Indicators of Smart Growth in Maryland

Prepared by: The National Center for Smart Growth Research and Education at the University of Maryland*
Jason Sartori, Research Associate
Terry Moore, Senior Research Faculty
Gerrit Knaap, Director

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*The views expressed in this report are those of The National Center for Smart Growth Research and Education and do not necessarily represent those of the University of Maryland or agencies of the State of Maryland with responsibilities for the management of some of the systems addressed in this report.

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http://smartgrowth.umd.edu

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EXECUTIVE SUMMARY

Maryland is often referred to as the birthplace of smart growth, a movement in land use planning that contributed to what is now referred to as sustainability planning, sustainable development, and sustainable communities. Maryland adopted a Smart Growth Program in 1997 with the primary purposes being to use incentives to (1) direct growth into areas already developed and having public facilities, and (2) reduce the conversion of farm, forest, and resource land to urban uses.

The National Center for Smart Growth Research and Education at the University of Maryland was established in 2000 in large part because of Maryland's leadership in the field of smart growth. Its mission is to provide research and leadership training on smart growth and related land use issues in Maryland and in metropolitan regions around the nation. Thus, a key focus of the Center's research is Maryland's Smart Growth Program: where is it effective, and how can it be improved?

This report provides some *indicators* (also called *performance measures*) that suggest answers to those questions. The term "suggest" is important: (1) there are many limitations of any assessment based on indicators, no matter how well developed, and (2) the indicator assessment reported here is only in its preliminary stages. Understanding the limitations of indicators is critical to interpreting their significance. Thus, Section 2 and Appendix B of this report discuss in some detail data, methods, and limitations.

Researchers and policymakers acknowledge those limitations, but that acknowledgement does not slack their desire for indicators that say something concrete about whether desired outcomes are being achieved, and at what cost in direct expenditures and spillover effects; and about directions for policy that would increase the desired outcomes, reduce the costs, or both. Sections 3 and 4 address those issues.

Section 3 reports indicators for six categories of issues. *Population* and *employment* growth drive development. That development is the immediate concern of the two thrusts of the Maryland Smart Growth Program: it puts pressure on the *natural areas* that the Program wants to protect, and it can occur in *development patterns* that not only eliminate and vitiate those natural areas, but also are inefficient from the perspective of providing *transportation and other infrastructure* and, ultimately *housing* (and other buildings). Some of the key findings:

- **Population.** The population growth rate in Maryland approximately equals the national average. The indicators give no direct, rigorous, or even casual evidence that the Smart Growth Program either increased or decreased the *amount* or *composition* of population growth statewide.

- **Employment.** Employment and other measures of economic activity have consistently grown over the last two decades in Maryland and all its regions. From 2000 to 2009, Maryland had the 13th highest annualized rate of job growth (1.0%) among the 50 states. Indicator data allow the conclusion that the Smart Growth Program did not stop economic growth, but they do not allow a conclusion about whether the Program increased or decreased that growth from what it would have been in the absence of the Program.

- **Transportation.** For most measures of transportation performance that are standardized, Maryland looks like other states: VMT, congestion, and car ownership have risen consistently over time. Maryland has higher transit ridership than most states, some of which may be attributable to the Smart Growth Program but most of which is attributable to Maryland's proximity to Washington, D.C. and its own historical investments in transit (especially in Baltimore and in suburban Maryland) that pre-date the Program.

- **Development patterns.** Urban development continued in Maryland at densities lower than several comparison states from 1990 to 2000. Most of that growth has not been infill of urban areas: the predominant form of urban development in Maryland remains suburban. Three-fourths of the new single-family *acres* were developed outside PFAs since 1997.

While this indicator has shown some improvement in recent years, the share of *parcels* developed outside PFAs continues to demonstrate an increase over time. Despite increases in density for the state as a whole (which is inevitable if there is any population growth), a substantial amount of Maryland's new growth has been occurring in the exurban areas of the state. The share of population that lives within a half-mile of rail transit stations, however, has generally risen over time.

- **Housing.** Although the single-family share of new housing construction has fallen recently, the single-family share of housing in Maryland is high for a highly urbanized state. Housing prices have inflated faster in Maryland than most other states the last few decades, clearly raising questions of affordability, which varies across the state.

- **Natural areas.** The trends for acres of farm and forest land have been steadily downward in Maryland and the U.S. for a long time, but data suggest that rate of decline is decreasing. Maryland and its counties have protected well over 1.3 million acres of land. There is still, however, a substantial amount and percent of critical land that is not protected. Measures of air quality are mainly stable or improving, yet measures of water quality demonstrate poor conditions in watersheds across the state.

If the indicators here are leaning in any direction, it is that Maryland has not made substantial progress toward improving its performance in many of the areas pertaining to smart growth. There are, however, reasons to qualify a direct conclusion like that one:

- Without the kind of research design that goes well beyond the reporting of indicators into statistical controls for multiple explanatory variables, there is no solid way to rebut the hypothesis that what the Maryland Smart Growth Program did was to prevent many indicators from getting much worse than they are.

- Things take time. Many changes in technology, social attitudes, prices, and the built environment occur slowly.

- If it is too early to expect to see much by way of results (e.g., changes to trends) then perhaps indicators of *outcomes* should be supplemented by indicators of *inputs*: of efforts made to stimulate future change (i.e., the number and strength of policies to change the patterns and effects of growth).

1 BACKGROUND

1.1 OVERVIEW OF MARYLAND'S SMART GROWTH PROGRAM

The Maryland Smart Growth Program was introduced by former Governor Parris Glendening in 1997 and passed by the Maryland General Assembly.[1] The program has two main parts: the Smart Growth Areas Act and the Rural Legacy Program. In short, the program (1) encourages new growth in already developed areas, where adequate infrastructure and public facilities currently exist, and thus (2) protects natural resources, farmland, and forests. Those purposes are the start of a definition of smart growth.

The program is usually referred to as an incentive-based, rather than a regulatory, program: it intended to provide state funds for infrastructure development in designated Priority Funding Areas (PFAs), and funding and other incentives for the protection of land outside of PFAs. It was praised as an innovative way for state government to combat the ills of sprawl and protect natural resources yet retain local land-use control.

There is general agreement among policymakers, planners, and academics that the *theoretical* effects of the program should be as intended (i.e., consistent with its goals): to direct more growth into developed areas (PFAs) and less growth into resource areas than would have otherwise occurred, other things being equal. But the program did not include any funding or requirements for measuring performance (outcomes) to address the question: did the theory become the reality?

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[1] Discussion and action leading to the program goes back farther (see Appendix A of this report). Recent antecedents of the program date from 1991 when, as part of an effort to protect the Chesapeake Bay, a state commission proposed a stronger state role in what had been traditionally local land-use decisions. Recommendations include state guidelines for permitted densities, performance standards, and local inventories of environmentally sensitive areas. In 1992, the Maryland legislature adopted a scaled-back version of these recommendations in what became known as the Economic Growth Resource Protection and Planning Act. This act established seven visions (later increased to eight) and required jurisdictions to modify their comprehensive plans to be consistent with these visions. The term "visions" (in contrast to terms like goals, objectives, policies, or benchmarks) was used to convey the general nature of the requirements and the broad range of responses available to local governments in addressing the visions. The eight visions were single sentences that said things like: protect sensitive areas, conserve resources, protect the Bay, focus rural growth into population centers, encourage economic growth, streamline regulation, ensure adequate public facilities, assure funding for all the preceding visions.

Without measurement and controlled evaluation, the complexity of the factors that affect urban development patterns make it hard to isolate the effects of a program like Maryland's Smart Growth. For example, did the amount or percent of development going into developed areas actually increase? A rigorous evaluation is even more difficult and must go beyond simple indicators to include an underlying causal model of key determinants of land-use change. For example, even if the amount or percent of development going into developed areas decreased might it have decreased even more in the absence of the Smart Growth Program?

In 2009, the Maryland General Assembly passed two major updates to the state's Smart Growth Program that are relevant to this question of performance measurement. The first revised the State's growth visions to 12,[2] which more comprehensively address the broad impacts of growth and collectively describe an integrated vision for sustainable development in Maryland. These 12 visions could logically be used as categories of things that the State wants to influence and, thus, wants to measure to see if it is in fact having any influence. The second—the Smart, Green and Growing Act—requires counties in Maryland to report certain data relating to the visions on an annual basis to the Maryland Department of Planning (MDP). MDP, in turn, is required to work with the National Center for Smart Growth Research and Education to gather additional data from state and federal sources and annually report on these measures and indicators of growth to the Governor and General Assembly. These new data offerings will provide valuable insight into the impacts of Smart Growth and fresh views of many of the indicators included in this report. The legislation established a goal of increasing the percentage of growth within PFAs statewide, and required counties to set their own goal for the percentage of their future growth that would occur within their PFAs.

1.2 THE MARYLAND SMART GROWTH INDICATORS PROJECT

The collection and reporting of indicators is not a new concept. State agencies including the Maryland Departments of Agriculture, Business and Economic

[2] See section 2.2.1 of this report, "State goals: Is there agreement on what to try to achieve?"

Development, Housing and Community Development, Licensing and Labor Relations, Natural Resources, Planning, and Transportation have been collecting and reporting indicators in their respective program areas for a long time. These state agencies are the main sources of information for the indicators in this report. The National Center for Smart Growth Research and Education at the University of Maryland (the NCSG, or, the Center) began to collect and report indicators more recently to permit a better understanding of where Smart Growth was succeeding and where it needed improvement. The Center's efforts began in 2005 with a grant from the Lincoln Institute of Land Policy. Primary funding for the project, however, has come from The Abell Foundation.

The Center refers to this project as *The Maryland Smart Growth Indicators Project*, or simply as the *Indicators Project.* The original intent of the Indicators Project was to gather and organize growth-related data and to make those data available to the public on one central website maintained by the Center. The goal was to track time-series data in a format that was easy to read, use, and evaluate. A beta version of the website was made available in 2008. Users identified many potential improvements that the Center may make, depending on funding.

The 2009 legislation elevates the Indicators Project from an academic exercise that *might* influence policy to a required effort whose results *should* be considered in all future discussions about land-use, development, environmental protection, and smart-growth policy in Maryland.

This report is a summary of some of the preliminary data the Center has and will continue to collect. The underlined words are all important. The Maryland Smart Growth Indicators website (www.indicatorproject.com) shows additional information not discussed in this report. Moreover, the potential scope of the full project (as now funded and potentially funded in the future) goes through 2011 so that data from the 2010 U.S. Census can be included in the time-series analysis. Thus, the results reported here are partial and preliminary, but they give a good sense of the breadth of the Indicators Project and some suggestions about the performance of the Maryland Smart Growth Program.

1.3 ORGANIZATION OF THIS REPORT

The rest of this report has three sections:

- **Section 2, Understanding indicators**. It is easy, tempting, and thus common for people to focus on a particular indicator as support for their policy preference. It is much less common for a particular indicator to be unambiguous about progress toward broad goals like quality of life. The world is complex and there are tradeoffs. Section 2.1 discusses what indicators are, what they do well, their limitations, and the implications for using them to inform or direct public policy decisions. Section 2.2 builds on the concepts in Section 2.1 to address issues related to defining indicators relevant to Maryland's Smart Growth Program.
- **Section 3, Selected indicators for Smart Growth in Maryland: what they show and what they might mean**. There are six categories of indicators, addressing population growth, employment growth, transportation and infrastructure, development location and patterns, housing, and natural areas and the environment. This section shows some indicators related to each category and describes implications for Maryland's Smart Growth Program.
- **Section 4, Conclusions**. Most of our conclusions about specific indicators are contained in Section 3. Section 4 brings them all together, and offers additional commentary.

2 UNDERSTANDING INDICATORS

There is general agreement on the steps for policy making: (1) get agreement on what outcomes are desired, (2) define and evaluate different packages of policies that might achieve those outcomes, (3) select and implement the one that seems likely to give the best outcomes for a given amount of cost, and (4) monitor (measure) progress and make adjustments.

In that context, *indicators* are about *measurement*. Specifically, with its Smart Growth Program the State of Maryland has taken a first pass at steps 1, 2, and 3 above. This report and the Maryland Smart Growth Indicators Project are about step 4: *what progress toward desired outcomes is suggested by measurements of those outcomes, either directly or indirectly*?

Any statement about performance (i.e., progress toward outcomes, and the costs of making that progress) must be interpreted in the context of the way that performance has been measured, the limitations of those measurements, and the difficulty of linking changes in performance to the actions. Section 2.1 addresses these issues. For a more detailed discussion of the topics it covers, see Appendix B, Overview of Program Evaluation and Performance Indicators. Section 2.2 then builds on those general principles about indicators to discuss them in the context of Maryland's Smart Growth Program.

2.1 OVERVIEW: DEFINITIONS, PRINCIPLES, TECHNICAL ISSUES, LIMITATIONS

2.1.1 What are "indicators" and why do they matter?

What progress is Maryland making toward achieving the goals for the development and preservation of land that its citizens care about? Indicators provide some answers.

Indicators are measurements. They may measure physical quantities (e.g., levels of air quality or traffic congestion), money (e.g., value of agricultural products or average incomes), public opinion (e.g., percent of people believing that crime is less of a problem than it was five years ago), or anything else that people care enough about to monitor.

Indicators are about impacts. At the heart of debates about smart growth and development are questions about how the actions of households, businesses, and governments affect the quality of life in Maryland: about their impacts on the economy, the environment, the culture, education, scenic vistas, and so on.

Indicators are evaluation criteria. It is logical to evaluate how well our public policies (programs, investments, regulations) are working to maintain or improve quality of life by seeing if indicators are showing change in the desired direction: are the impacts they purport to measure moving toward the goals citizens and their elected representatives have agreed to care about? That is why some states and cities refer to their indicators as a community report card.

The report-card analogy can connote a higher authority dictating to a rebellious, recalcitrant, and captive student. A better analogy might be the tracking of fitness indicators by people motivated to improve their fitness. They monitor

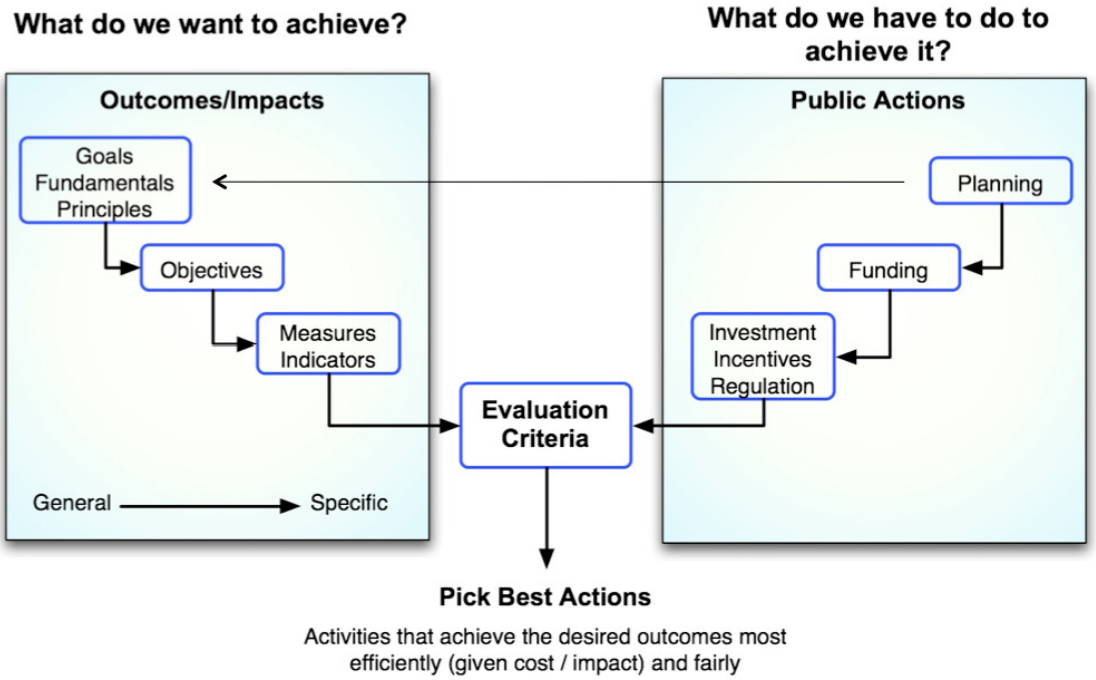
things like weight, heart rate, body mass, amount lifted, time taken, diet, calories, and so on. No single measure at a single point it time adequately describes their state of fitness. But when most of the measures are moving over time in a desired direction, there is evidence of progress and of actions that are working. That is what the Maryland Smart Growth Indicators Project aspires to: helping motivated communities to monitor their performance so they can make better progress toward achieving what they want to achieve.

