The Piedmont Atlantic Megalopolis [PAM]

Year 2005

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ABSTRACT

In 1961, French geographer Jean Gottmann suggested that the Northeast Corridor of the United States from Boston to Washington D.C. represented a new form of urban geography known as a megalopolis. Between now and the year 2050, more than half of the nation’s population growth, and perhaps as much as two-thirds of its economic growth, will occur in this and seven other identified emerging megalopolitan regions, or “SuperCity Regions.” SuperCity Regions are extended networks of metropolitan centers linked by interstate highway and rail corridors. There are SuperCity Regions in each of the major geographic areas of the United States (University of Pennsylvania, 2004). The SuperCity Regions are the current centers of population and economic growth in the nation, and will remain so well into the future. As they grow, will they remain competitive in the changing global marketplace? Will they be quality places to live? Can continued growth and development occur in a sustainable manner? If these areas continue to form without planning, will this create a nation whose global competitiveness is threatened by social and environmental problems? Consideration of the many challenges that face these areas engages the research and policy attention of a number of stakeholders, from chambers of commerce to environmental activists.

In the Spring of 2005, a team of researchers in the City and Regional Planning Program at the Georgia Institute of Technology focused on these questions of future growth in the area identified as the Southeast SuperCity (University of Pennsylvania, 2004). This document reports our findings. Our analysis of the Southeast SuperCity and the conclusions we report represent a fraction of what must be learned about the spatial patterns of this region. The challenges we identify span a wide scope of interrelated problems that will occupy planners and politicians from now into the indefinite future.
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CHAPTER 1:

Introduction

The Southeast SuperCity Research Project

In 1961, French geographer Jean Gottmann suggested that the Northeast Corridor of the United States from Boston to Washington D.C. represented a new form of urban geography known as a megalopolis. Between now and the year 2050, more than half of the nation’s population growth, and perhaps as much as two-thirds of its economic growth, will occur in this and seven other identified emerging megalopolitan regions, or “SuperCity Regions.” SuperCity Regions are extended networks of metropolitan centers linked by interstate highway and rail corridors. There are SuperCity Regions in each of the major geographic areas of the United States (University of Pennsylvania, 2004).

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In the Spring of 2005, a team of researchers in the City and Regional Planning Program at the Georgia Institute of Technology focused on these questions of future growth in the area identified as the Southeast SuperCity (University of Pennsylvania, 2004). This document reports our findings. Our analysis of the Southeast SuperCity and the conclusions we report represent a fraction of what must be learned about the spatial patterns of this region. The challenges we identify span a wide scope of interrelated problems that will occupy planners and politicians from now into the indefinite future.

The results of our research are presented in the following manner. Chapter 1 outlines the goals and objectives of the project. Chapter 2 explains the methodology used to define the Southeast SuperCity region, including preliminary boundaries. We then review the current characteristics of the region as well as troublesome trends and the major issues for the future. In Chapter 5 possible solutions to these major issues are proposed, and the need for a spatial perspective is reinforced. The document concludes with the areas in need of future research.
In 1807 and 1907 Presidents Jefferson and T. Roosevelt created national development and conservation plans that directed the United States’ growth in the first two centuries. President F.D. Roosevelt’s Public Works Administration and Tennessee Valley Authority and President Eisenhower with the National Defense Highway Act also played a role in shaping a national development strategy (Carbonell & Yaro, 2005). Now at the onset of the bicentennial of Thomas Jefferson’s first plan, researchers from around the nation are again envisioning a national planning effort. This report is the Georgia Institute of Technology’s contribution to this endeavor.

Why SuperCity Regions?

Population growth. Increasing urbanization. Traffic congestion. Growing inequalities. A struggling educational system. Water wars. Declining air quality. Ecosystem degradation. A transitioning economy. Increasing global competition. International innovations in collaboration. These topics appear in academic journals and books, but also appear on the front pages of newspapers and covers of popular magazines. They are the subject of conferences and classroom discussions, but they are also the daily work of politicians and practitioners.

These issues have several things in common:

- **They are spatial.** When Mercedes-Benz opened an auto plant in Vance, Alabama (outside of Birmingham) in 1997 it was not just an economic development issue. It also meant locating housing for 1,900 workers and their families, upgrading local infrastructure and municipal services, evaluating the impact of the truck routes for the delivery of parts and supplies, and monitoring the implications of a continuing trend that has shifted jobs from the urban core to suburban locations.

- **They are not confined by political boundaries.** Water supply is certainly not a local issue, as exemplified in the water wars between Alabama, Georgia, and Florida. Water scarcity pits industry against agriculture, residential development against ecosystem preservation, and state against state. Watersheds do not follow state lines, and what happens upstream affects everyone downstream.

- **They affect future generations.** Just 20 years ago a high school graduate in North Carolina could make a living wage in furniture manufacturing. Today, as more products are made abroad, a growing number of low-skilled workers face minimum-wage jobs in the service sector. The growing disparities between these workers and others in more affluent areas reflect many inequities of past educational and infrastructure investments.
• They are related to each other. The Atlanta Metropolitan Area understands the interrelatedness of these challenges. In 1998, the federal government began withholding transportation funds until the region identified a plan to conform to the Clean Air Act. As air quality problems put a halt to road expansion, the economic prospects of the region became uncertain.

A new planning perspective is necessary to address these problems. Current economic development planning tends to ignore the spatial distribution of impacts from its investments and programs. Local comprehensive planning is spatial in focus and concept, but is also driven by parochial interests, ignoring the cumulative effects of many individual decisions on the surrounding region. Transportation planning connects with regions, but fails to address adequately the land use and environmental impacts of infrastructure decisions. Other single-function planning efforts such as watershed or energy development planning are also incapable of connecting with the issues that affect the entire region. Most importantly, current planning — whether it is guided by an issue or by proximity — lacks a common vision. Although researchers, planners, politicians, and decision-makers each appreciate the interconnectedness of issues by content and by space, they have no guiding vision of what the future should hold, and no plan to get there.

The major issues that face SuperCity regions transcend current political boundaries and governance mechanisms. These issues relate to economic strength, environmental preservation, and quality of life. In economics, globalization is erasing traditional boundaries between economies, a process referred to as “debordering.” At the same time, there is an increasing tendency for industries to cluster to gain competitive advantage in a global system that places a premium on knowledge and innovation (Scott, Agnew, Soja & Storper, 2001). As these changes develop, “it has become increasingly apparent the city in the narrow sense is less an appropriate or viable unit of local social organization than city-regions or regional networks of cities” (Scott, Agnew, Soja & Storper, 2001, p. 11). Urban areas of the Southeast SuperCity region already benefit from these “tightly linked and spatially concentrated clusters,” but future economic development must enhance the growth and connections of these in order to ensure continued success.

It has long been recognized that environmental issues transcend current political boundaries and governance mechanisms. Ecological integrity, energy, pollution, solid and hazardous waste, water supply, water quality, air quality, habitat preservation, and natural resource use do not follow politically drawn boundaries. The impact of these problems has yet to be seriously considered in spatial planning, however. An adequate supply of developable land, water, and cheap energy will drive future development patterns in ways that are difficult to understand, much less predict. What is important,
and currently missing, is to incorporate these constraints into planning today in order to protect the ability of the Southeast SuperCity region to continue to grow and develop.

Quality of life issues have traditionally been addressed at the local scale, but in the SuperCity region these issues transcend current political boundaries and governance mechanisms. Community design, educational systems, parks, and cultural amenities are often planned without connection to the regional context. As a result, inequities emerge over the region as spatial segregation divides have and have-nots, wealthy school districts from poor, job-rich areas from job-poor. There are fiscal inequities as local governments struggle to gain tax revenue and the underserved populations of these places stress the region as a whole (Orfield, 2002). Sprawling development patterns are a result of these economic and development forces, as well as a cause. There has been a “loss of some simple and basic urban-design principles” and livability has suffered (Calthorpe & Fulton, 2001, p.8). The Southeast SuperCity must ensure a continued high quality of life if it hopes to retain and attract future residents. It must address current disparities and inequities in education and economic opportunity in order to enhance the success of the entire region.

Cross-disciplinary, regional, and sustainable strategies are necessary to make the most of future opportunities and overcome challenges. This realization has shaped the purpose and goals of this study and has led us to seek a new planning paradigm.

**Analytical Framework**

The lack of a planning paradigm to address regional issues shaped the techniques we used for analysis. The research team utilized a spatial perspective at a regional scale to complete the southeast SuperCity region case study. As such, the team combined existing data to form a regional data set, and we represented this data visually. As many characteristics as possible were mapped to identify linkages and patterns. This form of spatial analysis served a central function to the research and it was done at the regional level.

Most importantly, the research team chose the concept of sustainability as our normative guide in the analysis. There are multiple definitions of sustainability and sustainable development, each with a common concern about meeting the “needs of the present without compromising the ability of future generations to meet their own needs” (Krizek and Power,
1996, Appendix A; Bruntland Commission, 1987). The concept of sustainability demands that social goals relating to achieving equity, preserving the environment, and sustaining economic growth be recognized as interconnected and interdependent (Figure 1). Focusing on any one of these areas alone may compromise the other two. Simultaneously meeting goals in all three areas — economy, equity and the environment — can be conceptualized as the points of a triangle, with sustainable development as the center (Campbell, 1996).

The idea of sustainable development is continuing to evolve; its application requires that decision makers, planners, developers, special interests and politicians perceive of their communities as part of a larger system, with the success of any single component dependent upon the success of the system. This perspective reveals the procedural aspects of sustainability, a “new way of thinking” which is: 1) future oriented and long term, 2) reflective of natural constraints, 3) based on natural and geographic boundaries, 4) not artificial and political, and 5) holistic, interconnected and participatory (Krizek & Power, 1996, p. 18). These principles were used to guide the research team as it evaluated the Southeast SuperCity region.

The research team divided into six functional areas—Environment, Demography, Transportation and Infrastructure, Economics, Education and Equity, and Governance—to gather data and conduct our analyses. Members of the research team sought to maintain a balanced discussion between the functional areas as data were collected and reviewed, the boundaries drawn, and issues identified. The framework of sustainability demands that each functional area be considered.

The Southeast SuperCity was identified in the report entitled Toward an American Spatial Development Perspective (University of Pennsylvania, 2004). This report designated eight SuperCities, and among them was the Southeast SuperCity region, which includes the Atlanta, Birmingham, Raleigh-Durham, and Charlotte metropolitan areas, as shown in Figure 2. This area as served as the starting point, from which the team characterized existing conditions, trends and patterns, and projected a future scenario, assuming the trends and patterns we identified would continue. The team explored the functional relationships of urban, suburban, and rural areas in the Southeast; studied innovative strategies undertaken on other continents; and debated what it all means for today and for our future. The next three chapters present the outcomes of this work.
FIGURE 2 : Emerging SuperCities
CHAPTER 2:
Defining the Southeast SuperCity Region

Introduction and History

The southeast region of the United States has its own unique heritage, historical perspective, customs, musical styles, and cuisine (Wilson, Ferris, 1989). The region is home to timeless films such as “Gone with the Wind” and award-winning authors such as William Faulkner, and is considered the birthplace of blues music. The southeast has built upon this rich history to become a dynamic and ethnically diverse region that is now home to Fortune 500 companies, the busiest airport in the world, critically acclaimed art and museums, national banks, and media powerhouses. The region has a charm that can only be understood by examining its rich history and historic development patterns.

