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TCRP Report 39

The Costs of Sprawl—Revisited

Transportation Research Board
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Report 39

The Costs of Sprawl—Revisited

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TRANSIT COOPERATIVE RESEARCH PROGRAM

The nation's growth and the need to meet mobility, environmental, and energy objectives place demands on public transit systems. Current systems, some of which are old and in need of upgrading, must expand service area, increase service frequency, and improve efficiency to serve these demands. Research is necessary to solve operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the transit industry. The Transit Cooperative Research Program (TCRP) serves as one of the principal means by which the transit industry can develop innovative near-term solutions to meet demands placed on it.

The need for TCRP was originally identified in *TRB Special Report 213—Research for Public Transit: New Directions*, published in 1987 and based on a study sponsored by the Urban Mass Transportation Administration—now the Federal Transit Administration (FTA). A report by the American Public Transit Association (APTA), *Transportation 2000*, also recognized the need for local, problem-solving research. TCRP, modeled after the longstanding and successful National Cooperative Highway Research Program, undertakes research and other technical activities in response to the needs of transit service providers. The scope of TCRP includes a variety of transit research fields including planning, service configuration, equipment, facilities, operations, human resources, maintenance, policy, and administrative practices.

TCRP was established under FTA sponsorship in July 1992. Proposed by the U.S. Department of Transportation, TCRP was authorized as part of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). On May 13, 1992, a memorandum agreement outlining TCRP operating procedures was executed by the three cooperating organizations: FTA; the National Academy of Sciences, acting through the **Transportation Research Board (TRB)**; and the Transit Development Corporation, Inc. (TDC), a nonprofit educational and research organization established by APTA. TDC is responsible for forming the independent governing board, designated as the TCRP Oversight and Project Selection (TOPS) Committee.

Research problem statements for TCRP are solicited periodically but may be submitted to TRB by anyone at any time. It is the responsibility of the TOPS Committee to formulate the research program by identifying the highest priority projects. As part of the evaluation, the TOPS Committee defines funding levels and expected products.

Once selected, each project is assigned to an expert panel, appointed by the Transportation Research Board. The panels prepare project statements (requests for proposals), select contractors, and provide technical guidance and counsel throughout the life of the project. The process for developing research problem statements and selecting research agencies has been used by TRB in managing cooperative research programs since 1962. As in other TRB activities, TCRP project panels serve voluntarily without compensation.

Because research cannot have the desired impact if products fail to reach the intended audience, special emphasis is placed on disseminating TCRP results to the intended end users of the research: transit agencies, service providers, and suppliers. TRB provides a series of research reports, syntheses of transit practice, and other supporting material developed by TCRP research. APTA will arrange for workshops, training aids, field visits, and other activities to ensure that results are implemented by urban and rural transit industry practitioners.

The TCRP provides a forum where transit agencies can cooperatively address common operational problems. The TCRP results support and complement other ongoing transit research and training programs.

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The members of the technical advisory panel selected to monitor this project and to review this report were chosen for recognized scholarly competence and with due consideration for the balance of disciplines appropriate to the project. The opinions and conclusions expressed or implied are those of the research agency that performed the research, and while they have been accepted as appropriate by the technical panel, they are not necessarily those of the Transportation Research Board, the National Research Council, the Transit Development Corporation, or the Federal Transit Administration of the U.S. Department of Transportation.

Each report is reviewed and accepted for publication by the technical panel according to procedures established and monitored by the Transportation Research Board Executive Committee and the Governing Board of the National Research Council.

To save time and money in disseminating the research findings, the report is essentially the original text as submitted by the research agency. This report has not been edited by TRB.

Special Notice

The Transportation Research Board, the National Research Council, the Transit Development Corporation, and the Federal Transit Administration (sponsor of the Transit Cooperative Research Program) do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the clarity and completeness of the project reporting.

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FOREWORD

*By Staff
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TCRP Report 39 will be of interest to individuals involved in ongoing discussions and debates about urban sprawl and its effects. This report is a literature review that represents the culmination of the first phase of TCRP Project H-10, "The Costs of Sprawl—Revisited." The report was prepared by Rutgers University's Center for Urban Policy Research, in conjunction with The Brookings Institution, Parsons Brinckerhoff Quade and Douglas, Inc., and ECONorthwest. Urban sprawl is a topic that interests urban planners, economists, environmentalists, sociologists, transportation professionals, policymakers and public officials, academics in many fields, and the general public.

Regardless of the focus of any particular debate or discussion on urban sprawl, most such discussions attempt to define sprawl and address whether it is "good" or "bad." Consequently, Chapter 1 of Section I of *TCRP Report 39* provides a working definition of sprawl and its associated costs. The next chapter provides historical discussion, dating back to the early 1920s when zoning acts were initially developed, and to the 1950s when the term "sprawl" entered the planning literature. As indicated by the title of this research project, the seminal 1974 report *The Costs of Sprawl*, prepared by the Real Estate Research Corporation, serves as a springboard for this research effort.

Section II of the report contains the Literature Synthesis. This section systematically presents the literature on sprawl in chapters that focus on the following major areas of impact:

- Public/private capital and operating costs,
- Transportation and travel costs,
- Land/natural habitat preservation,
- Quality of life, and
- Social issues.

Throughout this section, the research team discusses the literature and identifies the extent to which there is agreement and disagreement about the premises and conclusions.

Section III of the report presents annotations of studies, organized in chapters that focus on the same five major impact areas as Section II.

While this report will not resolve the debate on the benefits and costs of urban sprawl, it provides an important repository of information for the debaters.

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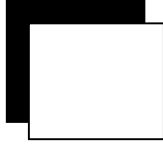
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PREFACE

In 1974, the Real Estate Research Corporation published a three-volume study entitled *The Costs of Sprawl*. The study consisted of an Executive Summary, Detailed Costs Analysis (Volume I), and Literature Review/Bibliography (Volume II). It encompassed more than one thousand pages. From the time of its publication until today, it has been regarded by the social science community as one of the most significant critiques of sprawl and among the most influential studies ever undertaken. *The Costs of Sprawl* has been cited in countless environmental and planning reports and journals; it has been reviewed—both positively and negatively—by more than one hundred journals and magazines; and it has been presented as the seminal study on growth impacts to numerous Congressional committees and bodies. *The Costs of Sprawl* was funded jointly by the U.S. Council on Environmental Quality, the Department of Housing and Urban Development, and the Environmental Protection Agency.

The Costs of Sprawl, like no other study before, sought to isolate both density and location of development as significant contributors to the costs of development.

The study analyzed six hypothetical new communities of 10,000 dwelling units each, from high density (19-20 units per acre) to intermediate density (3-4 units per acre); from communities with high levels of planning and design to those lacking significant planning. The study analyzed impacts on infrastructure, housing, transportation, energy, environmental, and quality of life costs of sprawl (Real Estate Research Corporation [RERC] 1974).

Although *The Costs of Sprawl* was influential, it was also flawed. The analyses of community types allowed unit size and number of occupants to vary, and the savings attributed to different community types were actually a function of the differing size (and types) of units and numbers of people found there. The absence of sprawl was not the reason for the savings; smaller units and fewer people to service were the cause of the savings. Yet, even though these shortcomings were uncovered, the direction of the findings so paralleled past and current intuitive feelings that the study continues to be used twenty-five years later as one of the most cogent arguments against sprawled development patterns.

Why such interest in sprawl? Although Americans like their single-family residences, automobiles, and suburban lifestyles, there is a nagging feeling that both the aesthetics of how communities develop and the efficiency of movement within and between them could be improved. In addition, buried down deep is a recognition that Americans are wasteful in their consumption of manmade (infrastructure) and natural (land) resources, and that their development choices are selfish in terms of impacts on central cities and the populations within them. But first it must be shown to the citizenry at large that there is a problem, because life is good and "If it ain't broke, don't fix it." Is suburban sprawl different from an alternative form of development? Is it less efficient? Does it cause resources to be needlessly consumed? Is there an alternative? What do those who have studied this issue say? How substantively strong is the evidence they bring to bear?

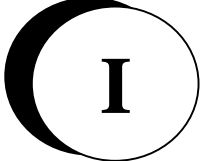
The study that follows is a detailed examination of most of the information that can be assembled on both sprawl and its costs in an effort to answer the above questions. The monograph views the *costs of sprawl* (with lower-case letters) as investigated in a variety of types and forms of about 500 studies. These studies vary between those that: (1) focus specifically on sprawl, and those that deal with suburban or exurban development; (2) are highly quantitative, involving modeling or econometric analyses, and those that are qualitative and purely descriptive; (3) concern the "harder" or physical/engineering aspects of sprawl, and those that substantively involve "softer" or quality of life/social issues; (4) are primary analyses and break new ground, and those that are secondary analyses of the works of others that add very little; and (5) vilify sprawl and see no positive effects, and those that champion

the development form as purely and unequivocally "American" with few, if any, negative impacts.

With regard to the latter, this assemblage of material identifies and provides evidence for both negative and positive impacts of sprawl in each of five impact categories. These are: (1) *public and private capital and operating costs*; (2) *transportation and travel costs*; (3) *land/natural habitat preservation*; (4) *quality of life*; and (5) *social issues*.

The work contained in this monograph is divided into three sections and thirteen chapters. *Section I* contains two chapters that provide an introduction to, and an historical overview of, sprawl's "growth." Chapter One contains an introduction to the concept of sprawl, including its defining traits; Chapter Two highlights significant events in the evolution of the sprawl literature. *Section II* is a synthesis of the literature of sprawl's impacts: To what degree can the impact be recognized, and what is its relation to sprawl? It divides sprawl's impacts—more than 40 in total, two-thirds negative and one-third positive—into the above five impact categories. The first five chapters of this section discuss each of the above categories of impacts. The sixth chapter in this section presents in summary form information from the previous chapters both quantitatively and qualitatively. *Section III* individually annotates approximately one-quarter of the sprawl literature. Again, this section is broken down into five chapters according to the five sprawl impact categories.

The review of the sprawl literature is designed to be historical, substantive, comprehensive, and integrative. Presented in this way, the reader will be drawn into the argument about sprawl from its origins to the present.

SECTION


INTRODUCTION

The literature review that follows is an analysis of the writings and studies concerning a pattern of land development in the United States termed "sprawl." Sprawl is the spread-out, skipped-over development that characterizes the non-central city metropolitan areas and non-metropolitan areas of the United States. Sprawl is one- or two-story, single-family residential development on lots ranging in size from one-third to one acre (less acreage on the West Coast), accompanied by strip commercial centers and industrial parks, also two stories or less in height and with a similar amount of land takings (Ewing 1997).

Sprawl occurs on a micro basis in almost every county of the United States (although it occurs in significant amounts in only about one-fifth of the nation's 3,200 counties). Sprawl also occurs in Western and Eastern European, Latin American, and Asian countries in response to increased affluence and

growing dependence on the automobile as the preferred method of intra- and inter-metropolitan travel. Most United States counties that contain sprawl have it in its residential form—i.e., low-density residential development in rural and undeveloped areas. Some counties are characterized by nonresidential sprawl, commercial and industrial development with floor-area ratios less than 0.2 located in the same types of areas (Burchell and Shad 1998).

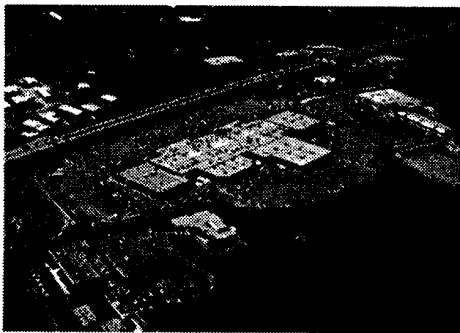
Sprawl is the spread-out, skipped-over development that characterizes the non-central city metropolitan areas and non-metropolitan areas of the United States. — Ewing 1997

Sprawl occurs, in part, because local governments in the United States encourage this form of development via zoning and subdivision ordinances which, in turn, reflect the desires of a large share of their citizenry. This type of

development is favored by the general public because it (among other factors):

- 1) dilutes congestion while accommodating unlimited use of the automobile;
- 2) distances new development from the fiscal and social problems of older core areas;
- 3) provides a heterogeneous economic mix;
- 4) fosters neighborhoods in which housing will appreciate;
- 5) fosters neighborhoods in which schools provide both education and appropriate socialization for youth; and
- 6) requires lower property taxes to pay for local and school district operating expenses than locations closer in. (Burchell 1997a)

Sprawl is so well-accepted by the public that the AAA-rated locations for both residential and nonresidential development are increasingly farther out rather than closer in, and more rather than less segregated by type of land use (Gordon and Richardson 1997a). Gated communities, farmettes, research parks,



Large regional malls, initially located along undeveloped highway interchanges, stimulate rapid additional surrounding development.

Source: Constance Beaumont, NTHP.

law offices, medical groups, megahardware and home improvement stores, theatrical and comedy clubs, new and used car lots, and restaurants all now seek peripheral locations in pursuit of

their markets. The move to the far reaches of the metropolitan area began with single-family subdivisions; shopping centers and garden apartments sprang up next; then research and industrial parks; then restaurants and entertainment facilities; and finally, discounters of every form.

The unique aspect of all this development is that few entities have ever failed because their outward locational decisions were in the wrong direction. Occasionally, a retailer or a residential development has gone under because an exit on the interstate or beltway wasn't developed as planned, but rarely has an economic entity failed in the United States because it was developed too far out.

The move to the far reaches of the metropolitan area began with single-family subdivisions; shopping centers and garden apartments sprang up next; then research and industrial parks; then restaurants and entertainment facilities; and finally, discounters of every form.

