VISION 2020 + 20 Update

Information Paper on the Cost of Sprawl

Puget Sound Regional Council

December 19, 2005

Overview

Over the past several decades there have been numerous studies analyzing the costs of development, especially comparing and contrasting alternative development patterns. Most of the studies have been spurred by the desire to prove the hypothesis that sprawling growth is more costly than smart growth. Studies vary in terms of the definitions of sprawl, methodologies, and findings, but most of the studies do conclude that costs are generally higher with sprawl-type development than with compact development or 'smart growth.' The Real Estate Research Corporation's *The Costs of Sprawl* (1974) is widely cited as a seminal piece of work in its isolation of density and location as key variables in the cost of development. Although it was later criticized for its methodology, the report was quite influential, stimulating additional studies and critiques through the 1970s and beyond.

This issue paper reviews some of the prominent research dealing with comparing the costs of alternative development patterns and summarizes the findings to draw general conclusions about the costs of sprawl. The purpose of this paper is to provide evidence and rationale for excluding a sprawl alternative in the VISION 2020+20 EIS.

This issue paper is organized as follows:

- Defining Sprawl: a discussion about the varying definitions of sprawl and how that can influence studies measuring the costs of alternative development patterns.
- What Sprawl Means in Washington State: a review of what the Growth Management Act, Growth Management Hearings Board and VISION 2020 say about sprawl.
- A Review of the Literature: a review of 11 key documents addressing the costs of sprawl in terms of study area, methodology, and findings/conclusions.
- Summary of Findings: a summary of the studies' findings on the costs and impacts of sprawl versus smart growth development.
- Where We Are Now: The Debate Goes On: a discussion of the continued debate between sprawl and smart growth.

Defining Sprawl

It is difficult to concretely define sprawl. Varying definitions and misconceptions make calculating the costs of sprawl quite challenging and differing studies difficult to compare. *Sprawl* can be broadly described as development that has occurred in a haphazard, undirected manner, often at a pace faster than that of population growth. Sprawl also can and has occurred in regions that are losing population. It is often associated with low density development, separated land uses, road infrastructure that favors the automobile over pedestrians or bicyclists, and weak or nonexistent centers of activity.

> *"Much as Justice Potter Stewart said of pornography, most people would be hard pressed to define urban sprawl, but they know it when they see it."*
>
> - Ewing, Pendall and Chen, Measuring Sprawl and Its Impacts, 2002

Based on a review of previous literature on sprawl, Burchell, et al developed a list of 10 common elements found in the varying definitions.[1] Developments that contain most of these 10 elements are viewed as sprawl:

1. Low residential density.
2. Unlimited outward extension of new development.
3. Spatial segregation of different types of land uses through zoning regulations.
4. Leapfrog development.
5. No centralized ownership of land or planning of development.

[1] Burchell, et al. "The Costs of Sprawl—Revisited." Transportation Research Board. 1998. p.124.

6. Transportation dominated by privately-owned motor vehicles.
7. Fragmentation of governance authority over land use between many local governments.
8. Great variance in fiscal capacity of local governments within a metropolitan area (revenue-raising capability strongly tied to property values and economic activity within municipal borders).
9. Widespread commercial strip development along major roadways.
10. Major reliance on the trickle-down process to provide housing for low-income households.

The alternative to sprawl, often referred to as *smart growth, higher density development, or compact development*, emphasizes the efficient use of land resources in existing urban and regional centers, public transit options, and neighborhoods that are pedestrian-friendly and have a mix of uses.

The difficulty in rationalizing one type of development over another is in the burden of proof. Debating the costs and benefits of alternative development patterns requires that we are clear about our terms of reference. While in theory it is reasonable to talk about research and findings that are "grounded in proven results or measurable outcomes," in practice this is quite problematic, particularly in something as complex as the urban built environment. Difficulties encountered include the ambiguity of what constitutes evidence, a lack of common service specific standards, variation in personal preference, and limited relevant data and information. In some studies, overall density is used as the indicator of a region's degree of sprawl. But this measure alone is insufficient to describe patterns of growth.

For example, by density alone (persons per square mile), Los Angeles has the highest gross density of any U.S. city.[2] However, if you consider neighborhood mix and accessibility, the assessment of L.A. looks quite different. For example, Ewing et al. developed a 4-factor sprawl index based on (1) residential density, (2) neighborhood mix of homes, jobs, and services, (3) strength of activity centers and downtowns, and (4) accessibility of the street network.[3] This index recognizes that compactness and density, while important, are not the only elements to smart growth.

