STORMWATER BASICS

What are the drivers of local government stormwater management programs?

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Chesapeake Bay and Water Resources Policy Committee
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Agenda Item 3

Metropolitan Washington
Council of Governments

Stormwater: Why Do We Care?

- Quantity issues – volume of stormwater flow generally increases with increased imperviousness
  - Streambank erosion, flooding
- Quality issues – stormwater carries pollutants from the landscape to streams, rivers and the Bay
  - Sediments
  - Nutrients (nitrogen and phosphorus)
  - Bacteria
  - Oil and grease
  - Toxic chemicals (e.g. pesticides)

Source: COG Staff

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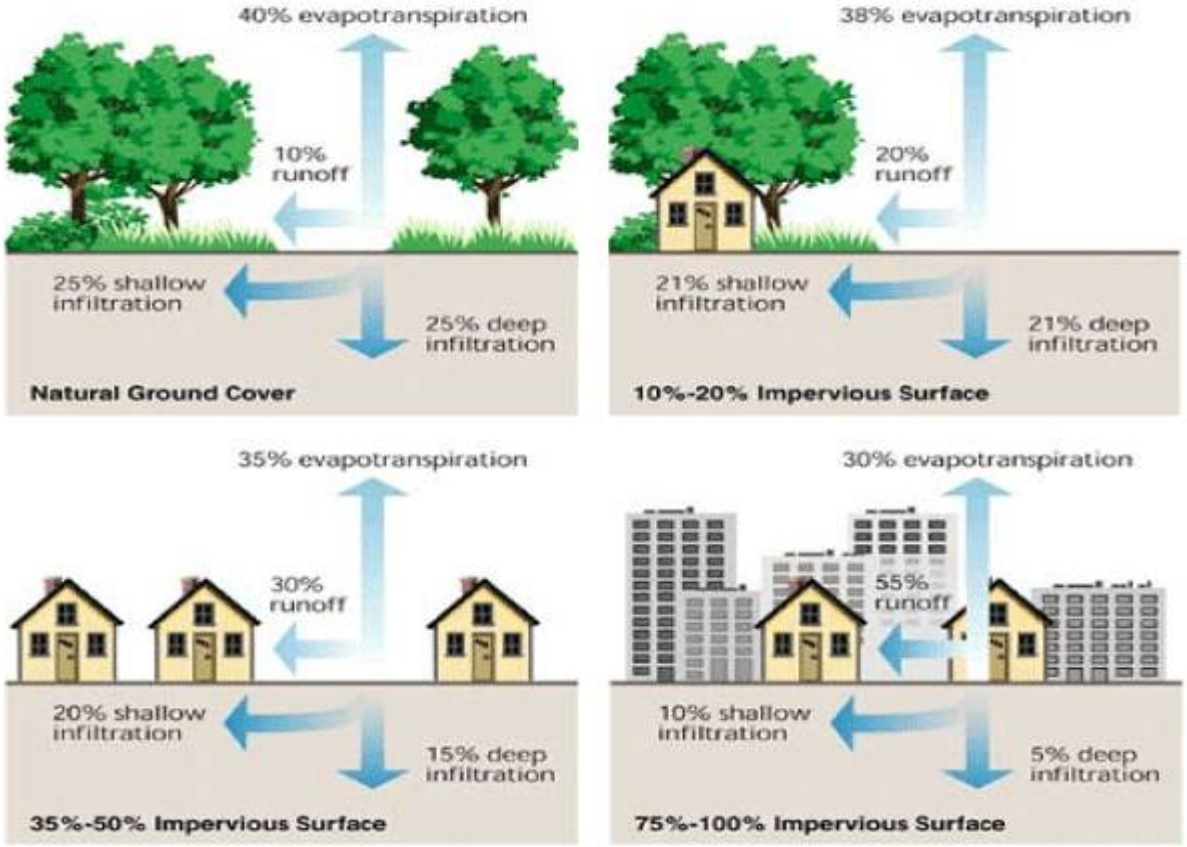


