

Maryland Scenic Byways Analysis of Rural Resource Lands: *Status, Vulnerability, Threat and Stability*

Introduction and Background

Maryland's Scenic Byways provide access to the scenic, archaeological, cultural, historic, natural and recreational resources of the State of Maryland for people of all physical abilities. These resources along Maryland's Scenic Byways are important for parts of Maryland's local economies. Because they are valued for their economic and societal benefits, protection of these resources is a State priority. This online application provides estimates of land use stability – further explained below – to serve as a prognosis for the long term viability of these resources. The application is not designed to interpret land stability on a property by property basis, but to provide a consistent framework for development pressures and resource susceptibility in the areas around Maryland's Scenic Byways.

Overview of the Analysis

The Land Stability Analysis was conducted by superimposing a network of 100 acre grid cells over lands relevant to Scenic Byways. We used four measures to examine the degree to which conservation of resource land is being achieved or compromised thus far in each grid cell and to develop a prognosis for likely long-term outcomes. The four measures are called *Status*, *Vulnerability*, *Threat* and Land Use *Stability*.

- The *Status* of rural resource lands is a measure of the number of residential lots already subdivided on those lands. It is sometimes convenient to think of *Status* as a measure of current fragmentation of resource lands by residential subdivision;
- The *Vulnerability* of rural resource land is a measure of the number of additional residential lots that can be further subdivided and developed under existing local zoning and land use management tools. Existing public land ownership or conservation easements are subtracted from the calculations, leaving a worst case scenario that shows what an area would be like if everything else that can be developed is developed.
- The *Threat* to rural resource land is an estimate of potential future market demand for residential lots, estimated by measuring the amounts of residential development that occurred on resource lands during a recent decade (1999-2009) and by then assuming a similar distribution of county residential growth projected to the year 2030.

The fourth measure, *Stability of Rural Resource Lands*, is used to assess the likelihood that the integrity of the land resource can be sustained into the future. It is based on simultaneous consideration of *Status*, *Vulnerability* and *Threat* to provide an indicator of the potential return on conservation investment that might be reasonable to expect in a given area:

- If land is already highly fragmented by development (*Status*), many more lots are possible (*Vulnerability*) and continued significant market demand for residential lots appears likely (*Threat*), the prognosis for land use stability and conservation success is relatively poor.
- If land is largely unfragmented by development, very few additional lots are possible and market demand for residential lots appears likely to remain insignificant, the prognosis for land use stability and conservation success is relatively good.

The greater the degree of stabilization, the better the land base is protected from development and the more time provided for preservation, before development excessively compromises the land and resources.

The more time provided for preservation with limited preservation funding, the more likely it is that the integrity of the land resource can be sustained into the future. Thus, considering all four measures for a piece of land in conjunction helps provide insights into the degree land has been stabilized, commensurate with development pressure, to provide time for easement acquisition to achieve conservation goals before the land resource is excessively compromised by development.

Use of the Analysis

The primary goal of this application is to provide planners, byway managers and natural resource managers with a tool to understand the stability of and risks to the land use base along scenic byways. This application uses MDP's Land Stability Analysis to provide the foundation to understand the current conditions of the land base, it's vulnerability to future development and where development has already occurred in the past. The *Stability* measurement gives the user of overall assessment of the health of the land base.

The individual metrics provide the user with valuable information as to why a particular land area is considered highly unstable or highly stable. For instance, *Vulnerability* is essentially an indicator of expected zoning performance. Highly vulnerable areas would benefit from a change in zoning to reduce the amount of allowable residential density. In such a case, it would be beneficial for SHA or a byway manager to collaborate with the local government having zoning authority help protect that particular byway resource. By reducing vulnerability, the resources overall land stability increases.

For an area with low levels of *Status*, it means that the land base is not very fragmented. If a particular byway resource is very dependent of scenic views or continued rural character, this may be an indication where investing in conservation easements on large properties may be an option. However, these decisions cannot be made in a vacuum. If the *Threat* in the same area is low, the chance of development occurring quickly is fairly low. Thus, maybe investing in conservation easements in this location right now is unnecessary in lieu of other fiscal priorities especially if the zoning is fairly protective (and the *Vulnerability* is fairly low).

However, if an area is *Highly Threatened*, it means considerable development has occurred there over the last 10 years. Under this circumstance, this may be an area where SHA, local governments, or byway managers may seek to improve infrastructure such as sidewalks, bike lanes, transit and/or roads to improve the visitor experience of that particular byway resource. The flip side to this decision making exercise would be that Highly Threatened areas near sensitive byway resources may become candidates for land preservation, especially if *Status* (fragmentation) is still relatively low and large pieces of land are available for potential preservation.

Certainly, many scenarios affect scenic byways. Thus, the individual metrics (*Status*, *Vulnerability* and *Threat*) may lead users to the wrong conclusion in some cases because individually they do not tell the whole story.

Finally, this application can help develop corridor management plans for byways. The Land Stability Analysis used in this application allows authors of new corridor management plans to focus attention and resources in the most unstable or stable areas as appropriate to mitigate development effects, or in areas in need of infrastructure to enhance visitor experience. In today's environment of limited financial resources, targeting available funding in a more effective manner will be pivotal to continuing to receive or increase funding in the future; this application is a tool to help managers do just that.

Analysis and Interpretation

A brief further explanation of the methodology is provided here.
For all four measures – *Status*, *Vulnerability*, *Threat* and *Stability*:

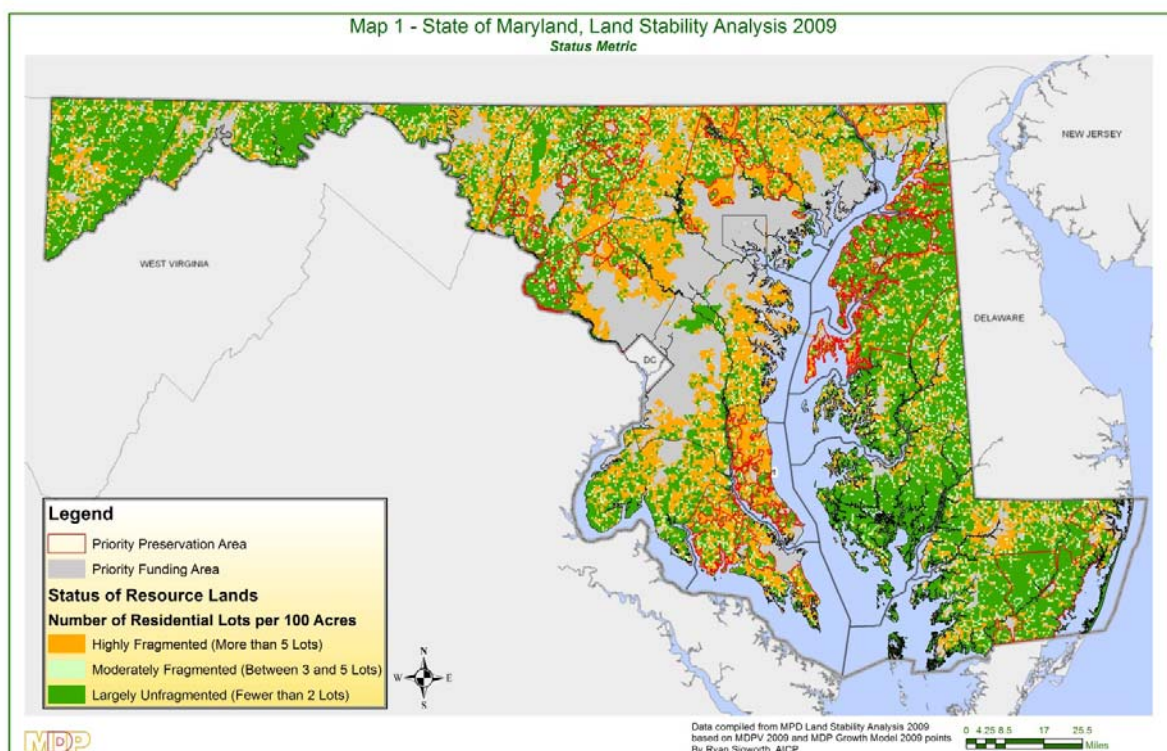
- This composite geography excludes all property located within the State of Maryland's Priority Funding Area (PFA). Properties located within the PFA are generally considered inherently low in stability due to the State's desire to encourage future growth in PFAs.
- This composite geography of Rural Resource Lands was divided into a network of 100 acre grid cells;
- Information for each of the four measures used in the analysis was derived for each cell using data derived from numerous sources.¹
- The results for each measure were mapped statewide.
- The results for each measure were also tabulated by county and other sub-geographic areas of interest and summarized statewide graphically for comparison among counties and other areas.