"Smart Growth can be applied in a variety of conditions, including rural, suburban and urban. For example, in rural areas it means clustering more development into villages, and in suburban areas it means creating complete, mixed-use, walkable neighborhoods. It is concerned with how people are distributed within a community, not with the total size of the community or the average density over a large area."[4] Therefore, the manner in which sprawl and its alternatives are defined is crucial in understanding the results of any study comparing the costs of differing development patterns.

What Sprawl Means in Washington State

This section describes relevant sections of the state and region's policy framework associated with sprawl that taken together provide a characterization of what sprawl means and how it is treated in Washington. Excerpts from the State Growth Management Act, Growth Management Hearings Board decisions and VISION 2020 are presented and discussed below.

1. What the *Growth Management Act* Says about Sprawl

The terms sprawl or sprawling are rarely used in the State Growth Management Act (GMA). Where they do appear is in the GMA's planning goals. An alternative to sprawl, that is, efficient urban development, is in the goals as well. These goals together show that a sprawling, low density development pattern is discouraged in favor of development in urban areas.

[2] Litman, T. "Understanding Smart Growth Savings." Victoria Transport Policy Institute. 2004.
[3] Ewing, R., R. Pendall and D. Chen. "Measuring Sprawl and Its Impacts." Smart Growth America. 2002.
[4] Litman, T. "Understanding Smart Growth Savings." Victoria Transport Policy Institute. 2004.

RCW 36.70A.020 Planning goals.
The following goals are adopted to guide the development and adoption of comprehensive plans and development regulations of those counties and cities that are required or choose to plan under RCW 36.70A.040. The following goals are not listed in order of priority and shall be used exclusively for the purpose of guiding the development of comprehensive plans and development regulations:

(1) Urban growth. Encourage development in urban areas where adequate public facilities and services exist or can be provided in an efficient manner.

(2) Reduce sprawl. Reduce the inappropriate conversion of undeveloped land into sprawling, low-density development.

2. What the *Central Puget Sound Growth Management Hearings Board* Says about Sprawl

In Washington state, the issue of sprawl has primarily been addressed through the state's quasi-judicial hearings boards, which are authorized under the GMA. This section highlights some of the key Final Decision and Orders of the board that has jurisdiction in the central Puget Sound region.

The following decisions explicitly interpret the GMA as striving for compact urban development, considering it the "antithesis of sprawl:"

- The Board holds that *compact urban development* is the antithesis of sprawl. By *striving* to achieve a land use pattern and urban form that is compact, cities and counties will serve the explicit direction of Planning Goals 1 and 2. [*Rural Residents*, *3310*, FDO, at 18-19, footnotes omitted]

- Since the GMA's initial adoption in 1990, one of its bedrock principles has been to direct urban development into urban growth areas and to protect the rural area from sprawl. [*Burrow, 9318,* FDO, at 18.]

- Comprehensive plans, including Final Urban Growth Areas (FUGAs), must follow the direction provided by the three fundamental purposes of both Urban Growth Areas (UGAs) and Countywide Planning Policies (CPPs): … and *(3) to achieve compact urban development.* [*Tacoma, 4301,* FDO, at 12.]

One of the early board decisions addressed the topic of sprawl, and it concisely listed the negative consequences of sprawl in eight points.

- [T]here are at least eight major negative consequences of sprawl: (1) it needlessly destroys the economic, environmental and aesthetic value of resource lands; (2) it creates an inefficient land use pattern that is very expensive to serve with public funds; (3) it blurs local government roles, fueling competition, redundancy and conflict among those governments; (4) it threatens economic viability by diffusing rather than focusing needed public infrastructure investments; (5) it abandons established urban areas where substantial past investments, both public and private, have been made; (6) it encourages insular and parochial local policies that thwart the siting of needed regional facilities and the equitable accommodation of locally unpopular land uses; (7) it destroys the intrinsic visual character of the landscape; and (8) it erodes a sense of community, which, in turn, has dire social consequences. [*Bremerton*, *5339c,* FDO, at 28.]

The Hearings Board makes distinctions between compact development in urban areas within the UGA and development in rural areas.The distinction between urban and rural development is discussed mainly in terms of land use patterns and lot sizes.

Urban

- Generally, any residential pattern of four net dwelling units per acre, or higher, is compact urban development and satisfies the low end of the range required by the Act. Any larger urban lots will be subject to increased scrutiny. [*Bremerton, 5339c,* FDO, at 50.][5]

- Land within an UGA, [including subarea planning areas], reflects the jurisdiction's commitment and assurance that it will develop with urban uses, at urban densities and intensities, and it will ultimately be provided with urban facilities and services. [*MBA/Brink, 02310*, FDO, at 11.]

