census Bureau data from 1960 to 2000. Ranking in the first column is among 13 states that have growth management policies, based on percent change during the decade prior to the year of enactment.

Source: U.S. Census Bureau

Data in Table 15 are slightly different, as they shows the ranking of the 13 states that have growth management policies based on their national ranking in terms of growth during the decade prior to enactment of their corresponding legislations. Again, Tennessee is well within the range, ranking 14th in population growth rates during the decade prior to the enactment of PC1101. Florida is once more the highest ranking state, ranked 3rd in the nation and Georgia, the second ranking state, ranked 8th (Table 15). Oregon, which has been evaluated as showing the successful effect of growth management policy, showed an 18.3% population growth rate (its ranking was 14th of 50 states) during 1960-1970, and enacted its growth policy law in 1972.

Table 15. Ranking Based on National Ranking of Percent Change during the Decade prior to Enactment (among states that have state-wide Growth Management Policies)

Ranking	State	Year of Legislation	Decade Prior to Enactment	Percent Change	Ranking
		Year	Decade	%	(out of 50)
1	**Florida**	1972	1960-1970	37.2	**3**
2	**Georgia**	1989	1980-1990	18.6	**8**
3	**Hawaii**	1961	1950-1960	26.6	**10**
	Washington	1990	1980-1990	17.8	**10**
5	**Oregon**	1972	1960-1970	18.3	**14**
	Tennessee	1998	1990-2000	16.7	**14**
7	**Vermont**	1971	1960-1970	16.4	**19**
8	**Maine**	1988	1980-1990	9.1	**20**
9	**Minnesota**	1997	1990-2000	12.4	**21**
10	**Maryland**	1997	1990-2000	10.8	**23**
11	**Rhode Island**	1988	1980-1990	5.9	**25**
12	**New Jersey**	1992	1980-1990	5.0	**27**
13	**Wisconsin**	1999	1990-2000	9.6	**29**

Note: Table is created using U.S. Census Bureau data from 1960 to 2000. Ranking in the first column is among 13 states that have growth management policies, based on percent change during the decade prior to the year of enactment.

Source: U.S. Census Bureau

Serious discrepancies exist in population growth rates between metropolitan area and their central cities. Central cities in core counties in major metropolitan areas in Tennessee show somewhat low population growth rates, while showing high growth rates in metropolitan areas. For example, Knoxville Metropolitan Area's population growth rate is 17.3%, whereas Knoxville's rate is just 5.3% between 1990 and 2000. Nashville's growth rate was just 11.6%, which is less than half of the 25.0% growth rate which Nashville Metropolitan Area experienced during the same period. In Tennessee, it has also been estimated that 31% of land uses were converted to developed land between 1992 and 1997 (USDA Natural Resources Inventory). In addition, per capita land consumption in urbanized areas in Tennessee is very high: per capita consumption of Chattanooga is 0.553, Nashville 0.539, and Knoxville 0.459. The figures are high compared to per capita land consumption in the top sprawling cities in the United States: 0.337 in Atlanta, GA, 0.259 in Houston, TX, and 0.118 in New York City, NY-NJ (Kolankiewicz and Beck 2000). As for transportation, interstate and highway systems enabling development expanded, and Tennessee continues to undergo more road construction. Therefore, the increase in daily vehicle-miles of travel is higher than the growth rate in population. For example, Nashville increased 7.6% in population but also showed a 13.9% increase in daily vehicle-miles of travel. In Knoxville, the gap is enormous. Knoxville increased just 1.6 % in population, but 17.0 % in daily vehicle-miles of travel.

Tennessee did not have the growth pressure that Hawaii did, but it experienced significant growth during the previous decade. Thus, this comparison indicates that Public Chapter 1101, Tennessee's Growth Policy Act, was enacted in time to control development patterns in order to curb unrestricted growth.

The Appropriateness of the Same Requirements for All Counties

Under Public Chapter 1101, 92 non-metropolitan counties and their associated municipalities have been required to develop 20-year plans for urban growth. Can this requirement be applied to all counties without flexibility?