The newest and soon-to-be one of the most successful airports in the United States is 33 miles from the city of Denver; a taxi ride from the airport baggage claim to the downtown Hyatt costs \$40. Is this an anomaly? No. Cincinnati's new airport is so far from the downtown that it is not even in the same state! Both airports have already drawn nonresidential development and are now drawing residential development to their edges. Both are tens of miles from the nearest existing development of these types. But neither can justify its location solely on flight pattern interference with residential environments. Instead, the locations were chosen for exactly the same reason other land use locations are chosen: an abundance of land was available, and it

was both relatively inexpensive and easy to assemble.

If sprawl is so desirable, why should the citizens of the United States accept anything else? The answer is that they no longer can pay for the infrastructure necessary to develop farther and farther out in metropolitan areas. In the state of South Carolina, if sprawl continues unchecked, statewide infrastructure costs for the period 1995 to 2015 are projected to be more than \$56 billion, or \$750 per citizen per year for the next twenty years. In addition to a massive infrastructure conservation program and the adoption of numerous technological cost savers, funding infrastructure in this state could require an increase in the gasoline tax of 2¢/gallon; an increase in the state sales tax of 0.5%; an increase in property taxes of 12.5%; the tolling of all interstates at 30-mile intervals; impact fees on residential and nonresidential development of \$2,000 per unit and per 1,000 square feet, respectively; and a mandatory 10 percent set-aside for infrastructure in all state, county, municipal, and school district general funds and intergovernmental transfer revenues (Burchell 1997b).



Despite massive road expenditures, I-395 in Arlington, Virginia, slows to a gridlock during rush-hour traffic.

Source: Virginia Department of Transportation.

The big-ticket item in all infrastructure projections is roads. In South Carolina, roads are expected to cost \$25 billion, almost half of the total \$56 billion infrastructure budget. In South Carolina,

roads will cost 2.5 times what will be spent on primary, secondary, and higher education infrastructure; three times what will be spent on health infrastructure, including all hospitals, institutions, and all water-sewer treatment systems; ten times what will be spent on public safety, administration, and justice infrastructure; fifteen times what will be spent on environmental protection infrastructure; and twenty-five times what will be spent on all cultural and recreational infrastructure.

Dually supporting and underutilizing two systems of infrastructure—one that is being abandoned in and around central cities and close-in suburbs, and one that is not yet fully used in rural areas just beginning to be developed—is causing governments to forgo the maintenance of much infrastructure and the provision of anything *other* than growth-related infrastructure. The United States, in other words, is funding road infrastructure by:

- 1) not funding all infrastructure;
- 2) not *fully* funding developmental infrastructure;
- 3) not repairing or replacing most types of infrastructure; and
- 4) not taking advantage of the technological improvements in rehabilitation, repair, and provision of infrastructure that could be passed on to taxpayers as savings.

Still, by no means is an alternative to the current pattern of land development the panacea. If South Carolina were to switch to compact development and managed growth measures to curtail spread development, the state would be able to save only about 10 percent of the projected \$56 billion infrastructure costs, or approximately \$5.6 billion. This is because about 40 percent of public infrastructure costs are not growth-related, and only about two-thirds of the remainder is *new* growth-related. When

development pattern savings are applied to the appropriate portion of new growth-related infrastructure costs, therefore, the saving is only 12–15 percent.

On the other hand, increasing the gasoline tax by 2¢/gallon in South Carolina, would have raised only \$56 million in new revenues statewide—one one-thousandth of the total required infrastructure costs—and one one-hundredth of the amount that potentially could be saved by altering land development patterns (Burchell 1997b).

In sum, most of the American public is not unhappy with the current pattern of development in metropolitan areas—it simply can no longer afford it. Thus, the primary concern about sprawl development, at a time when the average American is satisfied with its outcome, is *cost*. And costs need to be measured not just in terms of capital improvement but also in terms of resource depletion. Land in the United States is being consumed at triple the rate of household formation;

automobile use is growing twice as fast as the population; and prime agricultural land, forests, and fragile lands encompassing natural habitats are decreasing at comparable reciprocal rates (Landis 1995).

In sum, most of the American public is not unhappy with the current pattern of development in metropolitan areas—it simply can no longer afford it.

As a result, the professional transportation and city planning communities are beginning to look at sprawl to determine whether an alternative to this growth pattern can be conceived, and even more importantly, whether it makes sense to pursue an alternative pattern of growth. Does any alternative pose a viable option to current methods and forms of metropolitan development? A significant literature has developed in this area and is overviewed in this section.

CHAPTER

1

DEFINING SPRAWL

Sprawl, in its broadest sense, has long been an American zeitgeist. Alexis de Tocqueville, touring the United States in the early 1800s, observed "no urban growth boundaries," but rather marveled at "America ... where everything is in constant motion ... and where no boundaries were set to the efforts of man." Today's sprawl is the frontier of long ago; it is akin to the post-war suburb—both of which have been extolled as defining American influences.

John Delafons, Fellow at the Harvard/MIT Joint Center in 1961, chose as a research topic a comparison of British and American land-use controls. His work, *Land Use Controls in America*, provides an insightful look at the growth of the U.S. "system" of controls from 1920 to 1960 by an outsider who came from a country with a very formal system of land-use controls.

Delafons describes the U.S. system of master planning, zoning, and subdivision control as heavily influenced by a "prairie psychology." He explains that U.S. development patterns are characterized by:

- a) a supply of land which is viewed as virtually unlimited;
- b) land that is open to all and property ownership rights that are encouraged and protected by the U.S. Constitution;
- c) economic forces that are barely understood and should not be tampered with;
- d) development professionals who prepare land for development and do not question whether the land should be developed (i.e., they make sure utilities are in place and feeder roads have been planned for); and
- e) a basic distrust of elected and appointed officials, so that all procedures are codified and development that qualifies under these procedures does so "as of right," with minimal public review. (Delafons 1962)

U.S. development controls, he claims, are "static" and thus lack the ability to control tempo (timing) and sequence (which location first) of development. Development is free to wander and to take place incrementally in jurisdictions in the United States because existing land use

controls allow this to happen (Delafons 1962).

Many agree with Delafons' insight. Although some view contemporary development patterns as a reflection of the invisible but sure hand of the market (Gordon and Richardson 1997a), the unbridled movement outward of leapfrog, low-density development is increasingly being viewed as an American ill (Richmond 1995). Sprawl has taken on both a pejorative as well as a descriptive connotation, an intermixing that makes a balanced discussion, which attempts to disentangle the costs and benefits of sprawl, difficult.

U.S. development controls are "static" and thus lack the ability to control tempo (timing) and sequence (which location first) of development.

The shift to the suburbs has, of course, been manifest for more than half a century. In 1940, only 15 percent of the United States population resided in the suburbs (defined as metropolitan areas outside of central cities). As the millennium approaches, about 60 percent of the population is counted as suburban. Even the most vehement critics of sprawl recognize that suburban and exurban growth patterns have been and will continue to be inescapable development forms in the United States. The recent population increase of some 20 million people per decade is likely to continue for at least the next quarter-century. As a result, there will continue to be skipped-over development in rural and undeveloped areas. It would be totally unrealistic to expect even a moderate share of growth to occur solely in already built-up neighborhoods in cities or in close-by inner suburbs. Even the suburbs are being bypassed now by development seeking locations at the fringe of

metropolitan areas (Nelson and Sanchez 1997).

A WORKING DEFINITION OF SPRAWL

Density, or more specifically, *low density*, is one of the cardinal defining characteristics of sprawl. But density has to be set in context; cross-cultural and place-oriented differences factor into the definition of sprawl. Densities in the United States overall are roughly one-tenth what they are in Western Europe; in turn, Western European density is much lower than that of Japan and only a fraction of what is found in such locations as Hong Kong and Indonesia (Jackson 1985). And in all of the above locations, suburban densities are lower than the densities of central cities. Sprawl is not simply development at less-than-maximum density; rather, it refers to development that, given a national and regional framework (i.e., suburbs in various locations of the United States), is at a low *relative* density, and one that may be too costly to maintain.

Sprawl refers to a particular type of suburban peripheral growth. It refers to development that expands in an *unlimited and noncontiguous (leapfrog) way outward* from the solidly built-up core of a metropolitan area. In terms of land-use type, sprawl includes both *residential and nonresidential development*. Residential development contains primarily single-family housing, including significant numbers of distant units scattered in outlying areas. Nonresidential development includes shopping centers, strip retail outlets along arterial roads, industrial and office parks, and free-standing industrial and office buildings, as well as schools and other public buildings.

These different types of land uses are, for the most part, *spatially segregated* from one another. The components of this development are individually located in small subdivisions in zoning districts. Within each district, usually only one type of use is permitted—e.g., single-family residential, shopping centers, strip commercial, industrial, or office parks.

Another of sprawl's distinguishing traits is its *consumption of exurban agricultural and other frail lands* in abundance; these are the types of land found at the periphery of development. The loss of agricultural acreage takes place in significant amounts because it often is the cheapest land available for development. Fragile environmental lands are swallowed up because they are part of the otherwise developable tracts. These tracts would not be developed if the environment was adequately protected.

Under sprawl conditions, there is almost total *reliance upon the automobile* as a means of accessing the individual land uses. Seventy years ago, the streetcar was the most popular form of transportation to the suburbs. Nowadays the automobile is the most efficient means of accessing sprawl's outward extension and skipped-over development. For seven-day-a-week business and recreational use, including both at-peak and off-peak use, nothing can match the automobile for cost, efficiency, and versatility—at least in the short term.

Some analysts also include *the small developer* and *a lack of integrated land-use planning as important aspects of suburban sprawl*, and point to the relatively small residential subdivisions and nonresidential site plans created by individual developers operating independently of each other within the zoning districts of the 10,000 local governments found throughout the United States. The legal framework within which

sprawl occurs is fragmented into numerous relatively small units, separately controlled by discrete local governments with unique rules and regulations. These localities have different fiscal resources per capita (assessed valuation of residential and nonresidential properties). Some are quite wealthy; others have limited ability to pay for local services. The poorer localities are at a severe disadvantage when competing for development.



The automobile has replaced the streetcar, stimulating sprawl development.
Source: Minnesota Historical Society.

Still, it must be stressed that sprawl is almost impossible to separate from all conventional development. Even though one may be able to comprehend what appears to be a better method of development, it is difficult to translate that method into practice.

Some components of sprawl are not easily measured. For example, although it is possible to track residential single-family and nonresidential commercial and retail development taking place at low densities in the United States, accessed by automobiles in rural and undeveloped areas, this is the point at which almost all tracking stops. Measures of leapfrog development or development that is spatially segregated are virtually impossible. Measures of how much development is being delivered by small

developers in local jurisdictions is achievable but generally unproductive.

Finally, although a measure of gross residential density (number of dwelling units divided by area of jurisdiction) is available from several sources and can provide some indication of land taken per developed unit, the gross measure often masks the actual land takings of individual new developments.

On the other hand, there is little evidence to suggest that conventional development in a given location is anything other than leapfrog, segregated, and land-consuming. Thus, sprawl development can be characterized with some certainty as low-density residential and nonresidential intrusions into rural and undeveloped areas, and with less certainty as leapfrog, segregated, and land-consuming in its typical form.

A WORKING DEFINITION OF THE COSTS OF SPRAWL

The "costs" of sprawl have been talked about for decades, often without a full understanding of what these costs are and to what level they should be assigned. In the original RERC (1974) *Costs of Sprawl* study, costs were calculated in six different substantive areas and assigned to three different levels: infrastructure and transportation costs were assigned to the community, housing and quality-of-life costs to the individual, and energy and environmental costs to both the community and to society as a whole (RERC 1974). This is a characteristic of the sprawl literature which is only beginning to be addressed at the end of a twenty-five-year observation period. The work of Sam Seskin of Parsons Brinckerhoff and Terry Moore of ECONorthwest on full-cost accounting of transportation costs is breaking new

ground in viewing the totality of costs of public policy decisions (Parsons Brinckerhoff and ECONorthwest 1996). Their work is the exception. *Most cost-accounting efforts assign sprawl costs to either the easiest or the most common level of measurement.*

For definitional purposes, *the "costs" of sprawl are the resources expended relative to a type, density, and/or location of development.* These "costs" involve physical, monetary, temporal, and social/psychological resources. They involve costs to the individual, to the community, and to society. Most of the costs specified to date are physical or monetary, although occasionally social costs (e.g., the loss of upward mobility) or psychological costs (e.g., the loss of sense of community) are documented.

There is little evidence to suggest that conventional development in a given location is anything other than leapfrog, segregated, and land-consuming.

The "benefits" of sprawl are mirror images of costs. They involve resource gains due to type of development pattern and include categories of gain similar to those of losses stated above. This might involve a temporal gain in suburb-to-suburb travel time because most residences and jobs are now both suburban, or monetary gains due to reduced housing costs also from building farther out, or social gains such as the ability to achieve homeownership, again due to location in more distant places.

Costs and benefits are reported in the form that the primary research provides. In almost all cases, these are *costs* at the *community* level as opposed to costs at the individual or societal levels, or benefits at any level.