English colonial activity in the southeast originally centered around port cities, including Savannah, GA, founded in 1733, and Charleston, SC, founded in 1670. Similarly, the French settled Mobile, AL, in 1711. Intercity transportation was dominated by ships, so additional settlements formed upriver, often along the fall line, the geographic limit of water-borne navigation where the coastal plain meets the piedmont plateau. These cities include Columbus, Macon, and Augusta, GA; Columbia, SC; and Raleigh, NC.

What is now the populous core of the region developed in the age of rail travel. Charlotte, NC, began to boom with a gold rush in 1799, but most cities developed later. Atlanta, GA, named for the Western & Atlantic Railroad, which terminated in the city, incorporated in 1847. Birmingham, AL, at the junction of two rail lines, incorporated in 1871. Greensboro, NC, incorporated as a city in 1870, and Greenville, SC, incorporated in 1907 (Microsoft Encarta Encyclopedia Standard, 2004). Today, Amtrak’s Crescent, one of a handful of intercity passenger routes still running in the southeast, passes through all these cities, a living reminder of the passenger rail links that spurred their growth (Amtrak, nd).

After World War II, the comprehensive national highway network became a competitive rival to rail, especially since highways were constructed paralleling rail links. During the Eisenhower administration the Federal-Aid Highway Act of 1956 was passed. It began the construction of a nationwide interstate system (Federal Highway Administration, nd). This system dramatically impacted mobility, economic growth, and transportation effectiveness in the southeast. It reinforced already existing transportation links and promoted even faster growth and economic development in the cities within the cities along
the piedmont plateau. Ultimately automotive transportation became the primary mode for almost all of the passenger traffic and much of the freight movement.

Once a rural and isolated region, the southeast has made dramatic physical and social changes in only a few short decades. The southeast is now building on the strengths of its history and character toward major changes that will affect its environment, transportation and infrastructure, economy, and demographics for years to come. The region’s reputation has been enhanced by places like North Carolina’s Research Triangle, with its focus on computer science and biotechnology research; Charlotte’s cluster of financial services; Atlanta’s many corporate headquarters; Birmingham’s medical center; and increasing activity in the port cities of Charleston, SC, Savannah, GA, Jacksonville, FL, and Mobile, AL. These developments have catapulted the southeast into the global marketplace and marked the area as an emerging SuperCity Region.

As this history illustrates, the southeast region’s patterns of development have largely been shaped by the natural environment and transportation investments. As the region prepares for its future, it has a unique opportunity to consider a more thoughtful approach to addressing the many challenges and opportunities that come with a growing population. Our work this semester has focused on exploring the possibility of using a spatial perspective in planning for a sustainable future. Since any effort at spatial planning requires a delineation of the region based on an understanding of the existing and future relationships of its parts, this chapter explains our methodology for delineation of our region.

**Methodology and Approach**

Spatial planning refers to “methods used largely by the public sector to influence the future distribution of activities in space . . . undertaken to . . . balance demands for development with the need to protect the environment, and to achieve social and economic objectives” (Faludi, 2002). This practice is exemplified in the European Spatial Development Perspective (ESDP) (see discussion below). Of particular interest as we began to explore the southeast region was the concept of organizing the European Union into regions represented by a “Bunch of Grapes.” This analogy recognizes the polycentric development trends in Europe, which are also evident in the Southeast. Furthermore, the ESDP embraces economic performance as just one of many equally important dimensions that can affect the ways in which a region can grow and interact (Waterhout, 2002).

These concepts created a framework to analyze the region beyond its current characterization, prompting us to explore indicators that provide guidance on how we might define our region to support economic, equity, and environmental priorities to achieve sustainable growth.
With these concepts of spatial planning and sustainability in mind, our first task was to define the initial study area. We began by identifying the overarching factors that explain relationships among distinct places. These include:

- Settlement patterns
- Environment
- Transportation
- Economics
- Culture

These parameters led to our initial focus on a six-state subset of the southern region of the United States, including North Carolina, South Carolina, Georgia, Tennessee, Alabama, and Florida (Figure 3). These states, or at least portions of these states, are related to each other because:

- They are fast-growing areas.
- They are connected by rail and highway networks, most prominently Interstates 10, 20, 85, and 95.
- They share an economic history focused on manufacturing and transportation of goods.
- They are characterized by their “southern” culture.

European Spatial Development Perspective

Like the states within the United States, countries within the European Union are competing for jobs and investments. However, Europe is planning in a way to make all of Europe economically competitive. Spatial Planning is the large scale planning of growth, mobility, environmental protection and public investment in a manner that benefits all of Europe (Faludi, 2002).

With the formation of the European Union (EU) as a governmental body, the European Spatial Development Perspective has emerged as a directive to develop policies and investments for the European continent (Carbonell, and Yaro, 2005). With the introduction of the common currency and increased ease of travel between countries, European integration is accelerating with direct implications for development patterns within Europe. Cities are now becoming interdependent within Europe and the effects of one project within a country can have impacts on spatial development throughout Europe.

By planning in a fashion that is forward-looking, spatial and crosses borders, Europe can plan regional, national, and or community projects that complement each other to increase Europe’s economic competitiveness. In addition, spatial development is a key part of the European Union policy goal of achieving balanced and sustainable development (Faludi, 2002).
Our team then discussed ways to determine the preliminary boundaries of the southeastern SuperCity region and to identify the urban core. We went into this effort with a varied knowledge of the Southeast, as well as maps of transportation networks, settlement patterns (current and projected), protected lands, and watershed boundaries. During this process we reached unanimous agreement that our urban core would run along an area consisting of Atlanta, GA; Greenville and Charlotte, SC; Greensboro and Raleigh-Durham, NC. Furthermore, we suspected that Birmingham, AL, located to the west of this area, would be included. We also believed that the relatively nearby ports in Wilmington, NC; Charleston, SC; Savannah and Brunswick, GA; Jacksonville and Pensacola, FL; and Mobile, AL are related to this urban core through transportation and freight networks. This meant that the larger cities located at the fall line between the urban core and the ports most likely play a role in the larger regional network. The map in Figure 4 shows one of the several initial attempts to use the parameters to draw a boundary around our region and urban core.

Next we tested this “back-of-the-envelope” delineation of the region’s boundaries by analyzing data to generate a more empirical definition of the southeastern SuperCity region (Figure 4). For example, spatial distribution of population, both actual and projected, provides an idea of where the primary and secondary population centers are within the region. Existing transportation flows provided some guidance regarding possible future growth patterns. Environmental factors such as watersheds, natural boundaries such as mountain ranges, rivers, and permanently protected park and wilderness lands provide some idea of possible spatial limitations to future growth. Economic measures such as
commuting patterns and the volume of goods and people moving between population and employment centers within the region gave us insight into the economic inter-connectivity of the region.

The remaining portion of this chapter describes in detail the methods we used to move from the preliminary boundaries to an initial draft of the region’s boundaries. The topical areas used to define the region include: current and future settlement patterns, environmental features, transportation networks, and economic characteristics.

Current and Future Settlement Patterns
To aid in the delineation of the region’s urban core, several demographic factors were utilized. This was driven, in part, by the rapid population growth taking place in the southern portion of the United States, generally, and specifically in the six-state region (Figure 5).

Since the U.S. Census does not project county level data and their state level projections only go through 2025, county level population projections through 2030 were acquired from Woods and Poole, an independent firm specializing in economic and population projections. These data were projected by decade to 2050 in order to provide insight into where the future population would be located and what the population levels might be. Although the U.S. Census does not publish detailed projections for small areas, they do project the total United
States population through 2050. We used this projection as a benchmark for choosing the best population projection method for our region.

Two projection methods were found that are accurate for areas experiencing moderate or fast growth (Isserman, 1977). The first is a linear extrapolation method (LINAVE), which projects population based on an average of the absolute change in population. The second was an exponential extrapolation method (EXAVE), which projects population based on an average of the percentage change in population (Isserman, 1977). Three variations on each of these calculations were run with baselines of 1970, 1980, and 1990 populations to find the one that would project the national population closest to the Census 2050 projection. The LINAVE projection using the baseline year of 1970 was chosen for our region since it provides a United States total population result that is within 4 percent of the most recent U.S. Census projections for 2050 population (Table 1: Comparison of Population Projections).

**TABLE 1 : Comparison of Population Projections**

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</thead>
<tbody>
<tr>
<td>2050 Projection</td>
<td>419,854,000</td>
<td>436,735,289</td>
<td>439,075,614</td>
<td>443,009,161</td>
<td>465,233,600</td>
<td>464,336,600</td>
<td>466,217,700</td>
</tr>
<tr>
<td>% Difference</td>
<td>n/a</td>
<td>4.0%</td>
<td>4.6%</td>
<td>5.5%</td>
<td>10.8%</td>
<td>10.6%</td>
<td>11.0%</td>
</tr>
</tbody>
</table>

Source: U.S. Census 2000 and Woods & Poole 2004

The region’s county population levels and projections were entered into a geographic information system (GIS) for display and further analysis. This allowed us to see the spatial distribution of population and densities throughout the six-state region. We first mapped current population levels and densities for the region and compared it with our initial assessment of the make-up of the Southeast region’s urban core. We then compared this with 2050 population projections (Figure 6). Figure 6 shows a core region of population density along the I-20 and I-85 corridors starting around Birmingham and stretching towards the east and northeast through Georgia, South Carolina and finally ending in the Raleigh-Durham, NC area. This area is very similar to some of the initial ideas discussed in our group. Fall line and port cities also emerged as important population centers, as seen in Figure 6.
Environment

Consideration of environmental features is integral to the process of defining a sustainable region. In our analysis, watershed boundaries, geography, and ecologically sensitive areas were evaluated. Determinations for the boundaries of our region within the U.S., and for the specific delineation of what would become the urban core, were made based in part on these factors.

Watershed boundaries were the preliminary environmental tool used to make delineations. This tool is valid because it relies on natural, physical boundaries, as opposed to MSAs or counties, which are human-defined boundaries. Watershed boundaries are usually ridges that separate drainage basins. These features were important because these delineations affect water supply and allocation. Watershed boundaries dictate flows of waterways and determine where rainfall is collected.

The Southeast region is comprised of the following diverse physiographic features: Mountains, Piedmont, Fall line, Coastal Plains, and Coast (Figure 7).
Upon examination of the physiographic features, it was determined that some will act as natural boundaries. In the case of our region, the Appalachian Mountains are a physical barrier to the north. Population, transportation, and economic connections are severely reduced due to the features of the landscape. The fall line, where many secondary cities are located, spatially defines our region and influences other factors such as transportation links. There is a significant drop in elevation at the fall line, and it is the point where many rivers become navigable as you move downstream towards the ocean. Historically many cities were formed in this region due to this natural feature, and today it is where many of our secondary cities are located.

Features that restrict development can also be potential boundaries. Ecologically sensitive areas were examined to identify and understand existing development patterns and predict future ones. An example of this type of boundary is the headwaters of the Chattahoochee River, which are located in northeast Georgia. This ecologically sensitive area is essential to the water supply of Georgia, Alabama, and Florida, and is currently protected because it lies within the Chattahoochee National Forest. Due to this protection, no development will occur there, which inhibits linkages and connections across that area. For these reasons, this area serves as a northern boundary for the region.
Due to our focus on long-term sustainability, defining the region using environmental criteria was an important segment of the analysis of the southeastern SuperCity region. Our analysis evaluated watersheds, physiographic features, and ecologically sensitive and protected areas (Figure 8). The information obtained was then incorporated into the boundary definition process.

