Assessing the Vulnerability of Forested Watersheds to Urbanization

Peter Claggett

Geographer
USGS Eastern Geographic Science Center

Healthy Watershed Goal Implementation Team (GIT4)
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Vulnerability = $f$ (exposure, sensitivity, and resilience)
Vulnerability of Forested Watersheds to Urban Development

Exposure =  
• land demand

Sensitivity =  
• level of protection
• suitability for development
• accessibility

Resilience =  
(i.e., adaptive capacity)  
• land supply relative to demand
• hydrograph proportion of runoff to baseflow
• slope
• % forest cover
• % riparian forest cover
• other condition metrics
Exposure Varies Temporally
(Residential Building Permits: 1990 – 2010)
Exposure Varies Spatially
(RLA Development Pressure: 1990 - 2000)
Forest Loss (2006 – 2025)
Resistance (yr. 2100)

Legend

High : 16.8061
Low : 0.00213435

Anne Arundel County

Prince George’s County
* Based on 23 simulations and use of the GUIDOS software. Brackets represent +/- 2 standard deviations from the mean.
What about other threats?

- Roads
- Energy transmission lines
- Shale gas pads
- Sea-level rise
- Temperature/precipitation change