



Land Use Methods and Metrics Outcome

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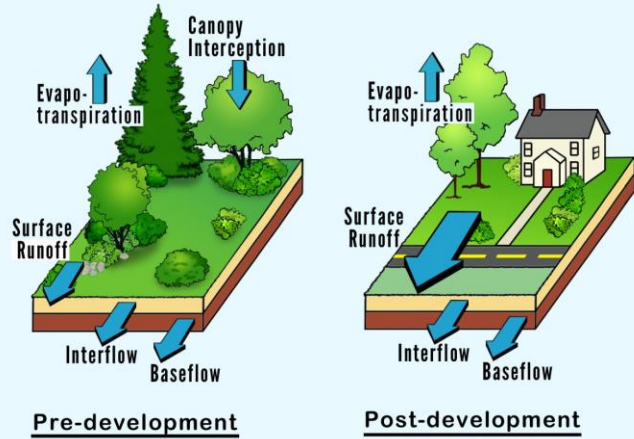
Through the Chesapeake Bay Watershed Agreement, the Chesapeake Bay Program has committed to...



- 1. Measure rate of farmland, forest and wetland conversion, and the extent and rate of change in impervious surface coverage.*
- 2. Quantify the potential impacts of land conversion to water quality, healthy watersheds and communities.*
- 3. Launch a public awareness campaign to share this information with citizens, local governments, elected officials and stakeholders.*

Impervious Surfaces: why are they important?

Figure 1.1 Water Balance at a Developed and Underdeveloped Site
(Source: Schueler, 1987)



Surface runoff is minimal in an undeveloped site, but dominates the water balance at a highly impervious site.

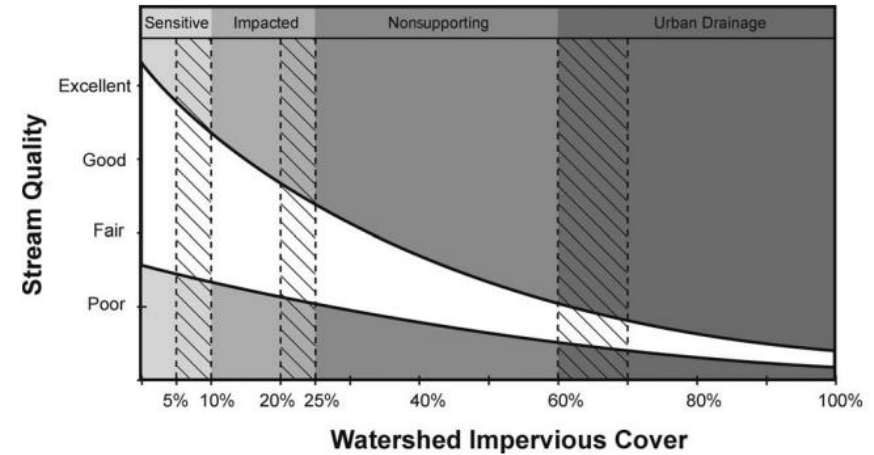
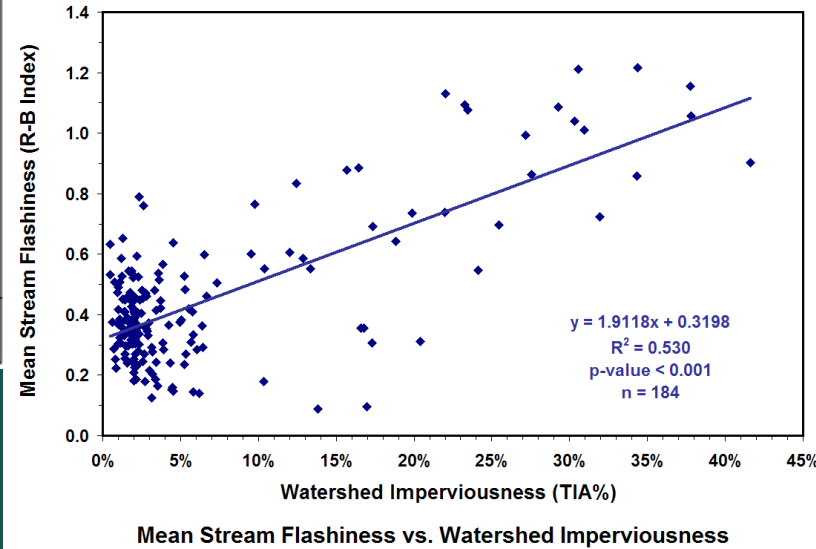