Basically, the plans must specify three types of areas: an urban growth boundary (UGB), a planned growth area (PGA), and a rural area (RA). It is important to have all counties and their municipalities develop a growth plan regardless of the growth rate. Population growth trend is just one of many factors accounting for urban sprawl. Urban sprawl should be controlled in several ways, including land use, economic development, transportation, and many other state policies. However, as analyzed in earlier chapters, all counties in Tennessee have not shown the same growth trends. Therefore, it is not reasonable to apply the same strategy to the counties that are experiencing different stages in growth. "Planning for Rural Areas in Tennessee Under PC 1101," a white paper issued by the TACIR, identified that "An urban growth boundary can help to direct development toward urban areas and away from rural areas. Simply designating an urban growth boundary is no guarantee (for rural areas) (TACIR 2001)." Public Chapter 1101 already tries flexibility, which is a way of addressing different local conditions. However, there is the risk that the growth plans are too generic and do not address the important issues.

For example, in the counties that show rapid population growth trends as developing areas, to specify urban growth boundaries and planned growth areas would be very helpful "in ensuring compact, efficient development and preserving farmland, forests, wildlife habitat, and other natural assets of rural areas (TACIR 2001)." However, in the counties that show low population growth and low population density trends, as in rural areas, "the question is how much, where, and what kind" of development should be in the areas, a question not answered by simply designating an urban growth boundary (TACIR 2001). Most of all, it is not reasonable that the requirements of the

Growth Policy Law should be applied to all the counties consistently; more flexibility is needed in this context.

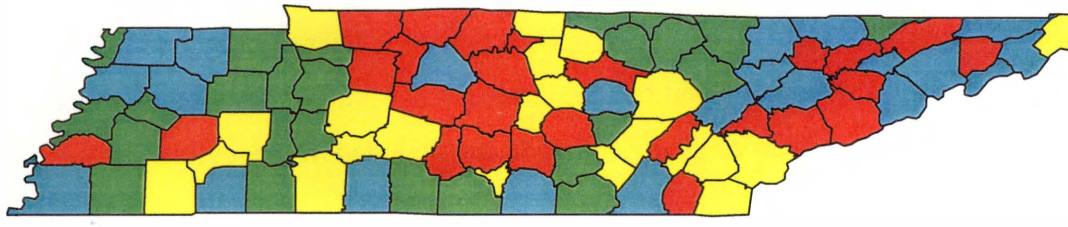
Table 16 shows a classification scheme and possible direction of counties based on their population growth and density trends. Simply using the median value of a 15.6% population growth rate during 1990-2000 and the 51.8 persons per square mile population density of 1990, all counties are classified into four areas: 1) mostly rural counties with negative or low population growth rate, 2) mostly rural counties with growth pressures, 3) consolidated areas, and 4) critical counties with crisis. A low population growth rate and low population density indicate rural areas, which are colored green in Figure 16. The growth policy in these areas should focus on preserving agricultural lands, forests, recreational areas, and wildlife management areas based on a long-term plan. A white paper issued by the TACIR indicates the inadequacy of the current growth plan, and suggests "a number of techniques and strategies—in the areas of regulations, public infrastructure, public costs and revenue, and public and private investments in open land—that the state could use to strengthen the rural areas component (APA 2002)."

High population growth rate and low population density indicate mostly rural counties with growth pressures, which are colored yellow (Figure 16). As seen in the map, such counties as Hickman, Maury, Smith, De Kalb, and Cannon, which are second rings of Davidson County, and counties such as Sequatchie, Bledsoe, and Meigs, which surround Hamilton County, are included in these areas. These counties are still low in population density, but high in population growth rate, meaning that these areas are on the verge of development. Therefore, these areas are the most appropriate counties in which to apply the current growth policy law and lead orderly development. Long-term, middle-term, and short-term plans can be used for more effectiveness.

Low population growth rate and high population density indicate consolidated areas, which include core counties within major metropolitan areas in Tennessee. The

Table 16. A Classification Scheme of Counties and Possible Direction

Growth Rate / Density		Population Growth Rate	
		Low	**High**
Density	**Low**	Mostly rural counties with negative or low population growth rate	Mostly rural counties and their municipalities with strong growth pressures
		20-year long-term plans are relevant	20-year long-term and 10-year mid-term plans are relevant
		Preserving agricultural lands, forests, recreational areas, and wildlife management areas	Efficient UGB, PGAs, and RAs: priorities on RAs with statutory tools and technical assistance
	High	Consolidated urban areas	Critical counties with crisis
		Emphasis on short-term, mid-term, and long-term plans	5-year short-term feasibility plans are relevant
		Redevelopment, revitalization, upgrade of infrastructure, and infill	Plan of services, redevelopment, upgrade of infrastructure, and infill



Notice: 1990-2000 population growth rate and 1990 population density are used for the classification. Median population growth rate is 15.6%, and median population density is 51.8 persons per square mile.