**FIGURE 8 : Environmental Features**

**Transportation and Economics**

The six-state study area is comprised of urban, suburban, and rural areas, each with its own unique economic base and drivers. Together, they create a diverse economy that creates regional flows of commodities and people. Identifying existing interactions of goods and people will help us to understand the relationships among these seemingly disparate places. The history of the region demonstrates how important economic and cultural connections were established over time and led to the current spatial ordering of the region. The research team utilized transportation data to understand the economic linkages in the regions. The linkages studied included major highways, commuting patterns, and freight movement.
The study area is articulated through a system of highways. As the automobile became the center of the transportation system, highways emerged as the most important link among piedmont cities, fall line cities, and port cities. Important transportation links for the region were compiled from the Freight Analysis Framework (FAF) developed by the Federal Highway Administration, by mapping the traffic flows of people and goods through average daily traffic data. Interstates 85, 20 and 40 are the primary corridors of intense freight traffic. I-85 passes through Alabama, Georgia, South Carolina, and North Carolina, connecting Montgomery, Alabama with Petersburg, Virginia. It crosses some of the major cities in the core area of the six states—Mobile, Montgomery, Atlanta, Greenville, and Charlotte—where it connects to I-40. Interstate 40 passes through Raleigh-Durham, and merges with I-95, which connects the region to the northeast. The map below in Figure 9 shows concentrated traffic on I-20 which suggests relationships among Tuscaloosa, Birmingham, Atlanta, Augusta and Columbia.

FIGURE 9 : Average Daily Traffic, passenger and freight

Interstate 75 is also identified as a major freight travel route in the six-state region. A strong connection is found between Macon, Atlanta, and Chattanooga. Furthermore, the map shows I-
75 as a link between Georgia, Florida, and Tennessee. Significant freight movement is seen on I-95 from the eastern ports of Savannah and Jacksonville into Florida, South Carolina and North Carolina. However, it does not appear that I-95 acts as an intra-regional connection between major southern cities.

People movement can also be captured through the Metropolitan Statistic Areas (MSA) defined by the U.S. Office of Management and Budget (OMB) and used by the Census Bureau for data collection and analysis. An MSA consists of a central city (with 50,000 or more inhabitants) or urbanized area (with a population of at least 100,000) surrounded by one or more counties. The addition of surrounding counties to the MSA is determined by the percentage of residents commuting into the central city for work. A county is included in the MSA if 25 percent or more of the employed residents work in the central county (Federal Register, 2000). This indicates relationships based not only on travel patterns, but also financial factors as counties with significant numbers of residents working in the urban core derive a large portion of their income from the economic activity of the urban core. For the purpose of this study MSA boundaries were used as defined in December 2003.

A corridor of economic activity and transportation networks clearly emerges when MSAs along I-40, I-85, and I-20, are mapped. The adjacent or nearly adjacent MSAs form a continuous core along the important highway linkages. MSAs in the remaining portions of the states tend to be more spread apart, but are connected by transportation networks (Figure 10).

FIGURE 10: MSAs of the Region
Next, we explored the flow of goods—by highways, railroads, air, and water—throughout the six-state study area and beyond. This data has been compiled from the Freight Analysis Framework (FAF) developed by the Federal Highway Administration. The FAF was designed as a tool for measuring and analyzing changes in freight transportation. Using the maps and data developed for the FAF we find greatest volumes of commodity flows throughout the Interstate 85 corridor continuing along Interstate 20 (Figure 11).

**FIGURE 11 : Commodity Flows**

Assembling the Data
All of these demographic, environmental, transportation and economic factors were entered into a GIS and used as overlays to provide an assessment of significant relationships within the study area and to test our initial boundaries. This section presents the results of the analysis, which identified the urban core and surrounding region.

**The Region**
We created an outer boundary for the overall region consisting of 357 counties (which include the counties of the urban core) in all six states. This boundary is derived from the region’s interactions with the urban core. These interactions are based on environmental, transportation, economic, and cultural factors, although each factor’s influence on a specific portion of the boundary varies.
The Urban Core

The settlement patterns and transportation analysis supported our initial delineation of the urban core. The greatest volumes of traffic and commodity flows traverse the corridor beginning in the Raleigh-Durham area in the east and continuing to Birmingham in the west. This is reinforced by the settlement patterns, which show a relatively consistent corridor of population density in this area.

The urban core, shown below in Figure 13, consists of 58 counties in four states (North Carolina, South Carolina, Georgia, and Alabama), stretches from Birmingham, AL, northwest to Raleigh-Durham, NC, on the eastern end, and follows the corridor created by I-20, I-85 and I-40.
The main driver in delineating the western boundary was economic factors. Therefore, we created a western boundary at the Alabama-Mississippi border. The economic disconnect is illustrated by the abrupt decrease in commodity flows past Tuscaloosa, AL. There is a primary watershed that extends from our region into the state of Mississippi; however, we found no other substantial linkages to justify including Mississippi in the region at this time. Further research should address the connectivity this watershed provides this eastern portion of Mississippi with PAM.

The northeastern and southern boundaries were created at the North Carolina - Virginia state line and just below Jacksonville, FL respectively. These lines were drawn primarily due to cultural factors. Virginia is more closely associated with the Washington, DC, area and the eastern seaboard than with the states comprising the southeast region. The northern parts of Florida seem to be more aligned culturally with Georgia and Alabama rather than central or southern Florida.

The eastern and northwestern boundaries are based on natural features. The eastern boundary is the Atlantic Coast and the northwestern boundary is shaped by the southern portion of the Appalachian Mountains.
Together, the urban core and surrounding region make up what we have named the Piedmont Atlantic Megalopolis (PAM) (Figure 14). The name is derived from the unique location of the region, occupying the Piedmont area, the Coastal Plains of the Atlantic Ocean, and the many metropolitan areas of the urban core.

FIGURE 14: The Piedmont Atlantic Megalopolis
As of 2000, PAM was home to over 25 million people, had more than 15 million jobs, and was composed of just over 190,000 square miles. Table 2 shows some of the basic features of PAM.

**TABLE 2 : Characteristics of Piedmont Atlantic Megalopolis**

<table>
<thead>
<tr>
<th></th>
<th>Population, 2000</th>
<th>Jobs, 2000</th>
<th>Land Area (Sq. Mi.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population, 2000</td>
<td>25,835,000</td>
<td>15,365,000</td>
<td>190,800</td>
</tr>
<tr>
<td>% of U.S. Population</td>
<td>9.2%</td>
<td>9.2%</td>
<td>5.4%</td>
</tr>
<tr>
<td>% of U.S. Jobs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of U.S. Land Area</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sources: 2000 U.S. Census and 2004 Woods & Poole

**Conclusion**

It is important to recognize that the preliminary boundaries described in this study are the product of many factors brought together. An examination of different features in the region could lead to subtly different boundaries. We are confident, however, that our boundaries reflect the interconnectedness of the region. Further, as more data are compiled and more research into the nature of SuperCity regions is completed, it will be necessary to review the boundaries and decide if they need to expand, contract or remain the same (see Conclusions, Future Research). It will also be important to reconsider boundaries as the region evolves. As the population grows, infrastructure is constructed, and new environmental issues arise, the boundaries may shift to address new regional opportunities and challenges.
CHAPTER 3: Characterizing the Piedmont Atlantic Megalopolis

The Piedmont Atlantic Megalopolis (PAM) is an area of unique biological diversity with many undeveloped and natural areas. It is an area that lags the nation in economic indicators per capita, but shows a greater growth rate than the nation on these same indicators. It is a region that is experiencing tremendous population growth from in-migration and resulting sprawling of the urban core, consuming land at a rate greater than the population growth. Further, the region suffers from a dichotomy in economic opportunity between the rural and urban areas: while the urban core develops, the rural areas lag behind. This section reviews the current status and details of the natural resources, economics, transportation and infrastructure, demographics, education, and governance of the region.

Environment and Natural Resources

PAM is defined, in part, by its basic physical and geographic features. The northwestern boundary is composed of the southern end of Appalachian mountain chain, which extends from New England until it eventually terminates in the vicinity of Birmingham, Alabama. The southeastern and southern boundaries are oceanic, the South Atlantic and the Gulf of Mexico. This creates a sloping area of land that falls from the mountains to the coast throughout the region in a southeasterly and southern direction. Along this slope is the Piedmont region of PAM, immediately adjacent to the Appalachian chain proper. At the fall line, a distinctive drop off in elevation that stretches like a low cliff from New Jersey to Georgia, the terrain drops off to the coastal plain, which in turn extends to the sea. As shown earlier in Figure 8, this basic physiographic pattern creates an environment that has several distinctive features.

The southeastern region of the United States receives roughly 50 inches of rain annually. Rain that falls in the Appalachian mountains and foothills drains down the major river drainage basins to the ocean. Historically, cities formed first on the coast where natural harbors are situated, then secondly along rivers at the fall line at the limit of navigable waters. Most recently major urban centers have grown up in the Piedmont areas, where the climate is milder, around newly developed transportation hubs. This area of the Piedmont, where the most active growth centers are located, is primarily dependent on surface water accumulating in upper reaches of these river basins. Areas closer to the coast, particularly in North Florida, rely more on groundwater, particularly the North Floridian aquifer, which extends up into Southern Georgia (Northwest Florida Water Management District, 2004). South Carolina has available groundwater resources, but still relies primarily on surface water since it is less expensive and easier to obtain (South Carolina Department of Natural Resources, 2005).
The relatively wet temperate climate of the Southeast and the diversity of its physiographic regions have contributed to the existence of an extremely rich and diverse ecosystem, one of the richest in the United States. The original southern mixed forests and conifer forests have some of the highest species diversity in the country, and are among the top ten eco-regions in richness of amphibians, reptiles and birds (World Wildlife Fund — Eco-region Profiles, nd). The Southeastern region’s rivers and streams have the greatest diversity of aquatic life in North America and are among the richest in all temperate latitudes (World Wildlife Fund — Southeastern Rivers, nd). However, over 98 percent of these original forests have been destroyed or converted to other uses, such as agriculture (World Wildlife Fund — Eco-region Profiles, nd).

In response to a need to study impacted and ecologically critical areas, the Southeastern Ecological Framework Project has identified and mapped ecologically sensitive areas in the southeastern region. Areas are designated as sensitive based on such features as native species habitats, significant natural communities, wetlands, roadless areas, floodplains and high quality aquatic ecosystems (Southeastern Ecological Framework, 2005). If we review the ecologically sensitive areas in the PAM region, a pattern of concentration in the mountains, river drainage basins, and the coastal areas emerges (Figure 15). Interestingly enough, the urban core of PAM along the Piedmont is not an area with a high concentration of ecologically sensitive areas.

FIGURE 15 : Southeast Ecological Framework
There is still undeveloped and open land in the Southeast, but rapid sprawl in most urban areas, particularly in the Piedmont, is threatening much of that undeveloped space and with it, the habitat for this biodiversity. Over two million acres of green space were consumed in the United States each year between 1992 and 1997 (USDA, 1997). Between 1982 and 1997, Atlanta increased its urbanized land by 81 percent to accommodate a population growth of 61 percent, Charlotte increased its urbanized land by 74 percent to accommodate a population increase of 39 percent, and Birmingham increased its urbanized land by 30 percent to accommodate a population increase of 10 percent (Calthorpe & Fulton, 2001).

The prevailing winds for most of the southeastern United States come from the west, so the ambient air in the region is influenced by activities in the Midwest and Central South. Notwithstanding this external influence, the rapid rate of growth and the accompanying increase in industrial and transportation have generated air pollution and created air quality issues for the Southeast. The U.S. Clean Air Act (CAA) empowers the Environmental Protection Agency (EPA) to set national standards for air quality in order to protect public health and natural environments. Concentrations of certain major pollutants are measured, including ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, nitrogen dioxide and lead (EPA, 2005).