A fundamental premise of the Maryland Smart Growth Indicators Project is that *what we choose to measure is what we will pay attention to, and what we pay attention to is what we will make progress on*. Indicators are valuable because they provide the foundation for public debate and decision-making by producing clear and well-documented facts about the direction of change regarding issues we care about.

2.1.2 Where do indicators fit in a discussion of future growth and public policy?

Figure 1 illustrates the typical process for discussing and selecting public policy, and shows where indicators fit in.

Figure 1: Summary of terms used in policy evaluation, and the role of indicators



Source: Moore, Terry and Paul Thorsnes. 2007. The Transportation / Land-Use Connection. American Planning Association. Chicago.

Note that indicators are in the left-hand box about outcomes and impacts: they are more specific measures of broad goals for desired outcomes. The right-hand box is about actions (public policy). Indicators join with public policy in the middle at "Evaluation Criteria" because indicators are likely to be some of the criteria by which alternative public actions get evaluated (e.g., "What kind of effect is Action X likely to have on Indicator Y?").

Indicators attempt to measure progress toward achieving desirable public goals and objectives (as specified on the left side of Figure 1). Indicators should fall under ("nest within") one of the higher level goals or objectives. For example, the number of new jobs by type is an indicator (a measure) of the broader goal of "economic development."

In the left-hand box, the goal of public policy (or government action) is, in broad terms, to better the lives of the people government serves. But "making people better off" is too broad a goal to be measured. One must get more specific. What can the public sector change that improves the things people care about? In broad terms, study after study, plan after plan, shows that the public generally wants:

- Economic prosperity: more and better jobs, higher wages, etc.
- Environmental quality: air, water, flora, fauna, etc.
- Amenity: mobility, housing, shopping, education, security, recreation, etc.
- Low cost: they want improvements in the three previous categories, but they do not want it to cost too much.

These agreed upon goals become controversial as a policy debate moves toward the details of desired outcomes and policies to achieve them. There are tradeoffs: for example, improving environmental quality may require more direct cost (taxes and fees) and indirect ones (regulation of property rights). Similarly, reducing congestion may be good for the economy, the environment, and amenity in the long run, but it probably requires higher direct prices (taxes and fees) for travel in the short-run and the long-run.

These points have implications for indicators: (1) since public policymaking always has multiple objectives, it will require multiple indicators; (2) there will be tradeoff among objectives—thus, it is unlikely that any single indicator will be

sufficient to compel a policy action; and (3) indicators must be tied to (nested within) broader public goals and objectives.

2.1.3 Indicators: less than perfect; better than nothing

There are many conceptual and technical problems in identifying, quantifying, and interpreting indicators. This project has tried to pay attention to all of them:

- **Number of indicators**. A single goal may generate many sub-goals (objectives), each of which may have a dozen reasonable indicators. This project had to select a subset of indicators, based on considerations that follow.
- **Measurement of indicators**. Measurement requires that the data sources and units of measurement be selected, specified, collected, and standardized. There are many technical issues to be considered, and decisions to be made about which indicators, and which ways to report those indicators, make the most sense. Any effort of this type is constrained by the availability, reliability, and comparability of data. Some information that would be valuable to collect, analyze, or compare simply is not collected by any jurisdiction or agency. Other information may be collected by one jurisdiction, but not another, or collected by multiple jurisdictions in different ways. One long-term goal of the Maryland Smart Growth Indicators Project is that it will help identify gaps in data collection that could be filled in future years.
- **Interpretation of indicators**. People can look at the same indicator and see different things. Indicators (1) provide some facts, but not all the facts, and (2) are subject to different interpretations. They can inform discussion; they cannot make decisions. For example, suppose an indicator of housing price shows those prices increasing. Consider all the questions this finding raises. Are they increasing because of Smart Growth policies, or despite those policies? Would they have increased even more without the policies? Even more fundamentally, are increasing prices a good thing (increasing property values for land owners, increasing tax revenues for local governments, indicators of a strong economy) or a bad thing (decreasing housing affordability)? The indicator, by itself, answers none of those important questions.

- **Aggregation of indicators**. Multiple indicators, measured in different units, cannot be added to a summary score. Scoring and weighting of indicators is possible, but requires participation by multiple stakeholders and careful technical work. Measuring relevant indicators is part of the Maryland Indicators Project; aggregating them into a summary score is not, though others can use the indicators to create such scores.

2.2 APPLYING THE CONCEPTS TO SMART GROWTH IN MARYLAND

2.2.1 State goals: Is there agreement on what to try to achieve?

What are the state's goals for quality of life that the indicators should try to reflect? The NCSG has tried to answer that question by looking at the history of state policy in Maryland regarding the amount, type, location, and characteristics of growth and development in the state.

As Maryland's growth management approach was developed over the last several decades, no effort was made until recently[3] to establish a set of specific goals by which the effectiveness of the state's efforts could be measured. Instead, the goals of Maryland's Smart Growth initiative have always been expressed in broad, idealistic terms. The general goals of the program have been:

- To support and enhance existing communities;
- To preserve natural resources and agricultural areas; and,
- To save taxpayers from the cost of building new and often redundant infrastructure.

For the last 13 years, Maryland has endorsed an approach generally consistent with the "Ten Principles of Smart Growth" developed in the late 1990s by the EPA-sanctioned Smart Growth Network and subsequently adopted by 38 Smart

[3] In 2009, the Smart, Green and Growing legislative package passed by the Maryland General Assembly and signed into law by Governor Martin O'Malley established a statewide goal of increasing the current percentage of growth within the priority funding areas and decreasing the percentage of growth located outside the priority funding areas. The act also requires local jurisdictions to establish a percentage goal toward achieving the statewide goal and to begin tracking certain growth-related indicators.

Growth Network partners, 50 units of government, 40 non-governmental organizations, and 13 private sector groups. Those principles are:

1. Mix land uses;
2. Take advantage of compact building design;
3. Create housing opportunities and choices;
4. Create walkable communities;
5. Foster distinctive, attractive communities with a strong sense of place;
6. Preserve open space, farmland, natural beauty, and critical environmental areas;
7. Strengthen and direct development toward existing communities;
8. Provide a variety of transportation choices;
9. Make development decisions predictable, fair, and cost-effective; and,
10. Encourage community and stakeholder collaboration in development decisions.

More recently, the report of the Task Force on the Future for Growth and Development in Maryland (*Where Do We Grow From Here?* December 2008) recommended "modernizing the State's Planning Visions to Achieve Smart and Sustainable Growth." It suggested 12 "visions" (i.e., principles) for planning that were ultimately adopted by the Maryland General Assembly in 2009. Some deal with process (e.g., public participation, stewardship, implementation), but most of the others are very similar to the EPA Smart-Growth principles. Some are quite general (e.g., protect the environment, conserve resources, build sustainable communities, economic development). Others are a little bit more specific about the desired form of growth, which can be measured—thus, they give some ideas about indicators:

- *Growth Areas.* Growth is concentrated in existing population and business centers, growth areas adjacent to those centers, or strategically selected new centers.
- *Community Design.* Compact, mixed-use, walkable design consistent with existing community character and located near transit options.
- *Infrastructure.* Growth areas have the water resources and infrastructure to accommodate population and business expansion in an orderly, efficient, and environmentally sound manner.

- *Transportation.* A well-maintained, multimodal transportation system.
- *Housing.* A range of housing densities, types, and sizes provide residential options for citizens of all ages and incomes.

Broad goals can be inferred from these statements, and they are ones that elected officials in Maryland would generally agree with. But this project does not try to create or summarize such goals.

The 2009 Smart, Green and Growing legislation established Maryland's first measurable statewide goal of increasing the percentage of growth occurring within PFAs and decreasing the amount of growth occurring outside the PFAs. The legislation also calls on local jurisdictions to establish their own targets toward achieving the statewide goal and requires them to track certain indicators of growth.

The NCSG presumes that something like the principles above are worth pursuing. The goals established through the 2009 legislation clearly suggest that indicators of growth inside the PFAs are worth measuring. Thus, the Maryland Smart Growth Indicators Project creates indicators that provide a sense of how close state and local policies are getting us to these targets.

2.2.2 Organizing indicators for the Maryland Smart Growth Indicators Project

Before making a final selection of indicators based on broad state goals, the NCSG looked at indicators used in other states and regions. Many have already developed websites that display indicators similar in content and quality to the Maryland Smart Growth Indicators Project website. Typical categories of indicators are economy, environment, community development, housing, public facilities and infrastructure, education, public health, public safety, and civic engagement. Each of these categories might contain five to 20 specific measurements related to the category topic. Some examples of indicators:

- Economy: employment by industry; unemployment rate; net job growth; employment in rural areas; economic diversification; funding for higher education; families and children living in poverty; median household income adjusted by cost of living; and income disparities between top and bottom quintile of population.

- Environment: changes in air quality; aquifer/water table depletion; acres of protected or restored natural land; harvestable shellfish beds; tree cover; funding for the environment; stream water quality; terrestrial and marine species; invasive species; household recycling rates; per capita greenhouse gas emissions; housing density and services within proximity to transit; hazardous substance cleanup.
- Housing: home ownership; median home price versus median household income; percent of households paying 30% or more of their income towards rent or mortgage; vacancy rates; market rate and subsidized housing production; homelessness; distribution of affordable housing; mortgage foreclosures; abandoned properties.

Ultimately, it was our obligation to make the best sense we could of all these considerations and pick a small subset of everything that we *could* measure as the indicators for this project that we *would* measure. Following is a summary of the logic that influenced our choices (the bold text shows the six categories of indicators that this report addresses):

- Maryland does not have strong policies whose direct purpose is to restrict population and employment growth, and it has only modest policies to encourage certain types of economic growth. In broad terms, Maryland's policy is to accommodate the growth that is driven by market forces and existing federal, state, and local policy to seek to locate in Maryland. Maryland's Smart Growth policies do not aim at restricting the *amount* of that growth, but at changing the *pattern* of that growth to ones believed more likely to preserve important natural resources, reduce environmental damage, and reduce costs by working more efficiently. Thus, we start by talking about indicators related to **population (demographics)** and **employment (the economy)**, which drive the land development that Maryland policy is trying to accommodate in smarter ways.
- Given that population and employment growth drive the demand for and supply of more development, and of the demand it creates for new buildings and more development, where is that development occurring, and is it occurring in smart ways? The development patterns depend on **transportation** and **other infrastructure**: where and how we build it, and how well it performs. The **land development patterns** themselves are of

interest, because some (e.g., the ones smart growth should encourage) are expected to have lower impacts on infrastructure costs and on natural areas. A special subset of land development is **housing** (residential development): is it well located and affordable?

- Where and how that development occurs is the main driver of impacts on the environment and natural systems. Is Maryland doing the **natural resource preservation** its Smart Growth policies call for? That includes preserving certain agriculture lands and natural areas, and protecting environmental quality and ecosystem services.

These categories are compatible with our assessment of the main visions or principles of Maryland's Smart Growth Program as we described them in Section 2.2.1. Population and employment growth drive development. That development is the immediate concern of the two thrusts of the Maryland Smart Growth Program: (1) it puts pressure on the natural areas that the Program wants to protect, and (2) it can occur in ways that not only eliminate or vitiate those natural areas, but also are inefficient from the perspective of providing public facilities and, ultimately buildings (including housing). These are the broad categories of concern that the indicators should be addressing.

Even with the categories set, however, the number of potential measures (indicators) is overwhelming: both for researchers to collect and policymakers and the public to consider. Section 2.2.3 describes some of the things we considered when narrowing the scope of our analysis; Section 3 then defines and reports on the indicators we concluded would be most relevant to Maryland's Smart Growth Program.

2.2.3 Some technical information about the indicators used in this project

Typical of any extensive data analysis, there are many technical issues that are relevant to the degree to which readers have confidence in the information, and to how they interpret that information. Here are a few of those issues:

- **Data sources**. A large portion of our measures and raw data were gathered from Maryland state agencies, including, but not limited to, the Maryland Department of Planning, the Maryland Department of Business and Economic Development, the Maryland Department of Natural Resources,

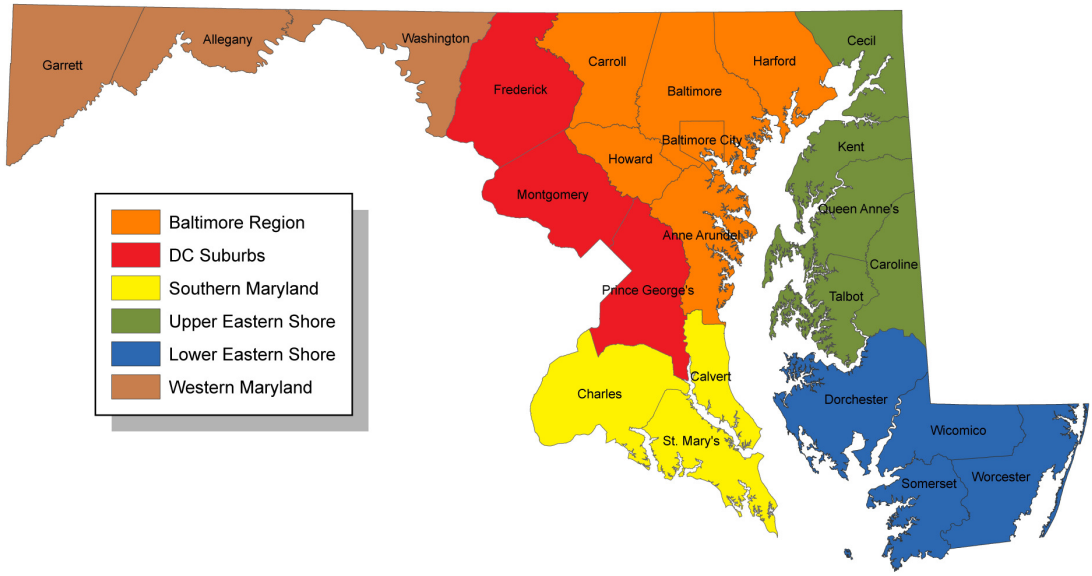
the Maryland Transit Authority, the Maryland State Highway Administration, and the Maryland State Department of Education. We have also collected data from federal agencies, regional transportation planning organizations, transit agencies, and other sources (including non-profit organizations). In some ways, the Maryland Smart Growth Indicator website is a portal to growth-related data from many different sources. We refrained, however, from simply duplicating the presentation of data already well-represented in the public domain. In these cases our website provides links to additional sources of valuable data.