CHAPTER

2

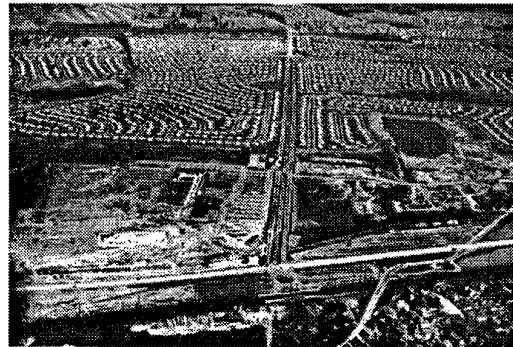
HISTORICAL OVERVIEW

Sensitivity to the consequences of sprawl-like settlement predates the coining of the term. The 1929 Regional Plan of the New York Metropolitan area, for instance, warned of a steady decrease in farms and open-space acreage in the region and underscored the need for settlement patterns that encouraged "the face to face association that characterized the old village community" (Regional Plan 1929, 23 and 216). At the same time, the Regional Plan spoke approvingly of "many carefully planned outer subdivisions with good features" (Regional Plan 1929, 1).

Concern about sprawl-like patterns of development was appropriate at this time. The Standard Zoning Enabling Act (1922), drafted under the aegis of Secretary of Commerce Herbert Hoover, the Standard City Planning Enabling Act (1928), and the legalization of zoning that resulted from the 1926 Supreme Court decision (*Euclid v. Amber Realty*) unleashed a barrage of "model" zoning and planning-enabling legislation across the United States. Euclidean zoning of segregated land uses and the emergence of the automobile began to establish the first

distant "suburbs" throughout the United States.

It was not until roughly the late 1950s and early 1960s, however, that sprawl as a planning term entered the literature. The land development pattern it depicted was typically criticized. Herbert Gans in *The Levittowners* described Levittown development of the 1950s as "residents living in a sea of cell-like structures on a



Levittown, Pennsylvania: post-World War II suburbia.

Source: Carl Byoir and Associates (New York).
Courtesy American Planning Association.

remote potato farm with cars spilling out of every street" (Gans 1967). In 1956, a Canadian planning study described urban sprawl as "scattered building

development" that had led to "inconveniences in the placement of public and business facilities" (Lower Mainland Regional Planning Board 1956). A year later, William H. Whyte, describing urban sprawl as leapfrog, scattered development, spoke of it as "a problem that had reached national proportions" (Whyte 1957).

The political and social climate of the period, however, provided definite financial incentives for building homes in the suburbs in the form of federally insured low-cost mortgages. This period also witnessed the massive federally subsidized expansion of U.S. highways (1956 *Interstate Highway Act*), including the establishment of the interstate system. The new roadway system, together with the growth in accessible, low-cost mortgages, helped push development far beyond the nation's central cities (APA 1997). Relatively few people seriously challenged this new pattern of growth in the outlying areas or questioned the changes in central cities brought about by multi-lane freeways.

Others soon entered the discussion, however. Marion Clawson, in 1962, described sprawl as a "lack of continuity in expansion," and noted it was both fostered by, and contributed to, land speculation (Clawson 1962). Similar literature of the period, including Lessinger (1962), Harvey and Clark (1965), and Bahl (1968) viewed sprawl as characterized by such features as lowdensity, scattered, and leapfrog patterns. Harvey and Clark (1965) identified the three cardinal traits of sprawl as lowdensity, ribbon, and leapfrog development.

Even at this early stage, pundits acknowledged the difficulty in defining the term sprawl. Writing in 1972, David McKee and Gerald Smith observed that:

Urban sprawl is rather difficult to define. In some circles the term is thought to be synonymous with suburbia. Certainly the problem exists in suburbia but suburbia itself is not the problem. Some equate sprawl with expansion. But this type of definition is not too helpful. (McKee and Smith 1972, 181-182)

McKee and Smith went on to describe sprawl in four forms: 1) very low-density development (i.e., two- to five-acre zoning); 2) ribbon-variety development extending along access routes; 3) leapfrog development; and 4) a "haphazard intermingling of developed and vacant land" (McKee and Smith 1972). The authors claimed that sprawl aggravated suburban problems (e.g., automobile dependence and the high cost of services and infrastructure) and also deleteriously affected cities by depressing real estate values, among other things.

The political and social climate of the period provided definite financial incentives for building homes in the suburbs.

Discussion of sprawl's effects transcended economics. Although the 1973 Rockefeller Brothers Task Force publication, *The Use of Land*, did not speak of sprawl per se, it concluded that the dominant pattern of "unrestrained, piecemeal urbanization" was leading citizens to ask how such growth affected their "quality of life" (Reilly 1973, 33). In a similar vein, *The Language of Cities* and the *Encyclopedia of Community Planning and Environmental Management* defined sprawl, respectively, as:

the awkward spreading out of the limbs of either a man or a community. The first is a product of bad manners, the second of bad planning. Sprawl is a by-product of the highway and automobile, which enabled the spread of development in all directions. As

builders scramble for lots to build on, the journey to work is lengthened and green spaces are consumed by gas stations and clutter. (Abrams 1971, 293-294)

the uncontrolled growth of urban development into previously rural areas. Sprawl refers to a mixture of land uses occurring in an unplanned pattern. Urban sprawl has been strongly criticized as an unattractive and inefficient use of land and resources, causing excessive infrastructure costs related to extending utilities to remote areas. It has also been accused of eliminating environmentally important open space while leapfrogging developable parcels. (Schultz and Kasen 1984, 378-379)

THE FIRST STUDIES ON THE COSTS OF SPRAWL

In the 1960s, professional research began to be undertaken in numerous areas relevant to the study of sprawl. Examples of this early research include *Innovation Versus Tradition in Community Development* (ULI 1963), which looked at the effects of development patterns on road lengths; *Howard County Study* (Howard County 1967), which considered comparative, countywide costs of roads, utilities, schools, and open space under sprawl versus more planned scenarios; *Urban Form and the Cost of Public Services* (Kain 1967), which considered public service costs at varying densities; *Planned Residential Environments* (Lansing 1970), which looked at how different overall development patterns influence trip generation rates and distances; *Total Energy Demonstration* (HUD 1972), which measured likely savings in energy consumption in planned communities; and *The Relationship of Land Use and Transportation Planning to Air Quality Management* (Hagevik 1972),

which examined how development planning affects air pollution on a regional basis. Although not articulated, the substantive foci in analyzing sprawl versus alternatives—namely, the issues of transportation, infrastructure, public service costs, and land and environmental issues—were already being formulated.

Many of these early studies were referenced by the bellwether study, *The Costs of Sprawl*, authored by the Real Estate Research Corporation in 1974. As summarized by RERC:

This analysis presents a complete and internally consistent set of estimates for direct costs and adverse effects resulting from prototypical housing types and land development patterns at neighborhood and community levels. Six neighborhood prototypes—differing in housing type and density—are analyzed, along with six community prototypes which represent different degrees of community-wide planning. ... Stated in the most general form, the major conclusion of this study is that, for a fixed number of households, sprawl is the most expensive form of residential development in terms of economic costs, environmental costs, natural resource consumption, and many types of personal costs. (RERC 1974, 2-7)

The Costs of Sprawl did not explicitly define the term "sprawl." As a matter of fact, those close to the study indicate that the term appeared as an afterthought in the title and summary of findings and was not used explicitly elsewhere in the study. The analysis of six community-level growth patterns within the study implied that sprawl development had at least two major traits: low average residential density (3 units or less per net residential acre), and a lack of overall planning at either the regional or community level. RERC did not define sprawl's specific

density characteristics, nor did it define its residential and nonresidential components.

RERC considered approximately 20 individual effects (see Table 1). As seen in Table 2, these costs can be grouped into four overall categories encompassing:

- 1) public-private capital and operating costs;
- 2) transportation and travel costs;
- 3) land and natural habitat preservation; and
- 4) quality of life.

Not considered in *The Costs of Sprawl*, and not part of its research charge, was any examination of sprawl's social effects, such as its impacts on cities.

The RERC study evoked a flood of commentary—much praise as well as some criticism. Two of the better known criticisms were articulated by Altshuler (1977) and Windsor (1979). Among other points, Altshuler argued that RERC underestimated the demand for services by higher-density development and commingled the effects resulting from high density and smaller-unit size. Windsor, in parallel, criticized RERC for not disentangling density from other factors, and among other shortfalls, argued that RERC ignored the benefits of sprawl, such as its "response to consumer preference" for single-family detached homes. These early points of opposition on the costs/benefits of sprawl are still present twenty years later and can be seen in the recent exchanges between Gordon/Richardson and Ewing on the subject (Gordon and Richardson 1997a; Ewing 1997).

Although the findings of *The Costs of Sprawl* dominated the literature for some time, new analyses continued to be published. Examples include David Popenoe's (1979) depiction of sprawl as

low-density, scattered strip development, which focused on its adverse sociological implications. In 1981, David Mills described sprawl as scattered, leapfrog development, and discussed how it both abetted and resulted from land speculation.

Not considered in The Costs of Sprawl, and not part of its research charge, was any examination of sprawl's social effects, such as its impacts on cities.

BURCHELL/LISTOKIN AND TISCHLER ON FISCAL IMPACTS

During the time period between the first and interim studies on the *capital* costs of growth, the national work of Robert W. Burchell/David Listokin of Rutgers University and Paul Tischler in fiscal impact analysis, or the examination of the *operating* costs of growth, came to the fore. From the early 1970s to the late 1980s, numerous studies were undertaken on the municipal and school district costs of growth. Burchell and Listokin were participating authors in *Housing Development and Municipal Costs* (Sternlieb 1975) and coauthored *The Fiscal Impact Handbook* (1978) and *The Practitioner's Guide to Fiscal Impact Analysis* series (1980, 1985). Paul Tischler, a private consultant, undertook studies throughout the country using the *MUNIES* and *FISCALS* models developed by him and others.

The fiscal impact studies sought to preview for a community, county, or school district the impact of projected development on future educational and noneducational public service demands. Burchell and Listokin offered an *average costing* approach built on regional and statewide demographic multipliers for the demand for public services, and average

historical costs for the costs of public services. Burchell and Listokin balanced the calculation of costs with revenue calculations in three categories: property tax, non-tax, and intergovernmental transfers. This was termed the *Per Capita Multiplier* fiscal impact technique, which became the method used in creating their fiscal impact hierarchy and the basis of their *Development Impact Assessment Handbook* (Burchell, Listokin, and Dolphin 1994). Burchell and Listokin found that most conventional residential development negatively impacted the host service provider, whereas open space development and nonresidential development broke even or positively impacted the host service provider. These studies paid little attention to explicit capital costs except that ongoing debt service was a component of operating costs.

Paul Tischler used a *marginal costing* approach in most of his fiscal impact analyses. In *MUNIES* and *FISCALS*, a great deal of time was spent gathering both site-specific data and information on excess or deficient service capacity locally. Tischler actually termed a component of his overall fiscal impact analysis a "level of service analysis." The Tischler studies involved detailed calculations of how a specific community with a particular set of financial conditions would respond if growth were to take place immediately.

Paul Tischler headed the economic committee of the American Planning Association from 1980 to 1990. Tischler generally reached the same conclusions on the fiscal impacts of residential development, open space, and nonresidential development as did Burchell/Listokin. Conventional residential development was generally found to be fiscally negative, open space or undeveloped land to be break-even, and

nonresidential development to produce positive fiscal impacts. Tischler and Associates was involved in costs of growth studies in numerous locations nationally and has also been involved in alternative development and impact fee studies.

These two groups, with different approaches and different audiences, found generally the same conclusions on the fiscal attributes of various types of land uses. They established for the planning and land development fields a solidification of opinion on the future public costs of residential and nonresidential development.

THE INTERIM STUDIES: MANAGED GROWTH COSTS IN CALIFORNIA; THE COSTS OF SPRAWL IN FLORIDA (DUNCAN AND FRANK)

In the early 1980s, in response to the rampant development of the 1970s, growth control ordinances began springing up in California and Florida cities. These included Davis (CA), Petaluma (CA), and Boca Raton (FL). Before one or more of these ordinances were challenged and set aside, initial inquiry concerned their potential impact on local housing costs. If growth were curtailed through building permit or population caps or through adequate public facilities ordinances, would these factors contribute to increased housing costs? Almost everyone looking at these issues concluded that growth control ordinances did increase local housing costs (Katz and Rosen 1987; Schwartz et al. 1981, 1989). Further, excessive growth management through protracted permitting processes, including fiscal impact analysis, coastal zone management procedures, natural resource inventories, and other mechanisms, was also found to increase housing costs (Parsons 1992).

