



**Storm Water Management and Climate Change:
Issues, Challenges, Adaptations, and Future Needs**

THE INTEGRATION OF STORMWATER MANAGEMENT, ECOLOGICAL UPLIFT, AND RESILIENCY

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The GreenVest Team.

- Prince George's County Based, Certified Small Business
- Ecologists, Biologists, Environmental Scientists, and Real Estate Professionals
- Full Delivery Business Model:
 - Land/Financial Acquisition
 - Design and Permitting
 - Construction Management
 - Maintenance and Monitoring
 - Long-term Management Endowment
- Holistic Approach to Improve Ecological Assets through Nature Based Solutions.
 - Water Quality Improvement Projects
 - Stream and Wetland Mitigation, Restoration, Enhancement
 - Coastal Resiliency and Sustainability

WHY ARE WE HERE?

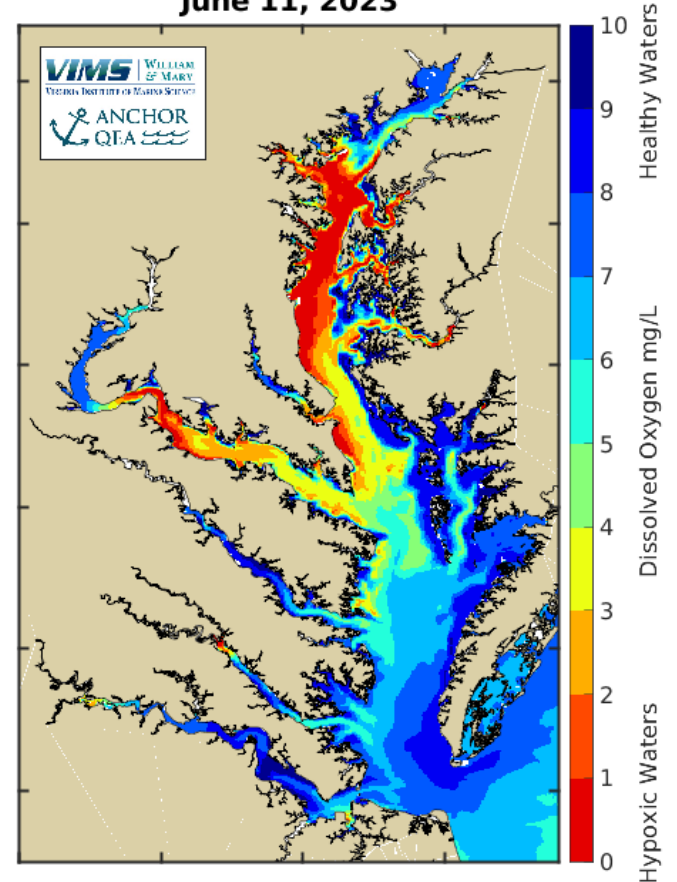


- Largest estuary in the United States
- 3600+ species (including us)
- Produces ~ 500 M lbs of seafood annually
- Economic benefits ~\$33 B/year
- Clean air/water regs cost range from \$26 to \$29 B/yr
- **Environmental benefits range from \$82 to \$533 B/yr**