- **Number of years of observation.** Our goal was to track indicators from the past to enable readers to examine changes over time and to provide readers with a basis for extrapolating future trends. But getting consistent data proved time consuming and difficult: definitions and data quality change over time. Thus, for many of the indicators we report just one point in time: we have a snapshot, not a movie. The lack of multiple observations (i.e., time-series data) for some variables makes it hard to answer the question of whether Maryland is making progress toward achieving its goals. Where we do have consistent observations from different years, we can and do draw stronger conclusions. At a minimum, this initial report establishes a benchmark by which future reports could measure progress toward smarter growth in Maryland.
- **Indicators versus benchmarks.** While we think it important for the state to establish goals regarding many of the measures in this report and on our project website, we refrain from suggesting specific targets.
- **Comparison to other states.** Smart Growth started as a statewide effort to preserve open space and natural resources, provide adequate public facilities, and concentrate growth in areas that already have adequate infrastructure. Because of this statewide effort to control development, we often compare Maryland to the other states. Two states of particular interest are Virginia and New Jersey because both are close neighbors of Maryland, have similar economic and growth patterns, and thus face several of the same concerns. Comparisons to these states also offer contrasts to a state that is less dense (Virginia), like Maryland used to be, and to a state that is more dense (New Jersey), like Maryland is becoming. By analyzing patterns in these states as well as in Maryland we can more

readily see where Maryland's policies have an effect on numerous indicators, and where the policies, by comparison with other states, have little influence.

- **Local differences.** Different areas in Maryland face different problems; smart growth policies on a local level need to reflect these contrasting needs. We attempted to collect data at the smallest geographic unit possible. The reflection of policies on a local level allows for appropriate stakeholders to address which policies are succeeding in their communities and which areas need attention. Moreover, these problems and issues often play a role in larger regional issues. Using county data, we occasionally aggregate data to the regional level in order to better analyze the impacts of growth and better understand the potential to address issues through regional cooperation. Figure 2 demonstrates our regional breakdown of the state, which is consistent with the regional analyses performed by the Maryland Department of Planning. Ideally, however, we would compare data across various types of development (urban, suburban, and rural) but data at this level of detail are extremely hard to obtain.

Figure 2: Map of Maryland's six regions



- **When simplicity becomes complexity.** An attraction of indicators is the idea that a simple report card can tell most of the story. If that is only partially or occasionally true for your child, how likely is it to be true in the aggregate for the six million residents of Maryland? This recognition of differences leads to a reasonable and unavoidable tendency to want to expand a simple indicator. Start, for example, with vehicle-miles traveled (VMT) as a direct measure of transportation performance and an indirect measure of environmental quality (carbon emissions). Is total VMT enough to measure, or should we report VMT per capita? Is it enough to report the total, or should we report the percent change? To understand Maryland's numbers, would it not be useful to report the same numbers for other states? And there will be local variation: rural counties with more distance between destinations and less transit will probably have higher VMT per capita and may want to see their individual performance. In short, one measure that could be described in one table (VMT) has metastasized into dozens of measures requiring many tables and pages of explanation. The objective and the hope is "simple and neat;" the reality is "complex and messy."

In addition to these issues about measurement, all the conceptual issues about interpretation raised generally in Section 2.2.2 apply specifically to Maryland indicators. Most broadly, by trying to make things simple, indicators risk making them wrong. Indicators are usually not linked to any formal conceptual model, much less to a rigorously and mathematically specified model of cause and effect. No interactions or tradeoffs occur. People can argue their intuitions and positions by focusing on the indicators that best support them. All manner of double-counting can occur: for example, measuring the same thing with multiple indicators can increase its implicit weight. We gave housing price as an example of an indicator for which reasonable people could have completely different interpretations. If people cannot agree on whether a single indicator is positive or negative, there is little chance of any informal scoring system leading to a consensus score on how well Maryland is doing and what it should do to improve.

But given all those very important caveats, it is still reasonable to hope that there are a few outcomes that Marylanders can agree are critical to its future, that progress toward those outcomes can be measured over time, and that those measurements can encourage and influence judgments about whether current

public policy can be adjusted in ways that will efficiently and fairly improve the outcomes. We carry that hope into the next section.

3 SELECTED INDICATORS FOR SMART GROWTH IN MARYLAND: WHAT THEY SHOW AND WHAT THEY MIGHT MEAN

Section 2.2 explained the logic for our selection and organization of indicators. We start with the drivers of development (population and employment), then look at the pattern of development that gets created (infrastructure, transportation, development type and density, housing), and finally at the impacts that development has on natural areas and the environment. This section discusses several key indicators from six categories: demographics, the economy, transportation and other infrastructure, development patterns, housing, and natural areas and the environment. Appendix C contains additional figures and tables highlighting many more indicators within the six categories.

3.1 DEMOGRAPHICS (POPULATION AMOUNT AND CHARACTERISTICS)

3.1.1 Background on the issues and indicators

Increases in Maryland's population have been the driving factor for the residential, commercial and industrial growth the state has experienced for the past half century or longer. Population growth influences the demand for new housing; fluctuations in housing prices; the spread of commercial development; the growing interest in redevelopment of older areas; the attraction of job-creating industries to the state; the attraction of people to Maryland who want to fill these jobs; and the amount and cost of infrastructure and services. Population growth is central to how and where the state grows, where development occurs, and the performance of Smart Growth and other state and local growth management efforts.

In the urban parts of a typical metropolitan area, residential development (housing) is the largest user of land, covering one-half to two-thirds of the land area. For some suburban communities, the percentage can reach 70% or more. New residential development occurs because consumers are willing to purchase it. That demand can occur without much population growth in some instances (e.g., in highly desirable communities with a limited land supply; in resort areas), but

even in those cases the residential development is a key contributor to general economic growth, which stimulates new employment and migration to the area of a labor force looking for jobs. In short, (1) population growth and residential development are closely linked: they cause and are caused by the other, (2) the type and pattern (location, density, mix with other uses) of residential development affects many other factors of concern to Maryland's Smart Growth Program, and thus (3) indicators of population growth provide an important context for indicators of the impacts of development.[4]

There is no ambiguity about what is being measured for this indicator: people, or the households that comprise them. Every ten years the U.S. Census does what it can to make a full count of people by their place of residence. For an indicator project like this one, ten years is too long to wait for counts: too much can happen in between. State and local government planners have the same problem. Thus, most states (including Maryland) have various state agencies that assemble (e.g., from federal sources like the U.S. Census) or make *estimates* of population annually,[5] based primarily on building permits (if housing units are being built and occupancy rates are roughly stable, then population must be growing).[6] In addition, they make forecasts of future population.

Where population is growing or not is relevant to an evaluation of Maryland's Smart Growth Program. For example, is Maryland growing much faster or slower than comparison states? Are parts of Maryland growing at different rates? Thus, the next section focuses on where growth has occurred, and on the characteristics of the households responsible for that growth.

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[4] The overlap and relationships among population, housing, and development patterns is an illustration of the kinds of problems any indicators project runs into: our subsequent indicators of housing and development patterns may be partially or largely double-counting indicators of population. But it is clear that population growth can be accommodated with different patterns of development, and those different patterns will have different effects on the efficiency with which public facilities can be provided and on the impacts on natural areas.

[5] Those forecasts are not strictly indicators—indicators are measurements of something observable, not predictions—but they are clearly relevant to the purpose of indicators in that they provide information that is relevant to a discussion of progress toward goals and of policies to improve that process.

[6] Here is another example of the circularity of these estimates: housing permits are used to estimate population growth, and population growth is then used to make estimates of residential development and its impacts.

3.1.2 Results

First, consider Maryland in the context of the United States:

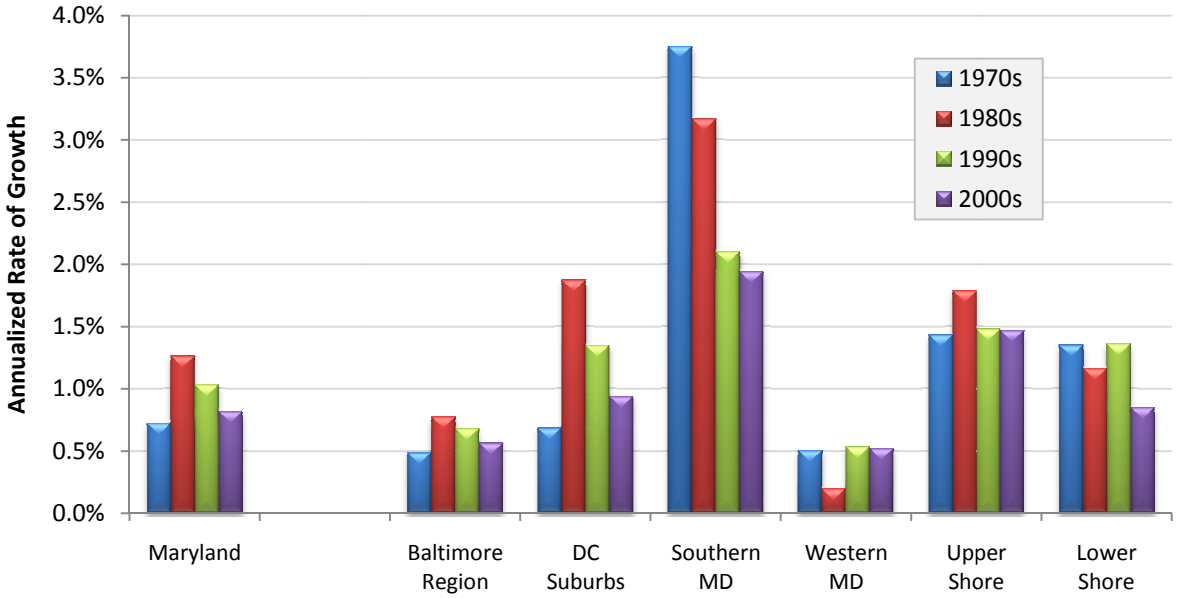
- With a 2010 Census population of 5,773,552, it is near the median of states in terms of total population (19th among all 50 states) and population growth since 2000 (23rd at 9% growth).
- Because of its relatively small land area (42nd) it has a relatively high population density (5th).
- Looking at the two selected comparison states, over the 50 year period between 1960 and 2010, New Jersey's population increased 45%, Virginia's 102%, and Maryland's 86%. For the U.S. as a whole the growth was 72%.

Within Maryland:

- Based on 2009 population estimates,[7] most of the state's population resides in the greater Baltimore (46%) and Suburban Washington (36%) regions.
- Long-run trends in population growth (since 1970):
  - In absolute terms, most of Maryland's growth was in the suburbs of Washington, D.C. Montgomery County has witnessed nearly more than a quarter of the state's growth over that time period.
  - In relative terms, Howard County has seen a 352% increase in population; Calvert County 331%; Southern Maryland (including Calvert County) 189%. Between 1970 and 2009 the share of Maryland's population in Calvert, Charles, St. Mary's, Cecil, and Queen Anne Counties almost doubled (from 4.8% to 8.5%). Figure 3 provides some more detail about historical growth rates, by region in Maryland.
  - Two jurisdictions lost population: Baltimore City (30% decline) and Allegany County (14% decline).

[7] We are using 2009 population estimates here because 2010 Census county level data were not yet available at the time this report was published.

Figure 3: Annualized population growth rates, by region in Maryland, 1970 – 2009



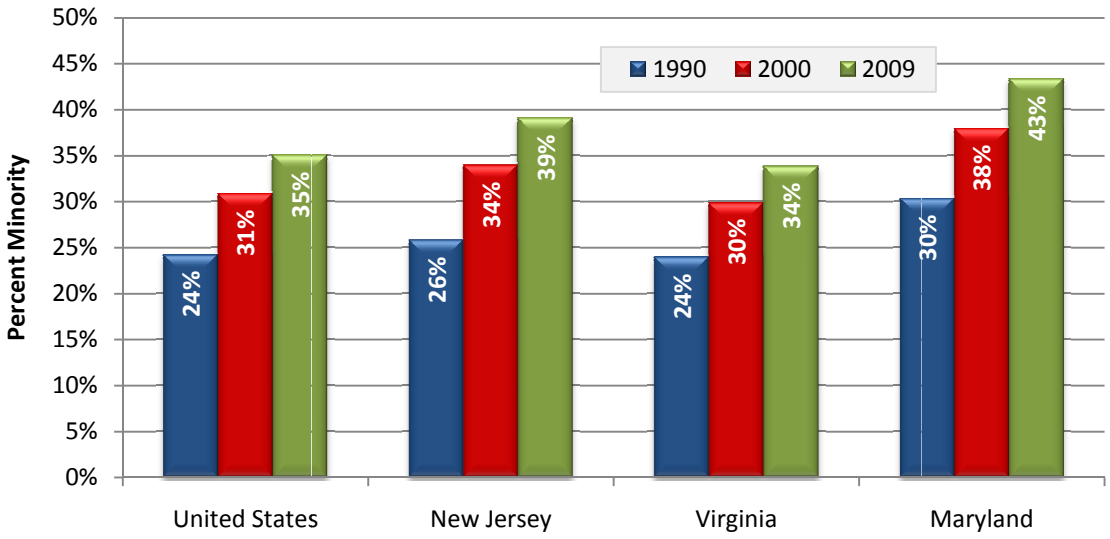
Source: U.S. Census

- Other information about the composition of population and growth:
  - Figure 4 shows the change in the percent of Maryland's minority population[8] over time: Maryland is more racially diverse than the comparison states.
  - Population change is, at the state level and on average, entirely due to changes in minority population. In the 1990s Maryland lost 1% of its non-Hispanic white population and increased its minority population by 38%. From 2000 to 2009, the estimated percentages are -2% and 23%. All regions of the state have seen an increase in minority population, with Southern Maryland (63%) and Western Maryland (50%) experiencing the largest minority growth. The Baltimore (-2%) and D.C. Suburbs (-7%) regions lost non-Hispanic white population; the other, less central regions had modest increases in non-Hispanic white population.
  - Vital statistics provided by the U.S. Census Bureau indicate that about 73% of Maryland's population growth between 2000 and 2009 resulted

[8] The minority population includes everyone other than "non-Hispanic white" for data from prior to 2000, and everyone other than "non-Hispanic white alone" for the post-2000 data.

from natural increase (more births than deaths in the state) and 24% was in-migration to the state. Across the U.S., these percentages were 62% and 35%, respectively.

Figure 4: Percent minority population (non-white population and white Hispanic population) in the United States, Maryland and select states, 1990 – 2009



Source: U.S. Census

- Population density (people per square mile) in 2009 is, of course, higher in urban counties (an average of 1,205 people per square mile in the nine counties that compose the Baltimore and Suburban Washington regions) than in rural ones (an average of 132 people per square mile, for instance, in the nine counties that compose the Upper and Lower Eastern Shore regions).

3.1.3 Assessment

The population growth rate in Maryland is near the average of all states in the United States. Population has grown in all regions of the state. The details of that growth are important for evaluating Smart Growth policy. Maryland's central counties have accommodated most of the population growth (absolute growth), but (1) Baltimore City has lost population, (2) Maryland's outer counties, farther from the state's urban cores, are growing at a faster rate (relative growth) than its urban counties, and (3) Maryland has grown despite net losses of its non-Hispanic white population.

The result is that despite increases in density for the state as a whole (which is inevitable if there is any population growth, since the size of the state cannot vary), a substantial amount of the new growth Maryland is experiencing occurs in the exurban counties, which is not the objective of the Smart Growth Program.[9] That last statement must, however, be qualified: measures of density depend on the area being observed. It is possible to have density increasing at a county or metropolitan level (people moving in) at the same time it is decreasing in urban areas (if, for example, all the growth were going to rural areas of the county). Section 3.4 addresses that issue.

3.2 THE ECONOMY (EMPLOYMENT AND INCOME)

3.2.1 Background on the issues and indicators

Economic development is hard to separate from the development of land that is the focus of Smart Growth. Land development is a manifestation of and contributor to economic development, and it is hard to conceive of productive increases in economic activity that could be sustained without new buildings to accommodate that activity (i.e., without land development). And if one takes economic forecasts as givens, then commercial and industrial development is driven by economic growth. Similarly, economic growth is highly correlated with demographic growth,[10] so it indirectly influences residential development as well.[11]

A principle of Smart Growth is that it is not anti-growth, but that it encourages and supports economic growth. Thus, it makes sense that the Smart Growth Indicators Project would include indicators of the economic activity that is key as both (1) an element of the quality of life of a state, and (2) a driver of the land development that affects most of the other things Smart Growth cares about. That said, and as subsequent sections illustrate, though Smart Growth supports

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[9] There are subtle distinctions here. Though the state program may not directly intend to limit growth in any specific county, by attempting to focus growth in developed areas, does it have the indirect affect (and intent) of limiting growth in some counties?