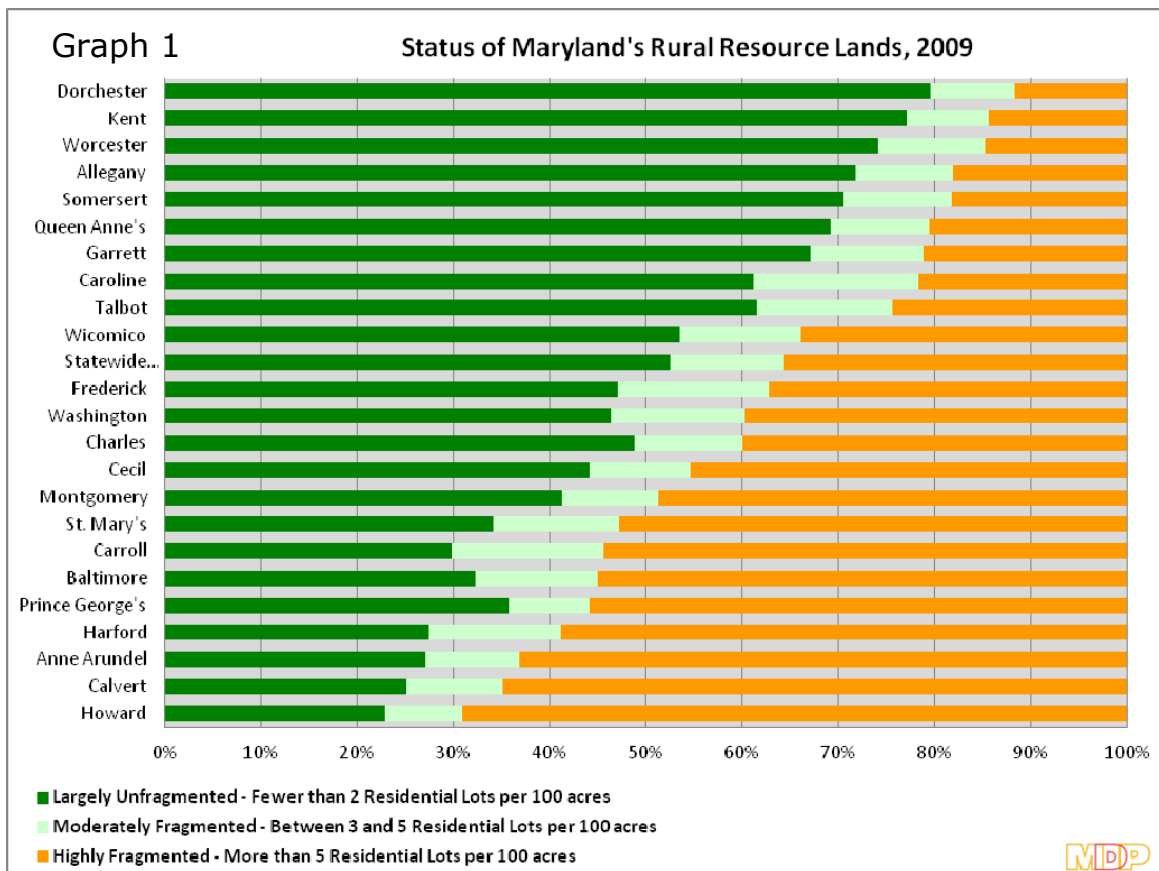
¹ These include the Maryland Department of Planning's (MDP) Master Parcel Database and protected lands data, which in turn are derived from *MdProperty View*, copyright 1996-2013/14, county zoning and sewer service data, data on subdivision and development capacity from MDP's Growth Simulation Model, information from numerous State and local preservation programs and a variety of other information.

Status of Rural Resource Lands

Map 1: State of Maryland, Land Use Stability Analysis 2009, Status Metric classifies the status of Maryland's rural resource lands in three categories: 1) largely unfragmented by subdivision and development; 2) moderately fragmented; or 3) highly fragmented. The map legend provides additional information about these categories. The inset image on the map illustrates the concepts behind these classifications somewhat graphically.

The implications of *Map 1* can be interpreted by considering Maryland as three groups of counties and reviewing the *Status* of rural resource lands among counties within and between groups in light of the principal conservation tools at work in respective counties. These tools are the zoning and related land use procedures that determine the nature and extent of development that can occur and easement acquisition efforts that permanently extinguish development rights and preserve the land.





To that end, we classified counties as most rural (Garrett, Allegany, Kent, Queen Anne's, Caroline, Talbot, Dorchester, Wicomico, Somerset and Worcester), core metropolitan (Montgomery, Baltimore and Howard) and transitional metropolitan (in transition from rural status toward conditions more like those of metropolitan counties – Prince George's, Anne Arundel, Washington, Frederick, Carroll, Calvert, Charles, St. Mary's, Harford and Cecil).

The most rural parts of the State furthest from the metropolitan core – Garrett and Allegany counties in the west and much of the Eastern Shore – are largely unfragmented at present (mostly dark green with relatively little light green and orange). The map also shows that many of the transitional counties outside the metropolitan core are in fact transitioning, indicated by much higher incidences of light green and orange than most rural counties: Washington, Frederick, northern Cecil, Calvert, Charles and St. Mary's.

As one might expect, counties we classified as Rural occupy all top 10 positions on *Graph 1: Status of Maryland's Rural Resource Lands, 2009*. The higher a county's position, the greater is the percentage of its rural resource lands that are *Largely Unfragmented* or only *Moderately Fragmented* by subdivision and development. Montgomery, the most populous county in Maryland, occupies the 11th position and has a greater percentage of *Largely Unfragmented* rural resource land than most of the transitional counties.

Rural resource lands in the core metropolitan counties of Baltimore, Howard and Montgomery counties have been subject to the most intense development pressure in the State for the longest period of time. All three counties have had aggressive easement acquisition programs that have preserved much land, helping to constrain fragmentation by residential subdivision more than would otherwise be the case. About 60, 38 and 26 percent of rural resource lands, in Montgomery, Baltimore and Howard counties respectively, remain *Largely Unfragmented* as represented on *Map 1* and *Graph 1*.

Montgomery County has preserved more farmland than any county in the nation, primarily through its Transferable Development Rights Program. The ability to accomplish this is primarily due to the county's agricultural zoning, which is among the most restrictive in the state: it allows only one onsite residential development right per 25 acres.

Baltimore County, somewhat below Montgomery on the graph, is the 3rd most populous jurisdiction in the state. County resource conservation zoning districts range from one lot per five acres to one lot per 50, with the bulk of the land allowing one or fewer lots per 25 acres. Roughly, 53% of Baltimore County's rural resource land is either *Largely Unfragmented* or *Moderately Fragmented*. This percentage is equal to or higher than those of transitional counties subject to smaller markets for shorter periods, including Saint Mary's, Anne Arundel, Carroll, Harford and Calvert counties.

In the third core metro county, Howard, permissive zoning allows one lot per 4.25 acres. In the metropolitan area's intense market for rural residential lots, this zoning has produced the most highly fragmented rural resource land in the state. This has occurred despite Howard County's pioneering efforts in land preservation, including easement acquisition through installment purchase agreements, adoption of equally innovative financing techniques for those agreements and a large investment of county funds in preservation.