Most of the major metropolitan areas in the region (e.g., Atlanta, Birmingham, Charlotte) experience periods of non-attainment under EPA air quality standards (Table 3). However, many of the smaller urban centers are also experiencing increasing periods of poor air quality (Western North Carolina Regional Air Quality Agency, nd). Ninety percent (90 percent) of North Carolina’s population and 84 percent of Georgia’s population live in areas with an “F” rating from the EPA for ozone (American Lung Association, 2004). Four major metropolitan areas in PAM are among the 25 worst for ozone air pollution (American Lung Association, 2004).

### TABLE 3 : Air Quality Statistics for Select Southeast MSAs

<table>
<thead>
<tr>
<th>Data for 2000-2002 MSAs</th>
<th>% unhealthy days</th>
<th>Bad air days/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fayetteville, NC</td>
<td>2.80%</td>
<td>10</td>
</tr>
<tr>
<td>Raleigh-Durham, NC</td>
<td>5.50%</td>
<td>20</td>
</tr>
<tr>
<td>Charlotte, NC</td>
<td>9.10%</td>
<td>33</td>
</tr>
<tr>
<td>Greenville, SC</td>
<td>6.10%</td>
<td>22</td>
</tr>
<tr>
<td>Atlanta, GA</td>
<td>11.80%</td>
<td>43</td>
</tr>
</tbody>
</table>
Economics
Describing the economy of such a large and diverse area is not simple. There are many players in many markets, some working together, some in competition, and others working independently. To understand the kind of employment and the type of the economy that exist in the region, five different characteristics were analyzed: economic drivers, unemployment rates, poverty, exporting activities (as determined by location quotients), and metropolitan economic growth.

To understand employment and economic development spatially, certain major economic drivers are mapped below in Figure 15. The major economic drivers we used include universities with 5,000 or more students, hospitals ranked in the nation’s top 100 rated hospitals, military bases, ports, international airports, state capitals, and Fortune 500 company headquarters. By comparing the percentage of each of these economic drivers to the percentage of the nation’s population living in the region, a determination can be made on if the region is well-served or under-served with respect to that driver. As a basic point of reference, note that the region includes about 10 percent of the nation’s population. Each year the National Science Foundation (NSF) ranks universities by the amount of academic research and development money they receive. According to the NSF, in 2004, universities in this region received 9.6 percent of the national total; therefore the region is equitably-served with respect to university research funding. The region is also well-served in port activity with 12 percent of all port calls, despite having only 11 seaports out of the 128 total in the nation. The region is very well-served in military services with 15 percent of the nation’s military bases. The region is under-served in quality hospital facilities, having only 5 out of the top 100 in the nation. The region is also not well supplied with Fortune 500 companies, having only 7 percent of the total. However, in recent years several headquarters facilities have relocated to the region. For example, Rayovac moved from Wisconsin to Atlanta in 2004 (Hedgcoth, 2004) and Bank of America to Charlotte in 1992 (Charlotte, NC Chamber of Commerce, nd).
The map in Figure 17 depicts unemployment rates by county for the entire United States. The central plains faired the best in 2004. However, there is a strip of low unemployment rates along the northeast Atlantic Coast from Vermont to Virginia that extends into PAM, including North Carolina’s Research Triangle to Atlanta. The port and coastal cities in northern Florida and southern Georgia also have low unemployment rates. Not surprisingly, the non-urbanized areas (especially in South Carolina) are struggling with failing economic conditions and as a result have extremely high unemployment rates (Bureau of Labor Statistics).
We examined urban and rural poverty to understand where there are inequalities in the economic system and where areas are distressed. Two separate and distinct phenomena were identified. One, there are large concentrations of poverty in urban areas with severe pockets very poor populations in the inner cities (Figure 18). Two, rural areas suffer from higher poverty rates overall (Figure 19).
FIGURE 18: Poverty Concentration

Poverty Concentration

FIGURE 19: Poverty Rates

Poverty Rate
The next phase of analysis measures a community’s exports. We measure an area’s exports by computing a location quotient (LQ) for each major type of economic activity. LQs are derived from economic base theory, which postulates “economic growth is directly related to the demand for its goods, services, and products from areas outside its local economic boundaries” (Blakely, 2002, p. 58). Location quotient analysis compares an industry’s share of the local economy compared to a reference economy, often the nation. The results of the analysis divide employment into basic, or export, and non-basic, or local serving. Basic jobs are often in industries like manufacturing, finance and insurance, information, and transportation and warehousing; whereas retail, government, health care, and social assistance industries often represent non-basic jobs.

Economic base theory operates on the premise that for every basic job created, at least one or more non-basic jobs are needed to provide local services to the “basic” employee and his/her family (Isserman, 1977). The concept prioritizes basic employment as the true wealth generator for economic area because such jobs bring in new capital from outside the region through the export process. In contrast, non-basic employment simply circulates wealth within the region. There is a danger in focusing solely on basic employment and external demand. A balanced approach, one that also meeting internal needs and demands, is important for a sustainable and healthy economy (Blakely, 2002).

The LQ is the ratio of the percentage of employment in an industry locally compared to the percentage of employment in the same industry in the reference economy. This study uses the nation as the reference economy because PAM’s competitors are other SuperCity regions, like the Northeast or Midwest. Furthermore, this study uses the categories defined by the National Industry Classification System (NAICS) to assess LQs (see Appendix I for a complete description of NAICS codes and categories). The LQ is calculated using the following formula:

\[
LQ = \frac{\text{percent of local employment in a particular industry}}{\text{percent of national employment in the same industry}}
\]

If this calculation results in a value greater than one, that industry is overrepresented in the study area and is considered a basic industry. Put simply, that industry in that area is producing more than the local economy demands, and is thus exporting the excess; the higher the number, the greater the degree of export. Conversely, a LQ of less than one means that the industry is not producing enough to meet the study area’s demand. The industry is underrepresented; therefore, the study area must import the products of that industry to meet local need. Industries with LQs less than 1.0 are considered non-basic industries (Blakely, 2002).
Using data from the Bureau of Economic Analysis an LQ analysis of the six-state study area’s employment in 2003 revealed seven basic industries, including construction, manufacturing, retail trade, real estate and rental and leasing, administrative and waste services, other services, and government and government enterprise (see Table 4). In 2003, approximately 35 percent (9,477,000 jobs) of all employment in the study area was in government, manufacturing, and retail trade, which is consistent with the national employment composition.

**TABLE 4 : basic industries of the six-state region, 2003**

<table>
<thead>
<tr>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
</tr>
<tr>
<td>Manufacturing</td>
</tr>
<tr>
<td>Retail trade</td>
</tr>
<tr>
<td>Real estate and rental and leasing</td>
</tr>
<tr>
<td>Administrative and waste services</td>
</tr>
<tr>
<td>Other services, except public administration</td>
</tr>
<tr>
<td>Government and government enterprises</td>
</tr>
<tr>
<td>Military (subset of government)</td>
</tr>
</tbody>
</table>

We also compared employment in metropolitan areas to employment in non-metropolitan areas. Basic industries in non-metropolitan areas include farm employment, construction, manufacturing, retail trade, other services, and government (including military and state and local government). As U.S. manufacturing and agricultural industries face growing international competition, the non-metropolitan areas may need to develop other industries.

Metropolitan areas have a slightly more diverse set of basic industries—construction; wholesale trade; retail trade; information; real estate and rental and leasing; administrative and waste services; arts, entertainment, and recreation; accommodation and food services; other services; and military (a subset of government) (Table 5).

---

* Employment data used in this report have been compiled from the Bureau of Economic Analysis (BEA) Regional Economic Accounts. The BEA makes 1969-2000 data available by Standard Industry Classification System codes. Data from 2001 and 2002 are categorized using the National American Industry Standard Classification system. It is important to note the limitation of this data set. Employment numbers for specific industries in some MSAs have been omitted to protect the confidential information or because there were less than 10 jobs in that industry. In addition, in some cases only estimates are provided.
We also compared non-metropolitan and metropolitan population, employment, and gross product. We found that 80 percent of the population and almost 84 percent of jobs are located in metropolitan areas. The metropolitan areas account for 81 percent of the six-state area’s gross product. Using this analysis we calculated gross product per capita and found that the metropolitan areas are slightly more productive than non-metropolitan areas, $33,743 to $31,931 respectively. Conversely, non-metropolitan areas exceed metropolitan areas in productivity if the unit of analysis is changed from people to jobs. Here we find that the non-metropolitan areas have a gross product per job of $70,719, exceeding both the national and six-state metropolitan areas. See Table 6 for details.

### TABLE 5 : basic industries of non-metro and metro areas, 2003

<table>
<thead>
<tr>
<th>Six-state non-metro area basic industries, 2003</th>
<th>Six-state metro area basic industries, 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm employment</td>
<td>Construction</td>
</tr>
<tr>
<td>Construction</td>
<td>Wholesale trade</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>Retail trade</td>
</tr>
<tr>
<td>Retail trade</td>
<td>Information</td>
</tr>
<tr>
<td>Other services, except public administration</td>
<td>Real estate and rental and leasing</td>
</tr>
<tr>
<td>Government and government enterprises</td>
<td>Administrative and waste services</td>
</tr>
<tr>
<td>Military (subset of government)</td>
<td>Arts, entertainment, and recreation</td>
</tr>
<tr>
<td>State and local (subset of government)</td>
<td>Accommodation and food services</td>
</tr>
<tr>
<td></td>
<td>Other services, except public administration</td>
</tr>
<tr>
<td></td>
<td>Military (subset of government)</td>
</tr>
</tbody>
</table>

**SOURCE:** Bureau of Economic Analysis

### TABLE 6 : comparing metro and non metro areas

<table>
<thead>
<tr>
<th></th>
<th>Population, 2003</th>
<th>Population as % of reference area</th>
<th>JOBS, 2003</th>
<th>Jobs as % of reference area</th>
<th>GP, 2003 (in billions)</th>
<th>GP as % of reference area</th>
<th>GP per capita</th>
<th>GP per job</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>290,788,976</td>
<td></td>
<td>167,174,400</td>
<td></td>
<td>$10,911.103</td>
<td></td>
<td>$37,522</td>
<td>$65,268</td>
</tr>
<tr>
<td>Six-state study area</td>
<td>49,227,909</td>
<td>16.93%</td>
<td>27,263,544</td>
<td>16.31%</td>
<td>$1,643.531</td>
<td>15.06%</td>
<td>$33,386</td>
<td>$60,283</td>
</tr>
<tr>
<td>Six-state study area - METRO</td>
<td>39,522,880</td>
<td>80.29%</td>
<td>22,881,512</td>
<td>83.93%</td>
<td>$1,333.637</td>
<td>81.14%</td>
<td>$33,743</td>
<td>$58,284</td>
</tr>
<tr>
<td>Six-state study area - NONMETRO</td>
<td>9,705,029</td>
<td>19.71%</td>
<td>4,382,032</td>
<td>16.07%</td>
<td>$309.893</td>
<td>18.86%</td>
<td>$31,931</td>
<td>$70,719</td>
</tr>
</tbody>
</table>

**SOURCES:** Bureau of Economic Analysis and U.S. Conference of Mayors
Transportation & Infrastructure

PAM is highly car-dependent region. Because it developed rapidly after World War II, land uses were rigidly separated and freeway construction was the primary transportation policy initiative. In metro Atlanta, for example, residents drive about 125 million miles per day (Associated Press, 2005). Work trip data from major metropolitan areas in the region shows that 92 percent of work trips are made by car (79 percent in single-occupancy vehicles and 13 percent in carpools) (U.S. Decennial Census, 2000).