TABLE 1
REAL ESTATE RESEARCH CORPORATION (RERC 1974a)
THE COSTS OF SPRAWL: SUMMARY OF FINDINGS

Category	Community Prototypes (10,000 units)					Neighborhood Prototypes (1,000 units)				
	Low-density Sprawl	Low-density Planned	Sprawl Mix	Planned Mix	High-density Planned	Single-family Conventional	Single-family Clustered	Townhouse Clustered	Walk-up Apartment	High-rise Apartment
INFRASTRUCTURE	<i>Capital costs per unit</i>									
Recreation	\$ 268	\$ 297	\$ 268	\$ 297	\$ 297	\$ 220	\$ 274	\$ 274	\$ 252	\$ 203
Schools	4,538	4,538	4,538	4,538	4,538	5,354	5,354	4,538	4,538	1,646
Public Facilities	1,662	1,626	1,645	1,622	1,630					
Roads/streets	3,797	3,377	3,235	2,708	2,286	3,080	2,661	2,111	1,464	801
Utilities	6,197	4,744	3,868	3,323	2,243	5,483	3,649	2,369	1,579	958
Infrastructure	16,462	14,582	13,556	12,487	10,995	14,137	11,938	9,292	7,833	3,628
Subtotal										
Construction/Other ^a	34,994	34,398	23,728	23,266	17,711	34,774	34,320	17,967	13,449	17,088
Total Unit Costs	\$ 51,456	\$ 48,981	\$ 37,283	\$ 35,753	\$ 28,706	\$ 48,911	\$ 46,258	\$ 27,259	\$ 21,282	\$ 20,696
Public Proportion	19%	12%	24%	16%	18%	15%	15%	20%	25%	13%
Public Costs	\$ 9,777	\$ 5,878	\$ 8,948	\$ 5,720	\$ 5,167	\$ 7,337	\$ 6,939	\$ 5,452	\$ 5,321	\$ 2,690
OPERATING	<i>Annual Nonresidential Operating and Maintenance Costs per Unit (in year 10)</i>									
Operating Costs	\$ 2,111	\$ 2,067	\$ 1,965	\$ 1,937	\$ 1,873	\$ 1,721	\$ 1,720	\$ 1,388	\$ 1,319	\$ 548
Public Proportion	57%	51%	61%	55%	55%	67%	67%	72%	74%	57%
Public Costs	\$ 1,203	\$ 1,054	\$ 1,199	\$ 1,065	\$ 1,030	\$ 1,153	\$ 1,152	\$ 999	\$ 976	\$ 312
LAND	<i>Land Required (for 10,000 units)</i>									
Total Acres	NA	NA	NA	NA	NA	5000	4000	3000	2000	1000
Developed Acres	4,590	4,113	2,780	3,040	2,173	NA	NA	NA	NA	NA
Vacant, Improved Acres	459	206	278	152	109	NA	NA	NA	NA	NA
Vacant, Semi-improved Acres	951	617	1,390	456	326	NA	NA	NA	NA	NA
Vacant, Unimproved Acres	—	1,064	1,552	2,352	3,392	NA	NA	NA	NA	NA
Total Vacant Acres	1,410	1,887	3,220	2,960	3,827	NA	NA	NA	NA	NA
ENVIRONMENT	<i>Principal Environmental Impacts (for 10,000 units)</i>									
Non-auto Air Pollutants ^b	1,420	1,420	1,034	1,034	809	1,420	1,420	951	738	644
Sewage Effluent ^c	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Water Use ^d	1,170	1,100	910	910	760	1,205	1,059	913	730	639
Non-auto Energy Use ^e	2,355	2,355	1,750	1,750	1,400	2,398	2,398	1,595	1,232	1,056

Notes: All dollar figures are per dwelling unit in 1973 dollars.

NA = Not applicable

^a Includes construction cost of the unit and other expenses such as land dedication.

^b Lbs. per day.

^c Billion liters per year.

^d Million gallons per year.

^e Billion BTU's per year.

Source: RERC (1974), Vol. 1, Executive Summary.

TABLE 2
REAL ESTATE RESEARCH CORPORATION (RERC 1974) THE COSTS OF SPRAWL:
SUBSTANTIVE AREAS OF INQUIRY

<i>Topics Considered By RERC (1974)</i>	<i>Public- Private Capital and Operating Costs</i>	<i>Transportation and Travel Costs</i>	<i>Land and Natural Habitat Preservation</i>	<i>Quality of Life</i>
Capital and Operating Costs				
Capital				
• Recreation	X			
• Schools	X			
• Public Facilities	X			
• Utilities	X			
• Road/streets		X		
Operating	X			
Land Requirements				
• Total acres			X	
• Developed acres			X	
• Vacant, improved/semi-improved acres			X	
• Vacant unimproved acres			X	
Principal Environmental Impacts				
• Nonauto air pollutants				X
• Sewage effluent				X
• Nonauto energy use				X
• Water use				X

By the late 1980s, two important costs of sprawl studies were undertaken in Florida. James Duncan, a consultant working for the Florida Department of Community Affairs, studied the capital infrastructure requirements of sprawl (scattered) versus compact development forms. Duncan found that various forms of scattered development could be as much as 70 percent more costly than equivalent forms of compact development (Duncan et al. 1989).

A colleague, James Frank of Florida State University, in research conducted for the Urban Land Institute, updated several early (1950s and 1960s) isolated costs of

Various forms of scattered development could be as much as 70 percent more costly than equivalent forms of compact development.

sprawl studies with 1987 data and prices, and assembled their results. His findings were similar to Duncan's: "contiguous" development was 45 percent less expensive for roads, water, and sewer than "leapfrog, far-out" development (Frank 1989). The Duncan and Frank studies are cited throughout the costs of sprawl literature.

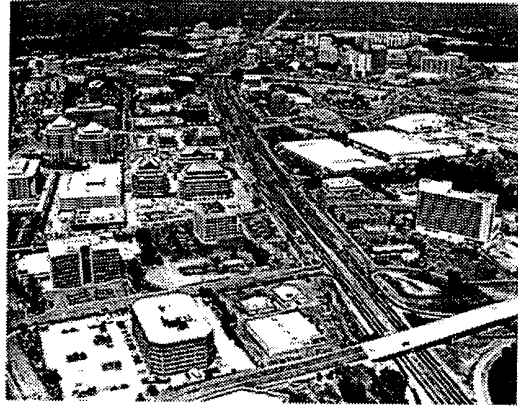
CHARACTERIZING SPRAWL: CRABGRASS FRONTIERS AND EDGE CITIES

Kenneth Jackson's *Crabgrass Frontier: The Suburbanization of the United States*, published in 1985, received much acclaim. Although sprawl per se was not mentioned in this monograph, numerous traits attributed by Jackson to the "crabgrass frontier" were clearly sprawl-like in character. These attributes were:

- 1) low residential density and the absence of sharp divisions between town and country
- 2) the socioeconomic distinction between the center and the periphery
- 3) a lengthy journey to work in terms of distance and time.

Jackson attributed the permanence of the crabgrass frontier to physical as well as political factors (e.g., that America was land-rich and had fragmented local governments). He also noted its problems (e.g., high local public service costs and increased automobile dependence) as well as its benefits (high level of housing amenity and individual open space).

Approximately six years after the publication of *Crabgrass Frontier*, journalist Joel Garreau published *Edge City: Life on the New Frontier* (portions of the book were actually in print before this time). Unique to Garreau's work was the concentration on peripheral *nonresidential* clusters brought together at suburban junctures of major beltways and axial interstate roads. These "edge cities" formed a new kind of metropolis because nonresidential development was soon joined by high-density residential development to form relatively self-sustaining urban clusters at edges of built-up areas. These clusters were unique; no more than fifty existed in the United States, and they represented sprawl at an urban scale (Garreau 1991).



Tyson's Corner in Fairfax County, Virginia, the prototypical "edge city."

Source: County of Fairfax (Virginia), Office of Comprehensive Planning.

During the early part of the 1980s, in a country with a newly refound admiration for capitalism, and in the latter part of that decade, in a recession that paid the price for earlier deficit spending, the literature on sprawl was relatively quiescent. The trend has reversed itself in the 1990s; as will be seen, there has been an outpouring of studies. These studies are reviewed in Section II of this report by substantive area. To give a sense of the current literature—and the current definition of sprawl and its alleged costs and benefits—a sampling is discussed here.

These "edge cities" formed a new kind of metropolis.

SPRAWL AND CITIES: DOWNS, RUSK AND BARNETT

In his 1994 book, *New Visions for Metropolitan America*, Anthony Downs adopted a broader approach for defining sprawl that primarily referred to density but included some other characteristics as well. Downs, building on an earlier work, *Stuck in Traffic* (Downs 1992), defined sprawl as encompassing five major elements:

- 1) low-density, primarily single-family residential settlement (without any numerical density specified)
- 2) heavy dependence upon private automotive vehicles for all types of travel
- 3) scatteration of job locations widely across the landscape in mainly low-density establishments (also without any numerical density specified)
- 4) fragmentation of governance authority over land uses among many relatively small localities
- 5) widespread reliance on the filtering or "trickle down" process to provide housing for low-income households.

New Visions for Metropolitan America proposed a basic method for analyzing sprawl—i.e., comparing its results to the results that might arise from alternative forms of metropolitan growth. Downs described a way of formulating alternative outcomes through an analysis of the basic traits of different growth strategies. Downs's approach is incorporated and described in more detail later in Section II.

As is apparent, even the most current literature on sprawl tends to *describe* its attributes rather than *quantify* them. Very few quantified analyses of sprawl's impacts or relationships to other variables appear anywhere in the literature. As a result, few studies have mathematically or statistically linked sprawl to other conditions or metropolitan traits.

A limited attempt at quantification was put forth in the 1993 work by David Rusk in *Cities Without Suburbs*. He calculated an "index of elasticity" that measured the ability of cities to extend their boundaries to encompass surrounding urbanized development. "Elasticity" is essentially the same as annexation, i.e., movement

outward from the city center (sprawl) without the creation of new political jurisdictions. Rusk claims that cities with high indices of elasticity are superior to those with low indices of elasticity, in terms of income distribution, racial integration, population growth, and economic development. The best cities are "elastic" cities, he claims, and applies his index both to cities themselves as well as their metropolitan areas.

Rusk himself did not perform mathematical or statistical analyses relating the variables just described, but three reviewers of his book did. John P. Blair, Samuel R. Staley, and Zhongcai Zhang (1996) used multiple regression employing measures of growth and economic welfare over the period 1980-1990 as independent variables, against Rusk's index of elasticity as the dependent variable. These reviewers concluded that Rusk's index of elasticity had statistically significant effects of the expected types on *city* employment,

The most current literature tends to describe sprawl's attributes rather than quantify them.

population, poverty, and per capita income growth and significant effects of the expected types on *metropolitan-area* population and employment growth—but not of the expected types on *metropolitan-area* per capita income or poverty growth. However, even where the regression equations identified statistically significant effects, they had low R^2 s (low explanatory power), an outcome that indicated that other unspecified variables were possibly not included in the regression equation. An implication of this analysis was that either Rusk's index of elasticity is not a useful indicator of sprawl or the indicator itself, due to its construction, inherently produced low levels of explanation.

City-suburban relationships were also considered by Jonathan Barnett in his 1995 book, *The Fractured Metropolis*. This analysis of metropolitan area trends was strictly narrative and advanced the thesis that U.S. metropolitan areas were splitting into "old cities" and "new cities." Barnett proposed that future growth be redirected into the "old cities." Much of his work was skewed toward physical design and planning; it favored compact development over sprawl and encouraged commercial development within, and the creation of urban growth boundaries around, older metropolitan cities.

SECOND GENERATION STUDIES ON THE COSTS OF SPRAWL

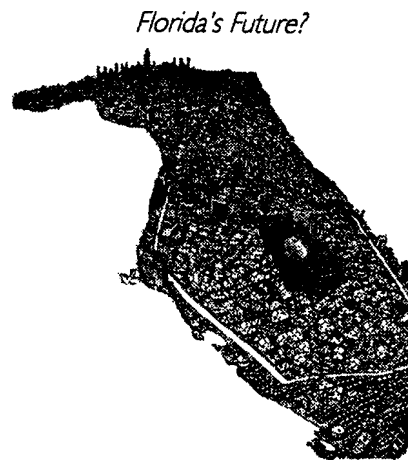
Research into methods to address the costs of sprawl and a study of the underlying data have been undertaken at both the Center for Urban Policy Research at Rutgers University and at the University of California—Berkeley. Starting in the early 1990s, Rutgers University researchers, led by Robert W. Burchell, began to quantify the relative impacts of alternative patterns of development. One or two years later, under John D. Landis, similar efforts were undertaken at the Institute of Urban and Regional Development at Berkeley. Both research organizations have looked at the prospective impacts of alternative development patterns. Both research organizations developed comprehensive land-use models to carry out these analyses (Burchell 1992a, 1992b; Landis 1994, 1995).

Costs were defined primarily in terms of resource consumption at the community level. Sprawl was defined as skipped-over, low-density residential and nonresidential development.

The Rutgers effort involved an analysis of the differing effects of "trend development" (sprawl-like) and "planned development" (compact form with managed growth attributes) in New Jersey. The results obtained are shown in Table 3. This Rutgers study was preceded by similar work for the State of Maryland as part of its original attempt at a Growth Management Act. Significant efforts to confine sprawl to the Baltimore-Washington corridor have been undertaken in Maryland.

Sprawl is defined as skipped-over, low-density residential and nonresidential development. — Burchell 1992a; Landis 1994

The New Jersey and Maryland analyses were followed by similar studies for Lexington, Kentucky (Burchell and Listokin 1994b), the Delaware Estuary (Burchell and Moskowitz 1995), and the States of Michigan (Burchell 1997a) and South Carolina (Burchell 1997b). Research is also currently underway, at Rutgers, for the State of Florida as part of its *Eastward Ho!* initiative, a development plan aimed at keeping a large share of future development east of Route I-95 in five southern counties. In all instances,



Florida's *Eastward Ho!* initiative hopes to avert this potential future.

Source: Tim Reilly, *Sunshine: The Magazine of South Florida*.

