Phantom Phosphate

Nightmare Nitrate

Spooky Sediment

(Un)Dead Zones

Terrifying Thermal Pollution

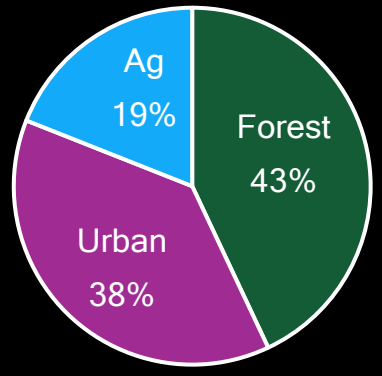
Threats to the Swan Creek Watershed

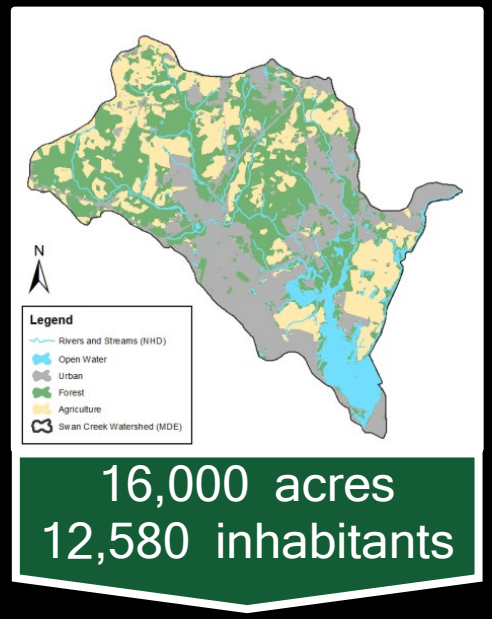
NONPOINT NINJAS *present...*

POLLUTION BUSTERS

Auna Walker, Community Coordinator • Bailey Carlevale-Cochran, Technical Talker
Samantha Hawk, Point Professional • Nina Field, Rural Reformer • Emma Konopacki, Urban Unifier