Fig. 2. Reformulated impervious cover model

<https://www.montgomerycountymd.gov/water/stormwater/about.html>

Jarnagin, S. Taylor. "Historical analysis of the relationship of streamflow flashiness with population density, imperviousness, and percent urban land cover in the Mid-Atlantic region." In World Environmental and Water Resources Congress 2008: Ahupua'A, pp. 1-10. 2008.

Schueler, Thomas R., Lisa Fraley-McNeal, and Karen Capiella. "Is impervious cover still important? Review of recent research." Journal of Hydrologic Engineering 14, no. 4 (2009): 309-315.

Impervious Surfaces as a LUMM metric

On the one hand...

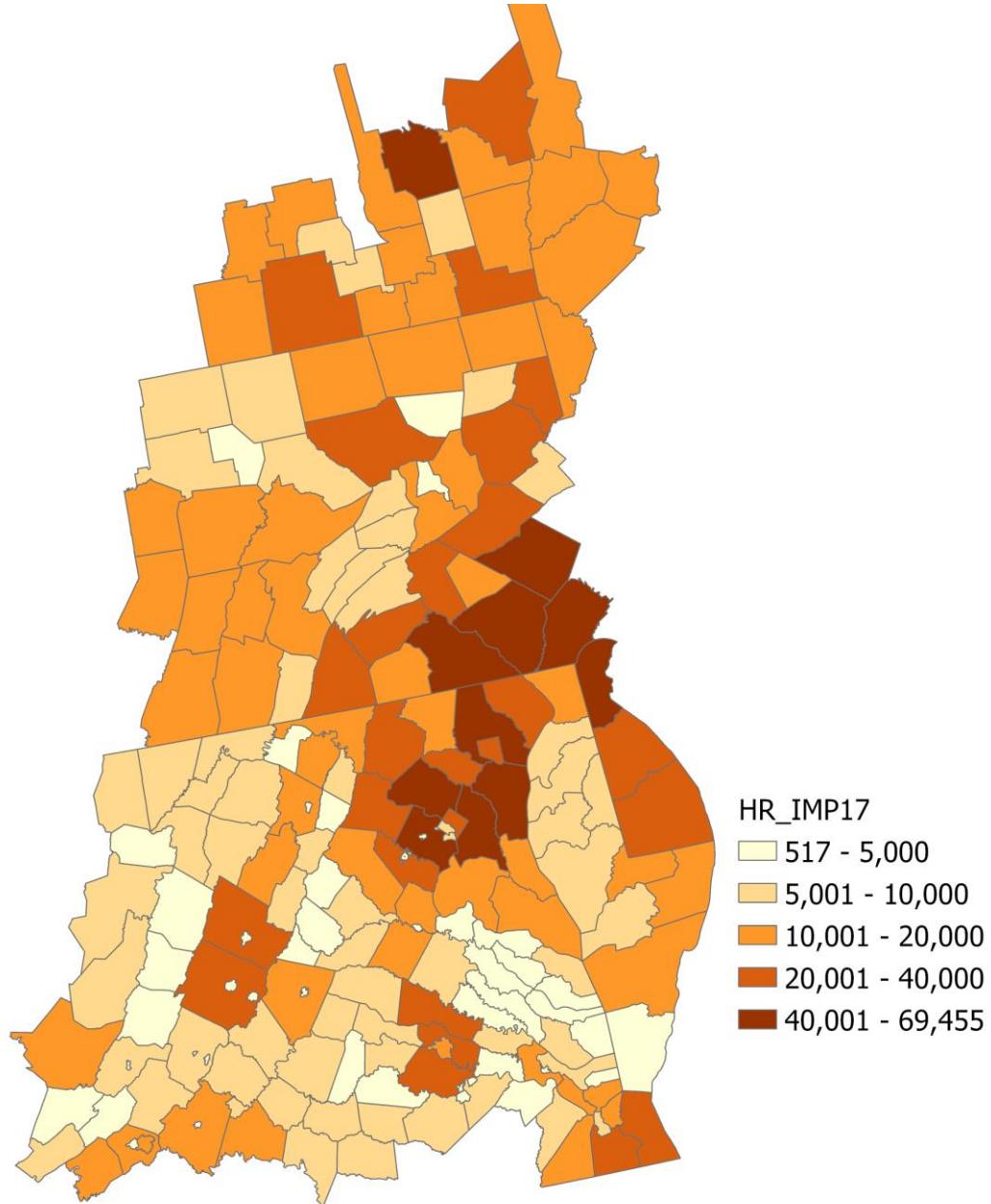
- Impervious surfaces are the fastest growing polluting land cover class.
- Impervious surfaces increase stream flow velocity and temperature and change the chemical composition of surface runoff.
- These changes lead to upland erosion and the densification of drainage networks, erosion of stream banks, scour and sedimentation of stream beds, threaten the health of aquatic life (incr. temperature, conductivity, sediment, nutrients, and toxics).