[10] Regional scientists debate whether people follow jobs or jobs follow people. Both can occur and the dominating driver depends on the place. But historically and probably still the primary driver is the jobs. People are more likely to move on business cycles than on bicycles.

[11] Again, causality moves in both directions and may have different weights in different locations and situations: is a local housing market down because the economy is down, or vice versa?

economic development, it does not support it everywhere or anywhere or at any cost, but in locations where infrastructure and services can be adequately and efficiently provided.

Most of the employment data used in this study are from the Regional Economic Information System of the U.S. Bureau of Economic Analysis (BEA). The BEA releases these summary data on an annual basis at state and local levels, with the most recent data coming from 2008. The BEA includes all full- and part-time jobs (including wage-and-salary jobs and proprietor jobs), and weights both equally.

3.2.2 Results

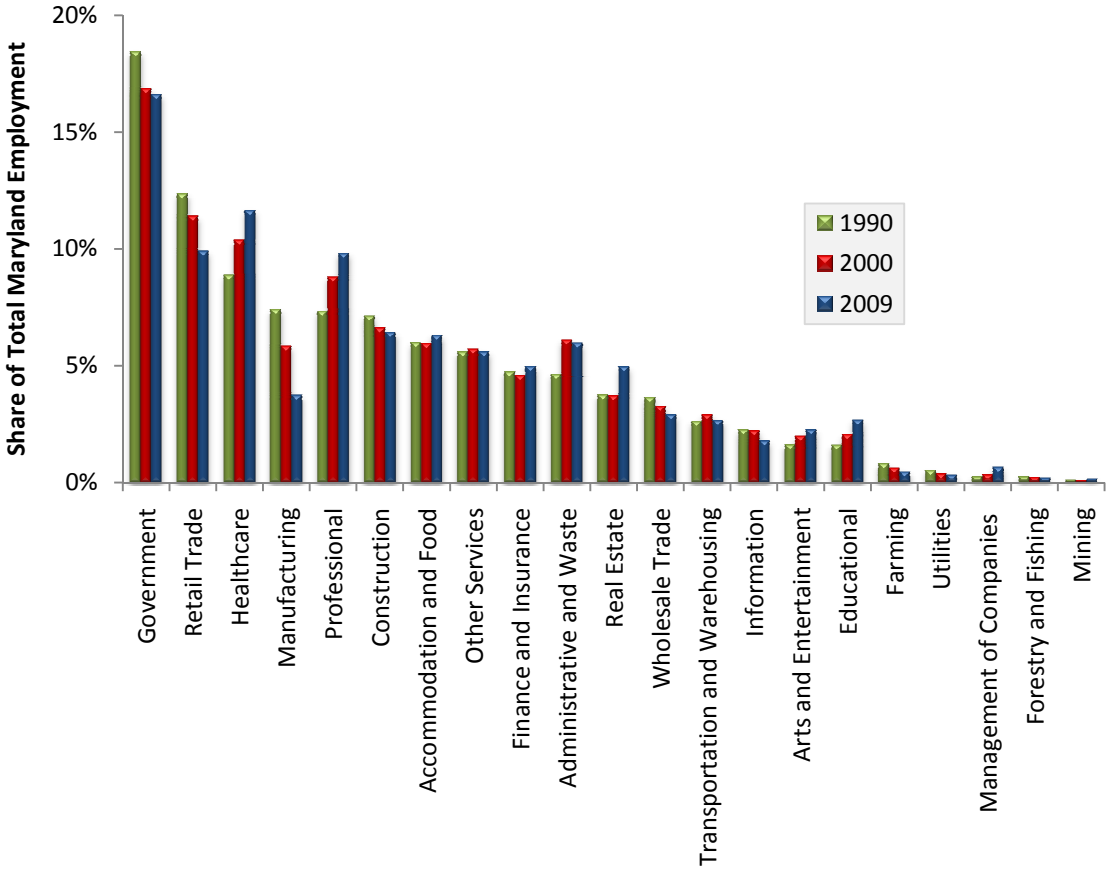
First, consider employment in Maryland in the context of the United States:

- It is near the median of states in terms of total employment (20th among all 50 states).
- In the 1990s Maryland ranked toward the bottom of all states in annualized rate of employment growth with 1.1% per year (44th among the 50 states). Despite the recession at the end of the decade, in the 2000s it ranked near the top with 1.0% annualized employment growth per year (13th).[12]
- Looking at the two selected comparison states, Virginia had a higher annualized rate of job growth than Maryland in the 1990s (1.7%) and a slightly lower one in the 2000s (0.9%); New Jersey had a lower one in both decades (0.9% and 0.6%, respectively).
- Comparing the number of jobs to the amount of population (a measure of "job richness"), Maryland ranked 21st in 2009 with 0.59 jobs per capita. Virginia was slightly higher at 19th and 0.60; New Jersey lower at 29th and 0.57.
- Figure 5 shows the percent of employment in Maryland by sector, in 1990, 2000 and 2009. Three of the four largest sectors in 1990 lost share by 2000 and again by 2009. The biggest loser was manufacturing, while healthcare and professional services made the largest gains. That evidence is consistent with general shifts in U.S. employment over the last 30 years

[12] Through 2009.

from manufacturing to services. Government remains the dominant employment sector in Maryland.

Figure 5: Percent employment in Maryland by sector, 1990, 2000 and 2009



Source: U.S. Bureau of Economic Analysis

- Maryland's per capita real gross domestic product ranked it 19th among all states in 1997, and 13th among all states in 2009.
- Maryland is at or near the top of all states in measures of annual income to wage earners (either per capita or median household). Its median household income in 2009 was $69,272, or 38% higher than the U.S. average, about 17% higher than Virginia's, and 1% higher than New Jersey's. Due in large part to the recession at the end of the decade, Maryland was one of only five states to see its real median household income increase in the 2000s.

Within Maryland:

- Between 2000 and 2009 the state's employment increased by about 9.5% from 3,065,202 to 3,356,526.[13] For comparison sake, the state's population increased by 7.3% over that same period.
- The largest share of existing and new jobs has consistently been based in the Baltimore-Washington corridor. From 1970 through 2000, the Washington Suburbs were the location of 45% of Maryland's job growth. One county, Montgomery County, had about a quarter of the state's total job growth during that 30-year period. During the 2000s,[14] however, the greater Baltimore region has seen the largest share of the state's job growth (42%) despite the City of Baltimore having lost almost 51,000 jobs.[15]
- Given the shifts in absolute jobs, it is not surprising that relative shares have also shifted. Figure 6 shows the annual rate of job growth for regions in Maryland. The Baltimore Region has consistently accounted for about 40% of the growth. The D.C. Suburbs dropped from more than half of the state's employment growth in the 1970s to only 38% in the 2000s, with Southern Maryland and (to a lesser extent) the Upper Eastern Shore picking up most of the difference.
- In 2008, the Baltimore Region, the D.C. Suburbs, and the Lower Eastern Shore all had between 0.61 and 0.64 jobs per capita. Southern Maryland was lowest at 0.48. In all regions the numbers were all slightly higher in 2008 than they were in 2000 (jobs were growing faster than population).
- Figure 7 shows that though the Maryland average for annual median household income is about $70,000, there are substantial differences by region and by County.

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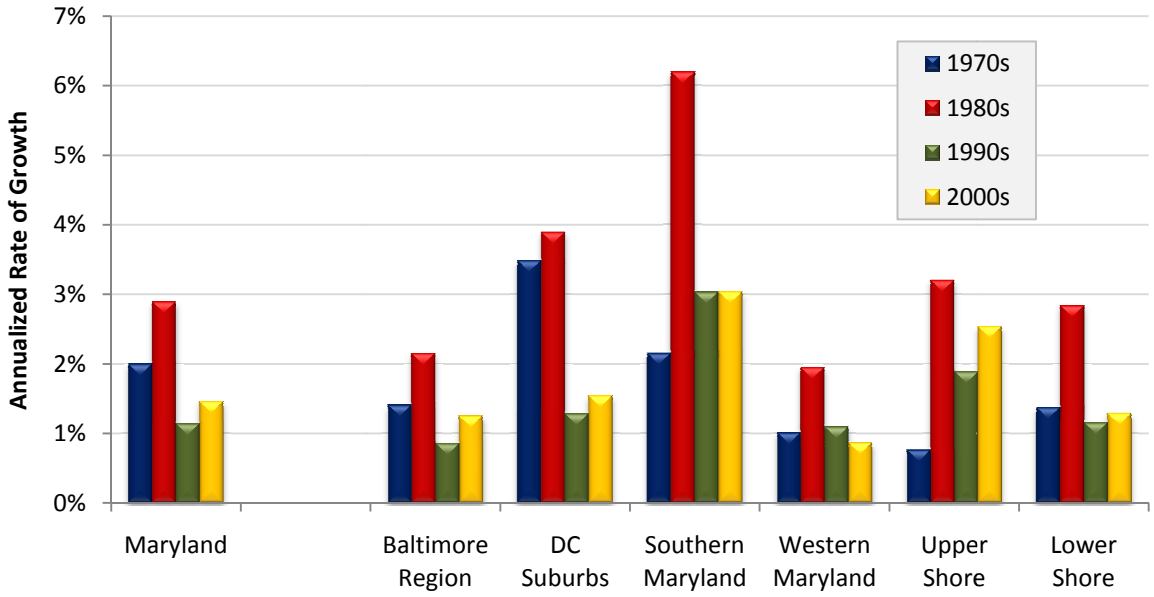
[13] Note that this statement is based on BEA estimates of all employment, which includes proprietor jobs. If only wage-and-salary jobs are considered, the growth rate is only 2.4%.

[14] Using county-level BEA data, which at the time of this report's release were only available through 2008.

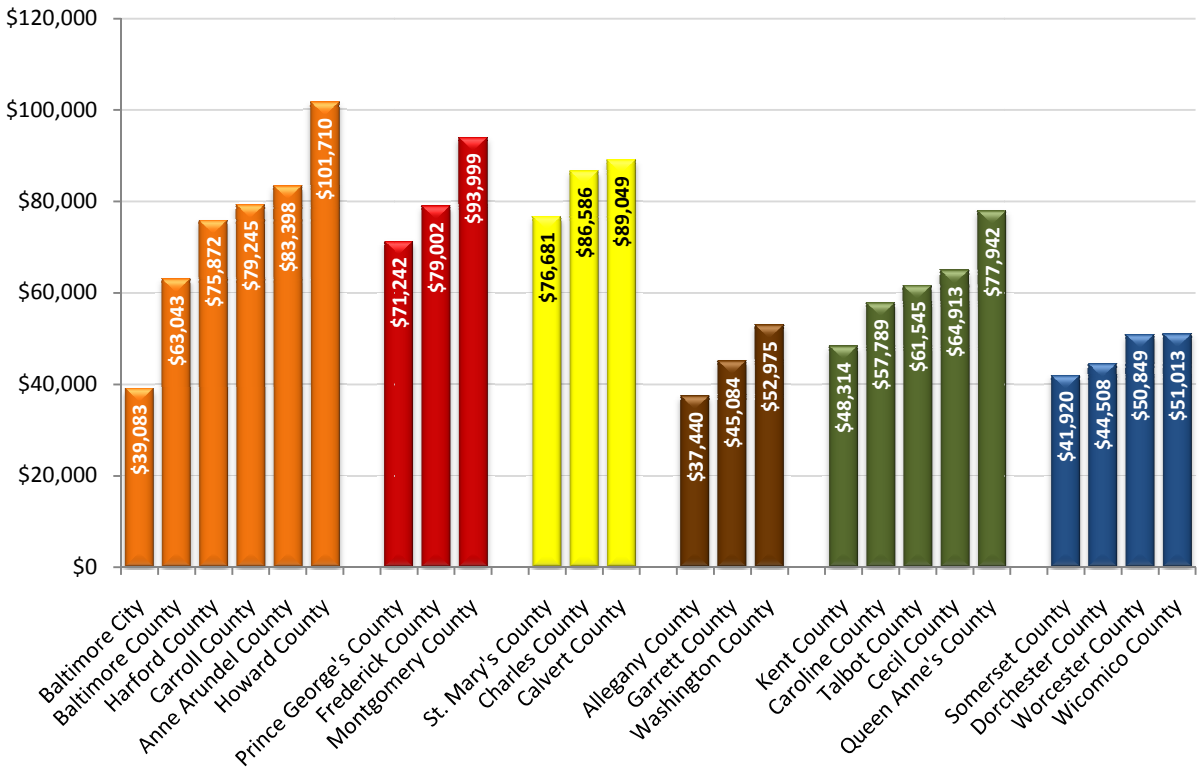
[15] Note these are two different areas: the region and the City. The region includes the City as well as Anne Arundel, Baltimore, Carroll, Harford and Howard Counties. Thus, it is possible, even likely that a lot of the job loss in the City was a migration of jobs to other parts of the region.

Figure 6: Annual rate of job growth for regions in Maryland, 1970 – 2008



Source: U.S. Bureau of Economic Analysis

Figure 7: Median household income for counties in Maryland, 2006-08



Source: U.S. Census Bureau

3.2.3 Assessment

Maryland's economy is relatively strong when compared to other states on standard measurements. Employment and other measures of economic activity have consistently grown over the last two decades, and have grown faster than they have in the majority of states. Like all other states and metropolitan areas, the long-run employment trend has been to shift from manufacturing employment toward services.

Within the state, employment growth is strongest in the more urban central counties, which is where Smart Growth policies would want most of that growth to occur. That growth is correlated with and probably a main contributor to the higher household incomes in these counties. But as noted elsewhere in this report, it is possible to have jobs concentrating in what would be characterized as an urban county (e.g., Montgomery County) and simultaneously going into suburban and rural parts of that county.

In our judgment, the economic data illustrate what we identified as a problem with indicators: they are not usually tied to any formal economic model, and they offer no ability to provide rigorous statistical support to claims of causality. About all we can say at this point is that after the Smart Growth Program was adopted in 1997 employment continued to grow in all Maryland counties. The program did not stop economic growth: indicator data do not allow a more detailed conclusion about whether the Program increased or decreased that growth from what it would have been in the absence of the Program.

3.3 TRANSPORTATION AND OTHER INFRASTRUCTURE

3.3.1 Background on the issues and indicators

Whenever or wherever development occurs, a certain amount of infrastructure to support the development is required. Roads should be sufficient to handle the traffic generated by new development. Infrastructure for drinking water and wastewater—either public water and sewer systems or private wells and septic systems—must be put in place. New residential development often means that new or larger schools will be needed, or that new fire, police, rescue or sanitation services will be required.

Transportation affects decisions about where houses and businesses are built more than any other type of public works project. It is literally the "driving" force behind development. Conversely, in places where development is allowed to occur, governments are often forced to provide the transportation necessary to meet the needs of those new development centers.

Because of the direct effect that transportation decisions have on development decisions (and vice versa), questions about the kind of transportation project that is built (i.e., highways or rail) and where it is built have become intertwined with growing concerns about land use, development patterns, traffic congestion, expensive and time consuming commutes, the level of exhaust emissions from vehicles, and, most recently, the effects all of this may be having on global climate change.

Other major infrastructure for development that are major state and local government concerns are water and wastewater treatment facilities and piping, public safety facilities and services, and public schools.[16]

As with population and employment and development, one finds with infrastructure and development causality moving in both directions: the type, location, and cost of infrastructure affects the type and location of development, and vice versa. Smart Growth encourages development (and redevelopment) within existing communities where infrastructure and services already exist. But often the existing infrastructure and services are outdated or insufficient to support new development and must be upgraded, sometimes at costs that exceed those for providing the same infrastructure in less developed and less central locations. These and other considerations, and the scarcity of standardized data about infrastructure capital and operating costs across counties, make many simple indicators of infrastructure performance hard to interpret in isolation.