Character of Swan Creek

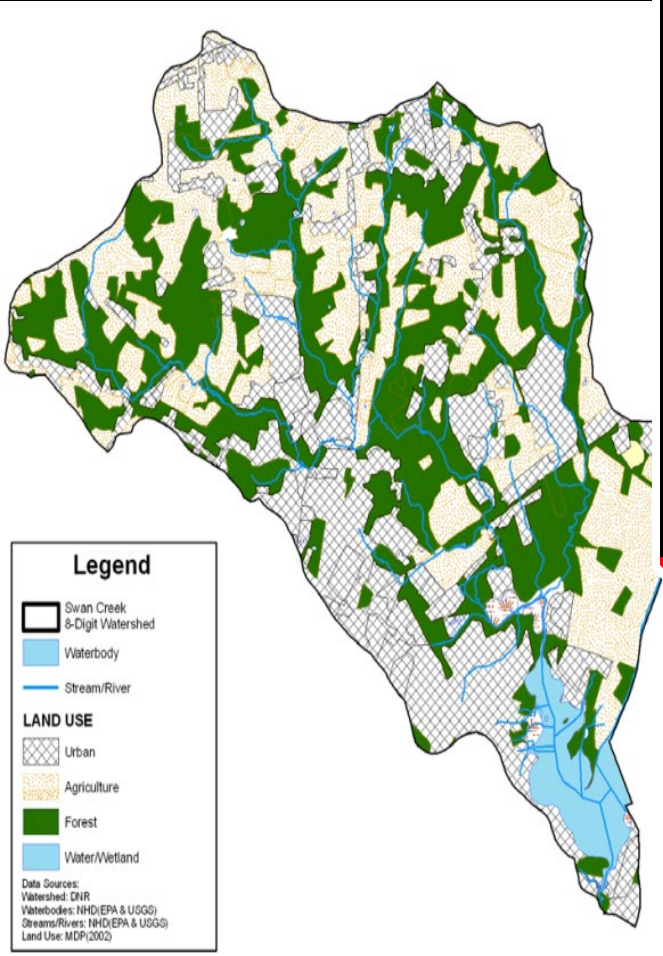


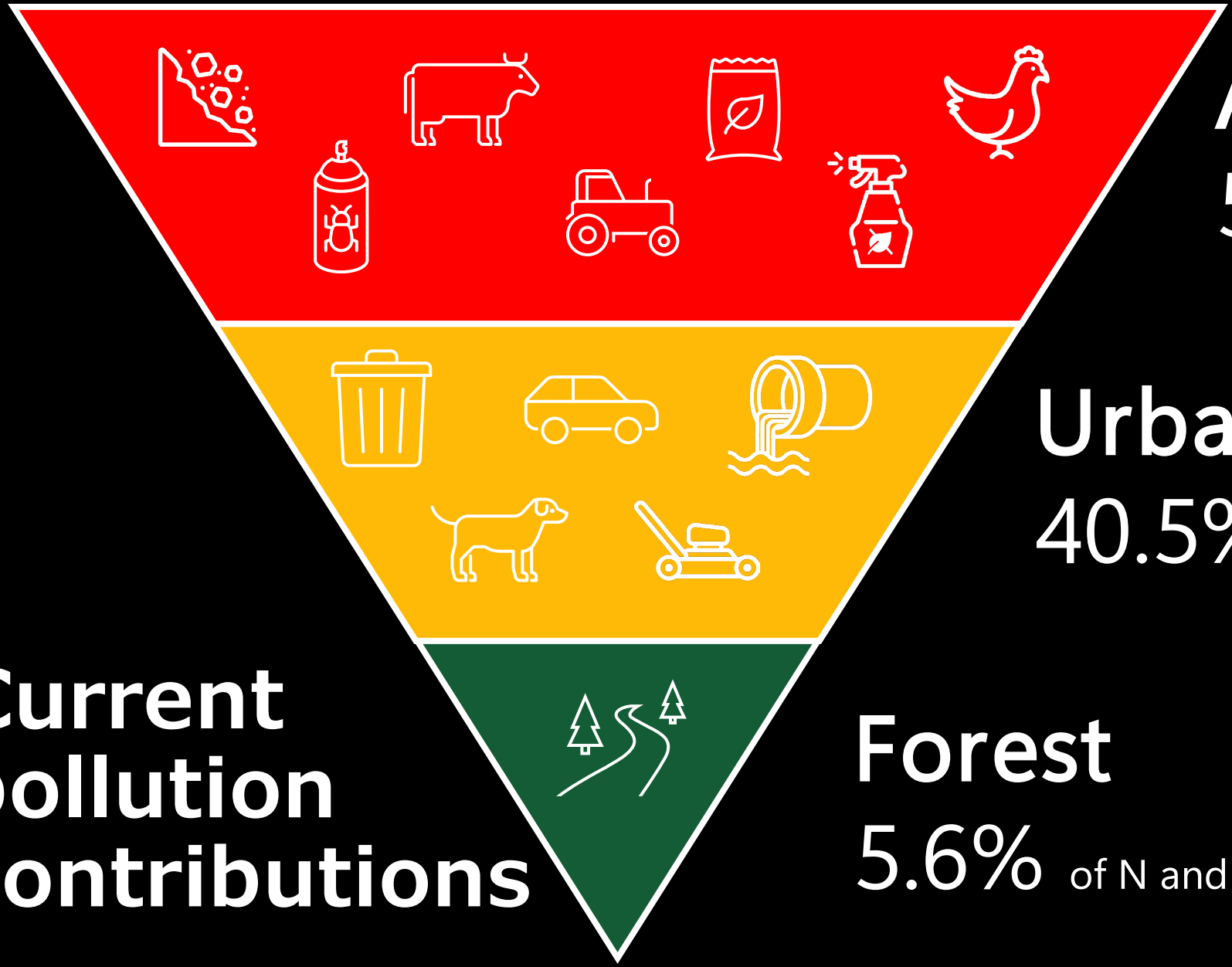


16,000 acres
12,580 inhabitants

- Development envelope
- Route 40 and Interstate 95
- Aberdeen, Bakerfield, Roye-Williams, and Swan Creek Schools
- Aberdeen Proving Ground
- Two golf courses & many county parks
- Ripken Stadium
- Rich indigenous and Underground Railroad history

State of the watershed





Current pollution contributions

Agriculture
53.9% of N and P

Urban/Suburban
40.5% of N and P

Forest
5.6% of N and P

Current BMPs

- Bioswales
- Bioretention ponds
- Street sweeping
- Crop rotation
- Stream Restoration
- Community engagement