- A pattern of 1- and 2.5-acre lots meets the Act's definition of urban growth…. However, a pattern of 1- or 2.5-acre lots is not an appropriate urban density either…. An urban land use pattern of 1- or 2.5-acre parcels would constitute sprawl; such a development pattern within the rural area would also constitute sprawl. [*Bremerton, 5339c,* FDO, at 49.]

- [A future land use map designation for residential development that permits only 1 du/2 ac within city limits (UGA) is not an appropriate urban density and constitutes sprawling low-density development.] [*LMI/Chevron, 8312,* FDO, at 24.]

Rural

- Any residential pattern of 10 acre lots, or larger, is rural. [*Vashon-Maury, 5308c,* FDO, at 79.]

- A pattern of 10-acre lots is clearly rural and the Board now holds that, as a general rule, a new land use pattern that consists of between 5- and 10-acre lots is an appropriate rural use, provided that the number, location and configuration of lots does not constitute urban growth; does not present an undue threat to large scale natural resource lands; will not thwart the long-term flexibility to expand the UGA; and will not otherwise be inconsistent with the goals and requirements of the Act. As a general rule, any new land use pattern that consists of lots smaller than 5 acres would constitute urban growth and is therefore prohibited in rural areas. The greater the density becomes, the more difficult it will become to justify an exception to the general rule. The exceptions to this general rule are few, both because the circumstances justifying them are rare and because excessive exceptions will swallow a general rule. [*Sky Valley, 5368c,* FDO, at 46.]

- Any smaller rural lots will be subject to increased scrutiny by the Board to assure that the pattern of such lot sizes (their number, location and configuration) does not constitute urban growth…. [*Vashon-Maury, 5308c,* FDO, at 79.]

- For purposes of determining if a proposed use constitutes impermissible urban growth or permissible rural growth, the Board will consider "such lands" to refer not to an individual parcel, but rather to the *land use pattern* in the immediate vicinity of a

[5] …densities of less than four dwelling units per acre have been challenged before this Board and found to be appropriate urban densities in limited circumstances. The Board has stated, "The presence of special environmental constraints, natural hazards and environmentally sensitive areas may provide adequate justification for residential densities under 4 du/acre within a UGA. (Citation omitted.) [*Forster Woods, 1308c*, FDO, at 31.]

proposed use, and whether the proposed use will be compatible with rural character of the land use pattern in the vicinity. [*Vashon-Maury, 5308c,* FDO, at 68.]

- ESB 6094's amendments to RCW 36.70A.070(5) explicitly clarifies: the legislature's continuing intent to protect rural areas from low-density sprawl; and that while some accommodation may be made for infill of certain "existing areas" of more intense development in the rural area, that infill has to be "minimized" and "contained" within a "logical outer boundary." *With* such limitations and conditions, more intense rural development in areas where more intense development already exists could constitute permissible compact urban development; *without* such limitations and conditions more intense rural development would constitute an impermissible pattern of urban growth in the rural area. [*Bremerton/Port Gamble, 5339c/7324c,* 9/8/97 Order, at 24.]

3. What *VISION 2020* Says about Sprawl

The terms sprawl or sprawling are only mentioned a few times in the VISION. Each time it is in reference to the GMA's goal of reducing sprawling, low-density development. Sprawl, per se, is never mentioned in the strategies or the multicounty planning policies but encouraging alternatives to sprawl is implied throughout the VISION. For example:

> "Building on the base provided by the Growth Management Act, countywide planning policies, and local comprehensive plans, the VISION 2020 strategy for urban growth areas includes three parts: (1) identify and maintain urban growth areas, (2) support compact communities, and (3) focus growth in centers. Taken together, these three parts encourage a more compact development pattern that conserves resources and creates additional transportation, housing, and shopping choices." [p.14]

A Review of the Literature

Some of the most prominent and influential literature dealing with the costs of sprawl are summarized here in terms of the specific study question, methodology, and major findings or conclusions, as well as notable critiques made by other researchers. A more extensive list of references related to the cost of sprawl is included at the end of this issue paper.

Real Estate Research Corporation. "The Costs of Sprawl." (1974)

"The Costs of Sprawl" report by the RERC, referenced in the introduction, compared the costs of six hypothetical communities with 10,000 dwelling units each and concluded that high density development was less costly. The cost was evaluated in terms of 4 key indicators: (1) energy cost, (2) environmental impact, (3) capital cost, and (4) operating cost. The study methodology assumed different space standards for different types of dwelling units, so the differences in cost were a function of size, not density or location.