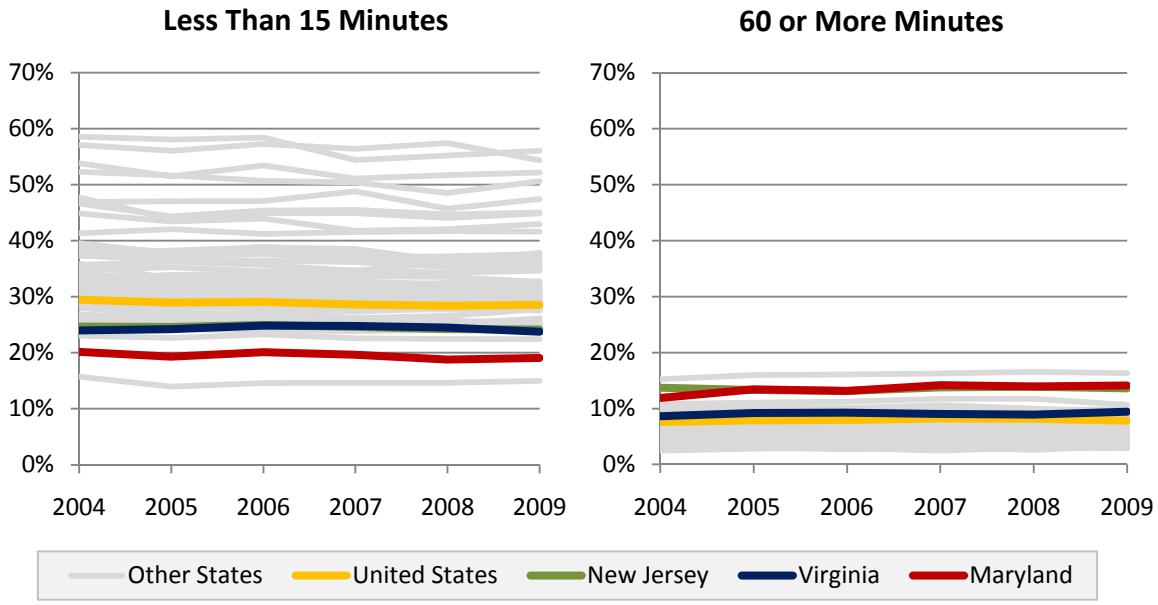
[16] Electrical generation and transmission and telecommunications are typically handled by the private sector and were not researched for this report.

3.3.2 Results

Nothing about Maryland's economy, demographics, landscape, building patterns, or policies has caused it to diverge in any significant way from national trends in congestion and VMT.

Nationally, congestion has grown unabated in the 439 U.S. urban areas studied by the Texas Transportation Institute (TTI) since the early 1980s. One source ranks Maryland fifth worst in the nation for congestion on urban interstates (69% of the urban interstate miles were rated as congested in 2005).[17] MDOT reports that at the aggregate level certain measures of congestion[18] have not grown in the State since 2002, but Figure 8 shows what most commuters believe: travel to work takes longer in Maryland than in almost any other state: fewer trips under 15 minutes, and more trips (with the percentage rising) of trips over 60 minutes.

Figure 8: Travel time to work in U.S. states, 2004 - 2009



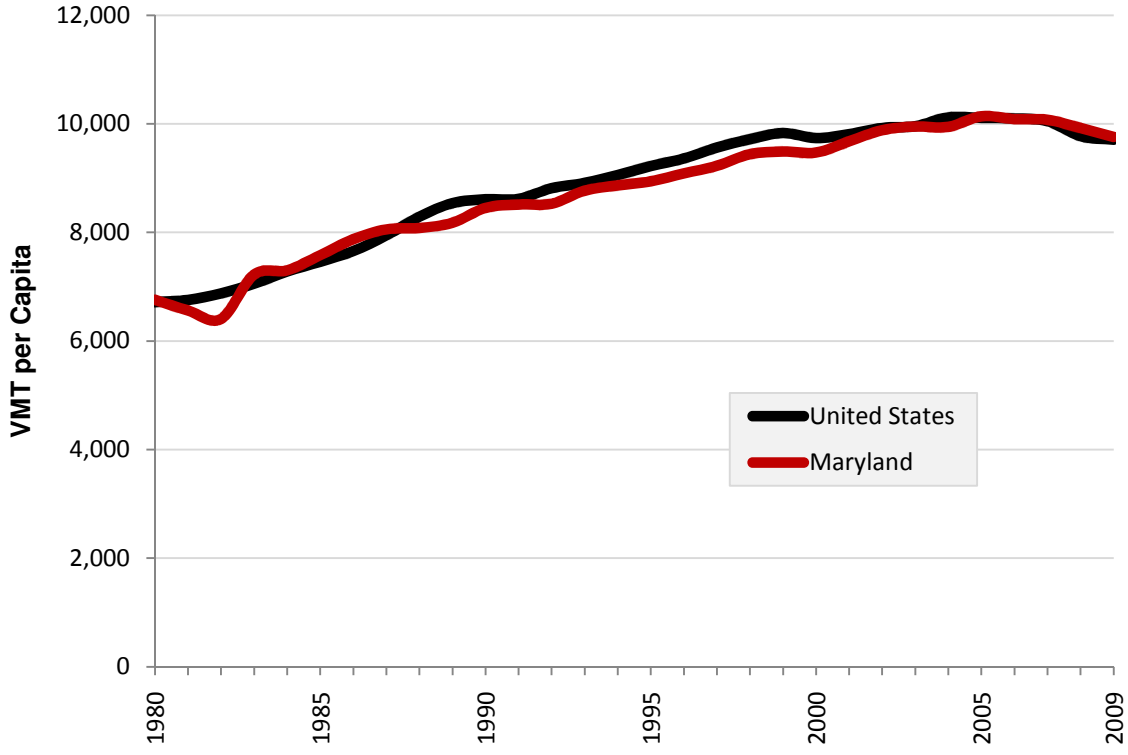
Source: U.S. Census Bureau

[17] Maryland Department of Legislative Services, Office of Policy Analysis, *Congestion in Maryland: A Bumper to Bumper Analysis*, July 2008, page 1.

[18] *2009 Annual Attainment Report*, page 38. Measured as "percent of freeway and arterial lane-miles with average volumes at or above congested levels." This is one measure of congestion, but it would not fully capture a situation in which freeway miles *that are already congested* are becoming more congested (slower travel times and longer congested periods). More refined measures could show increasing amounts of vehicle-hours of delay.

For VMT the national trend has been generally been upward since measurement began over in 1970. In fact, 2008 was the first year since 1980 in which nationwide VMT did not exceed the previous year's total.[19] Maryland has hovered around the national averages for VMT and per capita VMT growth since 1991. Baltimore and Washington, D.C. ranked in the mid-range of VMT per capita on principal arterials among the 100 largest metropolitan areas. MDOT data indicate, however, that VMT decreased in both 2008 and 2009, after having increased each year since 1982. Additionally, VMT per capita in Maryland has fallen in five of the last six reported years. Nationwide, the measure has followed a very similar trend, having fallen in each of the last five reported years. Figure 9 suggests visually what the numbers are saying: Maryland's trends in change in VMT per capita have paralleled those of the nation. Figure 10 shows Maryland's VMT per capita at the regional level.

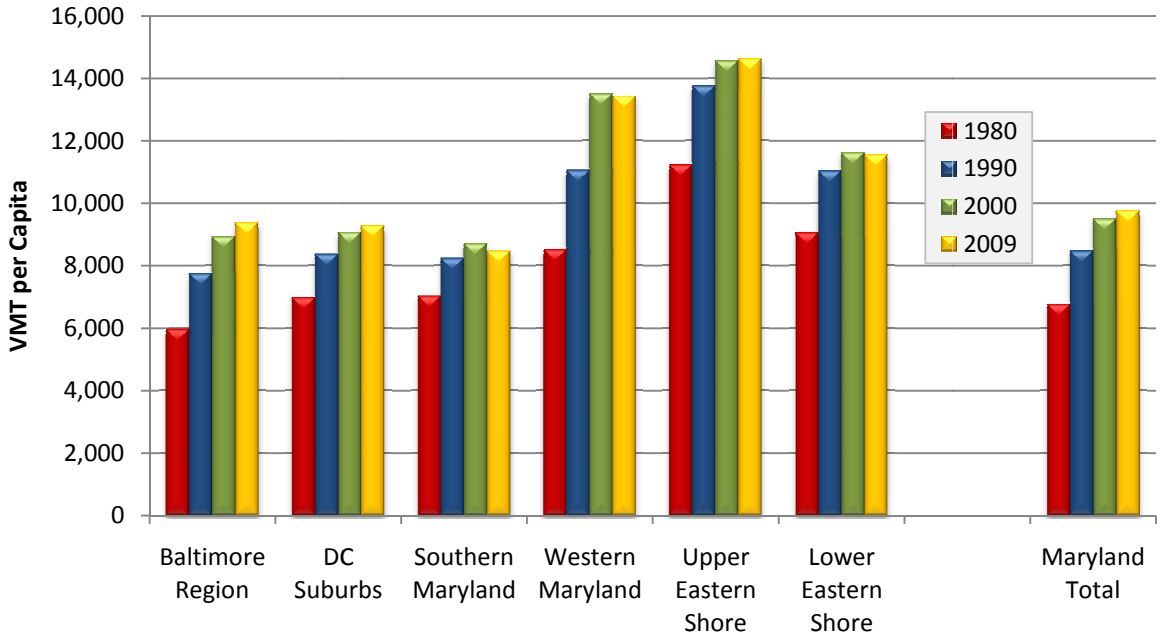
Figure 9: Comparison of growth in VMT per capita, Maryland versus U.S., 1980- 2009



Sources: U.S. Census Bureau; Maryland Department of Transportation, State Highway Administration; U.S. Department of Transportation, Federal Highway Administration.

[19] 22 March 2010. United States Department of Transportation, Federal Highway Administration. Accessed 30 December 2010. http://www.fhwa.dot.gov/policyinformation/travel/tvt/history.

Figure 10: VMT per capita by region in Maryland, 1980, 1990, 2000 and 2009



Sources: Maryland State Highway Administration and U.S. Census Bureau.

The NCSG did a more detailed evaluation of the distribution of VMT across Maryland counties. It allocated Maryland's 24 counties to one of three equal groups (high, medium, low) on several variables (total population, population density, total VMT, and VMT per capita) for three time periods (1990, 2000, and 2009). The results:

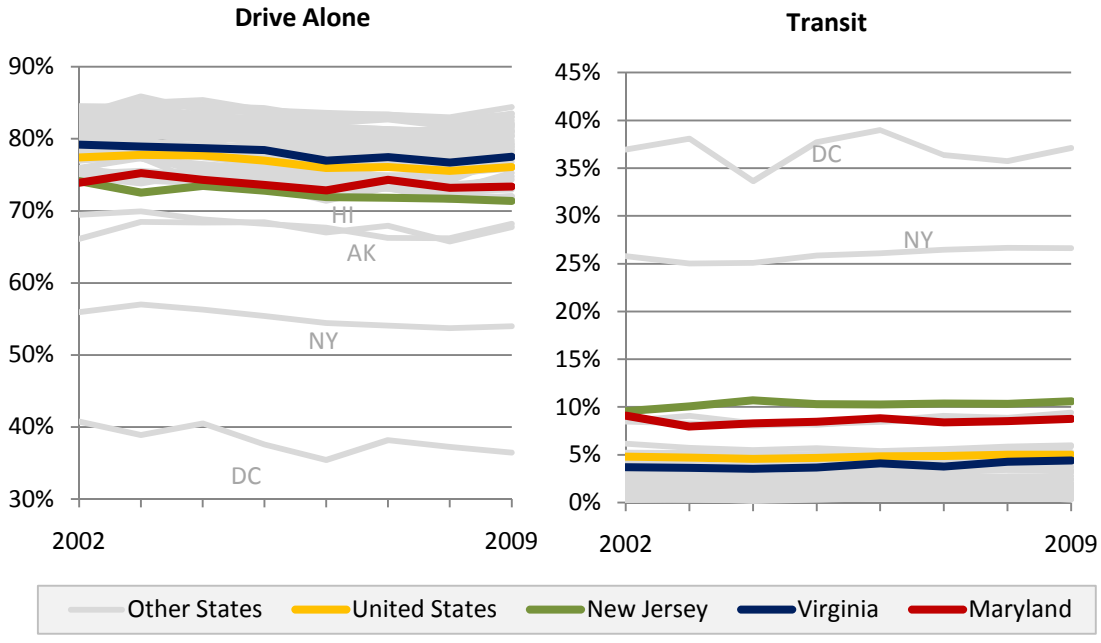
- Comparing across time on each variable, the counties rarely changed groups.
- Comparing across variables on each time period, counties generally had the same ranking in each time period for population, population density, and total VMT. For example, if a county was in the high group on total population, it was very likely to be in the high group on population density (because the differences in the area of counties is much less than the differences in their populations), and on total VMT (more people, more driving).
- But for VMT per capita, the rankings changed: in general, the counties with a higher ranking on population, density and VMT were more likely to rank in the middle or low group on VMT per capita. That finding is consistent with those of other studies: people in more rural areas tend to drive more

miles per capita. People in urban areas may make more trips per capita, but they may be shorter, and more of them are made by alternative modes.

Congestion and VMT are related to each other, and both are related to several other variables. Economic activity (e.g., GDP) and household income are two, and both are growing. Another is car ownership. Maryland Motor Vehicle Administration data indicate that the growth rate in the number of vehicles registered in the state peaked in the 1970s when it grew more than seven times faster than population. Since then its growth rate has continued to outpace that of population, but at a declining rate. In 1970, per capita vehicle registrations was 0.48 statewide. By 1980, this had increased to 0.69, and by 2000 it was 0.78. These diminishing increases seen statewide are consistent throughout all but one of the state's six regions. In the D.C. Suburbs region, per capita vehicle registrations actually fell from 0.77 in 1990 to 0.74 in 2000. In 2000, the Upper Eastern Shore region had the highest rate of registered vehicles per person at 0.97.

In summary, in both Maryland and the nation, congestion and VMT have grown unremittingly for decades, and have only recently shown some evidence of slowing their rate of growth.

Figure 11: Travel mode used to commute in U.S. states, 2002 - 2009



Source: U.S. Census Bureau

Another indicator of travel patterns relevant to Smart Growth objectives relates to what could be called "the efficiency of vehicle use." Are travelers increasing their use of modes of travel that should reduce highway congestion and emissions? Figure 11 shows the trends for Maryland compared to other states.

Figure 11 shows what one would expect: for most states 75% to 85% of commuting is drive-alone, and less than 5% is transit. Maryland does better than most states on transit use, at about twice the U.S. average, though the rate has not changed substantially in recent years.

For other infrastructure, much less consistent information (over time and across geography) is available. In the future the NCSG would like to have some consistent indicators of the performance of other infrastructure systems, including water and wastewater systems, and public safety systems and services.

Schools are another big component of infrastructure. Table 1 shows school utilization (students as a percentage of estimated capacity). It suggests things look good on average, but the details show a lot of unnecessary capacity in certain jurisdictions and overcrowded schools in other areas. By region, and aggregated across school types, three of the five counties with overall capacity over 100% compose the Southern Maryland region where population growth has clearly outpaced school construction.

Table 1: School utilization in Maryland and selected counties, various dates

	Utilization	Highest County	Lowest County
Overall	93.1%	Charles – 112.8%	Kent – 60.6%
Elementary School	92.4%	Somerset – 111.1%	Talbot – 73.1%
Middle School	86.1%	Charles – 121.0%	Kent – 42.7%
High School	100.1%	Wicomico – 115.8%	Baltimore City – 63.7%

Source: Maryland Department of Planning and the Maryland State Department of Education. Schools reported data for enrollment and capacity for different dates between the period of roughly 2001-08.