TABLE 3
BURCHELL (1992)—NEW JERSEY IMPACT ASSESSMENT:
SUMMARY OF IMPACTS OF TREND VERSUS PLANNED DEVELOPMENT

<i>Growth/Development Impacts</i>	<i>Trend Development</i>	<i>Planned Development</i>	<i>Trend Versus Planned Development</i>	
			<i>Difference</i>	<i>%</i>
I. POPULATION GROWTH (persons)	520,012	520,012	0	0
II. HOUSEHOLD GROWTH (households)	431,000	431,000	0	0
III. EMPLOYMENT GROWTH (employees)	653,600	653,600	0	0
IV. INFRASTRUCTURE				
A. ROADS (\$ millions)				
Local	\$2,197	\$1,630	\$567	25.8
State	727	595	132	18.2
Total Roads	\$2,924	\$2,225	\$699	23.9
B. UTILITIES—Water (\$ millions)	\$ 634	\$ 550	\$ 84	13.2
C. UTILITIES—Sewer (\$ millions)	\$6,790	\$6,313	\$477	7.0
Total Utilities	\$7,424	\$6,863	\$561	7.6
E. SCHOOLS (\$ millions)	\$5,296	\$5,123	\$173	3.3
F. ALL INFRASTRUCTURE (sum of A–E in \$ millions)	\$15,644	\$14,211	\$1,433	9.2
V. LAND CONSUMPTION				
A. Overall Land (acres)	292,079	117,607	174,472	59.7
B. Frail Lands (acres)	36,482	6,139	30,343	83.2
C. Agricultural Lands (acres)	108,000	66,000	42,000	38.9
VI. HOUSE PRICE				
A. Median Cost per Unit (1990 \$)	\$172,567	\$162,162	\$10,495	6.1
B. Housing Index (higher is more affordable)	118	126	8	6.7

Source: Robert W. Burchell 1992a, b

TABLE 4
BURCHELL (1992-1997) FINDINGS OF SAVINGS OF COMPACT GROWTH
VERSUS CURRENT OR TREND DEVELOPMENT

<i>Area of Impact</i>	<i>Lexington, KY and Delaware Estuary</i>	<i>Michigan</i>	<i>South Carolina</i>	<i>New Jersey</i>
I. Public-Private Capital and Operating Costs				
1. Infrastructure Roads (local)	14.8-19.7%	12.4%	12%	26%
2. Utilities (water/sewer)	6.7-8.2%	13.7%	13%	8%
3. Housing Costs	2.5-8.4%	6.8%	7%	6%
4. Cost-Revenue Impacts	6.9%	3.5%	5%	2%
II. Land/Natural Habitat Preservation				
1. Developable Land	20.5-24.2%	15.5%	15%	6%
2. Agricultural Land	18-29%	17.4%	18%	39%
3. Frail Land	20-27%	20.9%	22%	17%

Source: Robert W. Burchell 1992-1997

polar development patterns are contrasted—i.e., "current" or "trend" growth is measured against "compact," or "planned" growth. The exact nomenclature in the studies is unimportant; what is important are the differing land-use configurations and their impacts, which are related below:

Current, or trend, development is historical development in an area. The land-use literature describes this type of development as skipping over existing development; land-consumptive and inefficient use of available land at or near the core of the metropolitan area; and requiring significant accompanying infrastructure in the form of roads, water and sewer lines, public buildings, and the like. *Compact, or a more managed, type of development* attempts to direct growth to already existing locations of development while preserving yet-to-be developed areas. Nationally, the land-use literature portrays compact development as more efficient in its land-use patterns and thus less land-consumptive. Accordingly, it often requires somewhat less development infrastructure. Compact development is also viewed as not limiting or restricting population or employment growth at the county, regional, or state levels. (Burchell 1997a, A-1)

Burchell developed a series of quantitative models relating to land consumption, road, transit, water/sewer infrastructure, fiscal impacts, housing cost, and quality of life to examine the relative effects of alternative development patterns. Application of these models across the aforementioned jurisdictions indicated comparable order-of-magnitude findings. For instance, a shift away from sprawl to compact growth was projected by Burchell to reduce water/sewer utility *infrastructure* costs by 8 percent in New Jersey, 7 percent in Lexington, 8 percent in the Delaware Estuary, 14 percent in

Michigan, and 13 percent in South Carolina. Table 4 summarizes the array of findings from the various Burchell studies (1992-1997). Table 5 groups the effects of sprawl, some dozen in all, into five overall categories.

The Berkeley effort employed the California Urban Futures (CUF) model of the San Francisco Bay Area to tabulate land consumed under three scenarios: (a) "business as usual"; (b) "maximum environmental protection"; and (c) "compact cities." These scenarios were differentiated, respectively, by (a) not restricting development either within the city or within unincorporated areas; (b) applying a range of environmental restrictions to both locations, but not restricting growth per se; and (c) restricting growth to acknowledge some environmental limitations and countywide minimum population projections. The two latter alternatives showed considerable overall *land* savings, particularly sensitive environmental land savings relative to the business-as-usual scenario. Total land saved in scenarios b and c was 15,000 and 46,000 acres, respectively. Scenario b saved nearly 60,000 acres of prime agricultural land, 10,400 acres of wetlands, and 2,800 acres of steep-sloped land; Scenario c saved 28,000 acres of prime agricultural land, 10,400 acres of wetlands, and 8,000 acres of steep-sloped lands (Landis 1995).

In a series of relatively current articles in *Environment and Planning Behavior*, Landis discussed the development and use of the second generation of the California Urban Futures Model. These articles were less about sprawl and land savings and more about urban modeling; still they suggested a framework for understanding and predicting the land-and habitat-taking effects of sprawl.

STUDIED REACTIONS TO SPRAWL—LUTRAQ (OREGON) AND CONCURRENCY (FLORIDA)

In the late 1980s and early 1990s, sprawl growth on the northwestern and southeastern coasts of the United States resulted in two different reactions—both supported by so-called "friends" organizations. In the first case, the organization was the *1000 Friends of Oregon*, in the second case, the *1000 Friends of Florida*.

In the early 1990s, growth in the Portland region was believed to hinge on the construction of a Western Bypass around the city. An alternative plan was sought to try to accommodate growth without the need for more highways. Sam Seskin of Parsons Brinckerhoff, leading a team of researchers in the Land Use Transportation Air Quality simulation (LUTRAQ), compared the transportation

impacts of a transit-oriented development (TOD) plan to the impacts of a preferred Bypass alternative. The LUTRAQ alternative shifted the location of 65% of new residential units and 78% of new jobs to locations within walking distance of light rail or bus transit lines by reconfiguring expected development into a series of mixed-use centers. The alternative showed a reduction in vehicle miles traveled and a reduction of the use of the automobile (Davis and Seskin 1997). Portland voters responded by approving a \$1 billion rail line along which TOD will occur, and Seskin received an American Planning Association award for the research effort.

Subsequent analyses produced by Genevieve Giuliano, however, found only small gains associated with non-automobile mode shares and very small reductions in vehicular travel. Equally

TABLE 5

BURCHELL (1992-1997) ANALYSIS OF TREND VERSUS PLANNED DEVELOPMENT: SUBSTANTIVE AREAS OF INQUIRY

<i>Topics Considered By Burchell (1992-1997)</i>	<i>Public-Private Capital and Operating Costs</i>	<i>Transportation and Travel Costs</i>	<i>Land and Natural Habitat Preservation</i>	<i>Quality of Life</i>	<i>Social Effects</i>
• Water/sewer infrastructure	X				
• School capital facilities	X				
• Housing cost	X				
• Fiscal impacts	X				
• Roads		X			
• Transit		X			
• Land capacity			X		
• Agricultural lands			X		
• Frail lands			X		
• Quality of life				X	
• Intergovernmental coordination				X	
• Effects on urban and rural centers					X

Source: Robert W. Burchell 1992-1997

distressing, the magnitude of investment in transit services needed to be quite large to achieve the resulting changes in mode shares. The LUTRAQ study unintentionally demonstrated the limits of making large investments in transit to influence travel patterns (Giuliano 1995b).

In Florida, meanwhile, the reaction to sprawl was to limit development if it could not be shown that sufficient public facilities would be in place at the time that development occurred (Florida Growth Management Act 1985). This procedure, termed "concurrency," included both mandatory (transportation) and voluntary (schools) components. At first, those distant from the scene thought that the procedure was responsible for shutting down growth in the state. After the dust from the housing recession of the late 1980s settled, however, those originally opposed to concurrency reluctantly agreed that it had channeled growth effectively. In the meantime, those who originally favored concurrency vehemently opposed it because roads were being built and widened and new schools were being constructed (albeit at developer cost) too far from the locus of existing development. Growth was slowed, but it also was accommodated in locations where it should not have been (Mofson 1997).

AT WHAT SCALE IS MEASUREMENT TO TAKE PLACE? URBAN FORM AND TRANSPORTATION

At about the same time that Burchell and Landis were looking at development form and its effect on resource consumption, two other important considerations began to emerge. The first was the scale at which transportation impacts were being viewed; the second was the effect of transportation on urban form, and vice versa. In other

words, while attempting to define the indicators of sprawl and more compact forms of development and their resulting impacts, it became apparent that one needed to specify at what level impacts were being measured—individual, community, or societal. Almost all studies to date have been undertaken with impacts specific to the community level. But Sam Seskin from Parsons Brinckerhoff, and Terry Moore from ECONorthwest, began pursuing the issue of "full" costs of transportation, attempting to view the costs of transportation decisions at the individual and societal scales as well as at the community level. They determined, for instance, that although using an automobile was efficient at the individual and community scales, it was expensive at a societal scale (air pollution). Although transit was efficient at individual and societal scales, it was expensive at a community scale (the cost to deliver transit). And walking, although efficient at community and societal scales, was expensive at an individual scale (the cost of the individual's time) (Parsons Brinckerhoff 1996; Moore and Thorsnes 1994).

Seskin and Moore shifted the inquiry to issues of the impact of urban form on transportation, and vice versa. The urban form impacts on transportation were much as expected. Seskin and Moore determined that sprawl development could be served well only by the automobile; much more compact development led to transit solutions. Mixed-use development enabled walking and biking. Transportation impacts on urban form were not quite a mirror image of the first, however. Significant use of the automobile led to unlimited spread development. Transit presence brought users who also needed an automobile; mixed-use development promoted foot and bicycle use, but an automobile was still required. Land use can affect

transportation mode and vice versa, but American society today remains heavily dependent upon the automobile (Parsons Brinckerhoff and ECONorthwest 1996).

CERVERO AND TRANSPORTATION ACCESSIBILITY MEASURES

One of the most widely published academics in the field of transportation planning is Robert Cervero, from the University of California at Berkeley. Ever since his first book, *Suburban Gridlock*, was published in 1986, Cervero has been solidly represented in the land-use/transportation literature. His latest book, *The Transit Metropolis* (1998), deals with transit-oriented cities. Cervero has done important sprawl work relating a jobs-housing "imbalance" to expanding commutes (Cervero 1996), and Bay Area growth trends of job decentralization to increased VMT per worker (Cervero and Wu 1996). Other aspects of his work involve (1) suburban congestion as well as measures for its relief (Cervero 1986, 1991a); (2) the role of suburban activity centers as alternatives to sprawl, and commuting patterns within these centers (Cervero 1989, 1991b, 1996); and (3) the feasibility of transit in suburban locations—i.e., the required density and implementation costs (Cervero 1994a, 1994b).

Cervero's latest contributions from a sprawl perspective are two papers he co-authored on suburban accessibility: (1) a 1997 paper co-authored by Timothy Rood and Bruce Appleyard, entitled "Job Accessibility as a Performance Indicator: An Analysis of Trends and their Social Policy Implications in the Bay Area"; and (2) a 1996 paper co-authored by Kara Kockelman, entitled "Travel Demand and the 3Ds: Density, Diversity, and Design." In these papers, Cervero and his colleagues show through factor and regression analyses the effect of current development patterns on employment

accessibility. They try to document, in other words, how well transportation serves employment markets. In the first article, Cervero finds that current sprawl development patterns have the largest impact on severely poor neighborhoods because they separate jobs from job seekers. Minorities are particularly disadvantaged, because even with equal education, vehicle availability, and accessibility, blacks still had disproportionately high unemployment rates.

Current sprawl development patterns have the largest impact on severely poor neighborhoods.

In Cervero's second article, he looks at what can be done. He measures the effects of density, diversity, and design on accessibility, and finds that compact mixed-use, pedestrian-friendly designs can reduce vehicle trips, vehicle miles traveled, and the use of the automobile. Density, he concludes, affects business trips; diversity affects both work and non-work trips, but has less of an effect than density; and design affects primarily non-work trips. He upholds the views of the new urbanists—somewhat, because he shows that sensitive land design and building arrangements can reduce travel distances and alter modes of travel.

THE BANK OF AMERICA STUDY: BUSINESS EMBRACES THE ANTI-SRAWL MOVEMENT

In 1995, four groups—Bank of America, California Resources Agency, Greenbelt Alliance, and Low-Income Housing Fund—published a study on sprawl that quickly came to be known as the *Bank of America Study*. Those who champion land development alternatives to sprawl point to this study, the work of one of the private sector's most influential members, as a landmark. If the banks finally realize that sprawl can no longer be tolerated, recognition of the impacts of differing

land development patterns on society's resources has indeed hit the big time.

The Bank of America study summarized changes in population, demographics, and employment that had taken place over the two decades prior to 1990. It also referenced a land-use pattern that had taken place during this same period of time and termed it "sprawl." Sprawl was characterized by decentralized employment centers and residential tracts accessed almost exclusively by the automobile. These decentralized locations were safe and cheap places in which to locate and had plucked all fiscal and physical benefits from the central city. Further, the study noted that the trend toward sprawl was aided and abetted by the federal subsidies given to the automobile.

If the banks finally realize that sprawl can no longer be tolerated, recognition of the impacts of differing land development patterns on society's resources has indeed hit the big time.

The Bank of America report was criticized for its inability to adequately interpret the long-standing criticisms of RERC's (1974) *The Costs of Sprawl* report. The Bank of America study seemed to buy into many of the arguments that favored the anti-sprawl position without an adequate look at contrary evidence. Nonetheless, those who championed the study as a summary of the ills of sprawl used the Bank of America imprimatur to promote the position that the business community, at long last, was calling for managed growth to conserve national resources.