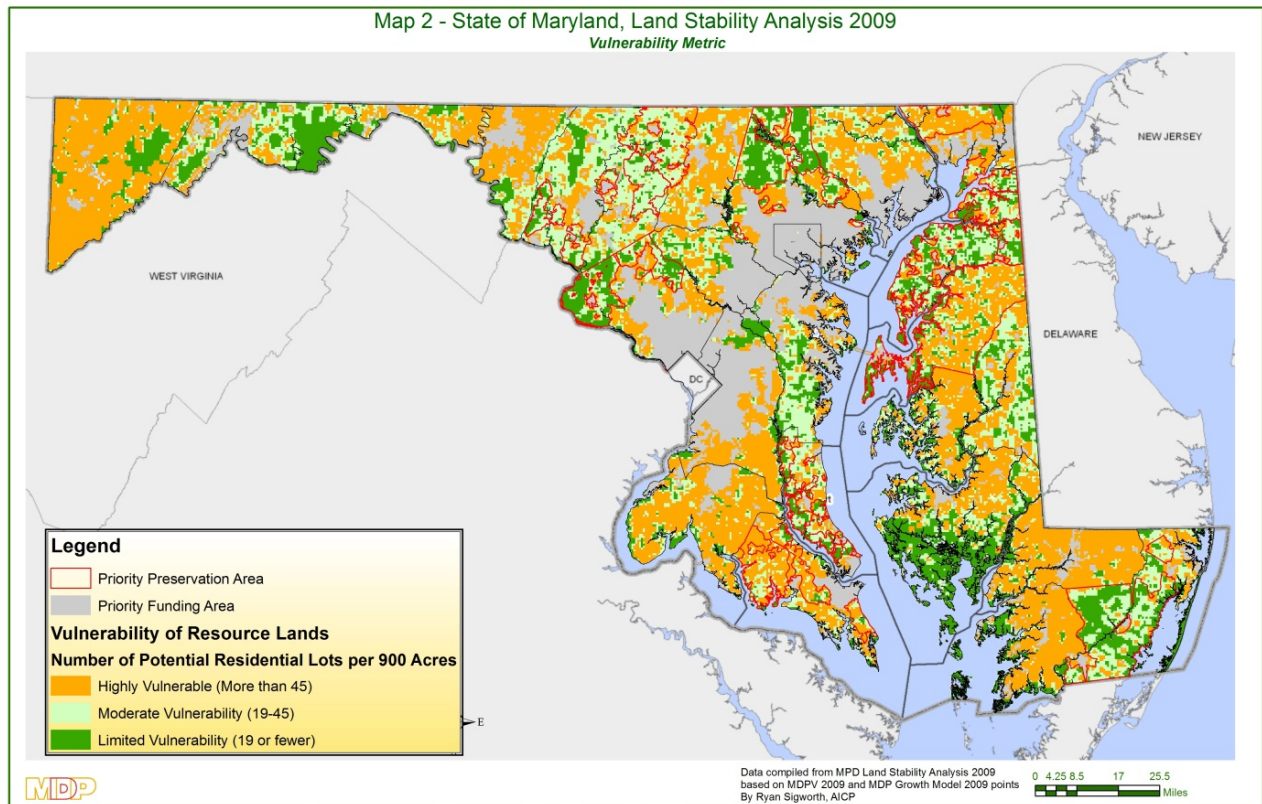
Of the transitional counties, Carroll, Harford and Calvert counties have had aggressive easement acquisition programs for some of the time during which they have experienced high development pressure. Their relatively high levels of fragmentation are largely a function of more permissive zoning in effect during much of that time, notwithstanding the fact that both Anne Arundel and Calvert counties have substantially strengthened their zoning protection in recent years and Carroll County is working to do so.

Taken by itself, the most important conclusion from the *Status* analysis is that in the long-term over which rural resource conservation goals must be achieved, zoning and related land use tools are as or more important than easement acquisition. If zoning and land use tools do not stabilize the land base adequately – that is to say, relative to the level of market demand for residential lots – land resources will be excessively compromised by development before preservation goals can be achieved.

Vulnerability to Additional Development

Map 2: State of Maryland, Land Stability Analysis 2009, Vulnerability Metric classifies the vulnerability of Maryland's rural resource lands in three categories: 1) limited vulnerability to further subdivision and development; 2) moderate vulnerability to further subdivision and development; and 3) high vulnerability to further subdivision and development. Classifications are explained further by the legend, explanatory narrative and graphic image on the Map. Notes regarding the vulnerability analysis:

- *Vulnerability* of land with *Highly Fragmented Status* on *Map 1* and *Graph 1* is not considered. The intent is to focus on the vulnerability of land whose status is *Largely Unfragmented* or only *Moderately Fragmented*, because the potential to achieve State goals before the land resource is highly compromised by development is greater in those areas than it is on land that is already *Highly Fragmented*.
- The vulnerability data presented does not reflect recent changes in legislation in the State of Maryland. Specifically, the Sustainable Growth & Agricultural Preservation Act of 2012 is not reflected in this data because the requirements and implementation of the legislation has not been complete as of this writing. Once the legislation is fully implemented, it is expected that vulnerability will be reduced in areas where the installation of septic systems is limited. Due to these omissions, vulnerability in most counties' rural resource areas, except those who have received exemptions, may be overestimated.



Essentially, the largest contiguous blocks of dark and light green land on this map reflect either limited amounts of development allowed by county zoning and related land use management tools, relatively large concentrations of preserved or otherwise protected lands, or combinations of the two. Additional details are provided in the discussion of *Map 2* and *Graph 2* below.

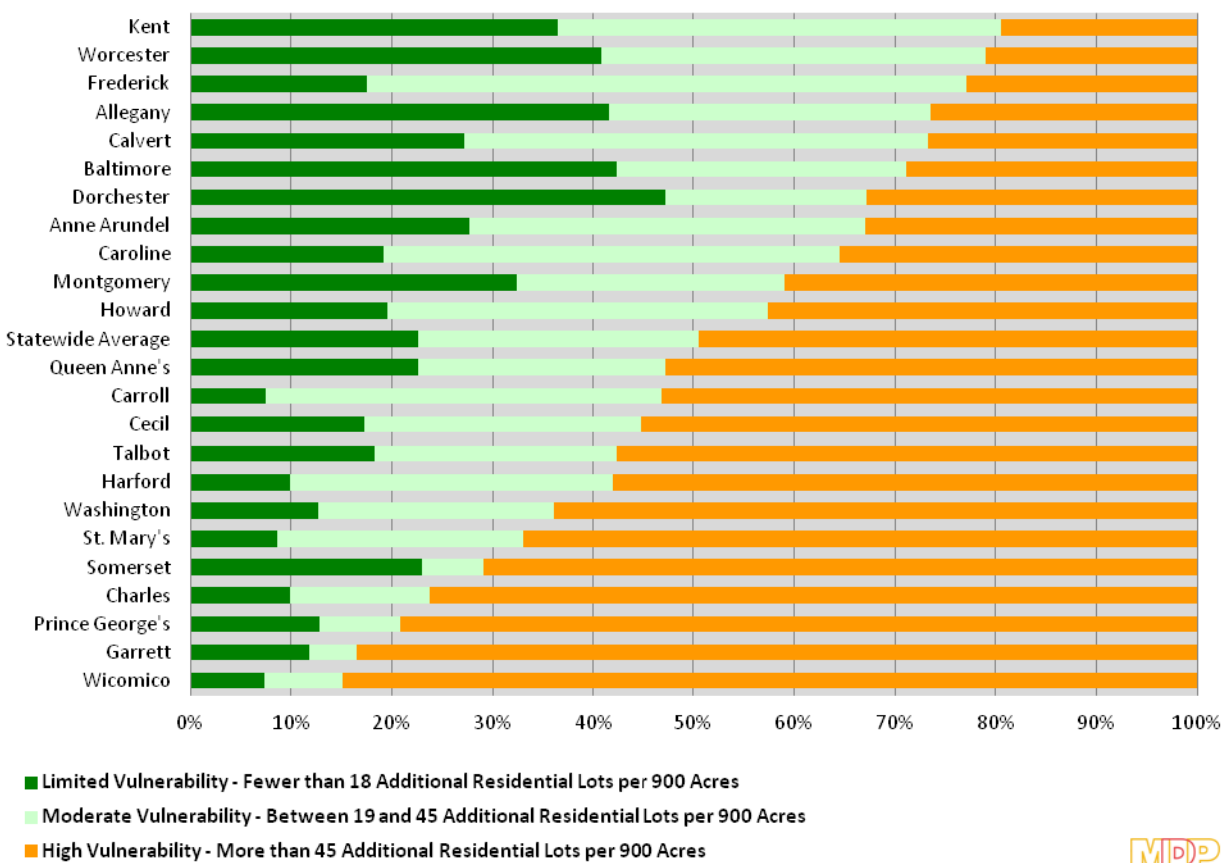
The largest blocks of orange land reflect levels of vulnerability that suggest that the integrity of resource land, including the preserved/ protected lands within those blocks, is at considerable risk from onsite or surrounding subdivision and development (see the graphic and explanatory narrative on the map).

