



PHOTO: EDWIN REMSBERG

## KEY POINTS

- Large-lot residential development on septic systems causes the majority of agricultural and forest land converted to development in the United States.
- Zoning regulations are one of the primary land-use policies used to manage development and reduce farmland and forest conversion.
- We analyze the effectiveness of the downzoning policy adopted in 1976 in rural Baltimore County.
- We assess subdivision trends for downzoned areas and residential control areas, including subdivisions in the post-zoning period and baseline period prior to the policy adoption.
- Our results indicate the downzoning policy did not affect the probability of development.
- The downzoning policy did significantly lower the density of development, with a reduction in density of 54% and 60% in agricultural zoning and watershed protection zoning areas.

## Downzoning for the Preservation of Agricultural and Forest Lands

By David Newburn

Land-use policies are critical to maintain the integrity of agricultural and forest lands in Maryland. The Maryland Department of Planning (MDP) forecasts that approximately 346,000 acres of agricultural and forest land are expected to be converted to development between 2010 and 2040 in Maryland.<sup>1</sup> The vast majority of this forecasted development (82%) is expected to occur as large-lot development on septic systems outside the priority funding areas (PFAs). Downzoning reduces the average housing density permitted on a parcel being converted to residential development. These zoning regulations are one of the primary land-use policies implemented to reduce farmland and forest conversion.

This report summarizes research that analyzes the effect of a downzoning policy on both the probability of development and residential density, using a spatially explicit dataset of residential subdivisions in Baltimore County.<sup>2</sup> Because zoning designations are not randomly assigned to parcels on the landscape, it is challenging to assess the effectiveness of downzoning. In other words, parcels downzoned for agricultural or watershed protection may be inherently less suitable for

development; for instance, because they are located farther from cities or on steeper slopes. To address this issue, we analyze subdivision development trends during periods before and after the implementation of the downzoning policy. We also compare the subdivision development trends for parcels downzoned for agricultural or watershed protection (treatment areas) and parcels zoned for residential use (control areas). In this treatment-control study approach, development trends prior to downzoning attempt to account for baseline differences between downzoned and residential zoned areas.

Our main results indicate that downzoning had no significant effect on the probability of development, but it did strongly affect the density of development. The rate of development was relatively unchanged with downzoning, but downzoning did reduce the number of homes built on those developed acres. Specifically, the density of development was reduced by 54% and 60%, respectively, for areas downzoned for agricultural and watershed protection. For further details, a more complete report of the policy analysis and discussion of the main results can be downloaded [here](#).

<sup>1</sup> American Farmland Trust, Maryland Department of Planning and Land Stewardship Solutions LLC. 2016. "The future of sustainable farming and forestry in Maryland". Report commissioned by The Harry R. Hughes Center for Agro-Ecology, Inc. Queenstown, MD. pp. 134.

<sup>2</sup> Newburn, David and Jeffrey Ferris. 2016. "The effect of downzoning for managing residential development and density." *Land Economics* 92(2): 220-236.





PHOTO: SUNNY'S FOREST / SHUTTERSTOCK.COM

### Downzoning Policy in Baltimore County

Maryland is one of the leading states in the adoption of land-use policies to protect agricultural and forest lands, and Baltimore County is a pioneer within Maryland.<sup>3</sup> In 1967, Baltimore County instituted an urban growth boundary (UGB), also known as the urban-rural demarcation line (URDL), which was the first UGB in Maryland. The rural region outside the UGB covers about two-thirds of the county land area. A common misconception is that an UGB does not allow any residential development in the rural area outside the boundary. But the UGB only limits the extension of municipal sewer service. This effectively restricts higher density development that requires sewer service to occur in the urban region within the UGB. Meanwhile lower density development on septic systems is still allowed in the rural area. Even after the UGB was adopted in 1967, the entire rural region was allowed a maximum density of one residential lot per acre. As a result, the rural region continued to have a significant amount of large-lot residential development on septic systems and the attendant losses of agricultural and forest lands.

To combat this issue, Baltimore County eventually adopted resource conservation (RC) zoning areas in 1976. This downzoning policy included three main zoning types in the rural region. Agricultural (RC2) zoning allowed a maximum density of one residential lot per 25 acres starting in 1976, which later was decreased in 1979 to one residential lot per 50 acres. Agricultural zoning aims to protect areas with prime agricultural soils and other lands suitable for production. Watershed protection (RC4) zoning allowed a maximum density of one residential lot per 5 acres and is designated to protect the major rivers and watersheds for three large reservoirs (Liberty, Loch Raven, and Prettyboy), serving as the drinking water supply for 1.8 million residents in the Baltimore metropolitan region. Rural residential (RC5) zoning allowed a maximum density of one residential lot per 2 acres and is designated for residential development in the rural area. It is important to note that exemption rules were created in the agricultural and watershed protection zoning areas during the creation of the RC zoning regulations in 1976. For instance, parcels with 2 to 50 acres located in agricultural zoning were still allowed to split into two residential lots after 1976, and this was later changed to parcels with 2 to 100 acres in 1979.