IS SPRAWL LIKED OR DISLIKED BY THE GENERAL PUBLIC? FANNIE MAE VERSUS "VISION PREFERENCING" SURVEYS

A question discussed and debated in a number of circles is whether Americans like their current development patterns. Often, those responding have difficulty making the distinction between shelter and location, and between both of these and way of life.

There is a popular literature that rates places on such indices as cost of living, public safety, climate, job growth, transportation accessibility, and access to cultural and recreational amenities (Savageau and Boyer 1993). Clearly, suburbs in the Southeast and Southwest fare better on this rating scale than cities in the Northeast and North Central regions of the country, or, for that matter, rural areas in any location. An economics literature looks at the determinants of worker migration, identified as job availability, good climate, and lower housing costs (Duffy 1994; Greenwood et al. 1991; Roback 1988; Rosen 1979). Psychological reasons for moving often parallel the economic determinants: physical (safety), physiological (economic), belongingness (sense of place), and personal satisfaction (cultural and recreational amenities) (Zinam 1989). Again, suburban locations appear to do better than urban locations on both of the above sets of criteria.

Americans are asked about their environments through two basic devices: a national, annual, in-person, in-home *Fannie Mae* survey of owners and renters on their housing (Lang and Hornburg 1997) or an occasional, professionally administered "visual preferencing" survey on their environments (Nelessen 1994).

Eighty percent of Americans contacted in the first survey identified the traditional single-family home with a yard as the ideal place to live. To afford it, they would rather live farther out than take a

second job, tie up savings, put children in day care, or incur heavier debt. Finally, they would rather occupy an average house in a good neighborhood than a good house in an average neighborhood (Fannie Mae 1994).

Respondents often have difficulty making the distinction between shelter and location, and between both of these and way of life.

Visual preferencing surveys are typically employed by planners and architects to test sentiment for a redirection in current development patterns and forms (Nelessen 1994). These surveys contrast the current versus an alternative development pattern and architecture and ask those surveyed to pick between the two. Often it is hoped by those who administer these surveys that the alternative development pattern will be chosen and, accordingly, localities will develop residential and residential areas in a different way (Calthorpe 1993). Most of those who experience this exercise of choice opt for the alternative, which typically shows a denser, more traditional residential village center and less spread-out residential subdivisions and strip commercial developments (Nelessen 1994).

The results of most of the two surveys on consumer preference and sprawl indicate that people feel comfortable with their current housing and its suburban location but also think that sprawl has an ugly look and that suburbs are becoming increasingly congested. Whether people would change their housing type (single-family), form (single-lot subdivision), or location (suburbs) to achieve a different "look" or "feel," or to be free from congestion, remains a crucial question.

AN UNUSUAL FINDING: THE CITY IS IMPORTANT TO THE REGION; THE USUAL FINDING: PEOPLE DON'T CARE

The United States has had a love–hate relationship with its cities for at least fifty years. This has taken two forms. The first is inquiry into the continued importance of the central city; the second is whether or not people will choose to live and work there.

In the mid-1990s, two articles rekindled interest in, and attempted to quantify the importance of, the central city to its surrounding area. One was written by Elliot Sclar and Walter Hook in 1993, "The Importance of Cities to the National Economy"; the other was written by Keith Ihlanfeldt in 1995 and entitled "The Importance of the Central City to the Regional and National Economy." At a time when most scholars viewed the central city's role in the region and nation as not critical and one of declining value, Sclar/Hook and Ihlanfeldt breathed new life into the debate on the role and future of the central city with the following arguments:

- In most metro areas, the higherpaying jobs are found in the central city.
- In the metro areas of the 100 largest U.S. cities, half of suburban families had at least one worker employed in the central city.
- Sixty-seven percent of suburban residents surrounding the 100 largest U.S. cities depend on the city for major medical care; 43 percent have a family member attending an institution of higher learning there.
- Cities provide low-cost housing for low-wage workers employed in—and necessary for—the activities of suburbs.
- The overall appeal of a region is influenced by conditions prevailing within its central city.

Sclar and Hooks argued that the United States subsidizes suburbs through homeownership income tax deductions and by federal/state cost-sharing of highway construction. Continued subsidization will cause increasing auto dependence, and a further channeling of most infrastructure expenditures to road building, at the expense of education operating costs. According to the authors, the United States ranked lowest among the seven most industrialized nations in percent of GNP that supported education.

Ihlanfeldt found that central cities possess certain "agglomeration economies" (the benefits of scale) that will sustain their primacy in a region. These include communications, labor, and producer concentrations. Moreover, financial services such as investment banking, commercial banking, legal auditing, and actuarial services were provided primarily by central city firms to suburban markets, and in many cases to world markets. According to Ihlanfeldt, these activities were not likely to be taken on by suburban firms, because few suburban firms have the appropriate scale to conduct them.

The United States subsidizes suburbs through homeownership income tax deductions and by federal/state cost-sharing of highway construction.

The second issue regarding urban areas was whether upwardly mobile households will continue to reside there. In the 1970s, the United States experienced significant movement of jobs and residents to exurban or rural areas. During this period of time, non-metropolitan areas were the locations of the fastest relative employment and household growth (Sternlieb and Hughes 1983). During the 1980s, there was stabilization, if not growth, of metropolitan areas. Buoyed by significant immigration and a slowing of metropolitan to non-metropolitan

outmigration, metropolitan areas were beginning to grow (Gordon, Richardson, and Yu 1997; Nelson et al. 1995, 1997). According to Peter Gordon, recent Bureau of Economic Analysis (BEA) Regional Economic Information System (REIS) data indicate that the trend is once again toward outer areas; indeed, over the last six years, outward metropolitan movement is almost as pronounced as it was during the 1970s. Gordon et al. finds that the one constant in all of this has been strong suburban growth, with parallel rural growth tilting the scale to outward movement, and even stronger suburban growth with reduced declines of urban areas tilting the scale toward inward movement. The consistency of the suburban component of this trend and renewed non-metropolitan growth (the outward movement) do not bode well for the future of the central city. Gordon and his colleagues conclude, citing additional data from the Economic Census CBD file, that:

The location decisions of households are influenced less by workplace accessibility than by availability of amenities, recreational opportunities, and public safety. In addition, the locations of firms are clearly becoming more footloose under the influence of the information revolution, just at a time when core *agglomeration diseconomies* (pollution, congestion, crime, fiscal instability, etc.) appear to be outweighing the original agglomeration economies that pulled people and economic activities together. In this view, the central cities are not coming back any time soon (Gordon, Richardson, and Yu 1997)

The suburban component and renewed non-metropolitan growth (the outward movement) do not bode well for the future of the central city.

THE VALUE OF OPEN SPACE AND FARMLAND: THE FARMER AND CONSERVATIONIST AS PLAYERS IN THE SPRAWL ARGUMENT

In the latter part of the 1980s and the early 1990s, the American Farmland Trust (AFT) began a series of studies to discourage the conversion of farm tracts to sprawled residential subdivisions. Not only was farmland ideal for developers because it was flat, it also was, for the most part, the cheapest land available. The percentage of farmland being lost in the United States was many times the percentage growth of household formation. The analyses of the AFT, called "Cost of Community Services," presented detailed case studies of the cost/revenue superiority of farmland to other types of land uses. Studies were undertaken in Massachusetts, Connecticut, Pennsylvania, Virginia, and the Midwest, and are heavily cited today. The conclusions drawn always demonstrate this group's advocacy and point to farmlands as a fiscal benefit to communities in which they are located. Regardless of methodology, the studies achieve their goal of representing farmland not merely as fiscally neutral but as fiscally positive. "Smart" communities should not want to lose this net revenue producer to other forms of development (especially residential), which would be more costly (AFT 1992b).

Growing out of this new attention to farmland was the recognition that farmers, as owners of this land, were often opposed to growth management (and thus pro-sprawl) and needed to be brought into the negotiation process. Otherwise, they would sell their land to developers before it could be acquired via public purchase or through some type of transfer of development rights. Farmers prevented passage of the original Maryland Growth Management Act and threatened to do the

same to the New Jersey State Plan if their real estate interests could not be protected. In Maryland, it appeared that the farmers could not be assuaged, and the Growth Management Act¹ failed. In New Jersey, farmers were appeased at the eleventh hour with a promise from the New Jersey State Planning Commission that their development rights would be purchased at a price somewhere between crop and real estate value, and the planning statute passed.

Randall Arendt, influenced by living in both walkable and planned open space communities in New Jersey as a child, and seeing these concepts implemented in England as an adult, built upon Ian McHarg's *Design with Nature* (1969) in an attempt to make current development patterns greener. In three of his latest books, *Rural by Design* (1994b), *Conservation Design for Subdivisions* (1996), and *Growing Greener* (1997), he provides convincing evidence that open space adds to the value of surrounding real estate and to the quality of life of those who live within it. Arendt sees the combination of compact development and open space as leading to interconnected networks of green space (Arendt 1994b). An area-wide, interconnected greenway can extend open space and wildlife benefits to the larger region. Further, successful control of sprawl will retain the "traditional character" of communities (Arendt 1996).

The Sierra Club, among other conservationist groups, is actively campaigning against sprawl. Its 65 chapters and 450 groups are challenging sprawl at the grassroots level in communities across America (Sierra Club 1998).

¹ Maryland ultimately passed a diluted version of the original act and has adopted a variety of "smart growth" procedures.

THE MECHANICS OF PAYING FOR SPRAWL: IMPACT FEES, TAKINGS, AND PROPERTY RIGHTS

In order to pay for sprawl and not impact current residents, local governments have turned to economists and land-use attorneys to devise a system of assigning a share of new required public service infrastructure to new owners of developed property. These mechanisms are termed impact fees, developer exactions, or proffers and are based on the rationale of charging development costs to those who have caused them. Impact fees are calculated by determining the specific costs that one new unit of residential development or 1,000 square feet of nonresidential development will cause in roads, water/sewer, public buildings (schools and municipal), and other capital infrastructure. Impact fees, developer charges, or whatever moniker they are known by, are currently the fastest-growing source of municipal revenues. Principal players in this group are James Nicholas of the University of Florida and Christopher Nelson of the Georgia Institute of Technology (Nelson 1988; Nicholas et al. 1991). Nicholas has constructed impact fee schedules in numerous counties and municipal jurisdictions; both Nicholas and Nelson have significant academic and professional publications in this area.

In order to pay for sprawl and not impact current residents, local governments have turned to a system of assigning a share of new required public service infrastructure to new owners of developed property. These mechanisms are termed impact fees.

The issue with impact fees specifically, and growth management strategies generally, is that these mechanisms presuppose government capacity to

regulate land. This amounts to a taking and thereby affects individual property rights. Although most of these techniques have been upheld, when they become overly aggressive, they are subject to judicial review.

This gets to what land-use attorneys describe as the "black hole" of takings jurisprudence. Until recently, a severe test of a taking has been applied. A land-use regulation is a taking if it: (1) does not substantially advance a legitimate state interest; or (2) denies an owner all economically viable use of his or her property. Post-1990, there appears to be an easing of this test that favors property owners. Charles Siemon (Siemon 1997), Robert Freilich (Freilich and Peshoff 1997), and Jerold Kayden (Young 1995) are recurrently involved in litigation concerning these issues or in designing land-use regulations to avoid such litigation. Suburban development ordinances that require payment for costs or link "social" objectives to the development of real property will be tested by the courts. To pay for sprawl, local governments have become quite inventive at both deriving fee schedules and in locating property owners to whom the costs can be assigned. Much as other forms of payment for sprawl are drying up, if governments are not careful, so too will these mechanisms.

SPRAWL'S CRITICS AND THE NEW URBANISTS

In 1993, a study conducted for the Chesapeake Bay Program defined sprawl as "residential development at a density of less than three dwelling units per acre" (CH2M Hill 1993). This definition did not have a "locational component" and was a modification of a definition presented in an earlier draft—i.e., "developments having gross development

densities of less than three or four dwelling units per acre or minimum lot sizes of at least one-quarter of an acre, and frequently of at least one acre." The latter definition had been criticized by Uri Avin (1993) for including properties with too high a density; it could be applied to many existing, close-in subdivisions in both Maryland and Virginia. On the other hand, in California, sprawl is currently taking place on 9,000-square-foot lots; obviously the upper-level density cutoff varies considerably by region.

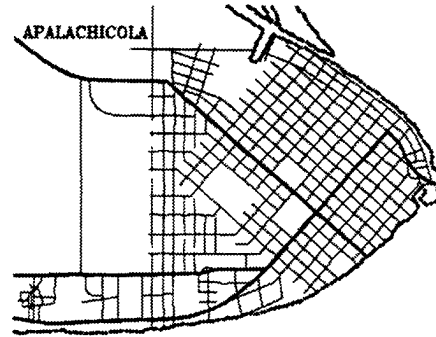
Sprawl, and more generally, suburbanization, were condemned in a polemical book by James Kunstler (1993). The title of the book, *The Geography of Nowhere: The Rise and Decline of America's Man-Made Landscape*, conveys his message. The strident tone of the message is reflected by the following statement:

We have become accustomed to living in places where nothing relates to anything else, where disorder, unconsciousness, and the absence of respect reign unchecked. (Kunstler 1993)

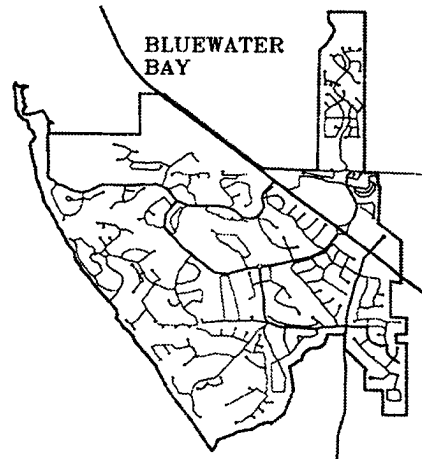
Peter Calthorpe's book *The Next American Metropolis*, published in 1993, offered a method for determining population densities in an idealized form of modern settlement. He presented a scheme for clustering housing and other improvements around transit stops at specified densities which could, in turn, be used to compute overall densities for ideal future metropolitan settlements. His scheme involved creating Transit Oriented Developments (TODs) around stations in a system of radial fixed-rail transit lines emanating from a region's major downtown. This approach quantified aspects of an alternative form of future growth. However, Calthorpe did not present any method of measuring the costs and benefits of sprawl, nor of the

alternative form he suggested. Neither did he present any database to use in carrying out such measurements.