FIGURE 20: Transportation Mode Choice

As a policy matter, much concern has revolved around the ozone precursors emitted from auto tailpipes, because federal law and regulations governing emissions can impose penalties on areas that fail to meet health-based federal air standards (i.e., non-attainment areas). These chemicals are a major source of smog in many U.S. cities (EPA, 2004).

Environmental problems resulting from congestion include air and water pollution, in addition to ozone precursors, from vehicle exhaust and pavement runoff; rising greenhouse gas emissions, unsustainable energy consumption, and “heat island” effects from solar-thermal gain from paved surfaces.
Congestion also causes the lack of access to spread-out destinations, particularly among those too poor, young, old or disabled to drive; the discarding of older, non-car-based sections of regions in favor of greenfield development; the near-monopolizing of public space by auto traffic; and disruption of community life by busy roadways that pose dangers to pedestrians and impede face-to-face contacts among neighbors (Newman and Kenworthy 1999; Ewing 1993, 1997; Putnam 2000; Black 1998; Kay 1997; Durning 1996).

Auto use is a public health concern as well, causing some 5,000 deaths a year in PAM states. Overall, in 2000 U.S. traffic crashes caused 41,821 deaths and another 5.2 million injuries, damaged 28 million vehicles and cost the national economy $230.6 billion (Blincoe, et al., 2002). According to Jane Jacobs, “Not TV or illegal drugs but the automobile has been the chief destroyer of American communities. Highways and roads obliterate the places they are supposed to serve...” (Jacobs 2004, p. 37).

The automobile similarly dominates non-commuting passenger travel within the region. PAM has limited passenger rail service. Throughout the populous core, the federally-supported Amtrak system runs only one train, the Crescent. Atlanta and Birmingham, both built on rail access, now have just two passenger trains a day—the northbound Crescent and the southbound Crescent. In PAM, passenger train travel per capita is a small fraction of that of the Northeast (see Figure 22).

![FIGURE 22: Passenger Travel by Train](image)

The dominance of motor vehicle travel in PAM puts the region’s economic connections at risk due to rising energy prices, increased environmental regulation, roadway congestion, or other developments.
At the national and global level, PAM is somewhat better positioned with respect to transportation, with the world’s busiest airport (in terms of both passengers and airplane movements, but not freight*) in Atlanta. The Charlotte airport is ranked 17th in the world in airplane movements (Airports Council International, nd a, nd b). The region boasts major ports at Charleston, Savannah, Jacksonville, Wilmington and Mobile. Together, the five ports accounted for $78.1 billion in foreign trade in 2003 (American Association of Port Authorities, nd a). One of those ports ranked in the top 50 global ports for container traffic; Charleston ranked No. 42 (American Association of Port Authorities, nd b).

Though this long-distance transportation infrastructure has been an economic driver in the region, it is not without cost in terms of environment degradation and social equity. Airports, for example, generate noise and air pollution, and the bulk of the burden is borne by nearby residents. Waterborne shipping, too, increasingly affects the ocean and coastal ecosystems as global trade rapidly accelerates, and consumers buy goods from overseas sources that were previously produced locally or regionally.

Reliable data on the extent and condition of water and sewer infrastructure are difficult to obtain. Many localities do not have data even for their own jurisdiction. However, it seems clear that infrastructure in this fast-growing region is often inadequate. For instance, many residents and businesses (even in urban areas) rely on septic systems for wastewater treatment. Septic systems place a higher demand on the water supply since water is not returned to the system for treatment and re-use and if such systems are not properly monitored and cared for, they can result in sanitary hazards as well. As in other parts of the country, antiquated combined storm-sanitary sewers must be replaced at great cost. The city of Atlanta alone is spending $3.2 billion to rebuild its wastewater infrastructure (City of Atlanta, 2005).

Demographics

PAM is experiencing tremendous population growth. In-migration and the growing number of older Americans most heavily influence the demographics of the region. Between 1990 and 2000, population growth in the southern and western regions of the United States outpaced the rest of the country and this trend appears to be continuing. The six-state region comprising PAM, a subset of the southern region of the U.S., has outpaced both the southern and western regions. During the decade 1990-2000, the six-state region grew 21.1 percent, PAM’s urban core grew 28.1 percent, and PAM’s surrounding region grew 15 percent, while the United States as a whole only grew 13.5 percent.

* The top airport for freight is in Memphis, Tenn., where Federal Express is headquartered.
This population growth is driven primarily by domestic in-migration. Four of the six states in the PAM region: Florida, Georgia, North Carolina and Tennessee, were among the top recipients of shifts in native born population between 1990-2000. Of these four, Georgia, Florida and North Carolina were the top three recipients in the country. Regarding domestic in-migration rates, all of the MSAs in PAM’s urban core with the exception of Birmingham are in the top fifteen MSAs in the country (Frey, 2002).

Domestic in-migration is driven in part by the attraction of the growing economies of the region, the relatively low cost of living and favorable climactic and environmental factors, all of which are found in the PAM region (Frey 2002, 2003b). These factors contribute to an increase in lower-skill service, retail, and construction jobs. These low-skilled jobs are attractive to migrants from outside of the country and to foreign born migrants undergoing secondary migration from other areas of the United States.

Atlanta, Charlotte, and Raleigh-Durham, all high domestic in-migration metropolitan areas, have also experienced increases in foreign migration. Additionally, Georgia and North Carolina were ranked in the top five greatest secondary migration recipients for 1990-2000 (Frey 2002, 2003b). In fact, five of the major cities within PAM’s core, Raleigh-Durham, Atlanta, Greensboro, Charlotte, and Greenville, have been designated as “hyper-growth” new Latino destinations. This designation indicates that these cities experienced a 300 percent increase in Latino population from 1980-2000. Raleigh-Durham had the highest growth rates of Latino population in the United States during this time period (Suro, 2002). These migration trends are diversifying PAM’s population (Figures 24 and 25).
Many of the areas experiencing high rates of domestic in-migration and foreign born migration are also experiencing high growth rates in persons aged 55 and over. Atlanta is among the top 20 metro areas for growth of the 65 and over age group, with a 40 percent increase during the 1990-2000 decade. Two secondary metro areas are also in this category: Jacksonville with a growth rate of 46.6 percent and Columbia with a growth rate of 36. Two PAM core metro areas, Atlanta and Raleigh-Durham, were among the top twenty cities in age 55-64 growth rates with rates of 55 percent and 48 percent.
respectively. Jacksonville, a surrounding metro area within PAM, was included in the top 20 as well, each having an approximately 52 percent increase (Frey, 2003a). The trends in the 55 — 64 age group are important, in part, because the locations of this age cohort, considered pre-retirees, may serve as a predictor for settlement patterns for the large baby boomer generation in the coming decades (Frey, 2003a).

Aging populations tend to move into the suburbs, especially in the PAM states (Frey, 2003a). Hispanic domestic and foreign migrants also tend to live in the suburbs and urban fringes (Frey, 2003b). The high rates of growth in these two groups, aging populations and Hispanic migrants, have helped continue a trend toward sprawling growth patterns throughout PAM.

This trend is shown by household data for the region. Similar to the United States as a whole, household size in PAM is shrinking (Figure 26). At the same time, the number of households is increasing at a rate greater than the rate of change in population growth (Figure 27). The rate of household change is greater in PAM than in the entire U.S.

**FIGURE 26 : Household Size, 1970-2000**

Source: Woods & Poole, 2004
The relatively low population densities throughout the PAM region also serve to show these sprawling growth patterns. As shown in Figure 28, there are few counties in the region with more than 1,000 people per square mile. Urbanized areas around the country are seeing decreasing trends in population densities. Some areas, including Atlanta, are seeing densities decline by one-third or more (Orfield, 2002). These sprawling growth patterns and the declining density have a direct effect on the rate of land urbanization. Orfield’s research on the United States’ largest metropolitan areas from 1970 to 1990 reveals that land urbanization is occurring at a rate 2.5 times the population increase in those areas.
Education promotes direct benefits, including personal productivity and earned income, and indirect spillover benefits, including local social stability as well as regional economic growth and quality of life (Hungerford and Wasserman, 2004). According to the Southern Regional Education Board (2003), nothing influences prosperity more than the education of its people. Therefore, the provision of a high quality primary and secondary school public education for all constituents is one of the best investments any government can make. Unfortunately, the PAM region currently has a number of troubling indicators in assessing educational provision and educational attainment within the region.

Investment in the education system in PAM falls below national rates.

- Teachers and educators in PAM are paid at the lowest rate of any region of the country (National Education Association, 2004).
- The total revenue collected per student in PAM is consistently below the national average (National Education Association, 2004) (Figure 29).
This lack of resources may have led to educational achievement and lags in attainment.

- Most states within PAM rank below the national average for average SAT scores (Southern Regional Education Board, 2003) (Figure 30).
The percentage of population with no high school diploma is above the national average, and the percentage of population with some college, college, or advanced degrees is below the national average (National Education Association, 2004) (Figure 31).

These educational achievement and attainment indicators may be related to increased disparities between class, race and ethnicity, with black and Hispanic children regularly falling far behind white children in educational performance (Haskins and Rouse, 2005). Projected increases in population
diversity underscore the need to overcome racial and ethnic differences in educational achievement to achieve the goal of equity in education.

**Governance and Planning**

Governance is the process by which society and organizations make decisions, determine representation, and render accountability. Governance is not synonymous with government, because it involves people and organizations outside governmental entities (Graham, Amos, & Plumptre, 2003). It is a complex process that has many different actors that have numerous roles.

Throughout PAM there are numerous layers of government. As shown in Figure 32, there are 6 states, 359 counties, and 2,902 cities and towns. These entities vary in scale, from Charlotte, with over 540,828 people, to Mountain Park, Georgia, with 506 people, for example (U.S. Decennial Census, 2000). However, each entity has powers and responsibilities given to it by the state. These powers and responsibilities include but are not limited to: public safety, taxation, and planning. Each state grants different powers to their counties and municipalities. The differences in these systems among the states increase the complexity. Cooperation is needed from the numerous layers of government to develop complementary polices and regulations to achieve a more economically competitive region.

**FIGURE 32 : Fragmentation**

![Fragmentation Map](image-url)
In addition to the complex layers of government, there are also multiple entities beyond those typically associated with government, which also impact planning. The spatial context of planning efforts varies, but most comprehensive planning is done at the local level, and focuses on parochial interests. There are regional planning entities in PAM, but these units of governance typically focus on a single problem or media, and rarely cross state boundaries.

Governments in metropolitan areas are highly fragmented, but even within a single government entity there is functional fragmentation. Governmental fragmentation refers to the raw numbers of government entities in any given region. Functional fragmentation is the division of duties by discipline and by problem. The internal fragmentation of city and local government reflects the need to work together, but it ignores the fact that problems are not connected to another. As a result, “goals, objectives and policies are considered and administered within the confines of their specific functional areas” (Krizek and Powers, 1996, p. 24).

Government fragmentation also enhances inter-jurisdictional competition. Communities compete for desirable commercial and industrial development and the accompanying perceived contribution to the tax base “[O]ne community’s gain is likely to be another’s loss” (Orfield, 2002, p. 91). State governments also compete at the federal level for transportation, education and other social welfare grants. The task for a sustainable future in PAM is to overcome the challenges these fragmented approaches pose.