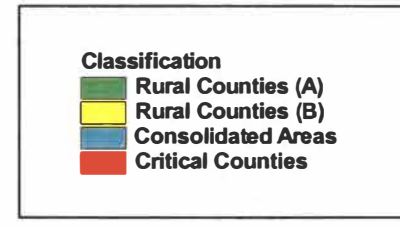


Figure 16. Classification based on Population Growth Rate and Density

main counties showing these trends, then, are, Davidson, Hamilton, Knox, Shelby, and Sullivan Counties. In particular, redevelopment and revitalization of these areas is critical based on municipalities within the counties. The Tennessee Strategically Targeted Areas of Redevelopment (TN S.T.A.R.) was created by executive order in January 2000, in order to help urban area revitalization and redevelopment (APA 2000). In addition, Tennessee's General Assembly "passed legislation to expedite brownfield cleanups and reuse, and Memphis was the first municipality to identify a brownfield site under the Brownfield Redevelopment Amendment (APA 2000)." Nashville, an inner city within Davidson County, introduced downtown revitalization in the early 1990s, and a large-scale job market has been created.

Principally, the areas of critical concern are those counties that show high population growth rate and population density, meaning that rapid measurements are needed in these areas based on the feasible 5-year short-term growth plan. As seen in Figure 16, Davidson County's surrounding counties (Robertson, Cheatham, Williamson, Rutherford, Wilson, and Sumner Counties), as well as most of the counties surrounding Knox County (including Union, Grainger, Jefferson, Sevier, Blount, and Loudon Counties) are included. Additionally, Jackson and Montgomery Counties, core counties of metropolitan areas in Tennessee, are included in the regions.

Regional Approach in Growth Policy

Public Chapter 1101 does not include any provisions for a regional approach such as coordination with neighboring counties, regional plans, or counties in the same metropolitan area. Instead, it only denotes the county and its associated municipalities as the planning units. When considering the growth trends of Tennessee, however, a regional approach is needed in the growth policy. Simply, examining Tennessee's growth patterns using the four categories described Table 16 and Figure 16, the regional

dimension of growth becomes evident; for example, the ring-like aspect surrounding Davidson County, corridors surrounding Knox County, the gathering of rural counties, and so on.

In particular, Nashville exemplifies the relevant dynamics. As mentioned in earlier chapters, one of the most explicit features in growth patterns of Tennessee is that Middle Tennessee has been showing huge economic gains, high population growth rates, new road construction, and related aspects of sprawl. The huge growth in Middle Tennessee has resulted from uneven development in Tennessee since 1970. The interstate system and new road construction have enabled the spread of development within the Nashville Metropolitan Area, spurring urban sprawl, creating many problems, and causing double-ring aspects to appear. Double-rings aspects create a possibility that one of the surrounding counties might play a role as a core county in expanding development to nearby counties (Figure 17). For example, Rutherford County has potential aspects as the county experiences economic gains and population growth, and with construction of Interstate 840, spread of development to neighboring areas is expected.

A regional approach in Tennessee's Growth Policy Act is therefore critical. Recommendations include:

1. Grand Division—East Tennessee, Middle Tennessee, and West Tennessee—can be used for the broad approach.
2. Metropolitan areas can be the planning unit to control sprawl in Tennessee.
3. Define clusters of counties based on growth patterns, location, or other relevant factors.
4. Identify mechanisms for coordination within these clusters, either through mandates or incentives.
5. At the very least, municipalities extending over two counties should be represented in both Coordinating Committees.

Other Factors

There are additional factors that should be taken into consideration. Urban sprawl is not a result of just one factor, rather it results from intertwined aspects such as economic development, population growth, traffic congestion, land use policies, and so on. As shown in the demographic analysis, changes in employment have drastic impacts on population (for example, new plants in Nashville). Change in employment base (either a new employer or a lost of jobs) will trigger substantial changes in population. Thus, the growth plans should be revised.