Traditional Urban Grids



Contemporary Suburban Networks



Street patterns of neo-traditional versus typical suburban neighborhoods.

Source: Florida Department of Community Affairs.

Calthorpe is a "new urbanist," part of an urban design movement called "neo-traditionalism." Neo-traditionalism calls for the development of neighborhoods that resemble those of the past—i.e., with grid street patterns, fronted by proximate single-family houses with porches, sidewalks, alleys, and other traditional features. The elements returned to neighborhood design include mixed uses,

the grid-based street structure, higher densities, pedestrian circulation, and transit use. The elements removed include single uses, cul-de-sacs, low densities, and automobile-dominated neighborhood access.

The neo-traditionalists, led by Andres Duany, and joined by Elizabeth Plater-Zyberk (1995), Anton Nelessen (1994), Peter Calthorpe (1993), and others, view current development patterns (sprawl) as driven by engineering standards and, accordingly, devoid of the capacity for human interaction. Neo-traditionalism is often proposed as a design alternative to sprawl, even though developments incorporating this type of design can be found in sprawl locations. Nelessen's vision preferencing analyses are sometimes cited by those who oppose sprawl as evidence that the American public is ready for this type of design. The Duany-led new urbanists propose that the new urban-like grids replace the current sprawl-like suburban networks.

MORE SPRAWL CRITICS— "TRUSTS" AND "OLD FRIENDS"

A critique of strip commercial development, and sprawl in general, permeates the current literature of the National Trust for Historic Preservation (NTHP) and its leadership (NTHP 1993; Moe 1996). At a 1995 conference on "Alternatives to Sprawl," Richard Moe, president of the National Trust, defined sprawl as low-density development located on the outer fringes of cities and towns that is "poorly planned, land-consumptive, automobile-dependent development designed without regard to its surroundings." He described two types:

"sellscape" retail development frequently spurred by major discount chains such as Wal-Mart and K-Mart, occurring along

major arteries and at highway interchanges; and "spread out" residential development, usually consisting primarily of single-family detached houses, located on the edges of existing communities or "leapfrogging" into previously undeveloped areas. (Moe 1996, 3)

In a later work, *Changing Places: Rebuilding Community in the Age of Sprawl*, Moe and Carter Wilkie (1997) indicated that sprawl was causing communities to be dysfunctional and diminishing a sense of connections between people. The authors suggested that if sprawl were tested by a truly "free" market, far less sprawl would occur on private financing alone. They proffered that sprawl developers captured benefits for themselves while everyone else in the community bore the costs. Both authors called for better land-use planning and more creative reuse of older urban and suburban areas.

Commercial strip development is a manifestation of nonresidential sprawl.

A more comprehensive view of the components of sprawl was offered in Henry Richmond's 1995 book, *Regionalism: Chicago As An American Region*. Richmond's conceptualization of sprawl included eight components:

- 1) low residential density;
- 2) unlimited outward extension of new development;
- 3) leapfrog development;
- 4) spatial segregation of different land uses;
- 5) decentralized land ownership;
- 6) primacy of automobile transportation;
- 7) fragmentation of governmental land use authority; and
- 8) disparity in the fiscal capacity of local government.

Richmond, former director of 1000 Friends of Oregon and a participant in the LUTRAQ simulation study, offered a wide-ranging critique of sprawl and included numerous carefully culled statistics supporting his allegations. Many of his criticisms are drawn from the subject of his continued research—the Chicago metropolitan area. His criticisms form the basis for his definition of sprawl. In defining sprawl, however, Richmond does not present specific alternative forms of growth, either conceptually or in terms of quantified analysis. Instead, he continues to propose an agenda of specific policy actions that would encourage a regional approach to managing future growth. His analysis, therefore, does not provide either a method for measuring the costs of sprawl or a specific alternative development form that would provide a better outcome.

SPRAWL EVENTS: LINCOLN INSTITUTE/GEORGIA CONSERVANCY CONFERENCES

In the spring of 1995, the Lincoln Institute of Land Policy hosted two important conferences on sprawl. The first took place in Washington, DC, and was co-sponsored by the National Trust for Historic Preservation and The Brookings Institution. This conference brought all the national actors on sprawl together in a debate format. Sprawl's good and bad attributes were debated before a national audience. This was the first appearance of the defenders of sprawl. Peter Linneman from the University of Pennsylvania and Peter Gordon from USC proved to be strong supporters of the free-market merits of continued suburbanization.

So successful was the conference in drawing national attention to the sprawl issue, as well as in drawing attention to the institutions that sponsored the conference, that the Lincoln Institute held

derivative conferences in two locations—Florida and California. Even though no debate was scheduled, again the issue was raised: How bad is sprawl? Gordon, joined by colleague Genevieve Giuliano, provided a strong and cogent argument in favor of sprawl and presented findings contrary to the research of Seskin (LUTRAQ), Landis (California Futures Studies), Burchell (Rutgers Modeling Studies), and Downs (*New Visions for Metropolitan America*). The savings gleaned from LUTRAQ were described as minimal, and the land/infrastructure savings of the California Futures and Rutgers studies were trivialized. Downs was also criticized for assigning causes of central city decline to sprawl that could not be defended.

In 1996 and 1997, at the annual meetings of the Georgia Conservancy, sprawl was again the topic of consideration. Like the National Trust, the Georgia Conservancy shifted its focus slightly from historic preservation and was making a major substantive thrust at curbing urban sprawl. These conferences, which again attracted national spokespersons on the manifestations and costs of sprawl, were not a debate, but rather represented a summation on the ills of sprawl. The Atlanta region was growing at a rate of 55,000 jobs per year, and the economy was in such a boom period that growth was flooding the arterials in and around the city. Sprawl needed to be contained, and the conferences were the beginning steps in an attempt to create a mood for regional growth management. However, even though some sentiment for growth was apparent, the consensus was that political jurisdictions in Georgia were a long way from being able to implement, even on a regional scale, the most elemental of growth management techniques (a growth boundary).

THE SPRAWL DEBATE: EWING VERSUS GORDON—IN PRINT AND IN PERSON

The debate over sprawl was brought front and center in two "point" and "counterpoint" articles in the *Journal of the American Planning Association*. The point article by Peter Gordon and Harry W. Richardson (1997a) critiqued the arguments and evidence frequently presented in favor of compact development (i.e., energy, transportation, and infrastructure efficiencies) and argued that the decentralized suburban pattern of development, in fact, offered many advantages, including reduced travel times and lower housing costs, as well as higher consumer satisfaction. In counterpoint, Reid Ewing (1997) made a strong case for the adverse effects of sprawl (as opposed to the benefits of compactness). Ewing pointed to increased infrastructure costs, increasing travel distances, and significant amounts of developable and lost fragile lands as the adverse effects of sprawl.

For the purposes of this review, the authors' respective definitions of terms bear note. For Ewing, sprawl was defined both by a series of three *characteristics*—(1) leapfrog or scattered development; (2) commercial strip development; and (3) large expanses of low-density or single-use developments—as well as by such *indicators* as low accessibility and lack of functional open space (Ewing 1997). Gordon and Richardson did not specifically define sprawl (nor compactness, for that matter). Instead, they referenced sprawl's various traits. Sprawl was alternatively denoted by Gordon and Richardson as low-density, dispersed, or decentralized development, whereas compactness was associated with higher densities and a downtown or central-city spatial pattern versus a

polycentric (or dispersed) spatial pattern (Gordon and Richardson 1997a, 95).

Adverse effects of sprawl include increased infrastructure costs, increasing travel distances, and significant amounts of developable and lost fragile lands.

Although the point-counterpoint authors addressed more than 15 different subjects in discussing sprawl and its alternatives, the subjects can be grouped into five broad areas, as shown in Table 6.

The debate moved from print to person in a forum held at the University of California—Berkeley in late November 1997. Both Ewing and Gordon had significantly increased the weaponry used to support their individual positions.

Ewing began the session with points of mutual agreement and spun out a longer list than most expected. These included that: (1) the market for transit was limited; (2) infrastructure costs were higher for sprawl development initially but could diminish over time with infill; and (3) automobile costs as a function of suburban residence were high, but few alternatives to this mode of travel and its costs existed. Ewing and Gordon continued to disagree about whether resource consumption (energy, land) differences under sprawl and compact development in light of national and global resources were sufficiently significant to cause concern, and whether the traffic consequences of sprawl (excessive travel and roadway congestion) could be argued away in terms of either current or future methods of resolution (higher travel speeds, congestion pricing). The session was narrowly focused on primarily transportation issues and never really dealt with social or quality of life issues of sprawl.

TABLE 6
EWING AND GORDON-RICHARDSON IN PRINT
SUBSTANTIVE AREAS OF INQUIRY

<i>Author</i>	<i>Topics Considered By Authors</i>	<i>Public- Private Capital and Operating Costs</i>	<i>Transportation and Travel Costs</i>	<i>Land and Natural Habitat Preservation</i>	<i>Quality of Life</i>	<i>Social Effects</i>	
Ewing (1997)	• Infrastructure costs	X					
	• Public service costs	X					
	• Transit		X				
	• Vehicle miles traveled		X				
	• Loss of resource lands				X		
	• Energy consumption					X	
	• Psychic and social costs					X	
	• Impact on central cities						X
	• Infrastructure and operating efficiency	X					
	• Transit			X			
Gordon and Richardson (1997a)	• Economical resource allocation	X					
	• Congestion		X				
	• Open space and agricultural land				X		
	• Energy glut					X	
	• Density preferences					X	
	• Downtown impacts						X
	• Equity						X

**CONTINUATION OF SPRAWL
PRINT—HOUSING POLICY DEBATE
AND THE URBAN LAWYER
SYMPOSIA**

One of the leading housing journals, Fannie Mae's *Housing Policy and Debate*, and a respected legal journal, *The Urban Lawyer*, both published symposia on sprawl. Several of the individual articles bear mentioning, but an important first point is that both housing and urban legal journals have come to recognize that suburban sprawl is an important topic for inclusion in their journals. This is significant. Both of the journals have had special issues on homelessness, exclusionary zoning, affordable housing, the economies of cities, the spatial mismatch of the poor in cities and available jobs in suburbs, and so on. Neither journal strays far from housing and urban problems. Thus, implicit in the publication of the two special issues on sprawl is the notion that at least some component of sprawl impacts on housing issues and quality of life. Sprawl does not only potentially cause excess resources to be expended in providing public infrastructure or, similarly, contribute to the loss of special lands and habitats. Sprawl does not only chain users to a single source of transportation for access to residential and employment opportunities. Sprawl has significant social and quality-of-life effects as well.

Suburban sprawl is an important topic for inclusion in housing and urban legal journals.

In *The Urban Lawyer* compilation of articles, Robert Freilich traced significant suburbanizing periods and methodically viewed their impact on central cities. Sprawl, he noted, is the force that distills the city's economic base, and it is orchestrated by suburban land-use controls that promote exclusion (Freilich

and Peshoff 1997). Charles Siemon pointed to the very limited number of techniques available to implement growth management and the difficulty of using them without encroaching upon property rights (Siemon 1997).

In the *Housing Policy Debate* articles, Robert Lang pointed to the voracity of sprawl and terms it suburbanization that was thriving and would not be shelved. Lang further commented that it was not productive to refer generically to nonresidential sprawl as "edge cities," a very limited phenomenon whose time may be past. To Lang, sprawl epitomizes current market preference, and its direction is clear—a continuing outward thrust from its urban core (Lang and Hornburg 1997). William Fischel of Dartmouth also proffered in the special issue of *Housing Policy Debate* that too much growth management could cause housing markets to diminish. According to Fischel, if you continue to castigate sprawl, you may turn around and not find any growth (Fischel 1997).

The upshot of this debate was that whereas at one time sprawl had only a solid line of inquiry detailing its costs; there was now a growing line of inquiry detailing its benefits.

If you continue to castigate sprawl, you may turn around and not find any growth.

**YET ANOTHER CONFERENCE:
CONTROLLING SPRAWL IN THE
LAND OF BARRY GOLDWATER**

In the summer of 1998, in Phoenix, Arizona, the sprawl debate continued, this time in a conference sponsored by the Drachman Institute of the University of Arizona and the Fannie Mae Foundation.

By now, the agenda and faculty had predictable topics and representations: Chris Nelson (Georgia Institute of Technology), Gary Pivo (University of Arizona), and John Holtzclaw (Sierra Club) were there to plead the case against sprawl. Peter Gordon (University of Southern California), Genevieve Giuliano (University of Southern California), and Robert Lang (Fannie Mae) countered with the benefits and normalcy of market-driven development.

The polarized positions of forum speakers left little room for anything other than agreeing to disagree. Armed with data to bolster their cases, speakers clung steadfastly to their agendas. In the few instances where the data were similar, these data were interpreted as consistent with diametrically opposed positions. The sprawl-anti sprawl positions hardened.