Governance

Governance in PAM exhibits many of the principles of good governance (Graham, Amos, & Plumptre, 2003). The complexity of the bureaucracy in PAM reflects the checks and balances of a federal governance system that divides power and responds to changing political priorities. The federal system and representative democracy allow for the participation of interest groups in decision-making and the peaceful resolution of conflicts. The public can hold decision-makers accountable, and government actions are relatively transparent as the public has access to information. The governance system in PAM has legal frameworks to protect the rights of citizens and ensure equal opportunity. The states in PAM are granted equal status by the constitution, and thus can compete for federal dollars. Systematic formulas are used to allocate the resources in areas of need such as welfare, housing and education. Federal legislators then can be held accountable for the impact of their decisions through the electoral process and politics. State constitutions provide for and protect the ability of local governments to regulate and manage land use. Meanwhile, citizens can actively engage their local representatives.

Intergovernmental relationships in PAM (and the United States) are characterized by interdependence, complexity and bargaining (O’Toole, 2000). Specialists in agencies, legislative committees and pressure groups all actively seek to gain influence in a maze too complex for any one official or citizen to comprehend. It is “increasingly difficult for anyone, even major officials like governors or mayors or presidents, to decipher just who [is] causing what to happen” (O’Toole, 2000, 18, emphasis in original). Power is shared between levels of government, both vertically and horizontally, and “any change requires mutual accommodation” (19), diluting and diffusing the original intent. The impacts of this complexity and accommodation on the future sustainability in PAM relate to the ability of actors to take action when decisive action is needed. It is increasingly difficult to craft a unifying vision, develop a singular policy approach and “systematically execute positive action in a straightforwardly rational manner” (19, emphasis in original).
A Brief History of the Southeastern U.S.

English Protestants settled the first of the Southeast states, South Carolina, in 1670. The settlers arrived from New England at Albemarle Point in present-day Charleston, South Carolina. The city quickly became the leading port and trading center of the South, in response to overseas demand for rice, cotton, and tobacco products. The slaves of the English and French Huguenot settlers built indigo, rice, and cotton plantations along the rivers and sea islands, while merchants made Charleston one of the busiest ports on the Atlantic. North Carolina, South Carolina, and Georgia were considered relatively rural settlements in contrast to the New England colonies. However, over time, the Southeast supplemented its economic base with lumber, tar and resin from the dense longleaf pine forests, which provided some of the best shipbuilding materials in the world. The Southeast’s settlers combined agriculture and trading, and the success of the early marketplace plays a major role in much of the region today. Plantation labor became a permanent source of enslavement for Africans, as native populations declined from disease.

The Southeast region was isolated from the remainder of the colonies, and was slow to grow its population. Even during the European immigration to the United States in the 19th and early 20th centuries, the Southeast region was largely unaffected, with the exception of workers drawn to the mining, forestry, and agricultural industries. The ethnicity of the Southeast region remained largely unchanged, with descendents from European settlers and African slaves.

Due in part to its agricultural roots, the Southeast region has historically been known for a more relaxed lifestyle, with friendly people, and home-cooking. Southeastern cuisine has roots in the West Indian, French, Spanish, Native American, and African American cultures. Agricultural products, plentiful wildlife and fisheries populations, and crops from Africa supplied the basis for southern cooking as it is known today. Those roots also supplied the music that the Southeast region is known for, including gospel, blues, hymns, and folk songs.

The Southeast region has gained global attention from unique contexts, which characterize the region in very different ways. The Civil Rights movement during the 1960s was a period of social unrest for the Southeast region, which at the time, allowed state-supported segregation of African-Americans. Its most noted leader, Dr. Martin Luther King, Jr. characterized the movement by using non-violent protests, sit-ins, and freedom rides to gain equality for African-Americans. The years of peaceful protests eventually led to the Civil Rights Act of 1964. Desegregation would allow African-Americans to attend the same schools, find work, use the same facilities, and enable voter registration the same as every other American citizen.

The Southeast region was again in the global spotlight in 1996 as Atlanta was host to the Summer Olympic Games. Mohammed Ali lit the cauldron flame and a record-setting 79 nations won medals. As millions watched the Centennial Games on television, over 80,000 people crowded the Olympic Stadium for the 16 days of festivities. Civic leaders showcased Atlanta as an international city, able to be competitive in the global market. Events were brought outside the City, including Athens and Stone Mountain Park. As a result of the Games, the city began to take stock and revitalize its urban housing and greenspace, as well as improving its pedestrian environment and boosting tourism.
CHAPTER 4:

Emerging Trends and Key Issues

This section highlights certain of the key trends and emerging issues we identified in our analysis of demographics, economics, environment and natural resources, education, transportation and infrastructure, and governance.

Demographic Trends

Population growth is a primary concern for PAM over the next fifty years. Extrapolating from the growth trend experienced by PAM in the last decades, the region is expected to grow 68 percent by 2050. This trend carries with it many related problems that touch on all aspects of sustainable development such as land consumption, resource depletion, income disparity, educational disparity, jobs-housing imbalance, infrastructure shortages, traffic congestion and increased need for economic development and social services.

The principal implication of the projected increase in population combined with reduction in the number of persons per household and current low density patterns is an increase in land consumption. The demand for housing stock will increase. As the demand increases, housing prices also increase, pushing development further out of the urbanized areas. Low-skilled and cheap laborers have to locate where inexpensive housing stock is available, which is typically at the urban fringe or suburbs. If this occupation pattern extends into the next decade it could result in excessive land consumption and mismatches between jobs, housing, and transit facilities.

The increase in the Hispanic population needs special attention as a result of certain social, educational and spatial features characteristic of it. Social disparity may increase with a shift in the racial mix. The educational system needs to be prepared to deal with a larger population of children that do not speak English at home, and to counter the effects of a population that has a large segment oriented to low-skill professions.

The aging population is another important trend in PAM and the nation. PAM will experience an increase in population aged 55 years and older as the baby boom generation ages. This segment of the population will gain in share, while the percentage in younger age groups is projected to decline. Figure 33 shows the aging of the population from 2000 to 2050.
Analysis of baby boomers residence patterns during the 1990s shows that pre-retiree baby boomers are more likely to reside in suburban areas than inner city areas. This pattern may continue during the next decades (Frey, 2003a). As this group ages and longevity increases, suburban communities need to be prepared to deal with the social services, health care, and transportation needs of a fast-growing, possibly economically constrained senior population (Frey, 1999). This demand can overburden public finance and create a deficit in public budgets over the long-term. As a result of this trend, housing changes will have to reflect the needs of retirement populations. This means that not only will the number and variety of housing types need to accommodate smaller average households, but also to accommodate larger foreign born households and retiring baby boomers housing requirements.

**Economic Trends**

The growing economy in the urban core paints a very positive image of the area. However, there are a few key trends both in the core and the surrounding region that will lead to future challenges if not properly addressed. These key trends include losing regional economic advantages, a lack of industry diversity and focus in the declining manufacturing industry, economically struggling rural areas and competition for economic development between adjacent jurisdictions.

The longtime advantages of doing business in the South have been the availability of a low-cost workforce, the low cost of living, and fewer regulatory concerns. This had made the option of locating in the PAM region more enticing to businesses. The cost of living has historically been low here compared to other sections of the country. Being able to afford a nice home on a decent piece of land has been luring employees to this region and has contributed to the booming population the region has experienced. However, as more businesses re-locate and people move to the region, demand increases driving higher land prices and the cost of living. Thus, the longtime lower cost of living advantage in the PAM region is diminishing. The low cost of the workforce is also becoming an increasingly smaller
advantage as the region is no longer competing against other regions of the U.S., but against workforces that are able and willing to accept much lower wages globally.

Reliance on the manufacturing industry in the region poses a threat to the sustainability of the economy. Currently, of the 10 major MSAs in the region, manufacturing is the number one export in six MSAs, wholesale is the number one export in three MSAs, while TCU (transportation, communication, and utilities) is among the in the top three exports for six of the MSAs.

The national decline of manufacturing and agricultural businesses is of chief concern to the region. Parts of PAM rely heavily on manufacturing and agriculture, which makes the region more heavily impacted than areas that rely on expected stable industries. Rural areas are the most impacted by this decline and already have felt the impact with significant and growing economic problems. They have higher poverty rates and higher unemployment rates than the core. To exacerbate this, these areas have continued to suffer from a lack of investment putting a strain on the core to share resources and leading to tensions between the economically booming spine and the struggling rural areas. Over the long haul this imbalanced relationship between the core and the surrounding region is not sustainable.

Adjacent jurisdictions compete aggressively for firms and economic development prospects to locate within their borders. This competition spurs firms to locate wherever the best financial incentives are in place. However, when the incentives change, the firms may move to an adjacent locality to reap the benefits there. Although it may benefit an individual community, this form of location hopping is ultimately detrimental to the region.

Water Supply Trends

Overall, PAM’s water supply suffers from both undersupply and overuse of water sources. There is imbalance between where water is located and where it is needed. In recent years, the supply of water has become threatened in areas with the highest growth rates although supply sources differ. The Piedmont area relies more heavily on surface water while the coastal plains and coastal areas rely on groundwater. In both instances, signs of overuse are emerging as more intensive water consumption practices become commonplace. The 1998-2002 drought brought attention to the issue for many jurisdictions in the region. Rough projections of the water consumption rates for the six states that make up the region show a rapid rise in water consumption rates.
FIGURE 34: Water Consumption Rates

There are small rivers, small recharge areas and limited number of reservoirs for surface water storage in urbanized areas of the Piedmont where growth is concentrated. For example, despite receiving nearly 50 inches of rain annually, Atlanta already has an acute problem. The Atlanta metropolitan region is estimated to have adequate water supply for its population growth until 2030, but only if water conservation increases (to an 11 percent reduction below today’s levels) and re-allocation of water use occurs in the two primary water reservoirs that serve the area: Lake Lanier and Lake Allatoona (North Georgia Metropolitan Water Planning District, 2003). Other major metropolitan areas in PAM are discovering the issue. Estimates show that 25 percent of North Carolina’s public water supply systems are expected to reach their limit by 2010 (North Carolina Rural Economic Development Center, 2004).

Coastal and rural areas that rely more heavily on groundwater systems are not immune to water supply issues. In rural areas there is an increasing demand for water for agriculture purposes. In coastal urbanized areas, over-pumping from the local aquifers has led to saltwater intrusion into the groundwater. This problem is in Beaufort, South Carolina, Savannah and Brunswick, Georgia, and Pensacola, Florida. (Northwest Florida Water Management District, 2003) but is likely to spread to other coastal communities experiencing growth.

The great need for water has created a tension resulting in PAM states facing intra-regional conflicts over water allocation (e.g., “Tri-state Water Wars”) and a definitive need for water conservation policies, treatment and re-use of water, and the environmental protection of recharge areas. Thus, providing for an adequate water supply to meet the diverse needs of the region is likely to become one of the most important issues in the coming years.
**Water Pollution Trends**

The sprawling growth in PAM has created increased problems with management of stormwater run-off. The increase in impervious surfaces has resulted in problems with pollutants from parking areas and road surfaces entering the aquatic systems. Without natural areas to disperse and absorb rainwater there has been an increase in erosion, sedimentation, demand on utilities, pollutants from stormwater runoff, and overall pollutant loads in many areas. This pollution leads to decreasing water quality and difficult and expensive treatment options.

**Land Use and Conservation Trends**

Sprawl is characterized by the rate of land consumption exceeding population growth. If sprawling development trends continue in PAM there will be a loss of valuable natural and undeveloped spaces. Associated with development, there is a lack of a coherent regional strategy with respect to land conservation targets. The Environmental Law Institute suggests that the most effective form of greenspace protection is through programs that maximize connectivity between protected areas. However, with each state or local entity pursuing its own targets, it is difficult to develop a greenspace system that maximizes connectivity and the protection of key natural areas and habitats which in turn reduces the sustainability of greenspace protection. In addition, over-reliance on private land preservation programs without a strong oversight and review function by a publicly accountable entity runs the risk of creating a series of protected areas that are not connected and do not represent the most valuable lands for protection. Although PAM recognizes the need for greenspace protection, it is not being pursued in a comprehensive manner now or in the future.