On the other hand...

- Impervious surfaces are an indicator of community economic growth and investment.
- Accommodating population growth while minimizing (not eliminating) increases in impervious cover is a hallmark “smart growth” principle.

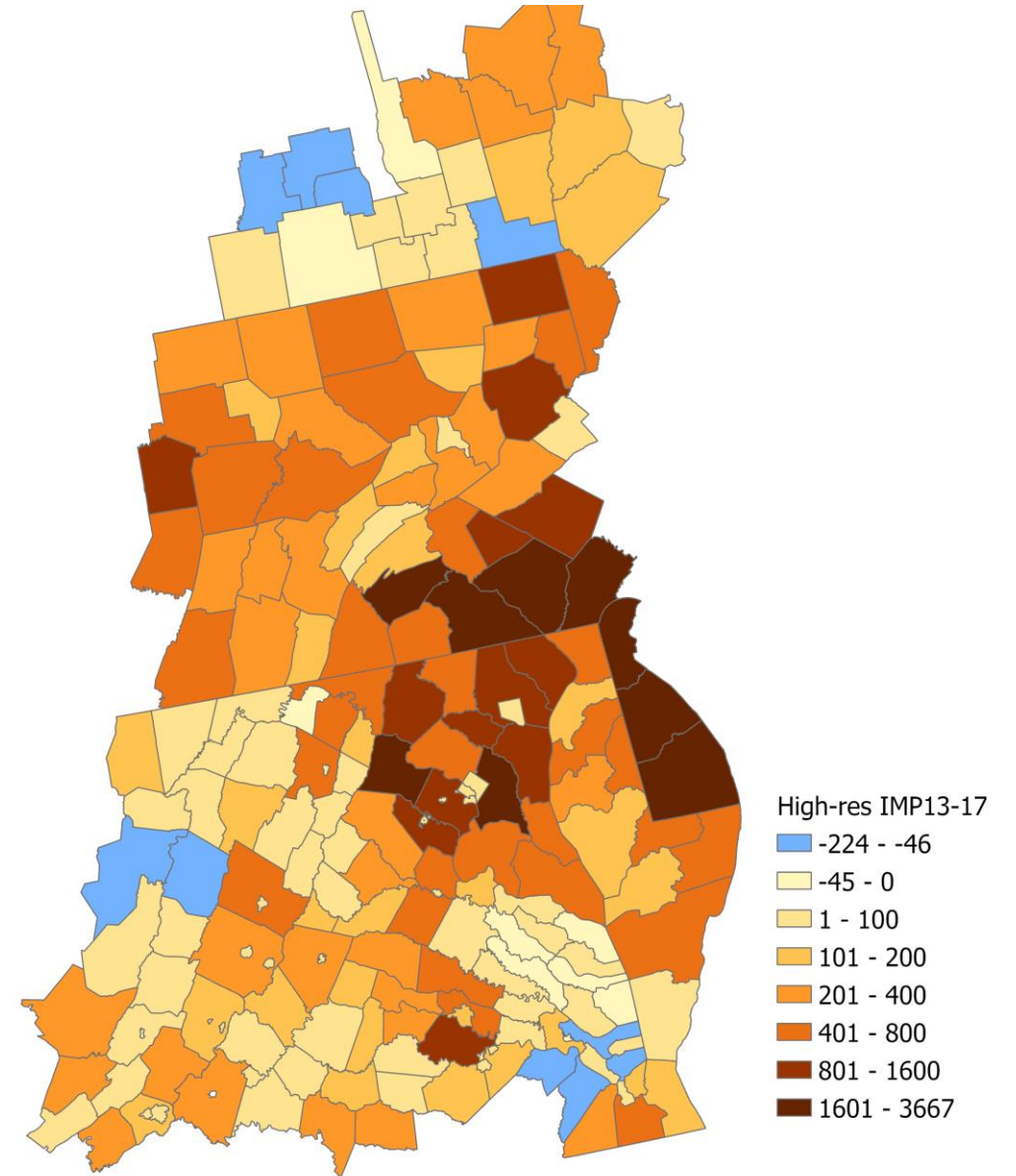
Metric: Total Impervious Area

How much impervious surface is there and where is it?



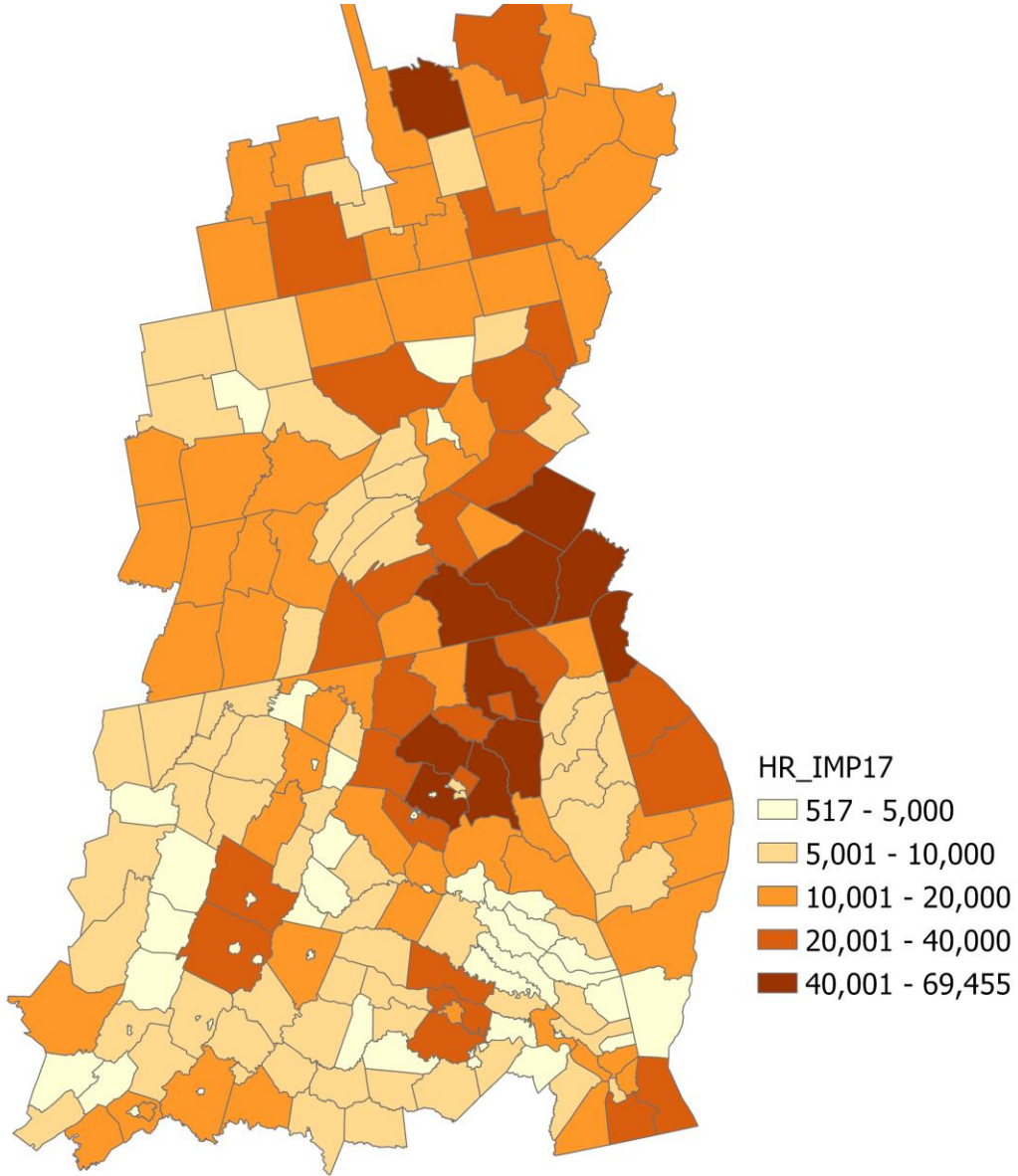
Metric: Impervious Area Change, 2013 - 2017