3.3.3 Assessment

For most measures of transportation performance that are standardized, Maryland looks like other states: VMT, congestion, and car ownership have risen consistently over time. Maryland has higher transit ridership than most states, some of which may be attributable to the Smart Growth Program but most of which is attributable to Maryland's proximity to the transit investments in

Washington, D.C. and its own historical investments in transit that pre-date the Program. Since the Smart Growth legislation was enacted, the share of commute trips on transit has been relatively constant in Maryland and in all regions of Maryland, and any recent increases are due much more to secular events (e.g., gas prices, increasing highway congestion, economic recession) than to the incentives or restrictions of the Smart Growth Program. For other infrastructure, we lack the data to comment.

3.4 DEVELOPMENT PATTERNS

3.4.1 Background on the issues and indicators

Smart Growth covers many economic, social, and environmental issues, but it is fundamentally about development patterns. Smart Growth principles (and Maryland's 12 new visions for growth) call for mixed uses, compact development, revitalizing urban centers, preserving farms, and protecting open spaces.

The ability to measure development patterns has grown in recent years. With the advent of GIS technology and the increasing organization of data by spatial coordinates, it is possible to compute all sorts of spatial indicators at almost any scale. But determining the right scale remains a complex problem. Uses can be mixed, for example, within the state, a city, a neighborhood, and a building. Which is the better scale for evaluating smart growth, and how should mixture be measured? Similar questions are relevant to measuring density.

While it is useful to consider the scale at which development patterns should be measured and to interpret carefully all measures computed at any scale, often the choice of scale is dictated by the availability of data. Data useful for measuring differences in development patterns across states are scarce and often inaccurate. Data for measuring differences in development patterns at the community or neighborhood level are also scarce and costly to collect and manipulate.

The pattern of development in Maryland with respect to Priority Funding Areas (PFAs) is of particular importance. PFAs are areas identified by local governments and certified by the Maryland Department of Planning as targets for urban growth. The extent to which growth actually occurs in PFAs is therefore a key measure of the performance of Smart Growth. The pattern of development with respect to transit station areas is also of particular significance. Not only is

providing alternatives to the automobile a general smart growth principle, but focusing development in transit station areas is an expressed goal of the current administration of Governor Martin O'Malley.

The indicators discussed below generally come from three data sources.

- A study conducted by the NCSG for the Lincoln Institute of Land Policy that examined development patterns in eight states: four considered to leaders in smart growth (Maryland, Oregon, New Jersey, Florida) and four considered not to be leaders (Texas, Indiana, Virginia, Colorado). Most, but not all of the indicators for this study, however, come from the period 1990 to 2000;
- Data provided by the Maryland Department of Planning based on the PropertyView database; and,
- Data from the U.S. Bureau of Economic Analysis and the Maryland Department of Licensing and Labor Relations.

3.4.2 Results

Although already a highly urbanized state, the share of developed land in Maryland increased by 14% from 1990 to 2000, more than any other state in the Lincoln Institute study except New Jersey and Florida.

From 1987 to 1997, Maryland added 0.6 square miles of new development for each new resident. At that rate, new Maryland residents consumed more land than new residents of Oregon and Colorado, but less than new residents of Florida, New Jersey, Indiana, Texas, and Virginia.

From 1990 to 2000, 11% of population growth occurred in areas already urbanized by 1990; 50% occurred in the area that became urbanized between 1990 and 2000; and 39% occurred in areas that were still considered rural by 2000. The share of growth that occurred in areas urbanized by 1990 was lower than all states in the Lincoln Institute study except Indiana; the share of growth that occurred in *newly* urbanized areas was the highest of all eight states.

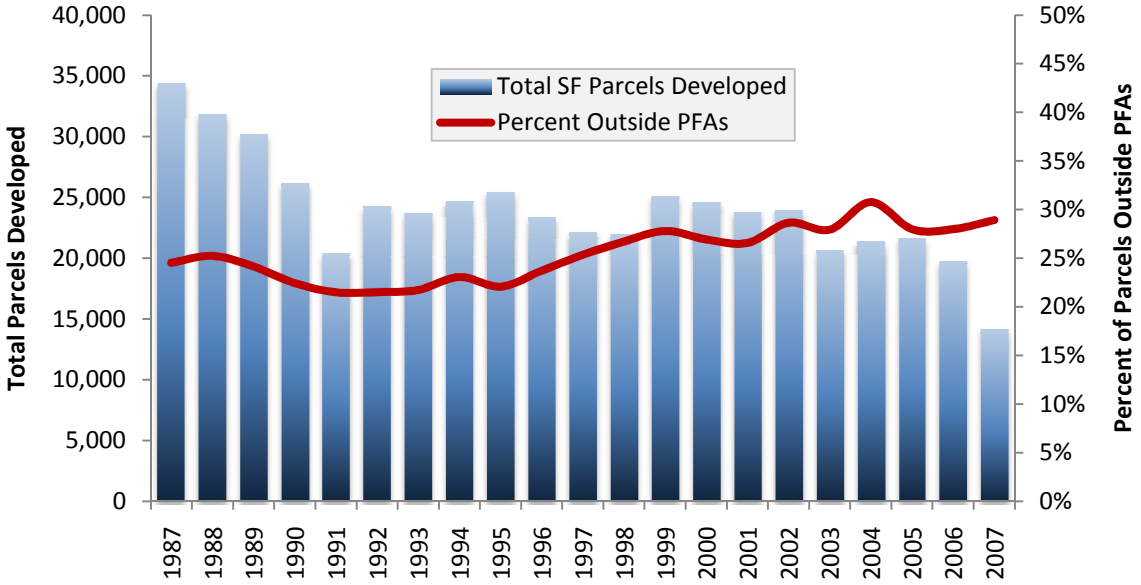
Regarding **development in Priority Funding Areas**, from 1987 to 2007 in Maryland:[20]

- The share of single-family *parcels* developed outside PFAs[21] in the state steadily rose from 24.5% in 1987 to 28.9% in 2007 and averaged 25.3% over the period. The share of new single-family units outside PFAs ranged from a low of 14% in Garrett County to a high of 86% in Prince Georges County, on average after 1998. Figure 12 shows historical trends in *parcels* (single-family parcels 20 acres or less in size) developed outside currently designated PFAs. Figure 13 shows the distribution by region.
- The share of single-family *acres* that were built outside PFAs has shown some fluctuation over that period. It declined from 76.9% in 1987 to a low of 71.8% in 1992. By 2004, it was back up to 76.9% but has fallen in each of the last three reported years to 74.3% in 2007. From 1987 to 2007, the average was 74.8%. The share of new single-family acres outside PFAs ranged from a high of 96% in Garrett County to a low of 48% in Prince Georges County, on average from 1998 through 2007. Figure 14 shows historical trends in acres (summed from single-family parcels 20 acres or less in size) developed inside and outside currently designated PFAs.

[20] Note that each of the following looks at new single-family development on parcels that are 20 acres or less. Looking at apartment construction and parcel redevelopment would likely impact these figures by increasing the share of development occurring within the PFAs, however we do not have the data to accurately perform such analyses.

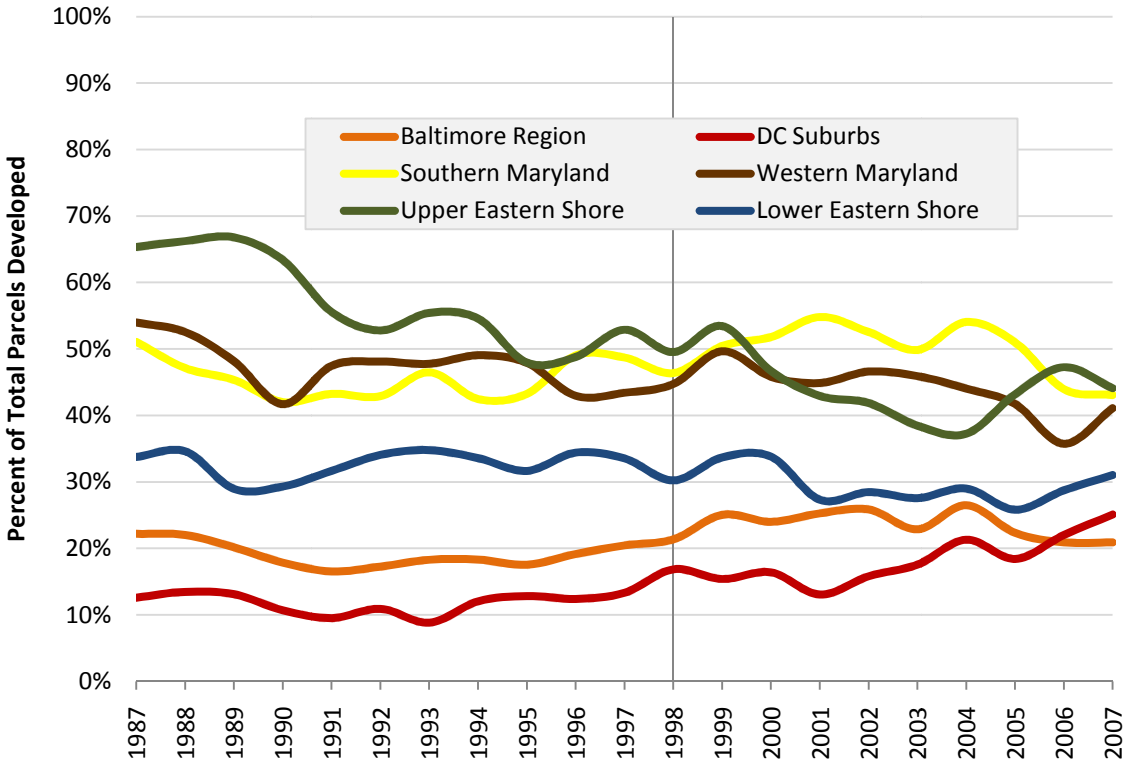
[21] Including outside PFA Comment Areas, which are areas designated by the counties as PFAs, but which MDP has determined do not meet the PFA criteria.

Figure 12: Total number of single-family parcels developed, and the percent developed outside currently designated PFA boundaries, 1987 - 2007



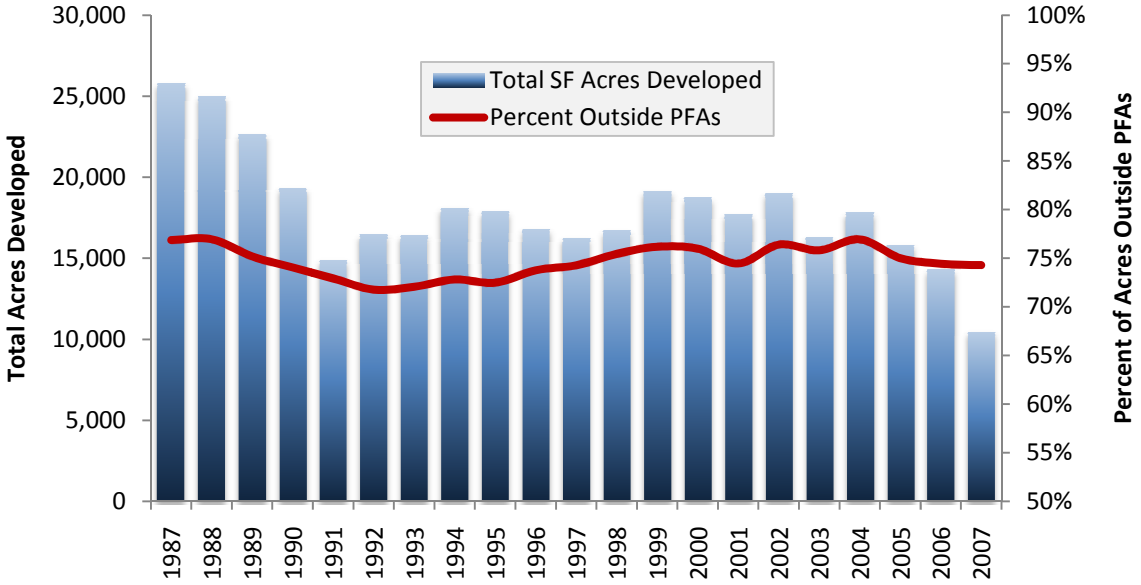
Source: Maryland Department of Planning

Figure 13: Percent of single-family parcels developed outside currently designated PFA boundaries, by region, 1987- 2007



Source: Maryland Department of Planning

Figure 14: Total single-family acres developed, and the percent developed outside currently designated PFA boundaries, 1987 – 2007



Source: Maryland Department of Planning

- The average size of single-family parcels that that were built outside PFAs fell from 2.35 acres in 1987 to 1.90 acres in 2007 and averaged 2.20 acres over that period, while the average size of single-family parcels inside PFAs rose from 0.23 acres to 0.26 acres, averaging 0.25 acres over the period.

Regarding **development in Rural Legacy Areas** (areas designated for state funding to assist with preservation efforts):

- Across the state, the average number of residential parcels developed annually inside Rural Legacy Areas was actually significantly lower for the 9-year period *prior* to the program's start than it was for the 9-year period immediately after (666 parcels developed annually compared to 823).
- Likewise, the amount of residential acres developed annually inside Rural Legacy Areas jumped significantly after the program was established (from 3,546 acres annually to 4,494).

Regarding **development in transit station areas** (identified as areas within a half mile of a rail transit station) from 1990 to 2000:

- Residential densities in transit station areas increased in every county with rail transit except Baltimore County and Baltimore City.

- The share of population that lived within a transit station area increased in all nine counties that have transit stations, except Frederick County.

Regarding the **balance of jobs and housing**:

- From 2000 to 2007 in Maryland jobs per household increased from 1.44 to 1.47 suggesting that Maryland continued to have a strong economy and to export jobs.
- In 2007 jobs per household ranged from a low of 0.64 in Worcester County to 1.82 in Howard County. The greatest increases in jobs per household from 2000 to 2007 took place in Anne Arundel, Queen Anne, and Baltimore Counties, all suburban counties. The greatest decrease in jobs per household occurred in Baltimore City.

3.4.3 Assessment

Maryland is a highly urbanized state and according to a recent study by the National Center for Smart Growth for the Lincoln Institute of Land Policy, urban development continued in Maryland at densities lower than several comparison states from 1990 to 2000. Half of that growth occurred in areas not classified as urban in 1990 but classified as urban in 2000. This suggests that the predominant form of urban development in Maryland remains suburban. While these development patterns were manifest largely before 1997, when Maryland's Smart Growth Program was adopted, there is little information from other data series to suggest that this pattern changed after 1997.

Perhaps most troubling is the persistence of single-family development outside of PFAs. Although only about one-fourth of new single-family housing *units* were developed outside PFAs since the mid-1980s, about three-fourths of the new single-family *acres* were developed outside PFAs. Moreover, the share of parcels developed outside PFAs continues to rise over time. These data strongly suggest that PFAs have not served as effective urban containment instruments. Recent efforts to strengthen the Smart Growth Program have included a statewide goal to reduce the amount of development occurring outside PFAs, but it is still too early to measure the impacts of these efforts.

Because the economy of Maryland has remained strong, the number of jobs per household (or per capita) in the state continues to rise. But jobs per household

continue to fall in Baltimore City and the largest rise in jobs per household over the last several years has been in suburban counties. The state continues to experience a decentralization of jobs.

Positive among the development pattern indicators are those that measure the concentration of development in transit station areas. Residential densities in many of the state's approximately 100 transit-station areas continue to rise, and at a rate faster than the rest of the county in which they are located. As a result, the share of population that lives within transit stations has risen over time, consistent with the smart growth principles of providing transportation choices and reducing dependency on the automobile.

3.5 HOUSING

3.5.1 Background on the issues and indicators

In an ideal world, every household would have housing to meet its desires. A somewhat more realistic goal for public policy introduces the idea of effective demand and ability to pay: households should be able to find the housing they need subject to the constraints imposed by housing price and income. That statement of the goal references several important concepts:

- Goods and services are scarce; they have price; there are tradeoffs.
- Households make choices to purchase a bundle of housing services subject to their budget constraints—choices about type (single-family/multi-family), tenure (own/rent), size (of the housing and the lot it sits on), quality, location (which includes considerations like commuting time and travel mode, neighborhood characteristics, local taxes, and local services-especially, for many households, school district), and other amenities.