The RERC study was criticized for not assuming all housing units were the same size. However, in reality higher density units are smaller, so RERC's assumption is not necessarily wrong. The RERC study was also criticized for being based on a theoretical analysis and not on actual experience. Critics also raised the issue that standards of service change with increased density, though this was not addressed in the study. For example, sidewalks, street lights, and mass transit exist in higher density urban areas, but may not be desired or required in suburban to rural areas.[6]

[6] Frank, James E. "The Costs of Alternative Development Patterns: A review of the literature." Urban Land Institute. 1989.

Robert B. Smythe, et al. “Density-Related Public Costs.” American Farmland Trust. (1986)

This study asked whether low density development was more costly than higher density development and attempted to answer the question using a real life case study— Loudoun County, Virginia. The authors had two objectives in conducting this study: (1) to develop a methodology that would be straightforward and easily replicated by other counties or regions, and (2) to do so using only readily available county and local data. The study was limited to public economic aspects and compares costs to tax revenues generated to derive net fiscal impacts of varying development densities. Given the available data, they were able to measure variations in cost attributed to density for school operation and instruction, school transportation, road maintenance and construction, and water and sewer services.

What they found was a net revenue shortfall for all 4 residential densities tested, from 0.2 (1 unit/5 acres) to 4.5 dwelling units per acre. But net public costs were found to be three times more per unit for the lowest density developments as for the highest. Fiscal deficits for the 2 lower density communities were 2 to 3 times as large as for the 2 higher density communities. Taxes generated by these residential developments outside the urban fringe were not sufficient to offset the additional cost of providing the infrastructure and services households required. The hypothesis that “residential development of rural land produces public revenues in excess of public costs” is disproved by the results of this study.

James E. Frank. “The Costs of Alternative Development Patterns: A review of the literature.” Urban Land Institute. (1989)

In this Urban Land Institute publication, Frank reviewed literature on the costs of development and sprawl from the 1950s to 1970s and adjusted all cost estimates to 1987 dollars to compare the studies’ findings against each other. He found that “[d]istinctions among alternative development factors form the experimental variables that are manipulated to observe the extent to which development costs change concurrently.” Such crucial variables include density, lot size, contiguity of development, improvement standards, and distance to central facilities, among others.

With a focus on the capital costs of streets, sewers, water, storm drainage and schools, the author found that the total cost of low density sprawl located 10 miles from a sewage treatment plant was slightly more than $48,000 per dwelling unit, excluding housing and land costs. Costs of infrastructure were reduced with tiered increases in density and housing mix and proximity to facilities to a low of $18,000 per dwelling unit. The author touches on issues such as the potential cost reductions based on reduction of standards (e.g., dirt roads, septic tanks), cross-subsidies between more compact development and sprawl which prevent prices from reflecting true costs of development, and gaps in knowledge such as the amount of existing capacity available for infill opportunities before new capital facility costs need to be considered.

Robert W. Burchell, et al. “The Costs of Sprawl—Revisited.” Transportation Research Board. (1998-2000)

Robert W. Burchell, et al. “The Costs of Sprawl—2000.” Transportation Research Board. (2002)

Burchell, et al. published “The Costs of Sprawl—Revisited” in 1998 through the Transportation Research Board, a comprehensive review and synthesis of the literature on sprawl and its impacts. The follow-up to that document, “The Costs of Sprawl—2000” attempts an objective analysis of the costs of two alternative development patterns – controlled and uncontrolled growth (sprawl) over a 25-year period for the nation as a whole. This 600-page tome is a product of more than 5 years of research by Rutgers University. Together, these two documents are probably the most comprehensive studies on the topic of the costs of sprawl.

“Part I” of “The Costs of Sprawl–-2000” begins with a description of sprawl in historical context. It then lays out the definitions and characteristics of sprawl and describes the databases that are used to project growth in the U.S. at the county level. Growth is projected under uncontrolled (sprawl) and controlled (some sprawl allowed, but overall more compact, higher density growth) scenarios for 15 economic areas in the U.S. “Part II” focuses on the impact of sprawl in 5 areas: land supply, water and sewer infrastructure, road infrastructure, public service costs, and real estate development costs. “Part III” is devoted to the personal costs of sprawl, namely, travel miles and costs, quality of life variables and sprawl’s relationship to urban decline. “Part IV” discusses some of the benefits of sprawl, policies in response to sprawl, and future research on sprawl.