How is impervious surface growing and where?



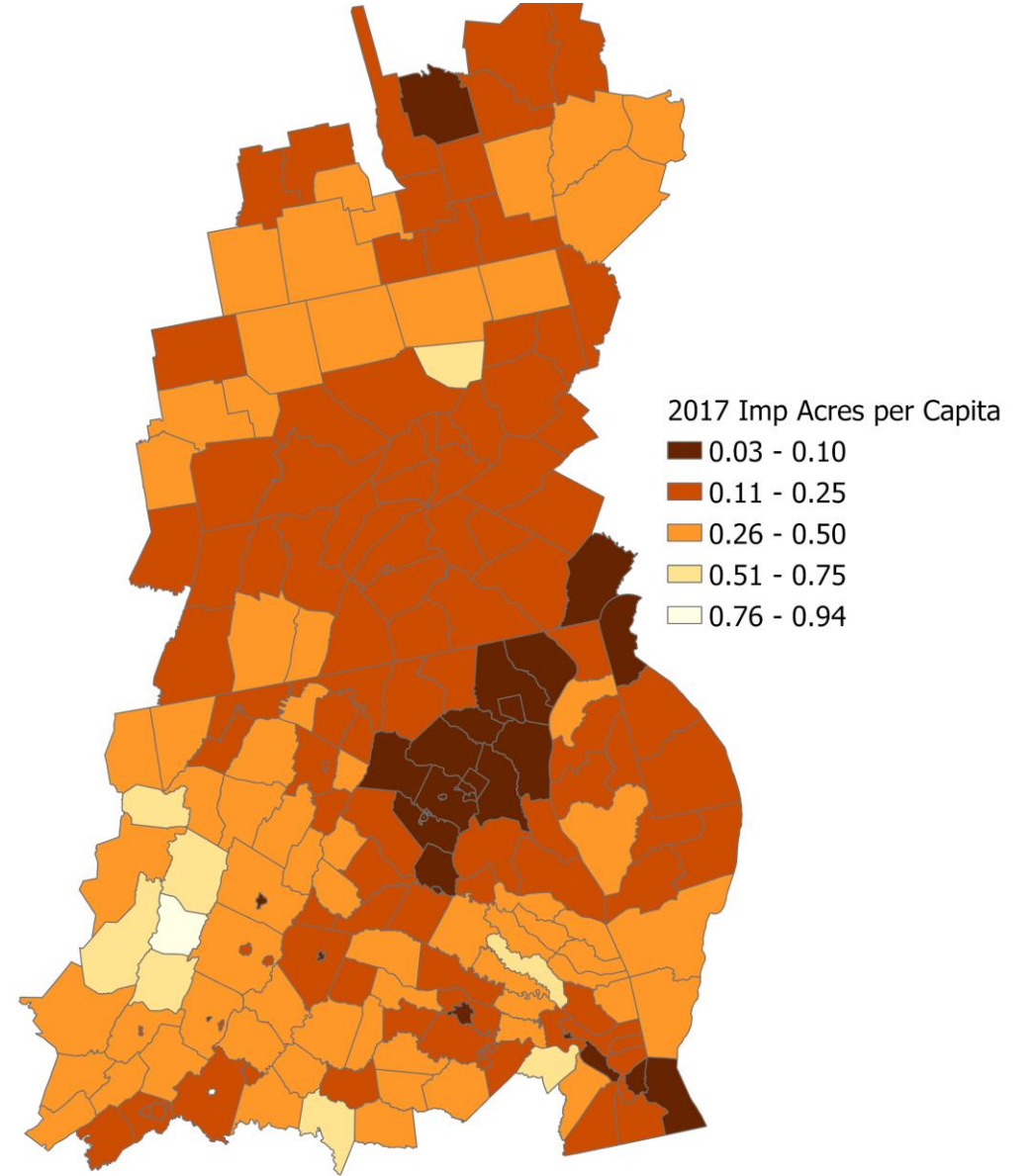
Metric: Total Impervious Area

How much impervious surface