Another important aspect is road construction. Although generally intended to solve traffic congestion, it instead draws more people to the roads, therefore impacting growth patterns and exacerbating the problem. The projected I-840 provides a good illustration of the impact between new road construction and urban sprawl. The interstate is under construction surrounding Nashville Metropolitan Area to solve heavy traffic flow in the area, but it is expected to draw more traffic and enable the areas to be developed. As identified in the previous chapter, Middle Tennessee, in which Nashville

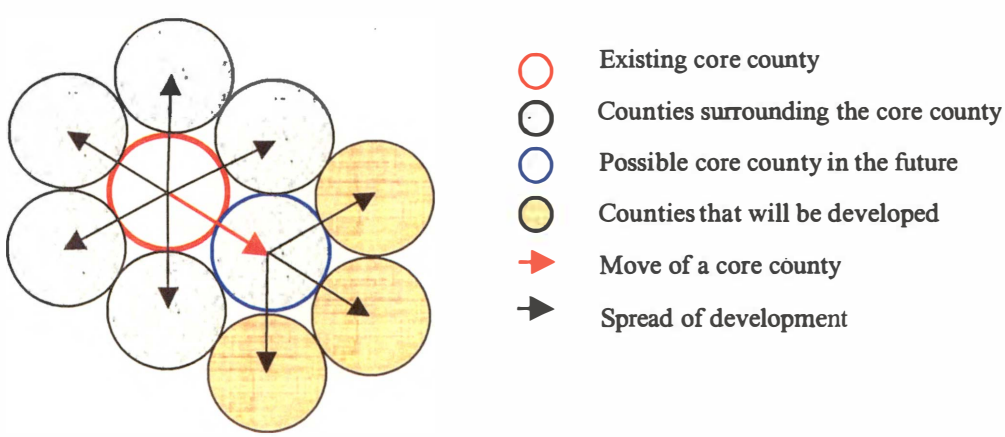


Figure 17. Possible Trends by Uncontrolled Development

Metropolitan Area is located, has shown great employment opportunities and an influx of population, resulting from uneven economic development when compared to East and West Tennessee. This indicates that Tennessee should be more careful in terms of economic development.

Therefore, Tennessee Growth Management Policy should consider many factors for the effectiveness of the legislation. Recommendations include:

1. State-level policies such as economic development, subsidies, urban planning, transportation, and other policies should be considered with cooperation among the responsible organizations.
2. TDOT is probably the entity that has more impact on sprawl than any other public or private organizations in the state. Therefore, the decision to locate and construct new roads should be done in conjunction with the decision of affected counties, which should revise their growth plans accordingly.

Conclusion

Public Chapter 1101 is a good first step to guide "smart growth" and to curb urban sprawl through legislation. The intensity of growth in Tennessee during the 1990s warrants state intervention. The legislation can be said to have been enacted in time. However, Public Chapter 1101 should be significantly improved by fine-tuning different types of requirements, incentives, or technical assistance that address the different needs of the various counties. First, because of outstanding population growth in Middle Tennessee, a regional approach such as Grand Division or metropolitan areas is recommended. By incorporating mechanisms for regional coordination, even development in overall Tennessee can be led. The classification scheme developed in the previous part shows evident needs of different approaches in the requirements of all

the counties. Clusters of counties with the same aspects should be defined, and mechanisms for coordination within these clusters should be identified. Finally, the plans should be revised when factors such as economic development, new road construction, urban planning, and subsidies are identified. Consideration of these many aspects will improve the effectiveness of Tennessee Public Chapter 1101.

CHAPTER 6
CONCLUSIONS

American cities have been substantially transformed during the 20th century. Economic activities pursued in rural areas before the 1920s moved into urban areas due to industrialization and the centralization of people and industries into central cities in the period from 1920-1970. During the same period, as street cable car and railroad lines made suburban areas more accessible, suburbanization began in American cities. However, suburbanization did not boom before World War II, and sprawl as a problematic pattern of land development has only appeared since the war. In the 1950s, the spread of automobiles and key federal government policies, such as the Federal Aid Highway Act, Federal Housing Administration (FHA) and Veterans Administration (VA) mortgage guarantees, fueled suburban development. The resulting urban sprawl caused many serious economic, environmental, and social costs. Urban sprawl required fiscal investment for infrastructure; and environmental costs such as water and air degradation, traffic congestion, and heath problems have become major public issues since the 1970s. In addition, social divide evidenced by racial and social tension has resulted from this trend.