The analysis found that sprawl would result in $227 billion in additional costs for uncontrolled vs. controlled growth. Uncontrolled growth leads to greater costs for land consumption and physical infrastructure and creates fiscal costs that exceed revenue. Sprawl does not often come in a form that provides for housing types other than single family detached units on large lots, so overall housing costs were greater for the uncontrolled growth scenario. There are also more personal travel costs due to the auto dependence of sprawl development.

The report does state some of the benefits of sprawl that are not as easily measured. This includes less expensive single-family housing than in central city areas, a wider variety of community settings, and in some cases less traffic congestion due to the trend of suburb-to-suburb trips over focused, city centers traffic. However, the study concludes that an alternative development pattern that is more resource- and cost- efficient is possible without sacrificing those benefits associated with sprawl.

Ken Snyder and Lori Bird. “Paying the Costs of Sprawl: Using Fair-Share Costing to Control Sprawl.” U.S. Department of Energy's Center of Excellence for Sustainable Development. (1998)

This study focuses on how sprawl is often subsidized in the U.S. and discusses methods for allocating costs more fairly. The impacts of sprawl highlighted by the authors are presented in 5 categories: (1) loss of open space and agricultural lands, (2) auto dependence, (3) urban blight/urban core disinvestment, (4) higher resource consumption, and (5) higher infrastructure and services costs. The authors present common arguments in favor of sprawl and then cite literature showing how sprawl has hidden costs that are not often considered in those arguments, such as the cost of new infrastructure and capital facilities, and air and water quality impacts due to increased vehicle miles traveled.

The evidence demonstrates how sprawl is more costly—economically, environmentally and socially—than more compact, smart growth. Snyder and Bird then go on to describe how tools such as fees, taxes and other growth management strategies can be used to steer growth away from sprawling patterns by placing a fair share of the cost of growth-related impacts into the cost of developing at lower densities. There is also a discussion of the potential policy implications of such tools.

J. Dixon Esseks, et al. “Fiscal Costs and Public Safety Risks of Low-Density Residential Development on Farmland: Findings from three diverse locations on the urban fringe of the Chicago metro area.” American Farmland Trust. (1999)

Ann A. Sorenson and J. Dixon Esseks. “Living on the Edge: The Costs and Risks of Scatter Development.” American Farmland Trust. (1999) (a summary of the original research)

This study compares the fiscal costs and public safety risks for three types of scattered development built on agricultural land in Northeastern Illinois: early scatter (new sprawl), maturing scatter (development that is older, but not fully built out and that is scattered on one acre or larger lots), and

transitional scatter (This is an area whose overall density is low but placement is on smaller lots compactly placed along public roads served by city sewer and water lines. It is produced by municipal annexation and will have higher overall density once the area is fully developed, but may have large open spaces between developments). The analysis was limited to single-family detached homes with shared local government services between the scatter area and a nearby municipality. The purpose of this is to test for differences in costs and service response times that could be attributable to density and location rather than to differences in service providers. The authors analyzed four service areas: public schooling, emergency services, public road maintenance and public sewer and water services.

The study finds that in scatter development sites, homes do not generate enough taxes to educate the children who live there. They also fail to pay the full cost of maintaining the roads that lead to and through their subdivisions. The cost of water and sewer infrastructure, where available, may be paid by other taxpayers in the adjoining municipality. In terms of emergency services, the study found that those living in remote locations can face increased risks to their personal safety due to longer response times. On average, police response times were as much as 600 percent longer; ambulance response was 50 percent longer; and fire response was 33 percent longer.

Reid Ewing, Rolf Pendall and Don Chen. "Measuring Sprawl and Its Impacts." Smart Growth America. (2002)

Ewing et al surveyed 83 metro areas and ranked them by their Sprawl Index. They then compared the top ten most sprawling metro areas with the ten least sprawling in the following travel and transportation related outcomes:

- Daily vehicle miles traveled per capita.
- Average vehicle ownership.
- Percent of commuters taking transit to work.
- Percent of commuters walking to work.
- Average commute times.
- Average annual traffic delay.
- Traffic fatalities per 100,000 people.
- Ozone pollution levels.

The least sprawling metro areas were found to perform better than their sprawling counterparts in nearly every outcome: fewer miles driven per day, fewer cars owned, greater percentage of commuters walking or taking transit to work, fewer traffic fatalities and lower ozone levels. Interestingly, sprawling and compact regions were not found to have a significant difference in commute time or traffic delay per capita, dispelling the belief that we can sprawl our way out of traffic congestion.