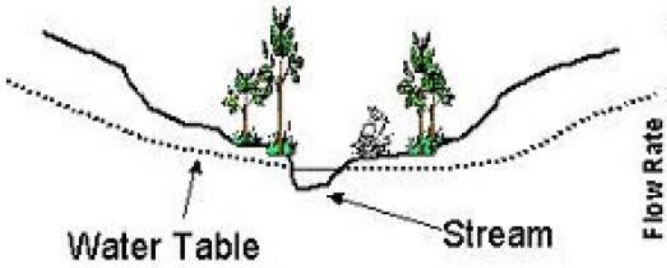
Source: Minnesota Pollution Control Agency: https://stormwater.pca.state.mn.us/index.php?title=Overview_of_basic_stormwater_concepts

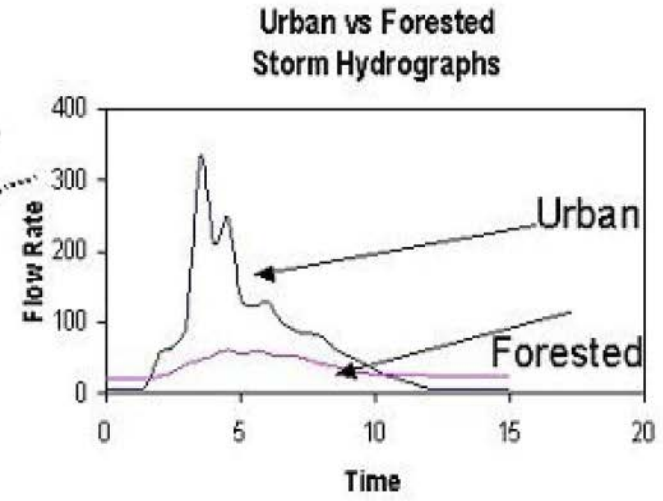
Human activities permanently alter the hydrology, or flow of water, through landscapes

One inch of rainfall running off an impervious parking lot generates 27,154 gallons of water

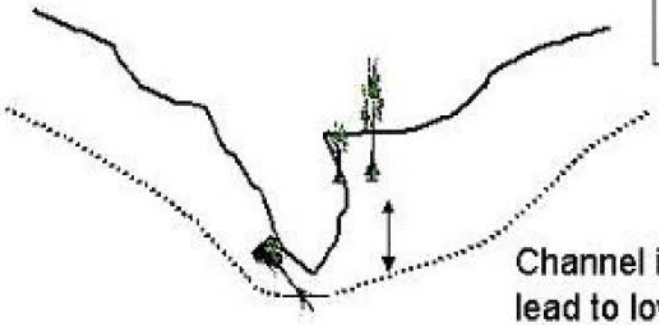
By contrast, undisturbed forested landscapes have the ability to absorb 90 – 95 percent of rainfall events, depending on intensity, slope etc.

I. Natural Channel





II. Channel with Incision Due to Increased Runoff



Urbanization leads to "flashier" storm flows which incise stream channels.

Channel incision and reduced infiltration in uplands lead to lower water tables in the riparian zone which results in a change from wetland to upland soils and vegetation, and less filtering of upland-derived nitrate.