WE CAN ALL AGREE



**Bottom Oxygen: Nowcast
June 11, 2023**

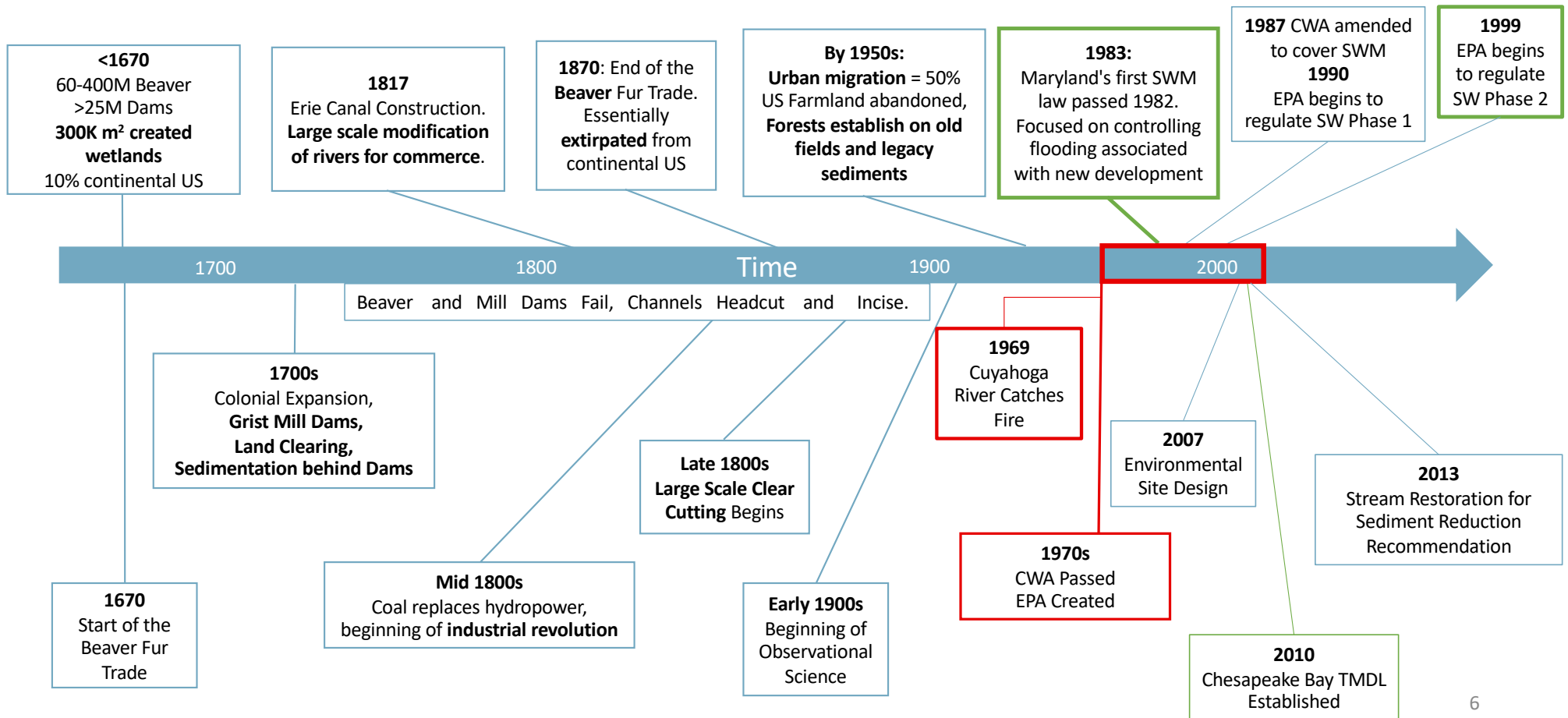


WHO'S TO BLAME?