Working from the least to the most vulnerable areas:

- The most extensive areas of limited to moderate vulnerability – in Worcester, Baltimore, Montgomery, Allegany and Anne Arundel counties – all reflect combinations of both restrictive zoning and variously extensive preserved and/or protected, publicly-owned land.
- Notable but significantly smaller areas of limited to moderate vulnerability (green/light green) in southern Cecil, northwestern Carroll, southeastern Washington counties and still smaller contiguous blocks scattered throughout much of Kent, Caroline and Frederick counties, also reflect relatively restrictive zoning in tandem with moderately extensive preserved/protected land.
- Most of the remaining more notable large and small blocks of low to moderate vulnerability (green/ light green) primarily reflect fairly extensive preserved or otherwise protected land in the absence of protective zoning: in Garrett (mostly public ownership), Washington, Harford (easements and public ownership), Howard (mostly easements), Queen Anne's, Talbot (mostly easements and the Chesapeake Bay Critical Area), Dorchester (public ownership and the Chesapeake Bay Critical Area) and Somerset (mostly the Chesapeake Bay Critical Area) counties.
- The extensive blocks of orange, highly vulnerable land are with a few exceptions the result of zoning that does not protect the integrity of rural resource land under significant development pressure.

Graph 2

Vulnerability of Maryland's Rural Resource Lands, 2009



Vulnerability is most acute in much of southern Maryland (including Prince George's County) and in Garrett, large portions of Frederick and Washington, scattered areas in southern and eastern Carroll, northern Cecil, Harford, Queen Anne's, eastern Talbot, Dorchester, Wicomico and Somerset counties. The level or immediacy of development threat differs substantially among these areas, due to variations among them in the size of their respective markets for residential development. This is addressed further (below) in the *Threat* analysis.

Graph 2: Vulnerability of Maryland's Rural Resource Lands, 2009 summarizes the percentage of rural resource land in each county subject to limited, moderate and high levels of vulnerability as defined here. The higher each county's position on the graph, the less vulnerable its rural resource lands are to additional subdivision and development. Each county's position on the graph is based on the combined percentage of land in dark and light green categories (limited and moderate vulnerability, respectively).

Counties' positions on *Graph 2* are, with some exceptions noted below, largely a function of one or both of zoning and extent of preserved land.

Of the rural counties, Dorchester, Allegany, Worcester, Kent and Caroline are among the least vulnerable in the state (toward the top of *Graph 2*, above the Statewide Average). Dorchester and Allegany's positions are primarily due to the extent of land that is protected by public ownership. Worcester, Kent and Caroline counties' positions are due primarily to their protective zoning, but all three also have considerable land preserved under easement (results of a *Vulnerability* analysis based on Caroline's new agricultural zoning – 2006 – have not yet been incorporated).

Of the rural counties below the Statewide Average in *Graph 2*, over 47,000 acres in Somerset are under public ownership or have other environmental constraints (e.g., Chesapeake Bay Critical Area). Wicomico and Garrett are among the most vulnerable in the state and are subject to relatively permissive zoning and/ or other land use management tools. Somerset, Garrett and Wicomico counties all have very permissive zoning. Talbot County, just below the Statewide Average, has zoning that is intermediate in the degree to which it protects conservation investment – less so than Worcester, Kent and Caroline counties and perhaps more so than Somerset, Garrett and Wicomico counties.

At one lot per 20 acres, Queen Anne's County's rural zones appear moderately protective, but have numerous development options that collectively make the land resource substantially more vulnerable to additional development, making them the third most vulnerable among rural counties. These development options include the commonly used clustering option, which allows one lot per eight acres clustered on 15% of the land, with the remainder in open space; bonus lots for large parcels; and the ability to transfer development rights between noncontiguous parcels. When noncontiguous transfer is used, rights that cannot be developed on sending parcels can be transferred to the receiving parcel and clustered on 50% of the land, at whatever density well, septic and environmental restrictions allow. Restrictions on open space remainders from cluster subdivisions and noncontiguous transfers can be developed to the extent that the zoning ordinance allows.

Of the core metro counties, rural resource lands in Baltimore and Montgomery are the second and third least vulnerable to future development in the state, respectively (top of *Graph 2*). Howard County is considerably more vulnerable, just below the Statewide Average. All three counties have had aggressive easement acquisition programs that have preserved much land, helping to reduce vulnerability. Howard's greater vulnerability is a function of much less protective zoning (see the *Status* discussion, above). Between 1996 and 2004, Baltimore County down zoned 69,000 acres of resource land previously zoned for greater density in the reservoir watersheds to 1:50 or 1:25.

Among the 10 transitional counties – Prince George's, Anne Arundel, Washington, Frederick, Carroll, Calvert, Charles, St. Mary's, Harford and Cecil – Anne Arundel has the highest percentage of resource land that shows limited or moderate vulnerability. This is in significant part due to the elimination by the county in 2005 of liberal family lot provisions in their agriculture zone. These provisions allowed lot yields substantially higher than suggested by their 1 lot/20 acre zoning.

Cecil County considerably reduced the vulnerability of its southern agricultural area by down zoning it to allow only 1 lot per 20 acres (it had allowed 1/8), but the northern area remains highly vulnerable.

The remaining eight transitional counties have among the most vulnerable rural resource land in the State (along with the more rural Wicomico, Garrett, Queen Anne's and Somerset counties). Although the *Status* of substantial portions of their rural resource lands is *Largely Unfragmented* or *Moderately Fragmented* on *Graph 1*, without exception, well over 60% of that land is highly vulnerable to further subdivision and development (*Graph 2*).

The most vulnerable in this group – Saint Mary's and Charles – have zoning that is quite permissive, as indicated by the extensive orange areas shown on *Map 2*. Calvert County, which follows as the next most vulnerable, has a history of small parcel subdivision associated with tobacco farming, contributing to both the relatively poor *Status* and high *Vulnerability* of its rural resource land. However, the county has significantly reduced the vulnerability of land in their priority preservation areas by down-zoning them to 1 lot/20 acres (which is not yet reflected in the analysis, along with substantial additional preserved land).

Prince George's County has a fairly small resource conservation zoning district with permissive zoning. Counted among its resource lands in this analysis is a variety of publicly owned lands of considerable acreage.

Harford County's rural zoning is 1 lot/10 acres, but the actual yield is considerably higher. This is largely due to provisions for family lots in addition to the lots allowed by density: one lot is allowed on each separately deeded parcel for father, mother, brothers, sisters, sons and daughters. Areas of less vulnerability, as shown on *Map 2*, generally result from extensive acreage under easement or public ownership. At the same time, less concentrated land under easement is still vulnerable to impacts from subdivision and development on nearby or adjacent parcels of land.

Frederick County's agricultural zoning gives landowners of parcels of record as of August 18, 1976 two options. The first is to subdivide into three large lots. The second is to cluster small lots at rate of three for the first 25 acres plus 1 lot per 50 acres above the first 25, plus one for the remainder. The provision for three units per parcel can create considerable subdivision potential on small parcels, but the county has determined that some or all of the rights from many parcels of record have already been used. Frederick also has over 95,000 acres in its Resource Conservation zoning district, which recently changed its allowed density from 1:5 to 1:10. This accounts for much of the vulnerability around the large concentration of State, county and federally owned land in the northwest part of the county.

Washington County's rural resource land was subject to very permissive rural zoning until recently, when the county enacted somewhat more restrictive zoning, including 1 lot: 20 acres and 1:5 on some private land, in different parts of their rural landscape. However, considerably more development is possible in both areas than suggested by allowed densities, due to provisions for additional lots beyond those permitted by base zoning. The more restrictive 1:20 zoning occurs in the southeastern portion, apparent on *Map 2*; the permissive 1:5 zoning occurs in the large area directly to the north, comprising most of the upper eastern part of the county.

Carroll County has moderately protective agricultural zoning and substantial easement concentrations in the west central and northwest portions of the county. This pattern is reflected on *Map 2*. The most vulnerable land is scattered throughout the southern and north-northeastern parts of the county, which also has most of the *Highly Fragmented* land in the county.