Increased runoff from impervious surfaces and other developed land uses degrades stream channel structure and biology

Source: Cary Institute of Ecosystem Studies
https://www.caryinstitute.org/sites/default/files/public/downloads/curriculum-project/5_5_Streams_pervious_surfaces.pdf

History of Stormwater Management

Pre 1980: Stormwater infrastructure primarily to address flooding (water quantity)

1980s: State and federal regulations begin to address water quality

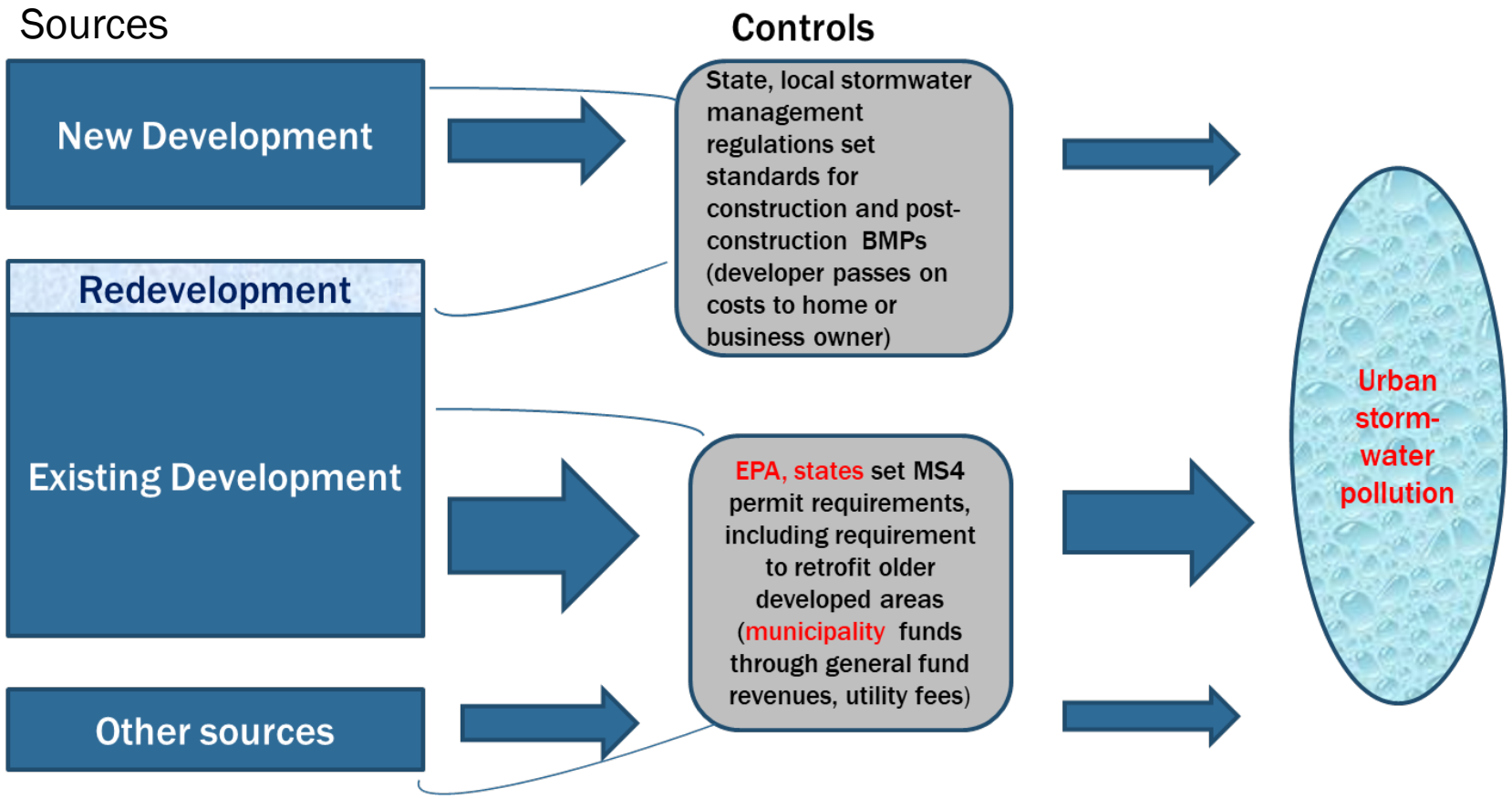
- 1983 – first MD regulations addressing stormwater management of new construction
- 1987 – Federal Water Quality Act extends NPDES permitting to stormwater
- 1988 – Chesapeake Bay Protection Act passage in VA