Cameron Speir and Kurt Stevenson. "Does Sprawl Cost us All? Isolating the effects of housing patterns on public water and sewer costs." *Journal of the American Planning Association.* (2002)

This study aims to further refine the relationship between costs of providing water and sewer services and development patterns by isolating 3 spatial attributes: (1) *lot size*—the separation between houses, (2) *tract dispersion*—the separation between development tracts, and (3) *distance*—separation from existing water and sewer centers. Based on a hypothetical scenario of 3,000 new single-family detached housing units in a town of 30,000 (3.5 people per housing unit), they used a cost simulation model to analyze 60 different scenario combinations. The 3 attributes are combined in different ways with each attribute allowed to vary across all scenarios while the other 2 are held constant. This way the cost consequence of each attribute can be isolated. The study found that smaller lots, shorter distances and lower tract dispersion all led to reduced water

and sewer costs. The cost of services was most sensitive to changes in lot size (.25 to .5 acre) with an average increase of 30%. Cost increases attributed to a doubling in tract dispersion (1 to 2) and distance (.25 to .5 mile) were about 6% and 3%, respectively. Large lots were also assumed to use more water to water lawns, so water use was increased by 25%, a valid adjustment.

Wendell Cox and Joshua Utt. "The Costs of Sprawl Reconsidered: What the data really show." The Heritage Foundation. (2004)

In this paper, Cox and Utt attempt to debunk the prevailing notion that sprawl costs more than smart growth. The paper outlines three of what the authors believe to be the "Current Urban Planning Assumptions" which are: (1) Lower spending per capita will be associated with higher population densities, (2) Lower spending per capita will be associated with lower rates of population growth, and (3) Lower spending per capita will be associated with older municipalities. The report uses an econometric analysis for more than 700 municipalities to attempt to determine the portion of municipal costs related to the impact of sprawl. They conclude that the opposite is true for the assumptions they listed:

- Highest-density municipalities have higher than average expenditures per capita
- Slowest-growing municipalities have higher than average expenditures per capita
- Oldest municipalities have the highest expenditures of all per capita

The authors also critique the results of the "The Costs of Sprawl—2000" report, saying that the additional cost of $227 billion is minimal over the 25-year period, amounting to $29 per capita per year.

Todd Litman. "Understanding Smart Growth Savings: What we know about public infrastructure and service cost savings, and how they are misrepresented by critics." Victoria Transport Policy Institute. (2004)

Litman presents a detailed critique of the Cox and Utt study showing that the latter either misunderstands or intentionally misrepresents smart growth, producing inaccurate conclusions about the cost of sprawl from their findings. This report summarizes various studies comparing the costs of alternative development patterns and finds that smart growth could provide savings of anywhere from $5000 to $75,000 annually per unit for publicly-borne development costs (roads and utility lines) and $500 to $10,000 annually per unit for incremental operations, maintenance and service costs.

According to Litman, Cox and Utt's analysis of the costs of alternative development patterns contains several critical errors. First, they assume that smart growth is primarily about increasing density (no matter what form it takes) or slowing growth, as opposed to accommodating expected growth in smarter ways. They also performed their analysis at the municipal scale. Most sprawl occurs outside of existing municipal urban areas, so their analysis ignores the additional costs of development in those areas. They also do not take into account conventional versus cluster development within municipal boundaries. They conclude that the cost savings of smart growth compared to sprawl are insignificant or non-existent, yet they measure only the difference in public costs and fail to consider the costs borne by the private sector and residents. These include direct costs such as well water, septic systems and garbage disposal. They also consider higher municipal employee wages in higher density cities to be a cost and an inefficiency, ignoring differences in overall wages in each area. Finally Litman criticizes Cox and Utt's claim that sprawling development is what consumers prefer because of the market distortions that favor sprawl. Litman suggests that households would be willing to shift to smarter growth locations if the true cost of sprawling locations were accurately reflected.

Mark Muro and Robert Puentes. "Investing in a Better Future: A review of the fiscal and competitive advantages of smarter growth development patterns." Brookings Institution. (2004)

This report argues that compact development patterns and investing in urban centers can save taxpayers money and improve overall regional economic performance. Based on a literature review of academic empirical literature, the authors find that:

- "The cost of providing public infrastructure and delivering services can be reduced through thoughtful design and planning."
- "Regional economic performance is enhanced when areas are developed with community benefits and the promotion of vital urban centers in mind."
- "Suburbs also benefit from investment in healthy urban cores."

Summary of Findings

For the purpose of this paper, the cost of sprawl is the additional cost of a sprawling development pattern compared to compact development or smart growth. Methodologies vary widely: some studied existing development, others used the hypothetical; some studied specific geographic areas while others analyzed the country as a whole. Many of the studies measure a certain aspect of development costs, but no study can measure all the potential added costs of sprawl. They may only measure the costs to government and thus ignore the costs of privately provided services. Some studied capital costs while others included operating and maintenance costs.