Public policy for housing typically focuses on the following issues:

- **Housing price and affordability**. The concerns of public policy with regard to housing usually do not include (or, at least, do not pay much attention to) the needs of households with greater-than-average incomes. The concerns are more about households with low-incomes, especially if those low incomes are coupled with special needs (e.g., disabilities, large family size).
- **Housing quality**. Housing is a complicated and expensive good, and poor design and construction can prove expensive or even fatal. Housing policy

always includes building codes and inspection. Increasingly, codes or other policies are addressing energy efficiency.

- **Housing pattern (urban form)**. A tenet of Smart Growth is that better planning and design can yield housing that is better, less expensive, or both. Greater housing density, smaller units, and a mix of uses lower not only the cost of housing, but also the costs of transportation, which is probably the second largest household expense after housing. Where housing is located and the mix of housing types also affects direct costs and indirect impacts. The location and types of housing can help communities mitigate some of the environmental, economic, and social costs of automobile-dependent development, use infrastructure more efficiently, and provide housing design that can improve the quality of life of neighborhoods and take advantage of existing or future transit investments.

The housing indicators that follow include information on housing prices, starts, affordability, and single-family/multi-family mix. Data on housing starts and prices are widely available from the county to the national level from a variety of sources, including the Maryland Department of Planning.[22]

3.5.2 Results

This section looks a several categories of housing indicators:

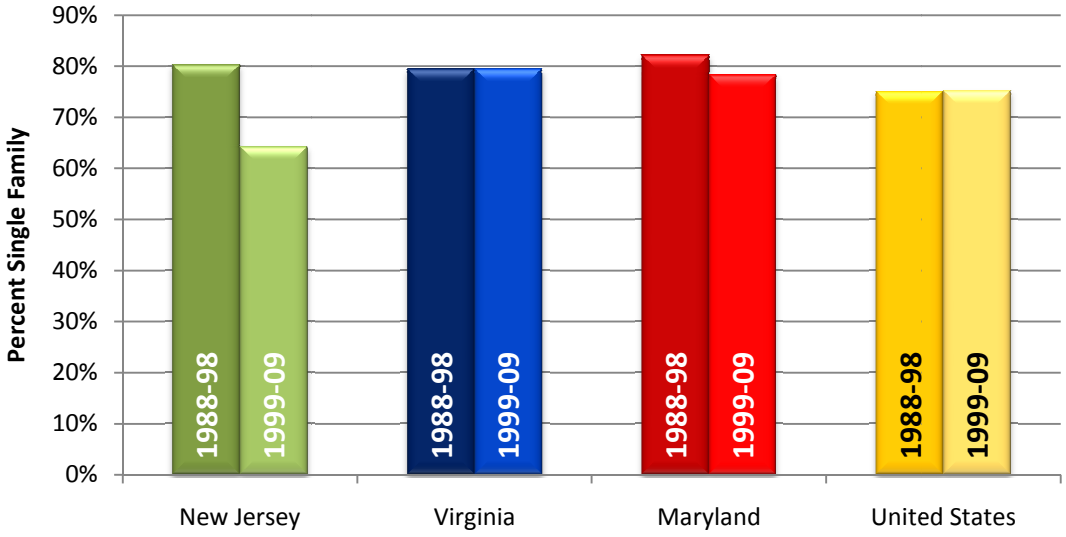
- **Housing starts** in Maryland tend to follow national housing market cycles, but (perhaps due to differences in regulatory structures) housing cycles tend to fluctuate less in Maryland than in neighboring Virginia. Nationally, 73% fewer building permits were issued in 2009 than 2005 when housing starts were at a 33-year high. During that same time period, Maryland's building permits fell 63% whereas Virginia's fell 65%. Consistent with growth in population, the largest *number* of housing starts are in the Washington and Baltimore suburbs, but the highest *rates of growth* of new housing construction are in Southern Maryland and the near Eastern Shore.
- **Housing prices** in Maryland are well above national averages and have stayed there even in the recent housing recession. In 2007, median housing

[22] Though it would be desirable to have data on housing *quality*, we did not assemble any for this report.

prices were the highest in Montgomery, Howard and Queen Anne Counties, in that order, and lowest in Allegany County, Baltimore City, and Somerset County, respectively.

- **Housing affordability**. On average since 2001, when measured as the ratio of a county's median housing price divided by the state's median household income, Montgomery, Howard, Talbot and Queen Anne counties are the least affordable and Allegany County, Baltimore City, and Somerset County are most affordable. When measured as the ratio of a county's median housing price divided by the median household income at the *county* level, then Garrett, Worcester and Talbot Counties are the least affordable and Allegany County, Harford County and Baltimore City are the most affordable. So whereas Montgomery, Howard and Queen Anne's Counties are generally unaffordable to many households across the state, residents of these counties tend to be less burdened than those in other counties due to their higher incomes. Interestingly, Talbot County on the Eastern Shore is among the least affordable in both measures.
- **Housing mix**. Maryland's Smart Growth legislation took effect in October 1998. In the 11 year period prior (1988 through 1998), the single family housing share of housing starts in Maryland was 82% compared to 79% in neighboring Virginia and 75% nationally. In the 11 years since, as demonstrated in Figure 15, Maryland has seen a slightly more diverse housing mix, with single family housing starts falling to 78%, whereas the corresponding rates in Virginia and across the country have remained unchanged. Excluding 2008 and 2009, which were unusual years in the housing market, the single-family share hovers around 80% in Southern Maryland, Western Maryland, and the D.C. suburbs; around 70% in the Baltimore region and on the Eastern Shore.

Figure 15: Single family building permit share by state, before and after Maryland's Smart Growth law took effect



Source: U.S. Census Bureau

3.5.3 Assessment

Assessing the performance of housing markets based on indicators is always tricky. Rising prices and falling starts are viewed as favorable to some and unfavorable to others. From a smart growth perspective, however, increasing housing affordability and falling shares of single-family units are trends in the right general direction.

Housing markets in Maryland are strongly affected by national market trends. Like the housing market in the rest of the nation, housing prices and starts dropped dramatically in the last few years. Perhaps because of differences in regulatory frameworks, however, housing market cycles tend to be less volatile in Maryland than in the rest of the nation. Even in the current down cycle, however, housing prices in Maryland remain above the national average, especially in Montgomery and Howard Counties.

Since 1975, and especially since the mid-1980s, housing prices have inflated faster in Maryland than most other states, including neighboring Virginia. In the most recent economic downturn, prices remained stable in most of the Washington and Baltimore suburbs and continued to rise in the state's most affordable jurisdictions: Allegany County and Baltimore City. When compared to the average state income, the suburban counties of Montgomery, Howard and Queen Anne are

the least affordable; but when compared with average county income, the outlying counties of St. Mary's, Garrett, and Worcester counties are least affordable.

Although the single-family share of new housing construction has fallen recently, the single-family share of housing in Maryland is surprisingly high for such a highly urbanized state. The dominance of single-family housing throughout the state is indicative of the lack of housing choice and affordability and diminishes the potential for multi-modal alternatives to automobile transportation, both major tenets of smart growth.

None of these trends is particularly good from a smart growth perspective. Housing starts continue to accelerate in the exurban counties; housing construction continues to be dominated by single-family housing; and housing remains unaffordable to many Maryland households.

3.6 NATURAL AREAS AND THE ENVIRONMENT

3.6.1 Background on the issues and indicators

Among the top public concerns about growth are the potential effects that development can have on the environment. The iconic issue of this type in Maryland is the effects development is having on the Chesapeake Bay and its thousands of miles of tributaries. Many of Maryland's oldest land-use and environmental protection laws were enacted out of concern about the deterioration of the water quality in the Chesapeake Bay and the loss of flora and fauna that live in the Bay.

By its very nature, development disturbs the landscape. Hills are leveled; valleys filled; forests cut; watersheds altered; streams polluted; wildlife habitats impaired. As more impervious surfaces are built, the speed and temperature of stormwater runoff increases, often with damaging consequences to streams or other bodies of water.

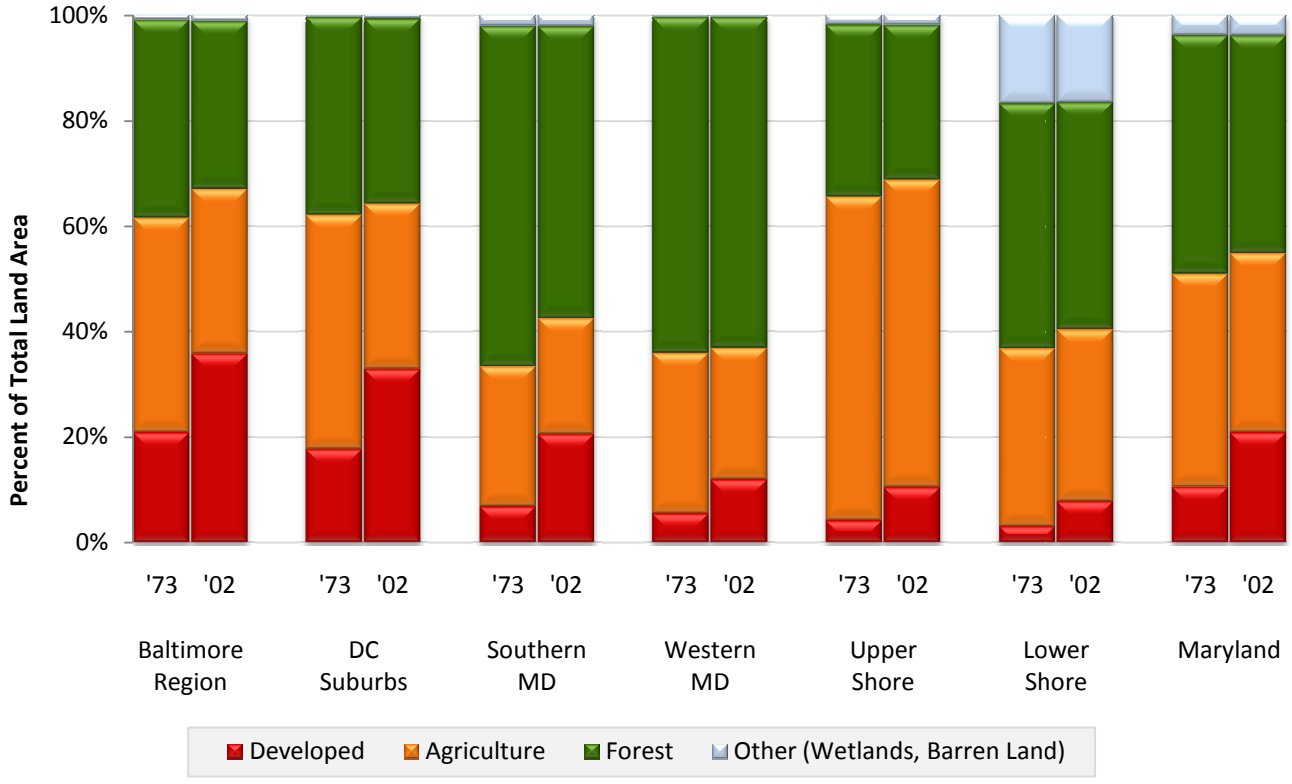
Natural ecosystems can provide a variety of benefits by filtering pollutants, helping to manage or mitigate flood damage, protecting drinking water recharge areas, providing for pollination of food crops and other plants, and protecting wildlife habitats. Preserving land in a natural state preserves these and many other "ecosystem services" that these natural areas provide.

Thus, in this category the Indicators Project focuses on: (1) indicators that natural areas (including farmland) are being protected (or converted to development), and (2) indicators of the quality of air and water.

3.6.2 Results

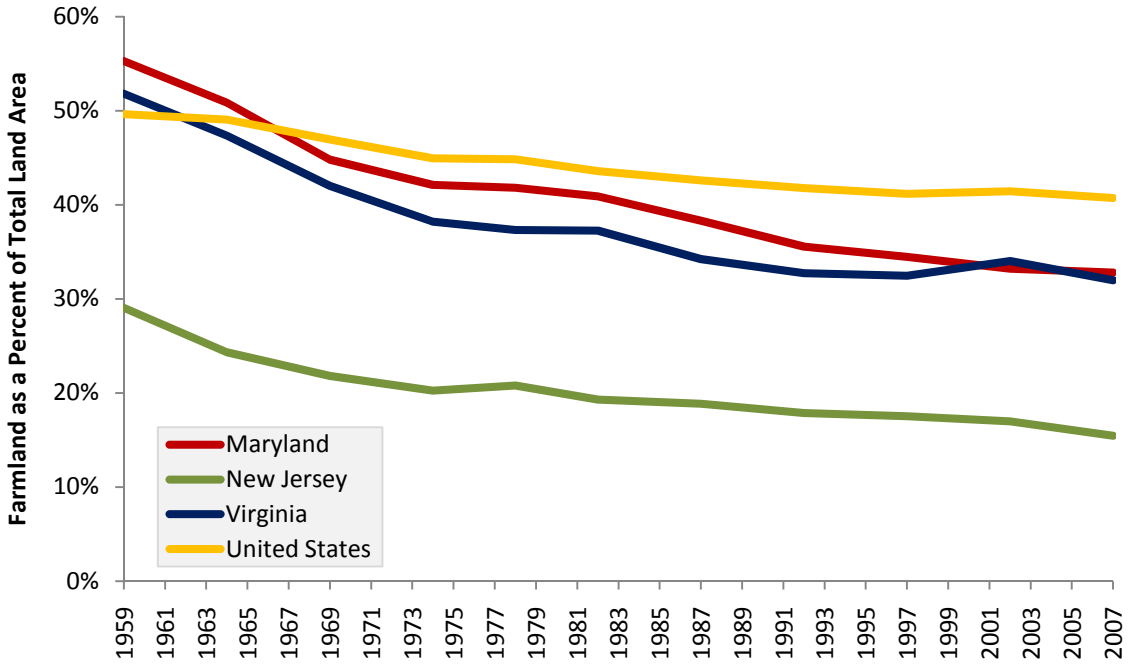
Long-term historical trends in the U.S. have been to convert forest and grass land to farm land, and farm land to urban or suburban land. Thus, for at least the last 30 years (1) there was not much forest and grass land left that could be economically converted to farm land, and (2) a large part of urban and suburban growth in the U.S. has occurred on what was previously farm land. The result has been a decrease in forest and farm land. Figure 16 shows that trend across regions of Maryland; Figure 17 shows, for farmland only, how Maryland compares to other states and the nation. The trends are similar.