1990 – 2010: Increasing focus on water quality

- Federal/state Phase I and Phase MS4 permit programs
- MD, VA, DC regulations for new and re-development

Post 2010: Increased focus on nutrient and sediment reductions driven by Bay TMDL; renewed focus on water quantity driven by increased frequency and magnitude of flooding

Responsibility for Managing Stormwater Ultimately Rests with Local Governments



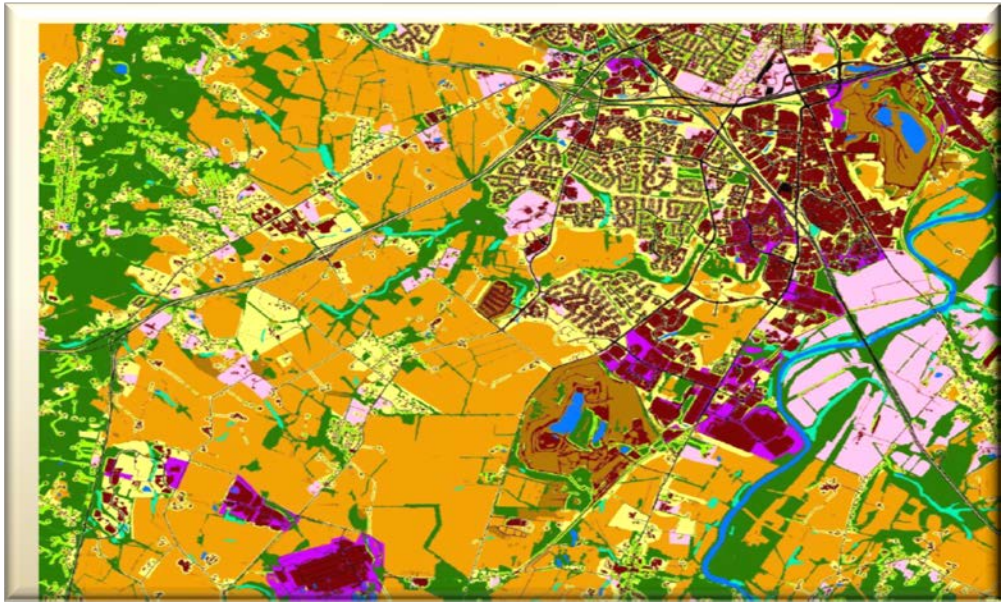
Source: COG

A Changing Landscape

Chesapeake Bay Program's land use forecast is estimating 223,000 new acres of developed land between 2017 and 2025, to include significant increase in impervious surface

Estimated Land Use Change in Chesapeake Bay Watershed, 2017 - 2025

State	DEV	NAT	AG
DC	198	(198)	-
DE	7,270	(2,159)	(5,111)
MD	31,126	(20,079)	(11,047)
NY	57	(40)	(17)
PA	44,853	(19,812)	(25,041)
VA	132,238	(95,818)	(36,421)
WV	7,318	(3,502)	(3,816)
Total	223,060	(141,607)	(81,453)