While established players echoed now-familiar refrains, several new players entered the debate. The strongest of these favored the pro-sprawl position. Robert Bruegmann, an urban historian (University of Illinois), spent considerable time debunking the myth that sprawl development patterns are either uniquely American or associated with the growth of the automobile. According to Bruegmann, sprawl was spawned in the nineteenth century by the horse and buggy and later by streetcars. Suburban-type neighborhoods were actually found throughout Europe in the nineteenth century, having nothing to do with either American cultural norms or the appearance of its automobile. Bruegmann sees the new urbanists as adding little but design innovations to sprawled locations, while mouthing the platitudes of the new community advocates of the 1970s (Bruegmann 1998).

The negative side of the Portland, Oregon growth boundary was clearly articulated

by Jerald Johnson, an economic consultant from that city. According to Johnson, the Portland urban growth boundary has succeeded in both increasing density and containing growth, but even more so, it has caused housing prices to rise. Johnson presented information indicating that housing prices in the city of Portland had increased at multiples of the level of density increases. Portland is becoming a victim of its own success. Housing demand and prices are high in a community noted for outward growth restraints and attention to quality of life (Johnson 1998).

Controlling free market development is a difficult sell in the Southwest, yet the importance of desert lands preservation was clearly articulated at this conference. In a state known for its creativity in siphoning off Colorado's water to reclaim the desert, there was recognition that development had to be contained and the more valuable parts of the desert inventoried and preserved.

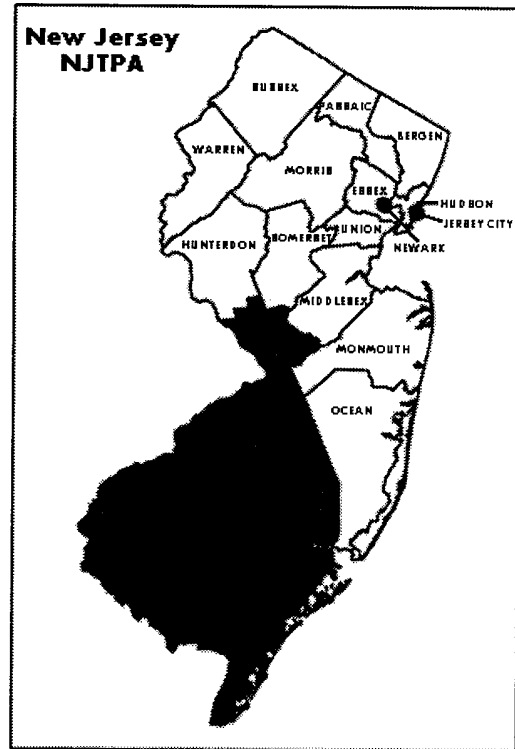
RESPONDING TO THE CHARGE: REGIONAL COOPERATION AND REGIONAL/STATEWIDE PLANNING

A one-man crusade against factionalized government, because it creates sprawl, has been waged by Myron Orfield, state representative for the City of Minneapolis in the Minnesota House of Representatives. Orfield believes that the best way to control sprawl is to get local governments to cooperate in developing regional strategies, land-use policies, and regulatory mechanisms. In his book *Metropolitica*, Orfield composed an aggressive regional strategy that links tax base sharing to affordable housing provision, farmland protection, and urban/inner-suburb redevelopment

(Orfield 1997). Orfield is a realist, however, and acknowledges that regional governments are not growing nationally but regional cooperation is. Currently, there is increased willingness to share selected municipal service delivery systems; there is virtually no interest in forming new regional governments (Petersen 1996).

At another level, there is an ongoing effort to promote planning at state and regional levels and to coordinate planning with infrastructure provision. State plans and growth management initiatives have been successfully put in place for the entire states of Colorado, Florida, Georgia, Maine, Maryland, New Jersey, Oregon, Rhode Island, and Washington, and for specific areas (e.g., the Coastal Zone, etc.) in California and North Carolina (DeGrove 1990). The guru of statewide planning, who has followed it for most of his career and has testified as an expert witness in most state house hearings, is John DeGrove of Florida Atlantic University. DeGrove is also politically astute and realizes that even the most encompassing state plan or growth management act will either be voluntary for compliance by subunits of government, or non-punitive for non-compliance by these same subunits.

No discussion of growth management would be complete without discussing the work of Douglas Porter of the Growth Management Institute and Arthur C. Nelson of Georgia Tech. For a decade, Porter has been a focal point of the literature on growth management. Porter participated in Sam Seskin's "Transit and Urban Form" study (Parsons Brinckerhoff 1996d), Reid Ewing's *Best Development Practices* (Ewing 1995a), and the LUTRAQ study (Davis and Seskin 1997). From *State and Regional Initiatives for Managing Development* to



The New Jersey Transportation Planning Authority, Inc. (NJTPA) serves as a forum for cooperative decision-making in the 13-county, northern New Jersey regional area.

Source: New Jersey Institute of Technology and Rutgers University. *TELUS: Transportation Economic and Land Use System—State-of-the-Art Information System for the 21st Century* (April 1998).

Managing Growth in America's Communities (Porter 1992; Porter 1997), Porter has been involved in implementing managed growth alternatives. This includes model regulatory and programmatic techniques and pairing these specific techniques with a particular growth management issue or problem.

Nelson has similarly authored *The Regulated Landscape* (Knapp and Nelson 1992) and *Growth Management Principles and Practices* (Nelson and Duncan 1995) and has been a principal in multiple regional costs of growth studies. One of the most difficult tasks in land use

is to effect meaningful regionwide growth management. Both Porter and Nelson have been involved with many regional growth management implementation efforts.

RESPONDING TO THE CHARGE: SUSTAINABLE DEVELOPMENT AND SMART GROWTH

As yet another response for a new direction in land use, the sustainable development and smart growth movements have emerged in the United States. The U.S. *sustainable development* movement is a direct outflow of the World Congress on Sustainable Development held in Rio de Janeiro in 1992. This philosophy of development reflects a desire to "develop today without compromising available resources for future generations." For the most part, overburdened U.S. communities in the South, Southwest, and West have justified growth management programs under the guise of compliance with this norm (Krizek and Power 1996).

Currently, twenty-one communities in the United States have adopted sustainable development ordinances that essentially limit growth to the degree that public facilities and services are in place to

This philosophy of development reflects a desire to "develop today without compromising available resources for future generations."

accommodate this growth. Counties and regions are preparing development policies consistent with the goals of sustainability. In Florida, the Governor's Commission for a Sustainable South Florida in December 1997 enacted an energy conservation policy for the southern portion of the state. Among energy-conserving ideas, the Commission required utility companies to derive

measures other than expansion of the user base as appropriate indices of company performance. Further, this Commission is deciding how improved transportation, education, and employment opportunities either add to or possibly detract from the goals of sustainability.

Precursors to current sustainability regulations were the 1970s growth control efforts of California and Florida cities, and the concurrency requirement of the Florida Growth Management Act of 1985. In the United States, the President's Commission on Sustainable Development, the U.S. Department of Commerce, the U.S. Economic Development Administration (EDA), and the U.S. Environmental Protection Agency (EPA) have implemented sustainable development objectives that their funded projects must observe. For the most part, the emphasis on sustainable growth ensures that capital projects respect the environment of which they are a part and do not unnecessarily spur growth in locations where existing infrastructure cannot support the growth.

Smart growth was an initiative of the American Planning Association (APA), the U.S. Department of Housing and Urban Development (HUD), and the Henry M. Jackson Foundation on the one hand, and the National Resource Defense Council (NRDC) and the Surface Transportation Policy Project (STPP) on the other. The APA/HUD initiative called for an updating of land-use controls to make them more sensitive to the ongoing problems of lack of housing diversity, traffic congestion, and environmental degradation. The initiative also called for land-use controls that emphasized compact development to conserve resources; that limited development in undeveloped areas while encouraged investment in older central cities; that promoted social equity in the face of

economic and spatial separation; and that were sensitive to the role of the private market and the need for simplicity and predictability in land use (APA 1997).

The NRDC/STPP Smart Growth effort consisted of a "Toolkit" for policymakers that attempts to promote growth that is "compact, walkable, and transit accessible" and will ultimately "compete better with sprawl in policy forums and in the marketplace." The Toolkit contains: (1) three policy reports on sprawl's environmental, economic, and social impacts; (2) research reports on sprawl-induced fiscal impacts and infrastructure requirements (including utilities and roads); and (3) a "Smart Growth Guidebook" (NRDC/STPP 1997).

Maryland adopted smart growth legislation at the state level in 1997. This legislation withholds, or at least sharply limits, any subsidies for new roads, sewers, or schools for political jurisdictions outside state-targeted smart growth areas (Maryland Office of Planning 1997). Rhode Island and Colorado have also adopted similar initiatives (ULI 1998).

The Smart Growth initiative calls for an updating of land-use controls to make them more sensitive to the ongoing problems of lack of housing diversity, traffic congestion, and environmental degradation.

Each of the above techniques has as its basis the better management of growth and more compact development for the purpose of resource conservation. In a September 1998 speech in Chattanooga, Tennessee, Vice President Al Gore recommended a "renewed federal commitment to the policies of smart growth (Gore 1998).

A GROWING CONCERN—THE EQUITY ISSUE IN SUSTAINABLE DEVELOPMENT

One of the under-researched sides of the sustainable development movement is whether there is a dark side to the goal of not compromising the physical environment for future generations. At the regional level, this dark side might take the form of freezing the movement of minority and ethnic populations to the outer reaches of the metropolitan area by making inner cities and inner suburbs "more attractive" to all, and especially to these groups. Thus, exurban resources would be "sustained" by reduced access to these resources by those with the least economic wealth (Lake 1997). The central thesis of the equity issue is that better environments for some will mean worse environments for others. Even if there is a solution that improves conditions for some without hurting others, the benefits of better environments will still be unevenly distributed (Marcuse 1998).

New urbanists take a hit in this literature in that their new environments for the most part continue to promote new space consumption: suburban-bound, affluent housing seekers (few "new urban" environments accommodate the poor in urban areas). Resultantly, many of these new environments do little to improve the physical sustainability of urban areas.

In a four-day National Science Foundation (NSF) workshop at Rutgers University in the spring of 1998, Robert W. Lake of Rutgers and Susan O. Hanson of Clark University brought together environmental and first/third world researchers from the United States, Canada, and the United Kingdom to propose an integrated agenda for studying urban sustainability. This involved differentiating between such terms as

urban sustainability (developed areas function to minimize the consumption of resources and manage equity) and *sustainable development* (an increment of land is developed to minimize the consumption of resources), and determining the effect of scale (local versus global) on both definitions and issues. The results of this workshop will be used by NSF to formulate a research program on urban sustainability.

The workshop focused on four issues, and a research agenda will be prepared regarding each. These are:

- economy-environment,
- local-global,
- urbanization as process,
- and governmental and institutional intervention.

SUMMARY

According to Robert G. Healy of the Nicholas School of the Environment at Duke University, the time may be right for an "alignment of the stars" on land use policy affecting sprawl. Healy points out the following signs: (1) the transit bike path and urban trail initiatives of the 1998 Transportation Equity Act for the 21st Century (TEA-21); (2) states moving to sustainable development, smart growth, or open space land acquisition initiatives; (3) citizens approving park and recreation bond issues of \$1.37 billion in 1997; and (4) private industry initiatives such as the Silicon Valley Manufacturers Group's attempts to support public transportation, affordable housing, and environmental protection to ensure that sought-after workers will continue to be attracted to the San Francisco region (Healy 1998).

Healy notes that the situation is different from federal land use initiatives of the 1970s that failed to get out of Congress because:

- 1) There is agreement in the environment and development communities that growth is inevitable but must be carefully monitored;
- 2) Sprawl is understood as an outcome of current conditions, and positions—both positive and negative—have been taken about it; and
- 3) Federal, state, and local governments are moving in similar directions in land use, and their sprawl-abetting and sprawl-controlling roles are being carefully examined.

Sprawl is a type of growth in the United States that even the most unenlightened realize needs rethinking. Yet sprawl is so endemic to the culture of the United States that it is almost impossible to change. Americans like its outcome. It provides safe and economically heterogeneous neighborhoods that are removed from the problems of the central city. In low-density, middle-class environments, life takes place with relative ease, and when residents wish to relocate, they typically leave in better financial condition—the result of almost certain housing appreciation in these locations.

The public services available to residents in sprawl locations are more than adequate—and their cost, until recently, has been relatively inexpensive. But costs are beginning to increase. Americans are looking, albeit halfheartedly, for an alternative to current development patterns. There is a general sentiment that communities and individuals specifically, and society as a whole, cannot continue to pay for the costs of sprawl. Costs have been held at a manageable level only because overall infrastructure is underprovided and developmental infrastructure is not repaired adequately or replaced.

Over time, sprawl has garnered a long list of detractors, but increasingly observers are asking that the issues be discussed fairly. Most of the early literature criticized sprawl, but much of the recent literature asks for an analysis that deliberately isolates both the costs and benefits of sprawl. This is the emphasis of Section II of this study: to break down the phenomenon of sprawl into its basic alleged impacts, both positive and negative, and to detail deliberately the strengths and weaknesses of each impact statement with specific citations from the literature. Impacts are categorized in five groupings. These are:

- 1) public-private capital and operating costs;
- 2) transportation and travel costs;
- 3) land and natural habitat preservation;
- 4) quality of life; and
- 5) social issues.

The above categories obviously contain significant overlap. The objective is not to define mutually exclusive groups but to begin to point out and synthesize the major concerns of the literature.