Figure 16: Change in generalized land use, Maryland and its regions, 1973 - 2002



Source: Maryland Department of Planning

Figure 17: Change in farm land, U.S. and selected states, 1959 - 2007



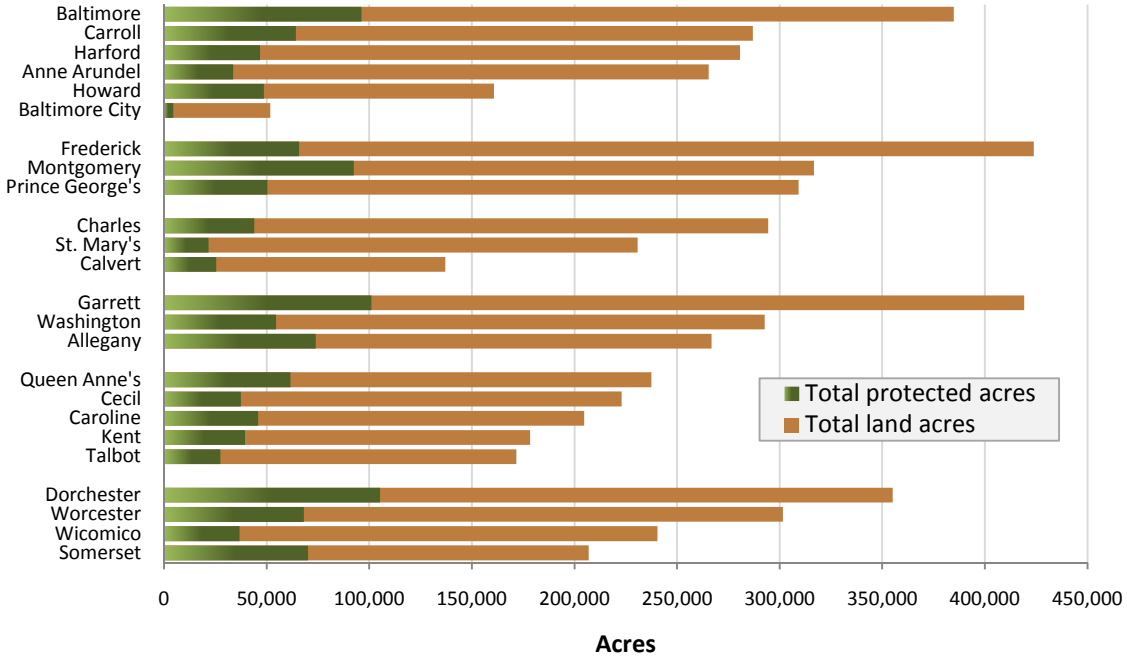
Source: U.S. Department of Agriculture

Not shown in Figure 17 is a related trend: the number of farms has dropped also. According to the U.S. Department of Agriculture, there are about half as many farms in 2007 in both Maryland and Virginia as there were in 1959. For both farm acres and number of farms, the *rate* of loss has been decreasing. In our opinion, that trend is due to both market factors (decreasing supply of farm land close enough to the centers major metropolitan areas to make it worth converting) and public policy (outright protection, and requirements for urban levels of service for new development, which increases development cost).

Regarding protection of land in Maryland, until recently (2008) the state lacked a complete and current accounting of acres preserved through all its programs. Thus, we are able to provide a snapshot of the amount of land in preservation status for 2008, but we have no earlier years for comparison that would allow us to comment on trends.

Figure 18 shows total land acres and total protected acres, by county, grouped by region. Each full bar shows the total land area for each county; the green portion shows land that is protected through all local and state preservation programs. Total land in the state is a little over 6 million acres.

Figure 18: Total and protected acres of land, by county, grouped by region, 2008



Source: Maryland Department of Natural Resources

Another way to measure land preservation is to look at two state programs aimed at that purpose. *Rural Legacy* is probably Maryland's most well-known land-preservation program; it was part of the 1997 Smart Growth package. Similar to the PFA program, this is primarily a funding mechanism. Large, contiguous areas of land across the state have been identified as Rural Legacy Areas—areas for which the state will provide funding to assist with preservation efforts. Depending on the region, roughly one-seventh to one-quarter of these lands now has some form of legal protection. *Targeted Ecological Areas* are areas identified by the Maryland Department of Natural Resources (DNR) as having a "high ecological value." Depending on the region, roughly one-fifth to one-third of these lands now has some form of legal protection, according to data supplied by DNR.

A primary purpose for protecting natural areas is to preserve the ecosystem services they provide with the intent of maintaining or improving environmental quality. Table 2 shows data about air emissions for two recent points in time for Maryland and the comparison states relative to all states in the U.S. It suggests that, on average, Maryland does relatively well on these types of emissions (except SO_2), but that it has made modest reductions on types of emissions in just a three-year period.

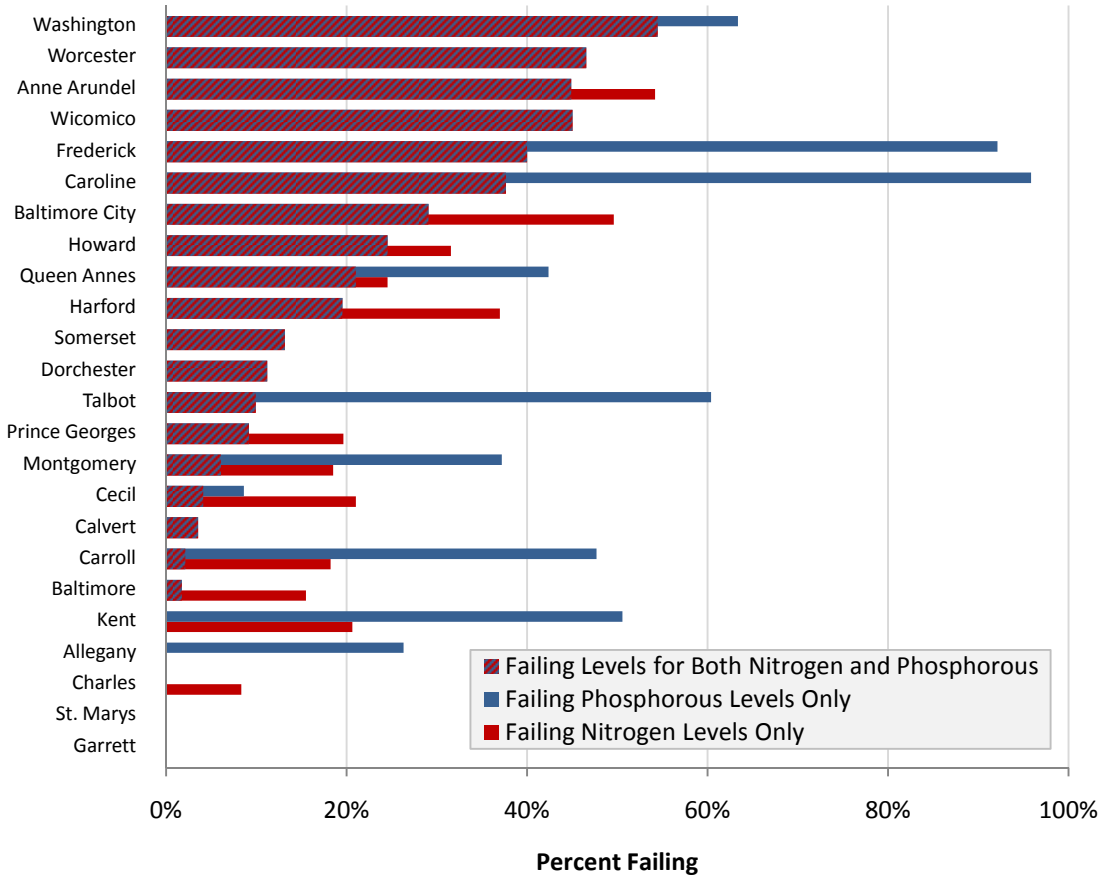
Figure 19 gives a snapshot only of an indicator of watershed water quality: the share of watershed land area in each county identified as having failing levels of nitrogen and phosphorous (as reported through the Chesapeake Bay Program's Phase IV Watershed Model and DNR's Integrated Watershed Analysis and Management System). These data were collected from DNR's website in 2009. Without time-series data one cannot comment on trends, but the picture does not look good for many counties.

Table 2: Air emissions by type, Maryland and comparison states, 2002 -2005

		2002		2005	
Emissions Measure	**State**	**Amount**	**Rank**	**Amount**	**Rank**
Volatile Organic Compound (VOC) Tons per Capita	U.S.	0.073		0.067	
	Maryland	0.048	7	0.043	8
	New Jersey	0.041	6	0.037	6
	Virginia	0.061	15	0.055	15
Nitrogen Oxide (NO_x) Tons per Capita	U.S.	0.073		0.063	
	Maryland	0.052	10	0.044	9
	New Jersey	0.037	5	0.032	5
	Virginia	0.069	20	0.058	19
Carbon Monoxide (CO) Tons per Capita	U.S.	0.383		0.325	
	Maryland	0.308	14	0.262	14
	New Jersey	0.242	5	0.204	5
	Virginia	0.349	16	0.302	16
Particulate Matter (PM_{10}) Tons per Capita	U.S.	0.074		0.072	
	Maryland	0.024	8	0.024	8
	New Jersey	0.009	2	0.009	2
	Virginia	0.039	13	0.037	13
Ammonia (NH_3) Tons per Capita	U.S.	0.014		0.014	
	Maryland	0.006	11	0.006	11
	New Jersey	0.002	4	0.002	4
	Virginia	0.008	17	0.008	17
Sulfur Dioxide (SO_2) Tons per Capita	U.S.	0.051		0.050	
	Maryland	0.063	32	0.066	32
	New Jersey	0.011	4	0.011	7
	Virginia	0.049	28	0.044	24

Source: U.S. Environmental Protection Agency, Emission Inventories, 2002 and 2005.

Figure 19: Percent of land area within failing watersheds, by county, 2009



Source: Source of the contaminant level data was the Maryland Department of Natural Resources. Compiled by the NCSG by mapping the watersheds against county boundaries.

3.6.3 Assessment

It is clear that Maryland and its counties are active in land preservation. The presumption is that preserving land will, among other things, preserve ecosystems and thus, to some degree, improve measurements of various aspects of air and water quality (outputs, or outcomes). One could step even farther back in the chain (this report does not) to measure policies adopted and money spent on preservation programs (inputs). In the middle are measures of the amount of protected land (an output of policy and expenditures; and input to environmental quality).

The trends for acres of farm and forest land have been steadily downward in Maryland and the U.S. for a long time, but an upward trend would be hard to produce: it would mean creating new farm and forest land faster than economic growth and urban and suburban development are using it up. Thus, it seems more

practical to focus on the *rate* of loss. The data suggest that rate is decreasing, and that conclusion is supported by the evidence that a lot of land in Maryland is protected from development.

The caveat, however, is that there is still a substantial amount and percent of land that is not protected. Roughly 20% of Maryland's land is "developed" and roughly 20% is "protected," which leaves 60% that is theoretically available for urbanization—three times more land than is now urbanized. That leaves a lot of room for the trends toward urbanization to continue in the future. One cannot tell from the high level of analysis in this report whether the various development regulations (including for land protection, environmental quality, and infrastructure pricing) are strongly binding on the type, location, and pattern of development or not. That statement emphasizes a purpose of indicators: to monitor whether the trends continue, or whether they change (perhaps in response to policy constraints and incentives).

Our limited measures of environmental quality are mixed. The good news is that air quality is consistently measured over time, relatively better in Maryland compared to other states, and in some cases improving. Historical data cannot reflect potential future changes, but the new emphasis on sustainability and controlling greenhouse gas emissions gives us reasons to be hopeful.

4 CONCLUSIONS

The indicators described in this report say something about how growth has occurred in Maryland, but they also illustrate many of the points made in Section 2 and Appendix B about the many limitations of indicators. We encountered all of the expected problems:

1. Data were not available.
2. When they were available, they could be (1) incomplete, (2) inconsistently measured for different areas or for different time periods, (3) inadequately documented, or (4) imprecisely or improperly measured.
3. In the instances where consistent data were available over time, the lack of a clear and well-documented linkage to a causal model made drawing inferences about the causes of change to the indicators highly speculative

(though we did provide our speculations, buttressing them to the extent we could with data we judged related).[23]

All indicator efforts have these problems, though many are less explicit about them than this report has been. An assumption (often unstated) of indicators projects is that in the absence of a causal model and statistical controls, one is looking for either big change in a few indicators, or small but consistent changes in a lot of indicators, to give some weight to a conclusion that something is happening, good or bad, or not.

The evidence assembled in this report did not find a compelling level of change in the variables chosen to represent the goals of Maryland's Smart Growth Program. We will return shortly to the reasons for and implications of that finding, but first we review some of the indicators:

- **Population.** The population growth rate in Maryland approximately equals the national average. The indicators give no direct, rigorous, or even casual evidence that the Smart Growth Program either increased or decreased the *amount* of population growth statewide.
- **Employment.** Employment and other measures of economic activity have consistently grown over the last two decades in Maryland and all its counties, and have grown faster in Maryland than they have most other states. Indicator data allow the conclusion that the Smart Growth Program did not stop economic growth, but they do not allow a more detailed conclusion about whether the Program increased or decreased that growth from what it would have been in the absence of the Program. Both the population and employment data confirm, however, that there is ample growth to be smart about.
- **Transportation.** For most measures of transportation performance that are standardized, Maryland looks like other states: VMT, congestion, and car ownership have generally risen consistently over time. Maryland has higher

[23] For an example of what we mean by a more rigorous evaluation with a research hypothesis and a research design that use time-series data and tries to control for alternative explanations of change, see the recently published report by Rebecca Lewis, Gerrit-Jan Knaap, and Jungyul Sohn in the Journal of the American Planning Association: 'Managing Growth With Priority Funding Areas: A Good Idea Whose Time Has Yet to Come' (75: 4, 457-478).

transit ridership than most states, some of which may be attributable to the Smart Growth Program but much of which is attributable to Maryland's proximity to the transit investments in Washington, D.C. and its own historical investments in transit that pre-date the program. The share of population that lives within transit stations has risen over time

- **Development patterns.** Urban development continued in Maryland at densities lower than several comparison states from 1990 to 2000. Half of that growth occurred in areas not classified as urban in 1990 but classified as urban in 2000, suggesting the predominant form of urban development in Maryland remains suburban, not infill. The share of *acres* developed outside PFAs has shown some variability since 1987, however approximately 75% of the new single-family acres developed since the passage of the Smart Growth Program have been outside PFAs. While this indicator has shown some improvement in recent years, the share of *parcels* developed outside PFAs continues to demonstrate an increase over time. Despite increases in density for the state as a whole (which is inevitable if there is any population growth, since the size of the state cannot vary), growth is increasing most rapidly in the exurban counties.
- **Housing.** Housing prices have inflated faster in Maryland than most other states the last few decades, clearly raising questions of affordability, which remains a problem but varies across the state. Although the single-family share of new housing construction has fallen recently, the single-family share of housing in Maryland is surprisingly high for a highly urbanized state and is indicative of the lack of housing choice and affordability.
- **Natural areas.** The trends for acres of farm and forest land have been steadily downward in Maryland and the U.S. for a long time, but data suggest that rate is decreasing. A considerable amount of land in the state has been preserved, but there remains a substantial amount and percent of land that is not protected. Measures of air quality are mainly stable or improving, but measures of water quality demonstrate poor conditions in watersheds across the state.

If one were to judge the Maryland Smart Growth Program based only on these indicators—which we think, for reasons we have given and that follow, would be bad evaluation technique—the conclusion would be "The indicators primarily

show things not looking great relative to stated or implied objectives and, where trend data are available, not having improved over the last 10 years, but there are a couple positive signs." If the indicators here are leaning in any direction, it is that Maryland has not made substantial progress toward improving its performance in many of the areas it says it cares about.

There are, however, reasons to qualify a direct conclusion like that:

- Without the kind of research design that goes well beyond the reporting of indicators into statistical controls for multiple explanatory variables, there is no solid way to rebut the hypothesis that what the Maryland Smart Growth Program did was to prevent many indicators from getting much worse than they are. That point is theoretically possible and even plausible. But there is no way to prove or disprove it by looking only at indicators.
- Things take time. Many changes in technology, social attitudes, prices, and the built environment occur slowly—in many cases slow change is what voters, property owners, and businesses want. The built environment will change substantially over the next 30 years, but not much over the next five. Given the slow nature of change in land use and development trends, it will be a few more years before we can evaluate whether recent legislation, which was intended to strengthen Maryland's Smart Growth Program, has a measureable impact on development trends.
- If it is too early to expect to see much by way of results (e.g., changes to trends) then perhaps measurement should focus on efforts made to cause change (i.e., the number and strength of policies to change the patterns and effects of growth). That would be counter to standard advice on policy evaluation (i.e., measure outputs, not inputs), but (1) it is something that *could* be measured, and (2) if the state fails to pay attention to the strength and implementation of its programs to manage growth, they are less likely to have any effects farther out in the future.