Colorado Historical Society

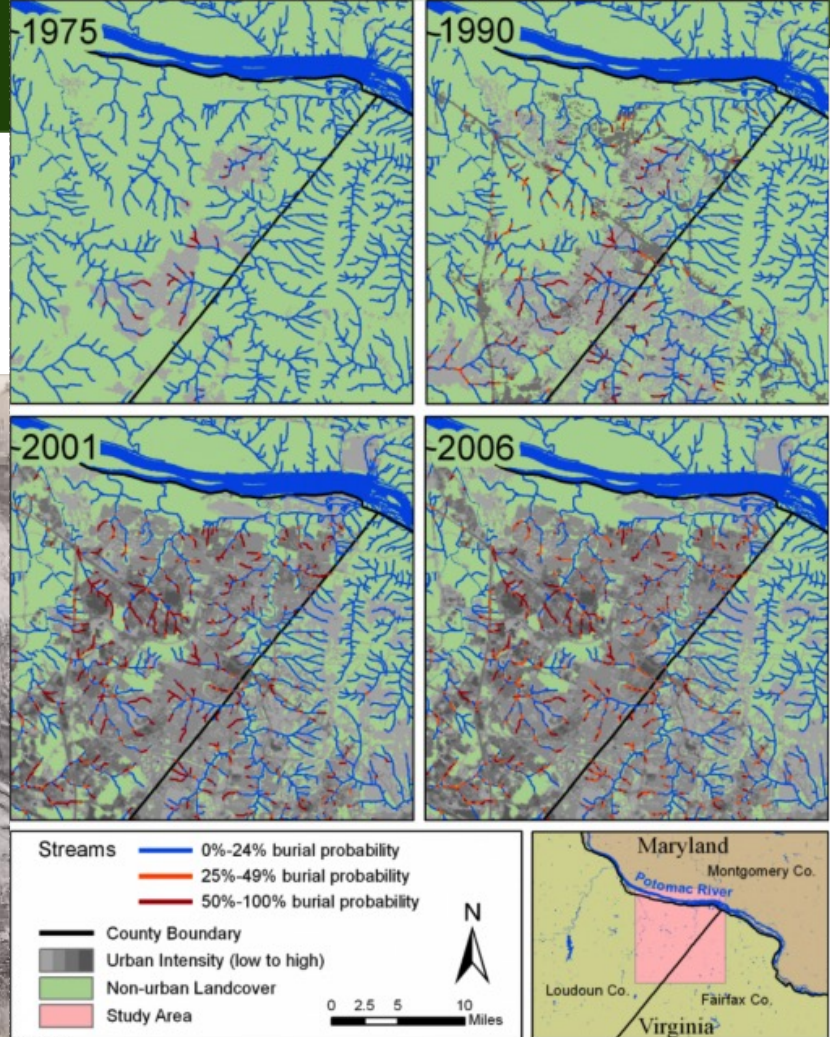
TIMELINE OF SELECTED WATER QUALITY MILESTONES



LEGACY OF ABUSE AND DEGRADATION



Photo credit: Baltimore DPW Archives and Ronald Parks



LEGACY OF ABUSE AND DEGRADATION



Walt Kelly

“THE SIGNIFICANT **PROBLEMS** WE HAVE **CANNOT** BE SOLVED AT THE SAME LEVEL OF THINKING WITH WHICH WE CREATED THEM.”

*-Albert Einstein
14th March 1959*

THE CLEAN WATER ACT

33 U.S.C. §1251 et seq. (1972)

- Structure to **regulate pollutants and water quality standards**.
- Unlawful to discharge any pollutant from a point source without a permit.

- **Section 402** National Pollutant Discharge Elimination System (NPDES)
 - **Discharge wastewater or stormwater** from a point source into a surface water.
 - All *NPDES permits* are written to ensure the Nation's receiving waters will achieve specified *Water Quality Standards (WQS)*. – ***Allows for the regulation of stormwater.***

- **Section 404** regulates **discharge of dredged or fill material** into waters of the United States, including wetlands. – *Allows development within WUS and requires mitigation to offset impacts*

THE CLEAN WATER ACT

Section 402, NPDES Program established Municipal Separate Storm Sewer System Discharge Permit Program (MS4)

In Maryland, EPA delegated NPDES authority (including the MS4 permit program) to the MDE

MS4 Program Goals

Restore and maintain the chemical, physical, and biological integrity of the nation's waters.

- Prohibit pollutants in stormwater and unauthorized discharges to the MS4,
- Reduce stormwater pollution to meet water quality goals established through Total Maximum Daily Loads (TMDLs),
- Restore poor quality streams by reducing pollutant loads, and
- Other activities to help meet water quality protection goals.
 - Reduce trash and litter county-wide.
 - Develop and implement public outreach and education programs that focus on reducing stormwater pollution and litter,
 - Conduct preventive maintenance inspections of all Stormwater management facilities,
 - Implement laws and programs to reduce stormwater and pollution