TOP PHOTO: SUNNY'S FOREST / SHUTTERSTOCK.COM  
 BOTTOM PHOTO: DUSAN PETKOVIC / SHUTTERSTOCK.COM

### Data and Model for Residential Development

The analysis relies on a spatially explicit parcel-level dataset of residential subdivisions in Baltimore County. Specifically, we used the 2008 parcel layer for Baltimore County provided from the Maryland Department of Planning. Using historic records of subdivision plats, we manually reconstructed each subdivision that occurred from 1967 to 2008. We determined the year of subdivision based on the final approval time recorded on the subdivision plat map. All parcels in the same

<sup>3</sup> Outen, Don. 2007. "Pioneer on the Frontier of Smart Growth: The Baltimore County, MD Experience." Smart Growth @ 10 Conference, Resources for the Future, Washington, DC. pp. 49.

subdivision were aggregated to determine the original boundaries of the “parent” parcel prior to subdivision. This allows us to reconstruct the original parcel boundaries on the landscape in 1967. We also recorded the number of buildable lots that were created in each subdivision. The average residential density is calculated as the number of buildable lots divided by the land area for the entire parent parcel.

For this analysis, we focus exclusively on the subdivisions in a 10-year time window immediately before and after the downzoning policy in 1967-1986. Our sample includes the 6,047 developable parcels that were eligible for residential development in 1967 and could be subdivided into two or more residential lots. Of those developable parcels, 284 were converted to residential subdivisions in 1967-1976 before the downzoning and 336 were converted to residential subdivisions in 1977-1986 after the downzoning. The period 1967-1976 represents the baseline trends for subdivision activity because all parcels had the same zoning at one residential lot per acre. The period 1977-1986 represents the post-downzoning trends immediately after the policy adoption. There are three different levels of downzoning: agricultural zoning (RC2), watershed protection (RC4), and rural residential zoning (RC5). We used urban residential zoning (DR1) as the control group because the zoning remained unchanged at one residential lot per acre during the entire study period in 1967-1986. This statistical framework is called a difference-in-differences (DID) approach because we evaluate subdivision trends in downzoned areas (RC2, RC4, RC5) relative to the control area (DR1), comparing the differences between the post-downzoning period and baseline period.

The econometric (statistical) model used for residential development has two stages. In the first stage, the developable parcels in 1967 are evaluated to determine whether or not the landowner converted the parcel to residential development during 1967-1986. In the second stage, if the landowner converts the parcel, then the subdivision is evaluated to determine the average residential density. Explanatory variables for both model stages include parcel attributes extracted within a geographic information system (GIS) on the zoning designation, parcel size, accessibility to downtown Baltimore City and major highways, limitations on development (steep slopes, floodplains), and other parcel attributes.



TOP PHOTO: ALEKSANDER BOLBOF / SHUTTERSTOCK.COM  
BOTTOM PHOTO: JOSEPH SOHM / SHUTTERSTOCK.COM

### Summary Results and Policy Implications

The model results indicate agricultural zoning (RC2) did not significantly decrease the probability of development. But the residential density decreased significantly by 54% in this region due to the downzoning policy. The agricultural zoning area has a lower probability of development than the control area (DR1). However, this lower rate of development in agricultural zoning was already occurring in the baseline period before the downzoning policy. Therefore, parcels located in agricultural zoning are inherently less likely to develop due to other factors (e.g., farther from urban areas), and not primarily due to the agricultural zoning designation.

One reason for the low effectiveness on the agricultural zoning is the minor exemption rule.



TOP PHOTO: JON BILOUIS / SHUTTERSTOCK.COM BOTTOM PHOTO: ARTAZUM / SHUTTERSTOCK.COM

As a political compromise in the downzoning process, smaller parcels in agricultural zoning (2 to 100 acres) are still allowed to split into two residential lots.

Hence, the downzoning policy had a minimal effect on the probability of development because minor subdivisions are allowed and commonly occur in the agricultural

zoning area. Without this allowance for minor subdivisions, the downzoning policy would likely have been more effective at reducing development in the area designated for agricultural preservation.

Minor subdivisions are not only an important aspect for prior land conversion. In Baltimore County, developable parcels that allow minor subdivisions (2 or 3 lots) currently represent the majority of remaining development rights in the rural region.<sup>4</sup> The Sustainable Growth and Agricultural Preservation Act of 2012 (known as the “septic law”) does not restrict minor subdivisions. Furthermore, since the septic law was adopted, many counties in Maryland (16 out of 24 counties) revised the definition of a minor subdivision to allow seven lots. This effectively allows more parcels to be exempt from the septic law. Hence, the legacy effect of parcels zoned to allow minor subdivisions remains an important issue for managing development in rural areas and preserving farmland and forestry in Maryland. Local governments can adopt mandatory clustering rules for residential lots to mitigate the impact of subdivision developments on farmland and forest conversion. ■

*For more information about this research, contact Dr. David Newburn at [dnewburn@umd.edu](mailto:dnewburn@umd.edu).*

<sup>4</sup>A distinction is made between major and minor subdivisions. In Baltimore County, major subdivisions are defined as projects with four or more buildable lots whereas minor subdivision projects have only two or three buildable lots.



COLLEGE OF  
AGRICULTURE &  
NATURAL RESOURCES

DEPARTMENT OF AGRICULTURAL AND  
RESOURCE ECONOMICS

Symons Hall  
Room 2119  
College Park, MD 20742  
[www.arec.umd.edu](http://www.arec.umd.edu)  
(301) 405-1293