Because of the variability among these studies, it is hard to make too many generalizations about the results. For the most part, these studies found that sprawl was more costly than smart growth. Based on the literature review and the review of the policy context in Washington state, the more easily measured cost differences between sprawl and smart growth are found for physical infrastructure (e.g., roads and utilities) and public services (e.g., schools, police, emergency response). The reasoning is fairly straightforward: sprawling development requires more lane-miles and longer water and sewer pipes than more compact communities. Compact areas can also more effectively share public services within a smaller geographic scope, requiring fewer fire and police stations per capita.

A review of these studies shows that the greatest savings that can be gained through smart growth is in capital facilities costs. Moderate savings can be found for operations and maintenance and service delivery costs.

There are less tangible costs associated with sprawl, such as the additional time spent on congested roadways, health impacts associated with pollution and safety, and impacts to wildlife and natural habitat from additional greenfields being consumed by development instead of being preserved for open space or conservation purposes. The environmental and social impacts of alternative development patterns on quality of life and social equity are difficult to quantify in monetary terms but are just as, if not more important to how we decide to grow as physical infrastructure and public services costs.

These negative impacts can be considered costs and some researchers would try to monetize these. But there is also merit in terms of discussing these impacts as having true costs that are beyond monetary measure. Some researchers would argue that trying to measure these in dollars and cents trivializes the cost. At the same time, the benefits of smart growth are equally difficult to quantify. For example, increased economic productivity is associated with higher-density, compact development, but it is extremely difficult to identify cause and effect relationships.

Qualitative impacts are discussed alongside quantitative costs in the following summary of findings from the review of the literature and the policy context:

Public Infrastructure and Services

- Sprawl had greater capital costs related to building more schools and extending roads, water and sewer lines and stormwater drainage systems, even as existing infrastructure may be operating below capacity. Economic viability is threatened by diffusing rather than focusing needed public infrastructure investments.
- Operations and maintenance costs for schools, roads, water and sewer lines, and stormwater drainage were higher for low density development.
- School busing costs were higher for low density development due to the greater distances between stops and schools.
- Sprawl across municipal boundaries blurs local government roles, fueling competition, redundancy and conflict among those governments. It also encourages insular and parochial local policies that thwart the siting of needed regional facilities and the equitable accommodation of locally unpopular land uses.

Transportation and Travel-related Costs

- Daily vehicle miles traveled per capita was higher in sprawl areas leading to greater air pollution/ozone levels which in turn produced negative impacts on public health.
- Average vehicle ownership is higher in sprawl areas, leading to greater private vehicle expenses such as gas, insurance, and maintenance.
- There are more traffic fatalities per 100,000 people in sprawl areas. Street design in sprawl areas favors the automobile, which leads to more unsafe conditions for pedestrians or bicyclists. There are fewer or marginal sidewalks and wider streets, especially in strip mall areas.
- The percentage of commuters taking transit or walking to work is lower in sprawl areas. Fewer transit options and unsafe streetscapes make these commute alternatives unworkable. Those who cannot drive and must use transit or other options to get to work or school experience negative impacts in the form of opportunity costs. Sprawl areas do not support the kind of regular public transit options that more compact development does.

Land and Natural Habitat Costs

- Sprawl consumes more land and privatizes previously common green spaces into large subdivided lots, destroying the intrinsic visual character of the landscape. Natural habitat and wildlife corridors are impacted by sprawl and its associated activities (e.g., more roads and cars, more urban runoff).
- Sprawl is associated with greater water and energy usage than compact development, as well as more building materials due to larger, predominately single-family detached housing developments on large lots than in smart growth areas.
- More urban runoff/water pollution is created by sprawl areas due to greater water usage, more cars, and more paved areas.

Health and Safety

- Sprawl areas experience longer wait times for police, fire and medical response.
- There are more traffic fatalities per 100,000 people in sprawl areas. (See Transportation and travel-related costs above).
- Sprawl has been associated with rising obesity. This may be linked to the design of sprawl areas, which offer fewer opportunities for physical exercise and health due to fewer sidewalks and walkable neighborhoods, and lack of interesting streetscapes or landscapes to walk in.