**Air Quality**

Major markers of the Southeast regions growth is the rapid increase in automobile usage and industrial development and their related problem of air quality in the region. If current trends continue, air quality will continue to deteriorate. Air quality is closely tied to transportation and economic issues, since some of the primary sources for air pollution in PAM are industrial and vehicular (American Lung Association, 2004). The majority of major metropolitan areas experience non-attainment periods regularly. The smaller metropolitan areas are also experiencing increasing problems with non-attainment. With the projected dramatic increase in population and few non-automobile transportation alternatives air quality will continue to deteriorate and produce increasing non-attainment levels in the major and minor metro areas.
Equity and Education Trends
The greatest failures in economic and social inequity are exemplified in the core where deep racial and ethnic disparities persist on indicators such as education, income, homeownership, and assets. Unfortunately, many of these disparities trends show no signs of reduction. Furthermore, since cities house a disproportionate share of low-income families, they cannot wholly bear the full challenge of housing affordability, healthcare and public education (Katz, 2005). Currently, PAM also suffers from a lack of educational performance and attainment. As the ethnic composition of the region changes, the educational system will be stressed further in an attempt to educate a larger population that do not speak English at home as well as to counter the effects of a significant population oriented to low-skill professions.

If these trends continue the implications for the PAM region include a continued disparity in wealth and limited and unequal access to resources. These disparities between rich and poor could have a negative effect on the appeal of the PAM region as a center for economic activity and growth. Therefore, planners should focus sustainability efforts in the areas of the region that are experiencing the greatest inequity and reduce them to ensure the future attraction and sustainability of the PAM region on the global marketplace.

Transportation and Infrastructure Trends
Due to current policies and infrastructure travelers in PAM metropolitan areas will have to rely almost exclusively on auto travel for access to work, shopping and other destinations. This creates a host of sustainability concerns including pollution, marginalization of non-drivers, injuries (or death) and cost from crashes; and further congestion. If the region’s near-total reliance on trucking for freight transportation continues, there will be many of the same issues as passenger commuting traffic patterns. In addition, the economic benefits of the region will be jeopardized if energy costs, environmental concerns, congestion, or other problems make auto travel and truck shipping less feasible with no ready alternative at hand. If long-distance travel and shipping continue to grow as rapidly as they have, environmental pressures from air travel and waterborne shipping will grow concurrently. These problems will be particularly difficult to solve at the metropolitan or regional level, since jurisdiction over these areas lies at the national or international level.

Rapid population growth will put new pressures on the funding for infrastructure in coming decades just as aging existing wastewater infrastructure is requiring expensive retrofits. In addition, energy use is growing faster than the national average reflecting population growth. Heavy reliance on fossil-fuel power plants will continue to cause environmental problems, including emissions of particulate matter,
mercury and greenhouse gases, and the environmentally damaging extraction of coal from Appalachia. New methods, new sources and conservation strategies must be considered

Governance Trends
In PAM, policies directed at economic development, growth management, water supply and educational attainment are often implemented at the wrong scale, or are not implemented due to implementation difficulty which increases, from local to state to federal levels. This trend in policy development and implementation has negative consequences for the region. In PAM, state governments allocate responsibilities to local government where land use regulation is a commonly allocated. But this system ignores the cumulative effect of many local decisions and the quality of state policy intervention varies. Some states require comprehensive planning at the local level, some even require local plans be consistent with state plans, but oversight of plan implementation is limited. Local municipalities continue to act in (what they perceive as) their own best interest. One of the greatest challenges for the future of PAM lies in convincing local entities to reduce either territory or powers to a regional council whereas currently they cannot be compelled to do so. “Indeed, local autonomy is the principle reason that American governments are unwilling to enter into arrangements for regional governance.” (Norris, 2001, p. 566) In order to ensure a sustainable future, new levels of policy implementation must be institutionalized to address problems that ignore state and local (even national) boundaries (McDonald, 1996).

Conclusion
Population growth provides important economic drivers to stimulate the economy but accordingly plays a negative role in increased development pressures and environmental degradation in the form of low-density suburban development known generally as sprawl. This sprawl takes its toll on available land resources and is a major concern for the future of the region. Furthermore, population growth could negatively impact and deepen inequities in the future. Employment and economic development for the region are closely tied both to the strengths and weaknesses of the education, infrastructure, and transportation systems. Without correction, the lack of high quality education, adequate water, sewer, and other infrastructure, and an efficient and balanced transportation system will negatively impact the economy of the region.
CHAPTER 5:
Sustainability Responses

The PAM research team concluded our project with an exploration and discussion of possible responses to the sustainability issues we identified. For every five persons in the region now, there will be almost nine by 2050. Growth of this magnitude brings both dynamic advantages and opportunities, but also great threats to the region. Without action now, the region will only see increasing social and economic inequity, further economic challenges and ever expanding sprawl.

As planners our role is to identify and evaluate possible solutions to the challenges our region faces in the next fifty years. This section presents potential approaches to addressing these three concerns to stimulate debate and to substantiate the need for a new spatial focus for planning and policy - that of the region. The brief presentation of ideas in this section is not meant to propose probable or even the “best” responses, we did not research the feasibility of implementation. Rather, we explored approaches that have been presented in the literature or attempted at the local scale, in order to begin the process of identifying the type of responses that will be needed. Our hope is that some of these proposals may one day be developed into useful tools for those who engage in long term policy making and those who engage in the day to day decision making that will guide the future of PAM.

Managed Development

One of the defining characteristics of PAM is the prevalence of sprawling growth patterns. The rate at which land is being consumed and converted into urbanized and suburbanized land is exceeding the rate at which populations are growing (Fulton, 2001). The disadvantages of these sprawling growth patterns have been amply highlighted in the previous sections of this report. Sprawl can be countered by land use planning that utilizes managed development approaches. The concept of “managed development” does not discourage development and growth; rather it encourages controlled and thoughtful development in recognition of the issues facing PAM. In this section several approaches to managed development are presented as examples of what can be done to address the problem of sprawl. It is important to note that any single solution is dependant upon coordination with the implementation of other policies. Isolated or singular approaches may act in opposition to one another, and one of the keys to success is to identify and address these “unintended consequences.”

One strategy for managed development is to encourage compact development in urban centers. In urban areas, compact development is encouraged in order to 1) reduce the requirement for additional infrastructure (e.g., sewer and water), 2) make public transit more feasible and 3) decrease
dependence on the automobile. One of the most effective means for bringing about compact development is to focus on infill development, which is the concentration of new development in areas of existing development to maximize those pre-existing loci. Local governments may be able to institute flexible zoning policies, improve infrastructure and provide economic or tax-based incentives to encourage infill development (Nelson and Duncan, 1995).

Another managed development strategy involves the enhancement of residential options through diversity. PAM consumers should be provided with real choices for community lifestyles. Current zoning and subdivision standards often result in homogenous and limited lifestyle options, especially in the sprawling suburbs. As biodiversity is analogous to a healthy ecosystem, a diversity of community options is analogous to a healthy region. Planning and zoning tools should include alternatives such as walkable villages, real towns or dense inner cities. “In cases when such choices are available, they almost always outperform the overall real estate market” (Calthorpe and Fulton, 2001, p. 273). Managed development can also encourage mixed-income housing that improves and diversifies educational opportunities and builds social capital, both addressing our equity concern. In rural areas, managed development would require continuation of large lot sizes (as large as 50 acres or more) to preserve farmlands, forests and natural habitats and to reduce sprawl. These are examples of diversified development patterns that can lead PAM development in a direction that provides for a sustainable and satisfying 2050 future.

**Green Infrastructure**

Land is being developed faster in PAM today than ever before. In the Atlanta metropolitan area, for instance, twenty-five percent (25 percent) of the tree cover has been lost since 1973, which translates into nearly fifty acres of trees lost every day (Benedict and McMahon, 2002). Furthermore, the elements of man-made infrastructure which facilitate the movement of people, goods and information have created a network of barriers to our natural systems. These barriers are in conflict with the natural landscape, impede natural processes, spatially fragment land uses, and isolate open space (Williamson, 2003). In order to offset these losses and systematically protect the ecosystems within PAM, we propose the establishment, planning, and implementation of a “green infrastructure.” Green infrastructure is the ecological framework needed for environmental, social and economic sustainability. These natural networks provide essential ecological solutions that offset impacts created by infrastructure.

Green infrastructure is a network of open space, woodlands, wildlife habitat, parks and other natural areas that sustains clean air, water and natural ecological processes and enriches our quality of life (Benedict and McMahon, 2002). The concept of green infrastructure repositions open space protection
from a community amenity to a community necessity (Benedict and McMahon, 2002). Green infrastructure components encompass a variety of natural and restored eco-systems and landscape features that make up a system of hubs and links.

Hubs anchor green infrastructure networks and provide origins and destinations for wildlife and ecological processes (McQueen & McMahon, 2003). Hubs include:

- Reserves: lands that protect significant ecological sites
- Managed Native Landscapes: large publicly-owned lands
- Working Lands: private working lands, including farmland, forests, and ranch lands.
- Parks and Open Space Areas: landscapes at the national, state, regional, county, municipal and private level that may protect natural resources and/or provide recreational opportunities.
- Recycled Lands: lands that were previously damaged by intense public or private use and that have since been restored or reclaimed (Williamson, 2003).

Links are the connections between the hubs, facilitating the flow of ecological processes. Links include:

- Conservation Corridors: linear areas, such as river and stream corridors that serve primarily as biological conduits for wildlife and may provide recreational opportunities.
- Greenbelts: protected natural lands or working landscapes that serve as a framework for development while also preserving native ecosystems and/or farms or ranchlands.
- Landscape Linkages: open spaces that connect wildlife reserves, parks, managed and working lands and provide sufficient space for native plants and animals to flourish. In addition to protecting the local ecology, these linkages may contain cultural elements, such as historic resources (Williamson, 2003).

The underlying concepts of green infrastructure include the science of conservation biology and the practice of ecosystem management (Benedict and McMahon, 2002). An analysis of the specific types, extents and qualities of the vegetation, wildlife, topography and resources of an area should be made to determine the role that each landscape feature plays in supporting natural processes (Williamson, 2003). Linking parks and other green spaces for the benefit of communities is also an integral concept. Green infrastructure is not intended to isolate people from nature by creating a separate network of open spaces just for wildlife. Its purpose is to integrate nature back into the community in a way that facilitates various levels of human interaction with the environment based upon the resiliency of the natural resources being protected. Demographic information, historical research and economic data should be used to plan viable green infrastructure (Williamson, 2003).
An effective network of green infrastructure cannot stop abruptly at the edge of the implementing jurisdiction. There are many laudatory efforts being made to develop and implement informed greenspace strategies, but to date, there is very little coordination between these local initiatives. Consider how much more effective a regionally based green infrastructure would be if it stretched seamlessly from Mobile, Alabama to Wilmington, North Carolina!

**Transportation Options**

The provision of transportation and infrastructure poses many sustainability challenges both today and in coming decades, as population and consumption grow. This section focuses on one response: reduction of car dependence, in large part by the provision of other transportation mode choices. Note that we are not simply advocating “increased mobility.” PAM is a hyper-mobile region, traveling billions of miles a year by car. Increased transportation options should go hand-in-hand with land-use reforms to minimize the need for travel and thus reduce congestion, and these options should include such low-impact, low-mileage modes as walking and cycling.