is there and where is it?



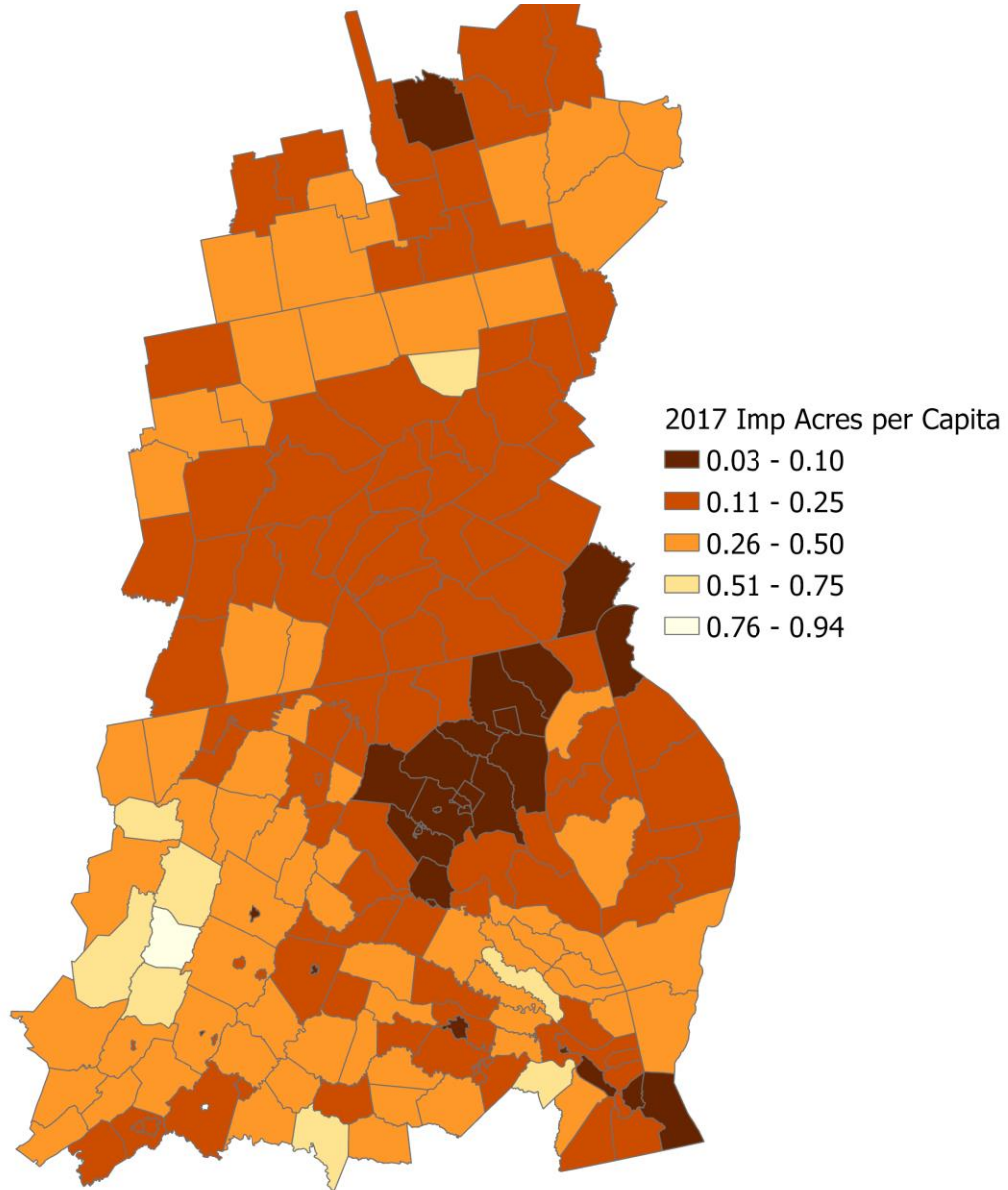
Metric: Impervious Area per Capita

How concentrated/dense is development?