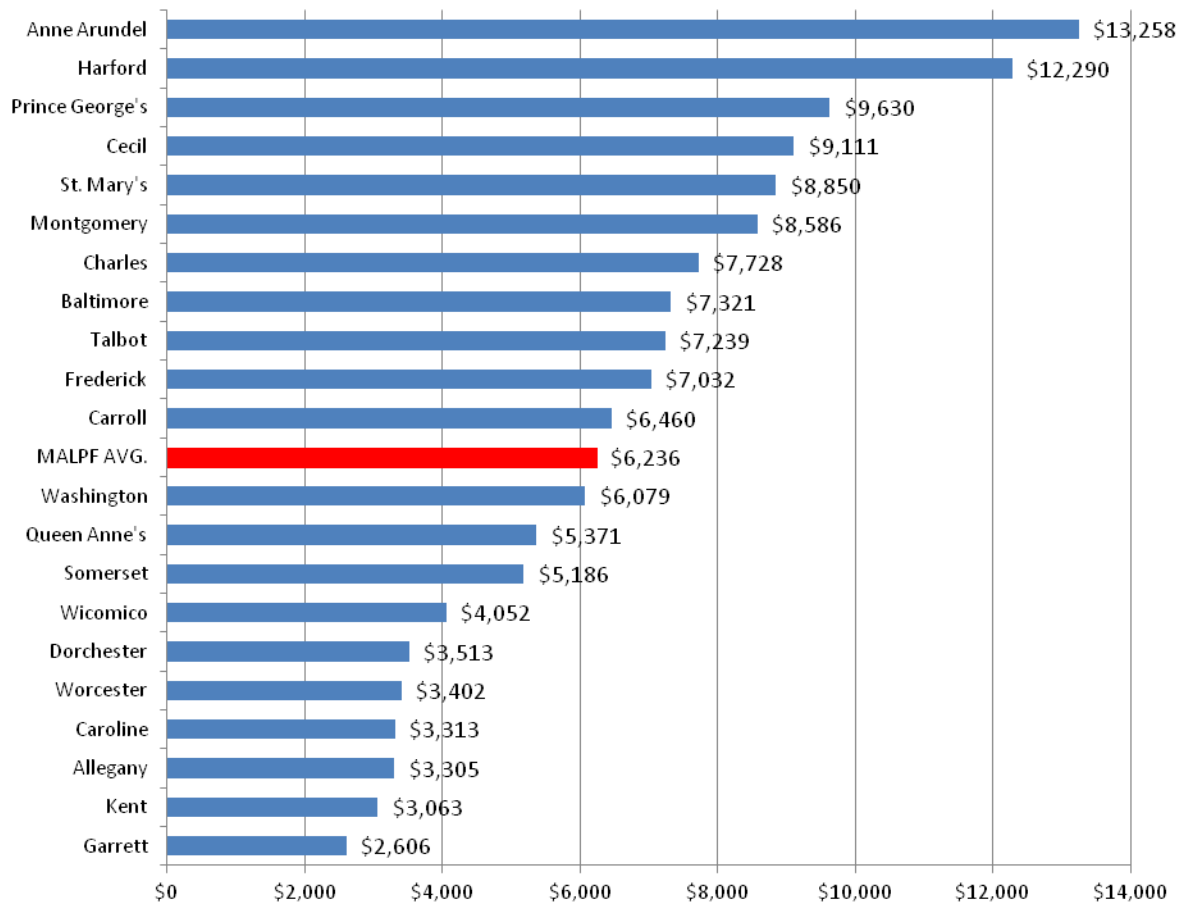
As suggested by the preceding discussion, vulnerability is increased in some counties by specific zoning and subdivision provisions that allow lot yields beyond base density. These types of provisions clearly not only affect lot yields of individual parcels but also the cumulative amount of development that can occur in larger areas. As a consequence, vulnerability as estimated here may not correspond to what one would expect by considering base zoning density alone.

Considered together, the *Status* and *Vulnerability* analyses indicate that relatively little of Maryland's rural resource land has been adequately stabilized by zoning and related land use management tools to achieve Maryland's land preservation and resource conservation goals. In light of the reality that preservation funds are and are likely to remain limited, much of the State's rural resource land base is likely to be excessively compromised by development before preservation goals can be achieved.

Counties that appropriate large amounts of local funds for easement acquisition may be able to expand some of their more extensive areas that have already been preserved, despite a lack zoning and land use tools to protect the investment. This possibility is suggested by the fact that there are some substantial blocks of land that have limited or moderate vulnerability as a result of preservation efforts in counties lacking protective zoning. Examples can be seen as the dark and light green lands on *Map 2* in Howard, Harford, Caroline and Calvert counties, all of which have very successful easement acquisition efforts in context of relatively permissive zoning (Caroline and Calvert counties' zoning have become much more restrictive only recently).

However, this is by no means a guaranteed or even a very likely outcome. First, appropriating relatively more money for easement acquisition is not likely to protect large contiguous areas if land use tools have not stabilized the land base and development pressure is increasing; otherwise, green/ light green areas on *Map 2* would be larger and more extensive in counties like Howard, Harford and Saint Mary's counties, all of whom have aggressively funded easement acquisition.

Graph 3 Average MALPF Easement Acquisition Cost per Acre, by County: 2008-2012



Howard County PDR program offers up to \$40,000 per acre. Easements on approx. 1,000 acres in 2009 ranged from \$28,440 to \$37,800 (Baltimore Sun, December 10, 2009).

Source: MALPF

Perhaps more important, escalating development pressure increases easement acquisition costs much more in areas with permissive zoning for residential lots than in areas with restrictive zoning. This is made evident by comparing average easement costs among counties whose resource lands are accessible to large markets for rural residential lots. For example, recent MALPF acquisition costs are notably higher in Howard and Harford than in Baltimore and Montgomery counties (*Graph 3: Average MALPF Easement Acquisition Cost per Acre, by County: 2008-2012*). Major employment centers and jobs are highly accessible from rural areas in all of these counties and residential lots are very expensive. However, rural land in Howard and Harford counties can generally be subdivided into many more residential lots than in Baltimore and Montgomery counties, making it far more attractive to prospective developers of major residential subdivisions.

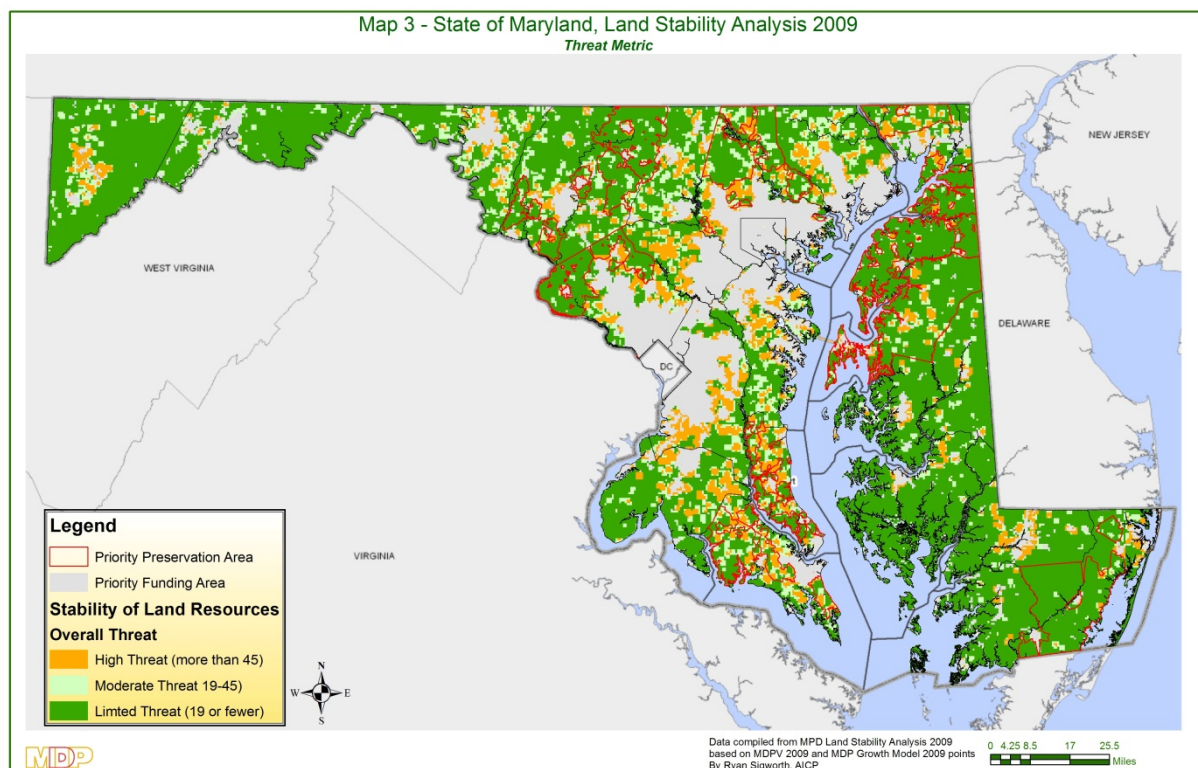
It is very difficult for preservation programs to compete with this market, as suggested by the comparisons. Higher easement costs mean less land preserved per public dollar and increasing difficulty competing with developers for land. As market demand for residential lots increases and the amount of remaining rural land shrinks, the price that must be paid to secure easements becomes prohibitively high, at least from a statewide standpoint. As represented by *Graph 3*, the situation is most extreme in Howard County, but numerous other counties may be headed toward a similar problem.