Quality of Life

- Urban decline. Older urban neighborhoods tend to overpay for public services, which subsidize newer lower density development on the urban fringe, or tax base is shifted from existing urban centers to pay for new capital facilities on the urban fringe. This leads to abandonment of established urban areas where substantial past investments, both public and private, have been made.
- Social inequities exist for transportation and mobility due to fewer transit options and segregation of land uses. This is of particular concern for low-income households, and non-drivers such as seniors and youth.
- Some sprawl has been associated with less community cohesion. As activities shift to inside the home or in the backyard, there are fewer eyes on the street and less neighbor interaction. Single-use areas (fewer sidewalks and walkable neighborhoods, separated uses, large superblocks) induce residents to get in their cars for every trip, instead of walking or biking around their neighborhoods.
- Segregation along economic and racial lines exists between city and suburb, although this pattern is changing in some areas.
- Urban/rural social divide. Urbanites moving to rural areas may consider typical farming activities with its associated odors and early morning schedules to be nuisances. This can affect the productivity of traditional farming communities forced to modify their behavior to suit newcomers.
- The predominance of single-family detached housing inhibits housing choice for the variety of income levels and preferences that exist. Forecasters project that aging baby boomers, echo-boomers, people having kids later in life or not at all, and others may prefer to live in urban areas or compact village or regional centers with a range of housing options and cultural amenities that sprawl areas do not offer.

In some of these areas, the performance standard is a variable that changes the extent of the additional cost, revealing the complexity of the relationship between density and costs. Litman shows the relationship as a tilde (~). In rural areas costs start low due to more residents providing their own water and sewage and service standards that are relatively low. Costs increase in suburban areas where public services are provided to dispersed development. As densities increase and there is clustering, costs decrease due to efficiencies. Costs then tend to increase at very high densities due to congestion and high land values. However, there are additional benefits such as reduced land consumption, increased economic productivity and reduced transportation costs associated with high-density central business districts.[7]

Where We Are Now: The Debate Goes On

Despite the number of studies finding sprawl to be more costly than compact development, the debate over the costs of sprawl persists. It is largely a political and a subjective matter as some of the quality of life impacts listed above might suggest. The “pro-sprawl” side argues that sprawl concerns are exaggerated and that the majority of Americans prefer it. “Anti-sprawl” advocates maintain that we cannot sustain another 50 years of population growth with the same type of sprawling development that characterized the last 50. They also argue that Americans, if given the true costs of sprawl and attractive alternatives, would choose smarter growth development patterns.

The following table summarizes some of the arguments or “myths” which support continued sprawl and their counterarguments.

[7] Litman, T. “Understanding Smart Growth Savings.” Victoria Transport Policy Institute. 2004.

Table. Prevailing Arguments in Defense of Sprawl and the Counterarguments

Arguments in Defense of Sprawl	Counterarguments
• Development is cheaper in suburban/rural areas	• True, but real costs are not measured. Adjoining municipalities often subsidize the more extensive and less efficient infrastructure needed for sprawl development.
• The additional cost of sprawl is privately provided indicating people's willingness to pay more for sprawl and their desire for sprawl	• Again, real costs are not reflected in the price of sprawl development. Adjoining municipalities often subsidize the more extensive and less efficient infrastructure needed for sprawl development.
• People prefer low density development over high density development	• Survey results showing more people preferring low density development can be misleading due to varying perceptions of "high density." Surveys that use visual examples are more useful and show that many are willing to sacrifice low density and more square footage for better designed homes with a range of nearby amenities.
• Residential development in rural areas produces public revenues in excess of public costs	• "Working" land, such as in agricultural production provides revenues in excess of public costs.
• Commutes are shorter in suburbs	• Due to growing suburb-to-suburb commuting, travel to work may be shorter for many workers, but more trips are necessary because of separated uses. Trips are longer and there are few alternatives for those who can't drive.
• Cars are the most versatile form of transportation and as cars get more fuel efficient and less polluting, environmental impacts will no longer be a concern	• Cars are still a long way from being environmentally friendly, but even if they were totally clean, it does not solve the problem of loss of wildlife habitat, resource consumption, traffic congestion or traffic fatalities resulting from sprawl type road infrastructure and lack of sidewalks or bike lanes. Auto dependent development also prevents non-drivers from having choices in how to get around. 32% of the U.S population can't drive.
• We are able to grow more crops with less land and labor, so prime farmland being lost to development is bunk	• The problem is where and what land is being lost. Productive farmland close to urban centers is being lost. New land could be brought into agricultural production but often at high economic and environmental cost. Also the farther farmlands must move from urban centers—where the consumers are—the more inefficient it is to bring products to market, especially for smaller farms selling their produce in local markets.

Clearly there are varying opinions about the qualitative costs and benefits of sprawl, but the quantitative studies still suggest that sprawl is more costly, both in monetized and non-monetized terms, than smart growth development. Municipalities should be aware of these facts when determining land use policies.

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