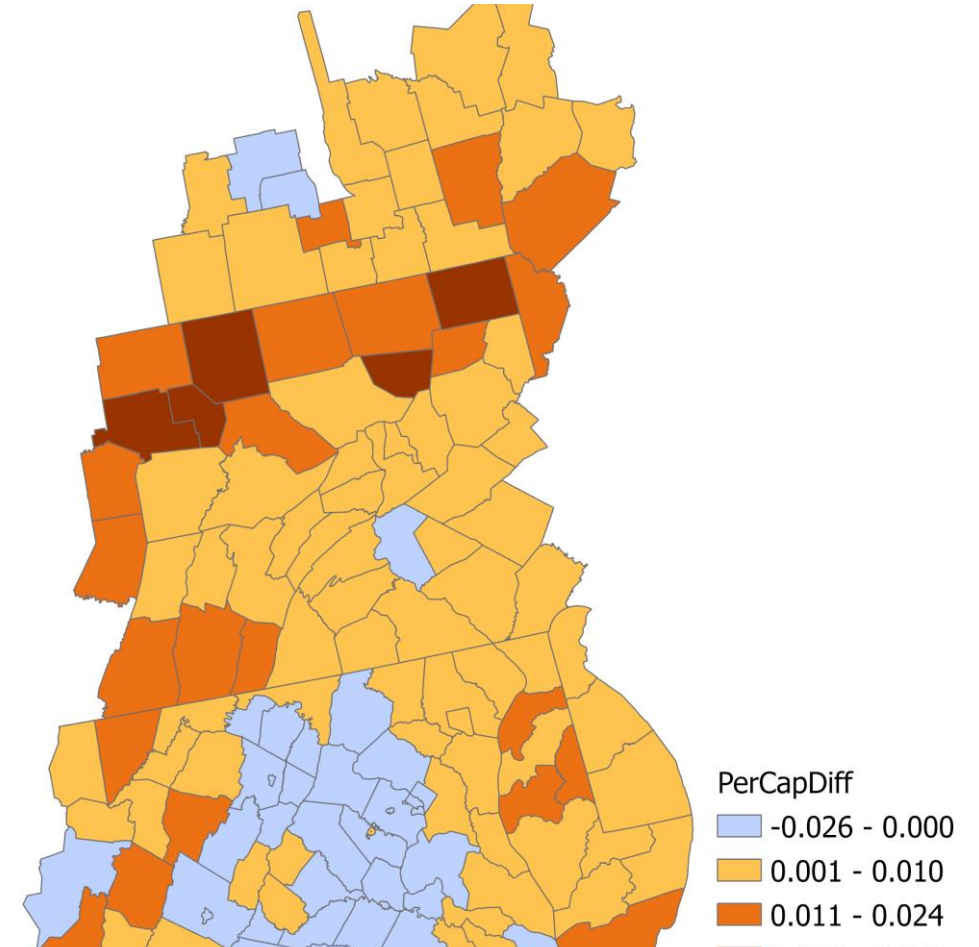
Metric: Impervious Area per Capita

How concentrated/dense is development?