Growth is not absolutely negative, and therefore many states have enacted growth management policies, called "smart growth." In 1961, Hawaii became the first state to enact a Growth Policy Act, and since that year, thirteen states have enacted state level growth management policies. Tennessee enacted its Growth Policy Act, Public Chapter 1101 on May 14th, 1998.

Tennessee has shown many urban sprawl trends. The baby boom in the 1950s shows that suburban homeownership was encouraged in Tennessee, thus creating the urban sprawl characteristic of suburbanization. Since 1970, population growth in Tennessee, as a result of enticing residents from elsewhere as opposed to fertility rates,

has been somewhat high when compared to the national level. Population increases have been concentrated in counties surrounding core counties of metropolitan areas in Tennessee. There have been serious discrepancies in population growth rates between metropolitan area and their central cities; central cities in core counties in major metropolitan areas in Tennessee show somewhat low population growth rates, while showing high growth rates in metropolitan areas. Middle Tennessee played a major role in increasing Tennessee's population growth. High population growth in Middle Tennessee is related to a strong regional economy during the previous decades. On the other hand, Nashville Metropolitan Area shows a huge spread of population and economic development to surrounding counties, a trend requiring the expansion of development—or urban sprawl—to provide services for the people in nearby areas.

Land consumption is very substantial in urbanized areas in Tennessee. Per capita land consumption in major central cities such as Nashville, Memphis, Knoxville, and Chattanooga is very high. From seeing that the increase in per capita land consumption is a major cause of overall sprawl in urban areas, the land consumption pattern in Tennessee's urban areas is an enormous indicator of the presence of sprawl. In addition, transportation, land use patterns, population growth and urban sprawl are intertwined. Increase in driving is a trend leading toward more scattered land development. Sprawl expands and generates more commuter travel time, resulting in traffic congestion and environmental degradation rapidly becoming areas of public concern. In the case of Nashville, the centrality of the city and the infrastructure of the interstate system enabled the city to be the base of various industries, and drew a huge population into the area. Construction of Interstate 840 surrounding the City of Nashville in Nashville Metropolitan Area, intended to reduce traffic congestion, will instead attract more cars into the roads and exacerbate urban sprawl problems.

Tennessee is a state with an abundance of natural assets, but in many places they are jeopardized by urban sprawl problems. Tennessee needs to gain the benefits of economic growth, while avoiding the costs of urban sprawl. These efforts include the

enactment of the Tennessee's Growth Policy Act, Public Chapter 1101, in a timely manner. Under Public Chapter 1101, 92 non-metropolitan counties and their associated municipalities have been required to develop 20-year plans for urban growth. The plans must establish three types of areas including urban growth areas—an urban growth boundary (UGB)—, planned growth areas (PGA), and rural areas (RA) Since enactment of the legislation, Tennessee has been one of the leading states in fostering orderly development and curbing unrestricted urban sprawl. At this time, Tennessee needs more careful regulation to promote increased effectiveness of the legislation.

In particular, from the context that all the counties do not show the same growth patterns, more flexibility based on the county-level is needed in the requirements. Public Chapter 1101 already tries flexibility, which is a way of addressing different local conditions. However, there is the risk that the growth plans do not address the important issues such as different situations and growth patterns in the counties. In addition, Public Chapter 1101 does not include any provisions for a regional approach such as Grand Division. One of the most explicit features of growth patterns in Tennessee is that because of uneven economic development in Tennessee since 1970, Middle Tennessee has been showing huge economic gains, high population growth rates, new road construction, and related aspects of sprawl.

Urban sprawl is not an issue that has resulted from just one aspect, instead it has been caused by various intertwining factors such as economic development, land use policy, transportation system, geographic conditions, and many other aspects. Tennessee's Growth Policy Act, Public Chapter 1101, has constituted a good first step toward a state-level growth policy. However, at this time, it needs to improve the flexible requirements based on the county level analysis, a regional approach, and a cooperative policy decision-making in order to address and control problematic challenges for a better future for Tennessee.

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