Threat: Development Pressure

Map 3: State of Maryland, Land Use Stability Assessment 2009, Threat Metric on the next page, which assesses the relative threat to Maryland's rural resource lands, estimates future demand for residential lots based on two assumptions, that:

- The market share of new residential development occurring in rural resource areas for the next 20 years in each county will be roughly equivalent to the share observed from 1997 through and including 2006; and
- The geographic distribution of demand for residential lots in rural resource areas will during the next 20 years will roughly correspond to the geographic pattern of residential development that occurred from 1999 through and including 2009.

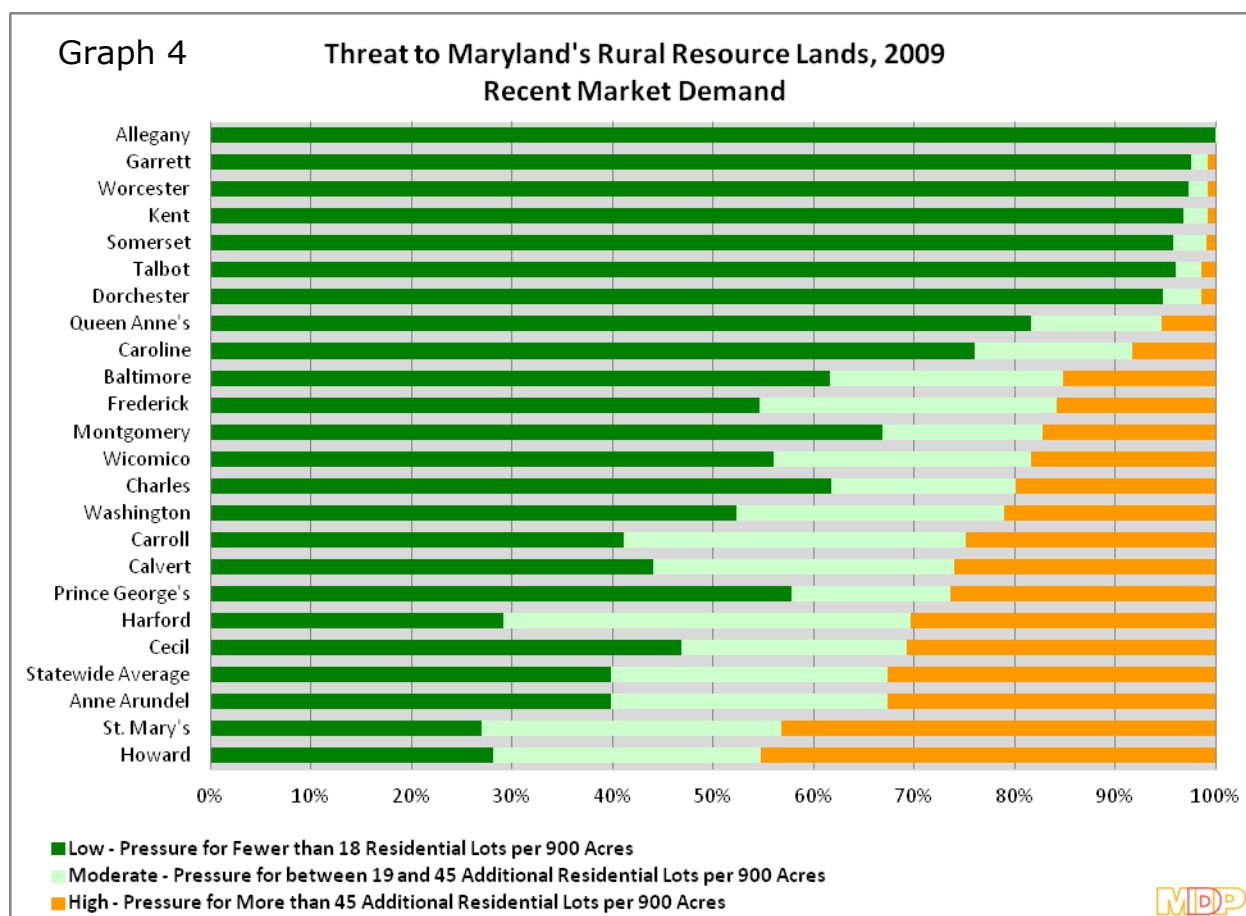
The degree to which development will occur in these relative amounts and patterns will obviously vary from place to place. The *Threat* analysis is designed to show what those patterns would be in each county; provide an estimate under those assumptions of how much land is likely to be threatened to accommodate the residential market for rural residential lots during this period; and indicate how widespread and intense that threat would be within each county.



The purpose of the *Threat* analysis in this assessment is to provide a way to examine the implications of within rural areas: it provides a way to distribute projected countywide residential development pressures throughout each county's rural resource land geography. This makes it possible to use that measure of pressure in conjunction with the *Status* and *Vulnerability* analyses already presented, the results of which are presented in the next section, *Stability*.

By themselves, the *Threat* map and statistics have limited meaning. As a measure of market demand for residential lots in rural areas, the percentage of residential lots subdivided or developed in rural areas from 1999-2009 may over or under represent market shares counties will actually experience in those areas over the next 20 years. Demand in the most heavily pressured rural areas could decrease in some places and increase in others.

One factor likely to affect that outcome is the size of the market for residential lots. One way to measure that factor is by considering the number of non-retail jobs in metropolitan and other employment centers throughout the State and their accessibility via highways from rural resource areas. Increasingly in Maryland, these areas serve as a source of residential lots for people commuting to job centers. The number of employment centers and their transportation accessibility from rural areas (i.e., acceptable commuting alternatives) continue to increase, both as highways expand and commuters choose residences with longer commutes. At the same time, the percentage of residential parcels and acreage improved outside of designated growth areas shows no signs of decreasing at a statewide scale and in most counties. For these reasons, demand for rural residential lots may in fact increase over the next 20 years, as job centers become more accessible as a result of improved highways and by virtue of new job center locations.



At the scale of the individual county, the more intense and widespread the threat, the greater and more contiguous the area colored orange on the Map. As summarized graphically by county in *Graph 4: Threat to Maryland's Rural Resource Lands, 2009* will be most intense and widespread in Howard and Saint Mary's counties, where almost 50% of the land will be exposed to the highest level of threat. From 20 to 35% of the land will be similarly threatened in all of the counties between Anne Arundel and Frederick (inclusive) on the Graph.

By contrast, over 90% of the land resource is expected to experience low development pressure between now and 2030 in Allegany, Garrett, Worcester, Kent, Talbot, Somerset and Dorchester counties. All of the counties above the Statewide Average are rural counties. The three directly below the Statewide Average have some of the more restrictive rural resource zoning in the State. All of the counties below Frederick on the Graph – those subject to the greatest threat – are transitional counties with the exception of Wicomico (rural) and Howard (metropolitan).

Stability

Please note: For purposes of simplification in the Scenic Byways application, the *Special* classification discussed below has been merged with the *Moderately Stable* classification. Therefore, all references in this methodology to the *Special* classification should be considered part of the *Moderately Stable* category in terms of the *Stability* metric.

Map 4: State of Maryland, Land Use Stability Analysis 2009, Overall Stability Metric, which classifies the overall stability of Maryland's rural resource lands, in tandem with *Graph 5: Assessment of Land Use Stabilization for Maryland's Agricultural and Natural Resource Lands, 2009*, addresses the two fundamental questions posed earlier in this Chapter: to what degree has land in different areas been stabilized, commensurate with development pressure, to provide time for easement acquisition to achieve conservation goals before the land resource is excessively compromised by development? In addition, given the answer, what is the potential and likely return on conservation investment, as defined here, in these areas?