As already presented in this document, PAM is heavily dependent on auto and truck travel at both the metropolitan and regional levels. Motor vehicle travel has been spurred by existing spatial development patterns with enforced separation of uses at the metropolitan level and footloose industry developing in far-flung greenfield locations on the metropolitan and regional levels. Motor vehicle travel has also been encouraged because “alternative” modes historically receive less-certain and lower funding compared to the automobile.

We propose the following:

1. At the metropolitan level, re-orient transportation planning away from car mobility as the defining standard in traffic engineering. A focus on mobility, or the potential for free movement in the system, has led to more and wider streets and highways, but as detailed earlier, the system still produces many unwanted, unsustainable effects. Planners need to develop new standards for funding and executing transportation projects. Transportation systems should be judged on the access they provide to destinations, not simply movement (Ewing, 1993; Handy, 2002).

2. Also, at the metropolitan level, roadway construction procedures should be revised to allow for context-sensitive design (CSD). CSD recognizes that urban and suburban arterials and highways have long been designed at inter-city, rural standards, with resulting high-speed traffic and reductions in livability and walkability. Instead, urban and suburban roadways should be designed for appropriate,
moderate speeds, using traffic-calming and other tools, with pedestrian options fully considered (Federal Highway Administration, 2005).

3. At the regional level, expanding mode choice should involve rail. There are already moves to provide this infrastructure; since 1992 the federal government and four southeastern states have been advancing a proposal to create a Southeastern High Speed Rail Corridor that would link major PAM cities to Washington, with rail speeds of up to 110 mph. Such a network would draw traffic from highways and even from short-hop air flights. According to supporters, it would:
   - Provide transportation options,
   - Reduce the rate of congestion growth,
   - Improve safety,
   - Improve energy efficiency, and
   - Improve air quality (Southeast High Speed Rail Corridor, 2005).

The Southeast High Speed Rail Corridor, shown in Figure 35, which is now under study, began with links between Washington and Charlotte (red). Other links are now part of the proposal (blue).

FIGURE 35: Southeast High Speed Rail Corridor

Source: Southeast High Speed Rail, www.sehsr.org
Revenue Sharing

Competition between local governments is often seen as a good thing. In fact, Charles Tiebout advocated the “vote with your feet” hypothesis where governments compete for businesses and residents through the bundle of services they offer. Theoretically, this would lead to specialized cities that provide services to attract a particular demographic (Tiebout, 1956). For instance, a city that invests heavily in their public schools would attract families with children or one that subsidizes parks and trails would draw those seeking an outdoor lifestyle.

Competition between local governments can have negative results, however. Often a municipality can suffer a loss in revenue from which it never recovers, such as a city that has historically relied on an industry that has since relocated abroad, or one that has been bypassed by large-scale federal infrastructure investments, or even one that has been damaged by a now defunct landfill. The loss of revenue means reduced services, which leads to less desirable living conditions and less people (and businesses) choosing to locate there, resulting in even less revenue-generating capability. This is the Tiebout theory in force, and it is a vicious cycle that increases the disparity between municipalities in a region and increases segregation as well. “The metropolitan areas with the greatest tax base inequality are very likely to show the greatest segregation by race and income.” (Orfield, 2003, p. 57)

Can competition between neighboring cities be realized on such an uneven playing field? Regional revenue sharing could break the cycle of fiscal disparities among municipalities and allow disadvantaged communities to begin to overcome their seemingly insurmountable challenges.

Competition between relatively equal cities can also have negative consequences. For example, commercial development typically yields greater revenue then the amount necessary to provide basic municipal services. Since a local government’s ability to provide services and maintain infrastructure is directly related to its capacity to raise revenue, city officials can be inclined to over-zone commercial districts or be more amenable to zoning changes that favor retail or office development, even when such actions may have negative externalities. Inadequate provision of housing, for instance, increases the jobs-housing disparity, forcing workers to live far from employment centers. Once again, regional revenue sharing can lessen this unhealthy competition by reducing the pressure to raise fiscal capacity.

Revenue sharing can take many forms. In one example, highlighted by Myron Orfield (2003), the Minnesota Twin Cities region adopted a form of tax sharing among its 187 jurisdictions beginning in 1971. The tax system works by designating 40 percent of taxes on new commercial and industrial development throughout the metropolitan area to a redistribution pool. This money goes back to the local governments using an allocation formula based on the local government’s ability to raise revenue. This system has made significant progress. Since its inception the disparity between the wealthiest
local government in the Twin Cities area and the poorest local government has changed from 47:1 to 11:1 (Orfield, 1997).

Regional Cooperation
The final section of this report on PAM has explored several big ideas and bold policy proposals that highlight the scope of the challenges facing PAM in the next 50 years. One of the most difficult and far-reaching of these proposals is our final proposal: the creation of a new institutional arrangement in United States governance — that of a regional entity. In PAM, we have proposed this entity be called the Piedmont Atlantic Alliance (PAA). The text of this report hints at the volume of planning and policy literature focused on this problem; the “critical problem” for sustainable development is scale of governance (McDonald, 1996, p. 230). “A system of planning based on unfettered local powers and responsibilities over the environmental and socioeconomic character of development is unlikely to be sustainable - the situation would be a tragedy of the commons on a global scale.”(McDonald, 1996, 231) The future of PAM depends upon overcoming this problem.

The current mix of environmental policy, growth management and regional planning is lacking effective “political structures” at the regional level. “We are stranded between national solutions too generic, bureaucratic, and large, and local solutions too isolated, anemic, and reactionary.” (Calthorpe & Fulton, 2001, p. 4) Effective regional cooperation is relatively non-existent in this country for many reasons (Norris, 2001). The American public shows a strong belief in local government and these governments have powers protected by state constitutions. Citizens have the most interaction with their local government. They do not view regional entities as having a role in their problems, nor do they perceive themselves as part of a “region,” however defined. Residents identify with their home towns and locally elected politicians, making it “difficult for citizens to attach psychologically or emotionally to regional institutions” (Norris, 2001, 564). Effective regional cooperation must overcome this detachment and make the connections between problems throughout the region.

The creation and acceptance of PAA should occur in stages over time. Initially this institution would primarily be an information exchange forum, negotiating voluntary agreements and informal cooperation. The role of the PAA would be to bring the fragmented and functionally disparate entities together to enhance their knowledge of overlapping problems and cumulative effects of their actions. PAA would also be responsible for collecting and analyzing economic and demographic data for the region, for analyzing environmental trends, and reporting on the global competitiveness of the region. As such, PAA would require the support and assistance of academic, non-for-profit, economic development, and special interest organizations. PAA should operate at a strategic and long-term
planning level. As it gains in acceptance and recognition, PAA would require a board of directors democratically elected to be representative according to the size of the population of participating cities, municipalities and counties.

Eventual recognition of PAA and others like it around the country could eventually extend to the federal level. These regional entities should advocate for fiscal resources to enhance lagging areas within their regions, engage in planning for infrastructure and transportation improvements, and enhance environmental programs such as watershed management. PAA would not replace any existing governance structure, but promote the interactions of these entities and fill the existing regional-level gap. PAA will promote the super-city and its surrounding region of the Piedmont Atlantic Megalopolis such that the future spatial distribution of people and businesses is sustainable. A regional entity of this magnitude is necessary to implement the proposals that have been presented in this report: managed development strategies, regional green infrastructure, expanded transport options and regional revenue sharing.

As pointed out by Calthorpe and Fulton (2001, p. 43): “Again and again we sacrifice the synergy of the whole for the efficiency of the parts”. The central challenge for a sustainable future for PAM is to enhance the synergy of the whole so that improvements are possible for both the parts and the whole.
The goals for the southeast SuperCity research team were much larger than anything we could accomplish in one semester. We set out to understand spatial planning, to learn about sustainable development, and to apply the concepts of sustainability to spatial planning. We attempted to identify the boundaries of the southeast SuperCity region, and then to characterize both the inhabitants and the physical features of this place — man-made and natural. We tried to relate the flows of people and goods to underlying infrastructure, and to understand the economic strengths and weaknesses of a geographic area for which such data is not tabulated. We then attempted to predict what the future may hold. We attempted to understand all this from multiple spatial scales: local, metropolitan, rural, suburban, state and federal.

To reach our goals the southeast SuperCity research team often relied on the work of others. We benefited from earlier work done by University of Pennsylvania students for the Washington-New York-Boston SuperCity region. We also learned from planners in the European Union. We reviewed multiple resources to learn about issues that not only face our region, but our nation as more and more people compete for fewer and fewer resources. We attempted to bring together policy and planning solutions proposed by other researchers and academics who have been struggling with the very same questions about people, place and the future. And finally, we tried to gather all we have learned into one document.

This concluding Chapter serves not only to complete our paper, but also to look ahead to the challenges that the next set of researchers will face. This is a complicated task that will require the efforts of more than just one group of students or one institution. In this section several areas of future work are proposed including: boundary identification, linkages, land conservation analyses, building new relationships and developing indicators.

**Identifying Boundaries**

The methodology used to define PAM was a preliminary attempt to identify the functional relationships that exist among the cities, towns, and rural areas of the southeastern United States. These functional relationships are intended to capture environmental, economic, and social interactions. The technique we used to delineate PAM was based on a combination of existing methodologies that were not necessarily designed to work together. It was also limited by time and available data.
Future research should address these limitations by conducting case studies of other methods for defining regions. This research should also analyze additional indicators of equity, environmental, and economic linkages. For example, as we transition from a manufacturing to a service economy it is becoming increasingly important to understand not only commodity flows, but also communication flows. Collecting and analyzing this data should be the focus of future efforts. The variety of indicators could be combined in a GIS to see how they interact and what potential boundary changes, if any, would come about. Continuing research should also evaluate the pros and cons of using different boundaries for different factors. For example, watershed and natural boundaries may be appropriate for environmental factors, but commodity and communication flows may be a better indicator of an economic region.

Land Conservation Analyses

We only touched on the role of local initiatives in greenspace protection in this report. If, as we argue, coordination among local and state level greenspace protection programs is imperative for a truly effective and efficient regional greenspace infrastructure, further research into the nature and extent of local level greenspace efforts will be a fruitful area of inquiry. PAM must conserve its land resources, but more importantly, it must conserve them intelligently. Further research should bridge the gap between environmental scientists who are working in the area of ecosystem viability and those who design and administer the policy, legislation and programs to protect those ecosystems. Further research in these areas could be beneficial for designing effective greenspace protection tools.

Building New Relationships

Research into inter-regional cooperation and governance has many components. It should involve a review of all types of regional cooperation and governance that have been tried in the United States. This analysis should be combined with unique perspectives on regionalism from the European Union, and should make the case for what type of cooperative efforts may be appropriate for PAM. The researchers should explore how to begin building support for a new regional perspective.

The Role of Indicators

As planners, we are concerned about the quality of life for present and future generations of residents in PAM. As planners, we are focused on outcomes, thus the need to measure progress and a need for indicators. One of the next steps for the southeast SuperCity project is to understand the literature on indicators well enough to propose a specific list for PAM. The need for useful and relevant indicators
engages citizens and individuals from local governments to nonprofits to the federal government. These citizens and individuals will need to be active participants in constructing the appropriate set of indicators for PAM.

Other areas of needed research will emerge as this case study is continued by future research teams at Georgia Tech and elsewhere. The development of a spatial perspective at the regional scale is important for a sustainable future in the southeast SuperCity, as well as SuperCities throughout the United States and the world. Our efforts are just the small part of the process that will culminate in recognition of this fact. As planners, we will spend our careers working to enhance this perspective in our communities.
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