Metric: Impervious Area per Capita Change, 2013-2017

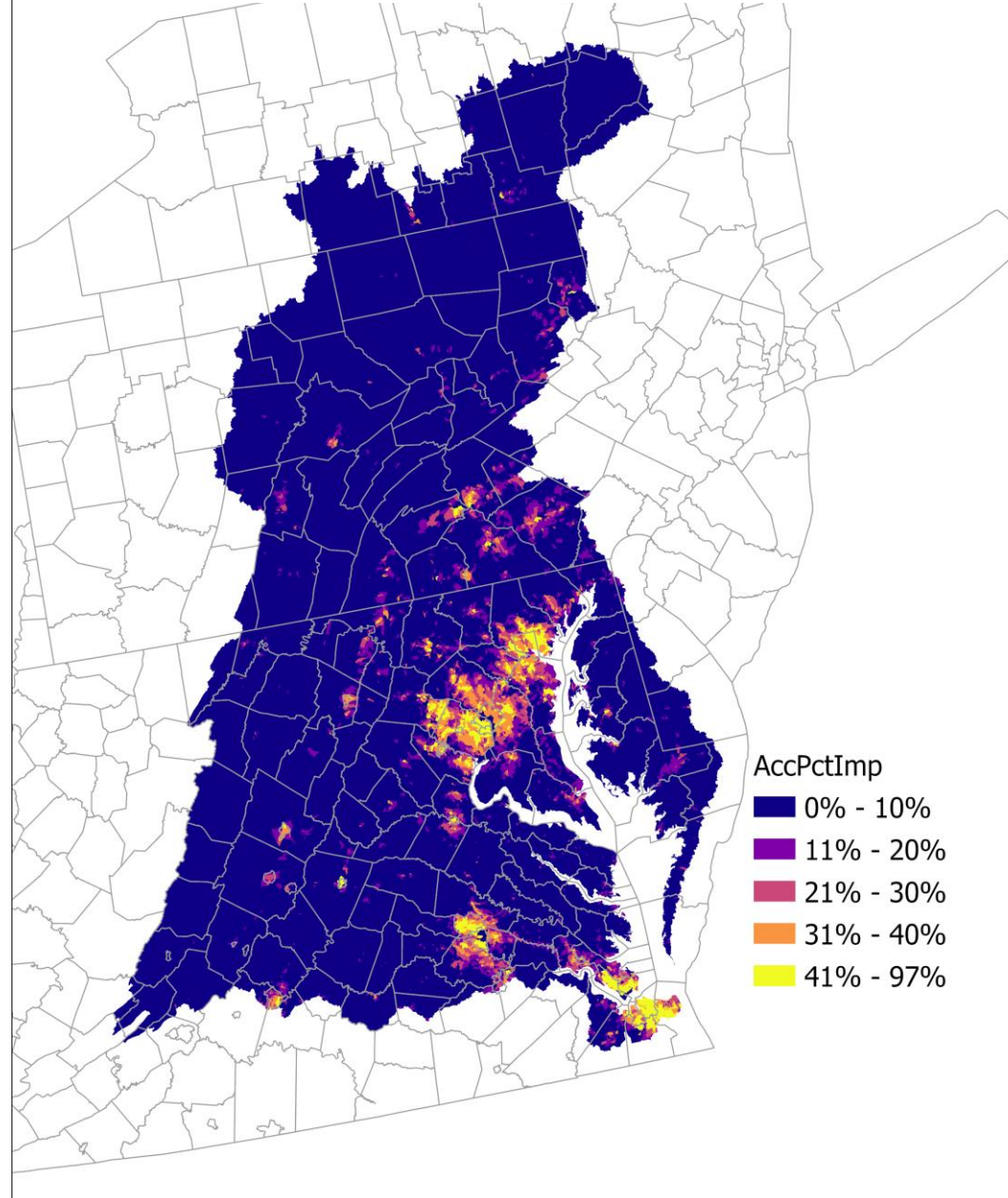
Is development becoming more or less dense?



Generally, as counties develop, their levels of impervious area per capita decrease as do their proportions of impervious surfaces composed of roads (38% in rural areas and 26% in urban areas). Therefore, changes in impervious area per capita should be evaluated relative to a county's overall level of development or population. Exceptions to these generalizations are related to large infrastructure and energy projects and/or declining populations.

Metric: Impervious Area per Catchment

Where are watersheds at risk of hydrologic, chemical, and biological impairment?



Future Metrics:

- Impervious Area Change per Catchment
- Effective Impervious Area

Future Indicators....

- Residential and Commercial Development gain (impervious + turf + trees over turf)
- Development gain per capita
- Forest clearing and regrowth
- Urban tree canopy gain (from planting) and loss
- Agricultural land gain and loss.

Future Scales....

- NHD+ catchments
- Census Places
- Census Minor Civil Divisions (Townships in PA)