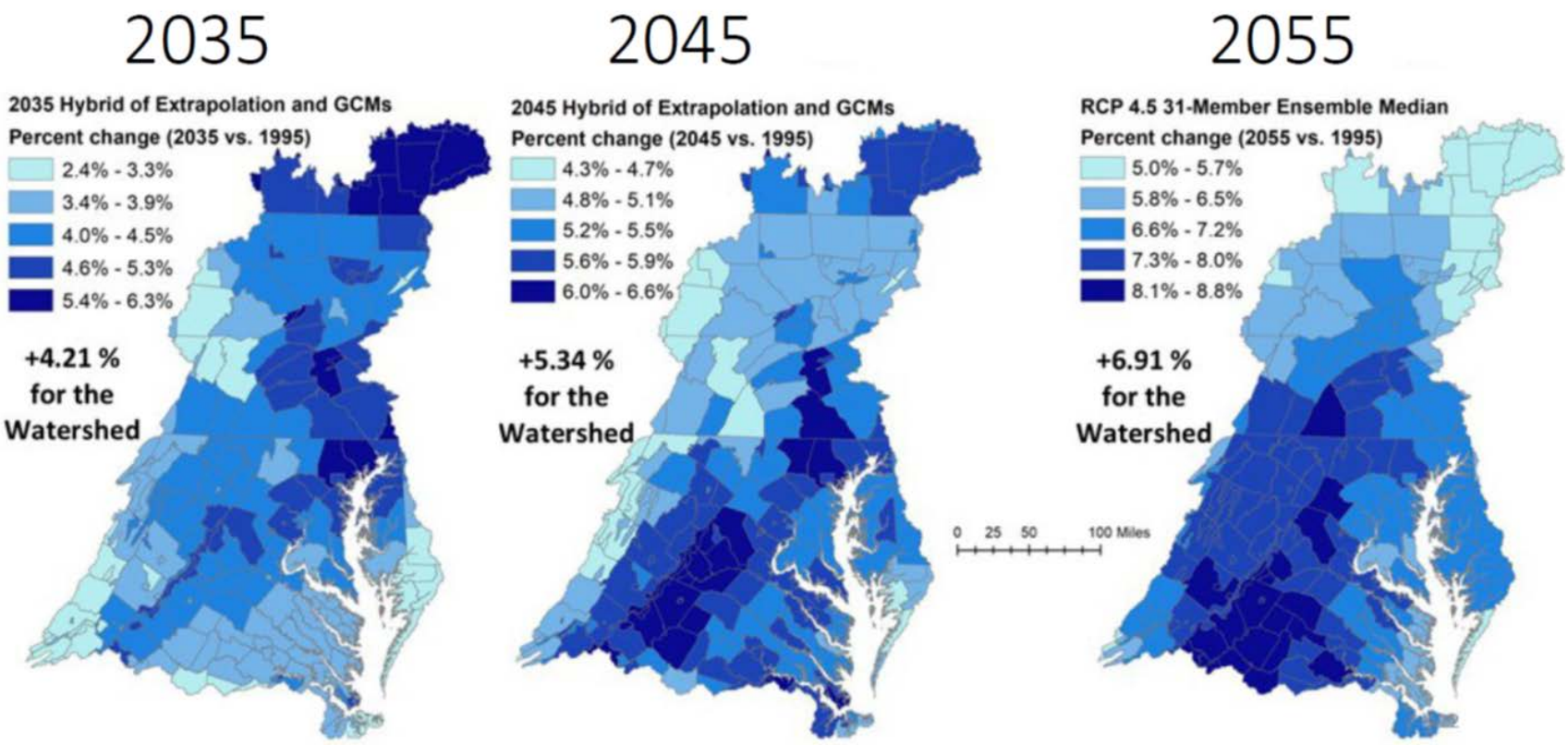


Source: Chesapeake Bay Program Land Use Workgroup
https://www.chesapeakebay.net/channel_files/40180/luwg_milestonelanduse_110619.pdf

A Changing Climate

Bay Program modeling accounts for both overall increase in precipitation and increase in highest intensity storms

Precipitation



Source: Chesapeake Bay Program Modeling Workgroup
https://www.chesapeakebay.net/channel_files/38277/2019_07_16_1040_mwg_climate_topics_-_gshenk.pdf

Infrastructure

Source: Tom Schueler, Chesapeake Stormwater Network

Gray?

Or Both?

Source: Brian Clevenger, MDE

Green?

Are climate resiliency, flooding concerns best addressed through small-scale infiltration practices or a return to larger-scale hydrologic retention practices?

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