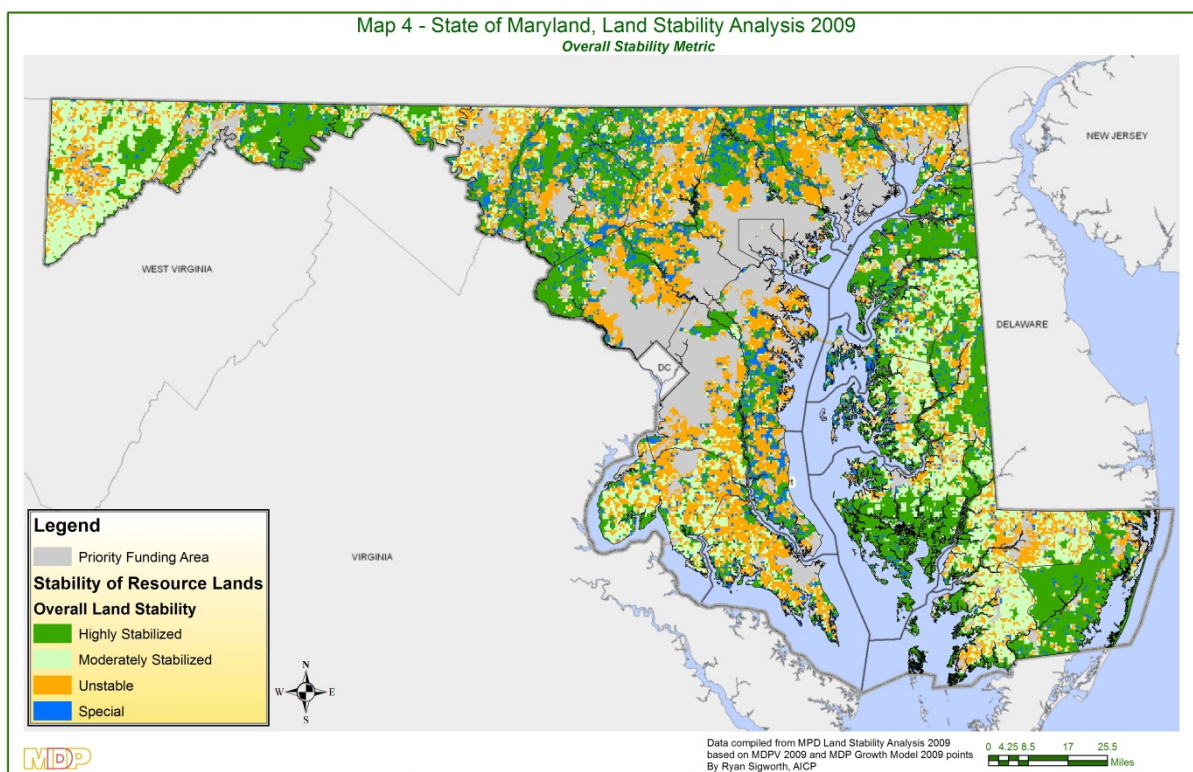
As described in more detail at the beginning of the Chapter, the map combines information for each of the other measures considered individually thus far: current *Status* shown on *Map 1*, future *Vulnerability* shown on *Map 2* and relative potential for *Threat* shown on *Map 3*.

Since an area can score most, moderate, or least for each measure shown on the preceding three maps, it can fall into one of 27 combinations when information from the three maps is combined. These 27 possibilities were consolidated into four levels of potential return on investment, as show in the following table.

Potential Return on Investment Rating System

Rating	Current Status	Vulnerability	Development Threat
High	Somewhat	Limited	Medium
High	Somewhat	Limited	High
High	Somewhat	Moderate	Low
High	Somewhat	Limited	Low
High	Unfragmented	Limited	Low
High	Unfragmented	Limited	Medium
High	Unfragmented	Limited	High
High	Unfragmented	Moderate	Low
High	Unfragmented	Moderate	Medium
Moderate	Somewhat	Moderate	Medium
Moderate	Somewhat	Moderate	High
Moderate	Somewhat	High	Low
Moderate	Unfragmented	Moderate	High
Moderate	Unfragmented	High	Low
Moderate	Unfragmented	High	Medium
Low	Highly	Limited	Medium
Low	Highly	Limited	High
Low	Highly	Moderate	Medium
Low	Highly	Moderate	High
Low	Highly	High	Low
Low	Highly	High	Medium
Low	Highly	High	High
Low	Somewhat	High	Medium
Low	Somewhat	High	High
Special	Highly	Limited	Low
Special	Highly	Moderate	Low
Special	Unfragmented	High	High

The basis for interpretation of these data is explained in the introductory narrative of this Chapter, *Analysis and Interpretation*. In summary, considering all three measures for a piece of land in conjunction yields an indicator of the degree to which it has already been stabilized, commensurate with



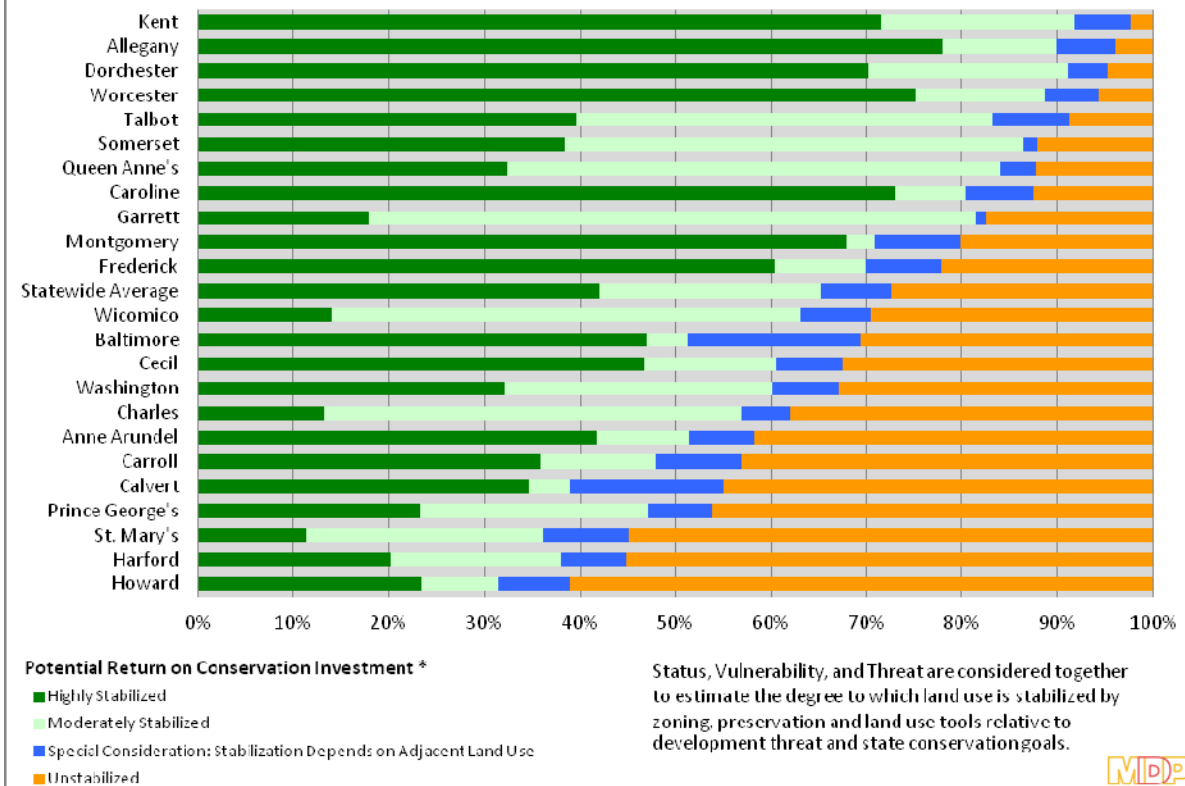
development pressure, to provide time for easement acquisition to achieve conservation goals before the land resource is excessively compromised by development. Since protecting rural land and resources from excessive compromising impacts is an important common goal of Maryland's land and resource conservation programs, achieving it means getting good return on conservation investment through land preservation in a relative sense, although it is by no means a complete measure for all of the State's conservation goals.

Note that *Special* lands (illustrated in blue grid cells) comprise two types: land that is already subdivided and developed (highly fragmented *Status*), but has limited or moderate *Vulnerability* and low *Threat*; and land that is currently free from intrusive development, but is both fairly vulnerable to further nearby development and subject to high levels of *Threat*. In context of our definition of good return – a high probability that fairly extensive tracts of rural land can be conserved from substantially compromising impacts of development – our view of these *Special* areas is that they could go either way: potential return depends on the broader prognosis for return on surrounding lands; thus, their classification as requiring special consideration.

The implications of *Map 4* and *Graph 5* on the next page are apparent by examining the results of the three groups of counties – rural, transitional and metropolitan – and reviewing potential return among counties. Also within and between those groups in light of their principal conservation tools: zoning and related land use tools that determine vulnerability and easement acquisition efforts that permanently extinguish development rights and preserve the land.