MUCH REMAINS TO BE DONE

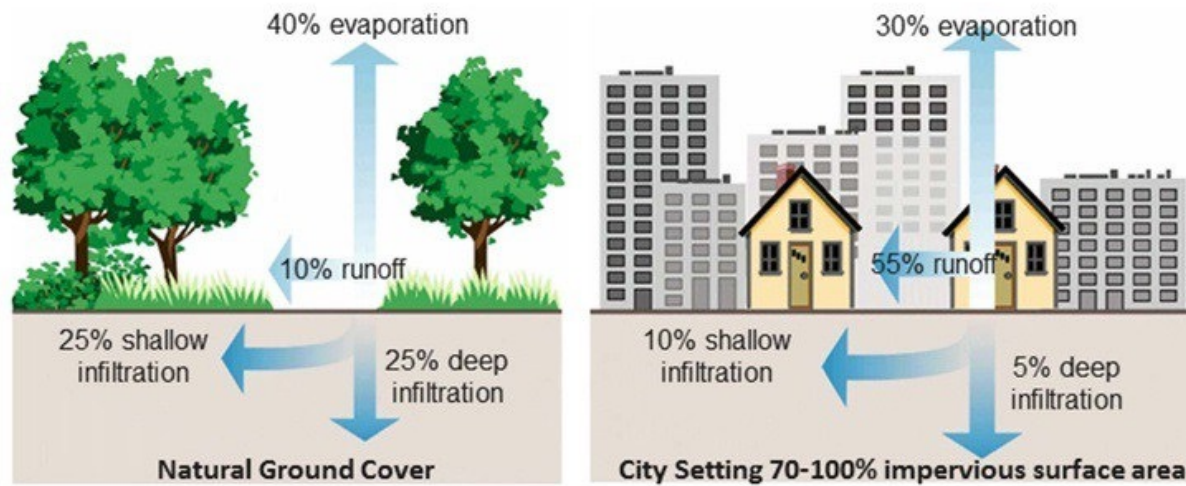


Philippe (1962) Richard



THE FIX IS NOT AS EASY AS IT MAY SEEM

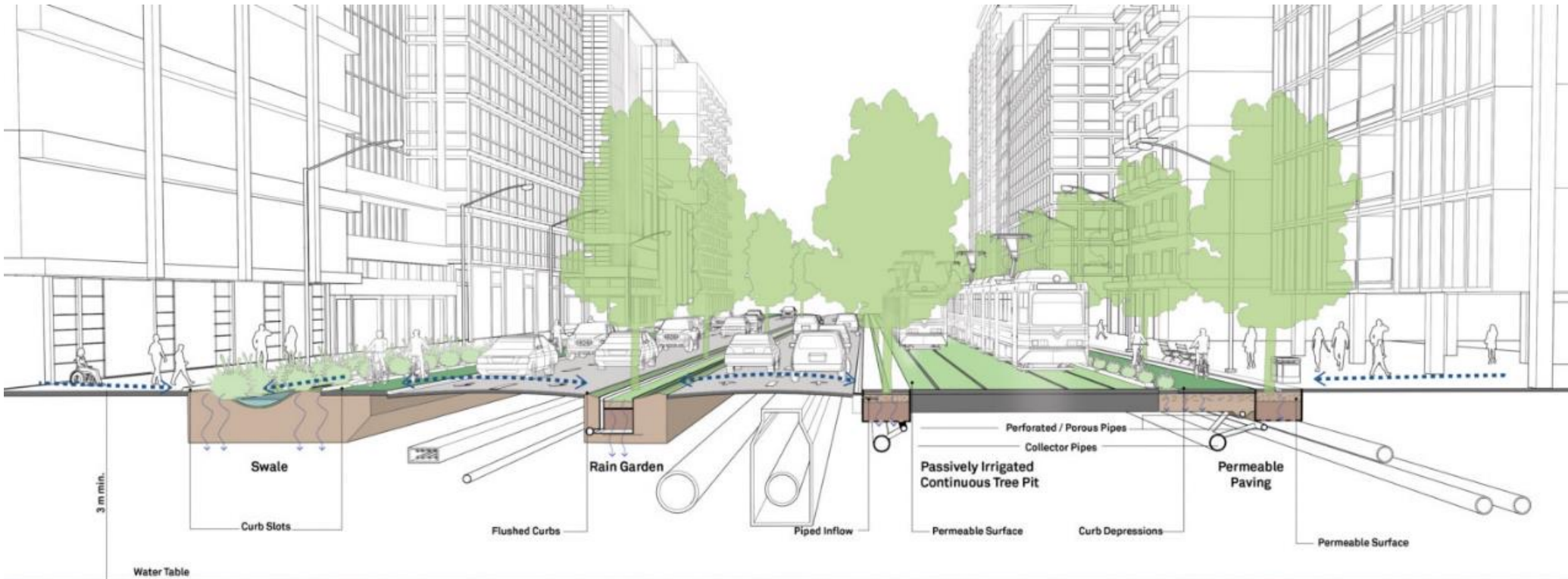
NATURAL vs. URBAN STORMWATER DRAINAGE



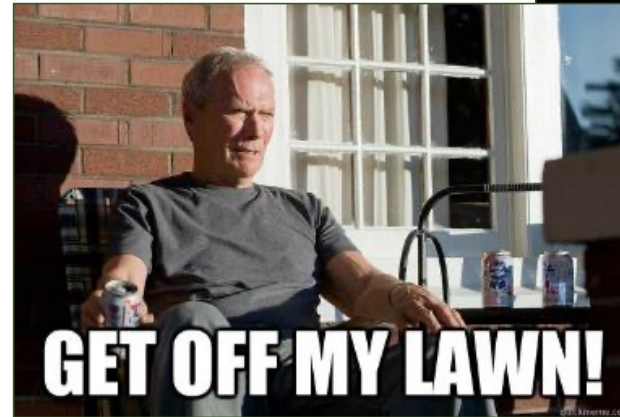
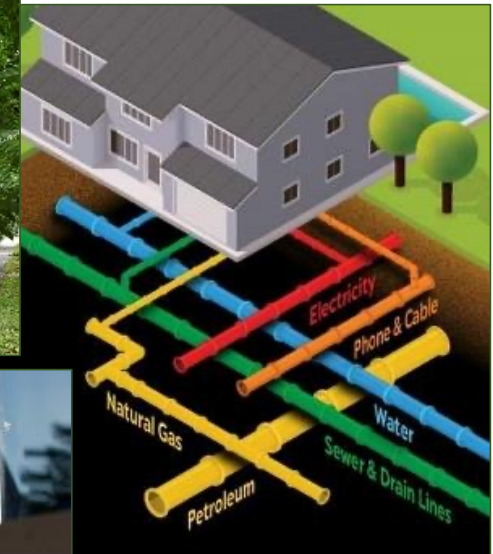
Stormwater infiltrates into the ground
Plants and trees work to absorb stormwater

Water hits impervious surface and runs off roofs, streets, parking lots etc.
Runoff goes into the sewers

THE FIX MAY NOT BE AS EASY AS IT MAY SEEM



ESTABLISHED NEIGHBORHOODS, DIFFERING OPINIONS, UTILITIES



WHAT CAN WE AGREE ON?



<https://www.flickr.com/photos/jacobkrejci/488591489/in/set-72157601822202309>



CHALLENGE: THINK BIGGER, HARDER, MORE CRITICALLY

Think Bigger



Identify degraded ecosystems with potential for ecological uplift.

- Find the cause of impairment
- Find (multiple) stakeholders, common ground, funding sources
- Identify co-benefits
- Avoid band aid fixes

Think Critically



- Does this make sense?
- Will it address the problem(s)?
- What problem WILL be addressed?
- What **choices** must be made?
 - Other resource impacts?
 - Jurisdictional challenges
 - Egos/Turf

Nature-Based Solutions



- Ecological processes over maintenance-intensive artificial systems.
- Multiple functions and benefits.
- Look for projects that make communities healthier, stronger, more resilient.

EXAMPLE PROJECT



Maryland
Department of
the Environment



MARYLAND DEPARTMENT
OF TRANSPORTATION

STATE HIGHWAY
ADMINISTRATION



EXAMPLE PROJECT





QUESTIONS & DISCUSSION

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