Graph 5

Assessment of Land Use Stabilization for Maryland's Agricultural and Natural Resource Lands*, 2009



The Eastern Shore and Western Maryland rural counties (with the exception of Cecil County, classified as transitional and Wicomico County, just below Montgomery County) occupy the top positions on *Graph 5*. This means that they have the highest percentages of rural resource lands in the *Highly Stabilized*, *Moderately Stabilized* and *Special Consideration* potential return categories combined. In conjunction with Howard County (a core metropolitan county), the transitional counties occupy the lowest positions, meaning that they have the highest percentages of lands in the *Unstabilized* or lowest potential return category. Montgomery and Baltimore counties, sandwiched around Wicomico County, are essentially separate the rural and transitional counties.

Consistent with those statistical positions, the largest, relatively contiguous area of *Highly Stabilized* (dark green) and *Moderately Stabilized* (light green) potential return shown on *Map 4* is on the Eastern Shore, extending almost unbroken from southern Cecil County to Worcester County. It is interrupted noticeably in a few places, marked by the relatively larger blocks (on the Shore) of *Unstabilized* or lowest potential return (orange) land, most substantial along a narrow corridor roughly centered on the main stem of the Choptank River in Caroline County and in the areas east and west of the Salisbury metropolitan growth area (white space) in Wicomico County. Less concentrated but noticeable orange blocks are also scattered in parts of Queen Anne's, Talbot and northern Dorchester and Somerset counties.

These breaks in the geography correspond to different combinations and degrees of existing residential development (along the Choptank main stem and in Wicomico, Somerset, Queen Anne's, Talbot and northern Dorchester counties), permissive zoning (in substantial portions of all of those counties) and threat from future development. The relative influences of these factors can be considered by reviewing the geographies mentioned in each of the three preceding maps along with information on the prevalence of public land holdings.

The largest block of land classified as *Highly Stabilized* potential return on the Eastern Shore is the southern portion of Dorchester County comprising Blackwater Wildlife Refuge and other public lands, in conjunction with considerable Chesapeake Bay Critical Area acreage. Substantial parts of the large areas of *Highly Stabilized* or highest potential return along the Bay in eastern Somerset County result from the presence of large State parks or wildlife management areas. Otherwise, most of the pattern of highest potential return on the Shore is due to relatively low levels of existing development, more restrictive zoning and related land use tools and limited threat, in conjunction with varying concentrations of land preserved by easement.

Elsewhere in the State, the most noticeable relatively large and contiguous areas of *Highly Stabilized* and *Moderately Stabilized* potential return are in Western Maryland (primarily Allegany County) and northern Baltimore and western Montgomery counties. These are followed by a substantial area in northwestern Carroll County and smaller, generally more scattered areas in Garrett, Washington, Frederick, Anne Arundel, Calvert and Charles counties.

The *Highly Stabilized* potential return rating on land in Allegany and Garrett counties is due to the presence of large State parks and wildlife management areas. In Allegany County, these are surrounded by private land with moderately restrictive (1 lot per 10 acres) zoning. In Garrett County, other than the large green block around Savage River State Forest, the far less restrictive land use management tools and considerable presence of scattered residential lots result in a more varied mixture of land with *Unstabilized* or lowest (orange) and *Moderately Stabilized* (light green) or moderate potential return. The compromising effect of land use tools in Garrett County is also reflected by the fact that other significant State holdings, like the Garrett and Potomac State forests, can barely be detected on *Map 4*. Their presence is largely obscured by the combination of residential lots, vulnerability and threat to private lands along their borders, suggesting that the resource values of those public lands could at some point be at risk of degradation as a result of intrusive adjacent development.

The relatively large areas in Baltimore and Montgomery counties with *Highly Stabilized* or highest potential return primarily reflect restrictive zoning and aggressive easement acquisition. In Baltimore County, lands owned by Baltimore City around Prettyboy, Loch Raven and Liberty reservoirs contribute very locally to this pattern. The less pronounced dark-light green area in northwestern Carroll County reflects the same combination of tools albeit with somewhat less restrictive zoning. The preponderance of blue *Special Consideration* areas in Baltimore County is due primarily to the presence of older (pre-1997) residential lots scattered throughout parts of the northern county.

The smaller and more scattered geographies of mixed *Highly Stabilized* and *Moderately Stabilized* potential return in Washington, Frederick, Anne Arundel, Calvert, Charles and Saint Mary's counties have different origins. The two westernmost concentrations in Washington County occur around State wildlife management areas, surrounded by the some of the county's more restrictive (1:20) conservation zoning. The sizeable dark green area in southeastern Washington County is land around the publicly owned Antietam Battlefield which also benefits from more restrictive zoning.

The largest solid block of land coded as *Highly Stabilized* or highest potential return in northwest Frederick County is a combination of State, federal and county owned land. The mixed pattern of potential return elsewhere is a function of permissive resource conservation zoning around those public lands and more restrictive zoning (more extensive dark and light green areas) elsewhere (reminder: the Vulnerability and Potential Return analyses are still being updated for Frederick County).

With the exception of a large block of public land in northwestern Anne Arundel County, areas of *Highly Stabilized* or highest and *Moderately Stabilized* or moderate potential return in Anne Arundel and Calvert counties result from moderately restrictive zoning and land use management tools recently applied in areas formerly subject to more permissive zoning; these areas have consequently experienced considerable impacts from development. Nevertheless, the improved land use tools vastly improve prospects for successful conservation of remaining resource in these areas. Anne Arundel County occupies the best position in the *Vulnerability* analysis (*Graph 2*). The county's substantially lower position in the *Stability* analysis is due to higher degrees of existing fragmentation from residential

development (see *Map 1* and *Graph 1* in the *Status* analysis) and *Threat* (a function of development activity between 1999 and 2009). This is one county in which *Threat* may decrease relative to that earlier period due to increased restraints on the number of lot subdivisions allowed.

With the exception of a few areas under public ownership along the Potomac Estuary in Charles County, most of the land with *Moderately Stabilized* or moderate potential return (light green) in Charles and Saint Mary's counties is a result of low *Threat*.

In summary, in the larger central Maryland region extending north and south of the Baltimore-Washington corridor, including all of Southern Maryland and other counties west to Frederick and east to Cecil County, good opportunities to achieve rural land and resource conservation goals in large, substantial blocks are limited to those parts of counties that have benefitted from combinations of moderately or highly restrictive rural zoning and aggressive State/local easement acquisition efforts. While easement acquisition is important, the overriding factor is zoning and land use management tools: the more restrictive the zoning and the sooner it was imposed relative to the onset of high development pressure, the larger the area of potential opportunity and the better the potential return on continued State conservation investment.

In those terms, the best opportunity in this extended central Maryland region is in Montgomery and Baltimore counties, followed by Carroll (northwest), Anne Arundel (south) and Calvert (several areas when data base is updated) counties. Additional opportunities for conservation of relatively large and contiguous areas exist on extensive acreage in Frederick County (reminder, the analysis is being updated) and less so in Charles and Saint Mary's counties. Harford and Howard counties offer the least opportunity.

As development pressure extends and intensifies on the Eastern Shore and Maryland's westernmost counties, the best conservation opportunities are also likely to occur in the parts of counties protected by more restrictive resource conservation zoning: southern Cecil, Kent, Caroline and Worcester counties, followed by the remaining counties to varying degrees.

One may suppose that counties lacking sufficiently protective zoning and land use tools have more time to put them in place, because they are further removed from development pressure. However, as development pressures increase and expand in these counties, there is little to support that conclusion. As discussed in the *Vulnerability* section above, increasing market size and demand in conjunction with permissive zoning and limited preservation dollars is likely to encourage development markets for major residential developments, easement acquisition costs will increase more than in counties with better land use tools and the ability of preservation to compete with development opportunities will be greatly compromised.

In short, based on the track record in Maryland, the choice by a local government to use or not use protective zoning and land use tools plays the dominant role in determining if easement acquisition efforts can protect large blocks of land, commensurate with State goals, or smaller islands fragmented by residential development. In the case of Maryland Scenic Byways, protection of byway resources (viewshed, historical, cultural and natural) is based upon the needs of each resource and the best method to protect it. In many cases, it may be a combination of tools such as working with counties to change the zoning of a localized area to provide additional protection. In other cases, focused acquisition of preservation easements may be utilized to protect byway resource sites sensitive to the potential impacts of surrounding development.

Lastly, these tools may lead to infrastructure enhancements at a specific byway site based on where new development has occurred (that is to say, *Threat*) and the overall stability of the land base. The enhancements could be improved roads, increased cycling infrastructure, pedestrian enhancements and/or improvements to byway resource sites to enhance visitor experience based on increased visitation. In many ways, this tool has a lot of untapped potential in terms of corridor management along Maryland Scenic Byways. The sky is the limit for managers and users of Maryland's Scenic Byways Online data and map layers.