Ecosystem status- Issues in the Watershed

Soils:

High levels of sedimentation

Loss of soil stability in riparian zones

Large amounts of runoff carrying nutrients and particulates

Aquatics:

Maryland department of environment (MDE) watershed implementation plan:

- Low dissolved oxygen

- Elevated pH, nutrients, suspended sediment

- Poor instream habitat structure

Wildlife:

Declining habitat diversity

Degraded fish index of biological integrity (FIBI)

Fragmented and degraded corridors for terrestrial species

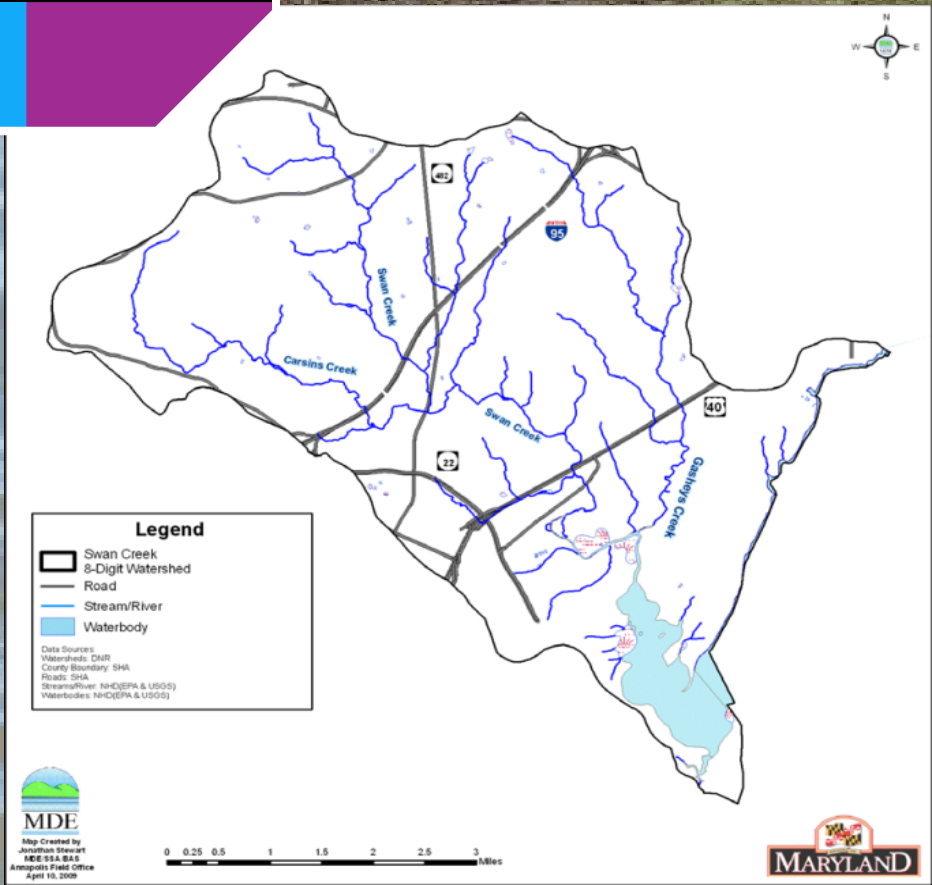
Forestry:

Decreased tree diversity and canopy complexity

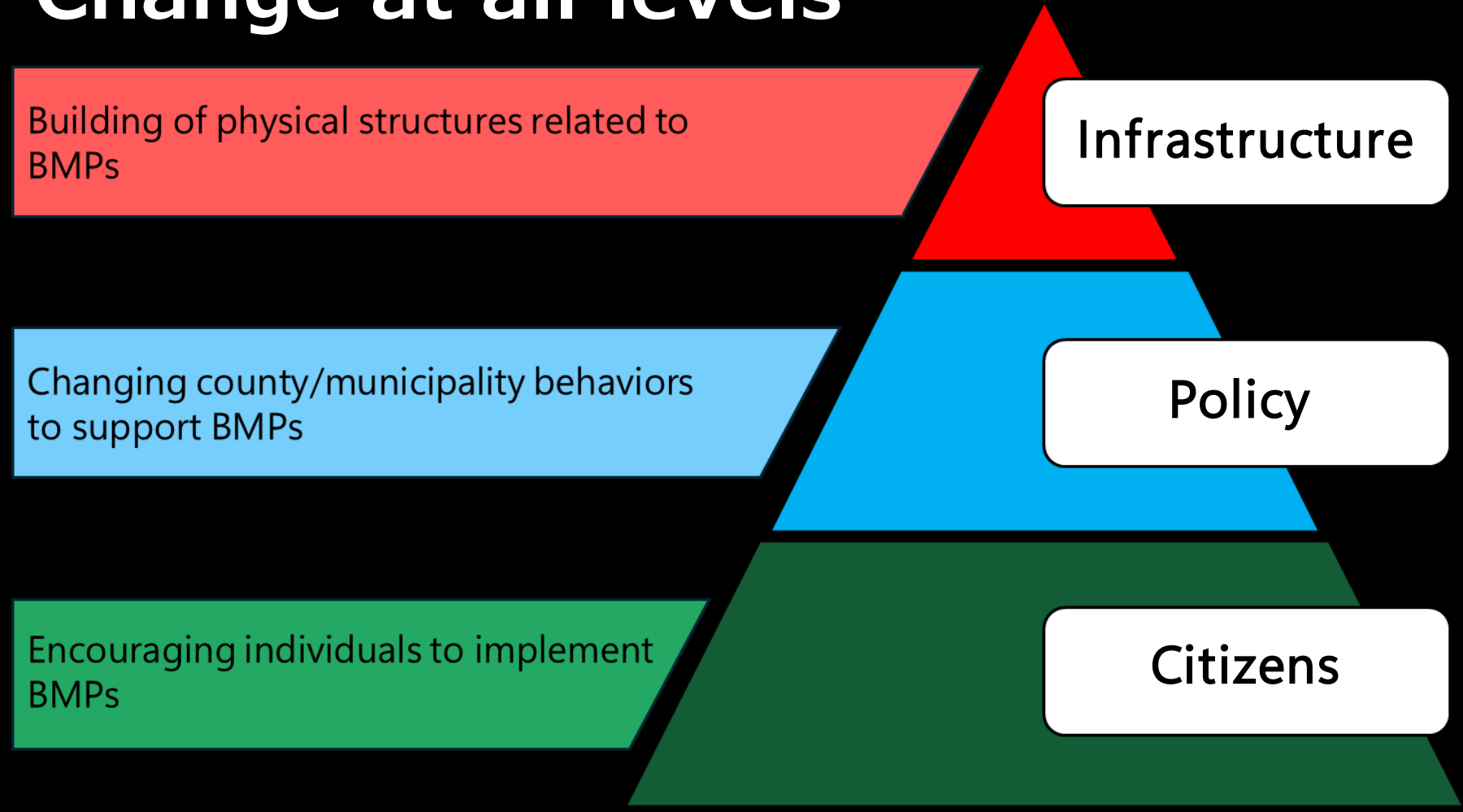
Fragmentation due to roads

Reduced forest resilience to disturbance

Solutions


Legend
Swan Creek 8-Digit Watershed
Road
Stream/River
Waterbody
Swan Creek
Carsins Creek
Gunpowder Creek
MDE
MARYLAND

The Paranormal Plan: Change at all levels

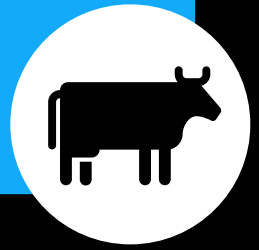


C

Agroforestry

Silvopasture

- Increased soil nutrients
- Reduced erosion
- Reduced heat stress to livestock
- Carbon sequestration



Alley cropping

- Reduced erosion
- Protection of crops from wind
- Increased soil moisture
- Protection from pests

Native forest products

- Diversified income
- Increased biodiversity
- Lower pesticide requirements
- Provide shade to crops or livestock

C

Reducing nutrient runoff on the farm

Managing Protein Supplementation

- Reduces Phosphate in animal waste
- Can reduce manure P by 30-35%

Phase Feeding to reduce waste

Phosphorus

Timing of fertilizer

- Corn's best timing is during the vegetive stage
- Risk of N loss is low from hip high to tasseling in corn

Nitrogen

Bioreactors

What is it?

Wood chip are buried in a trench on the edge of a field

Bacteria from chips converts agricultural tile drainage from nitrate to nitrogen gas

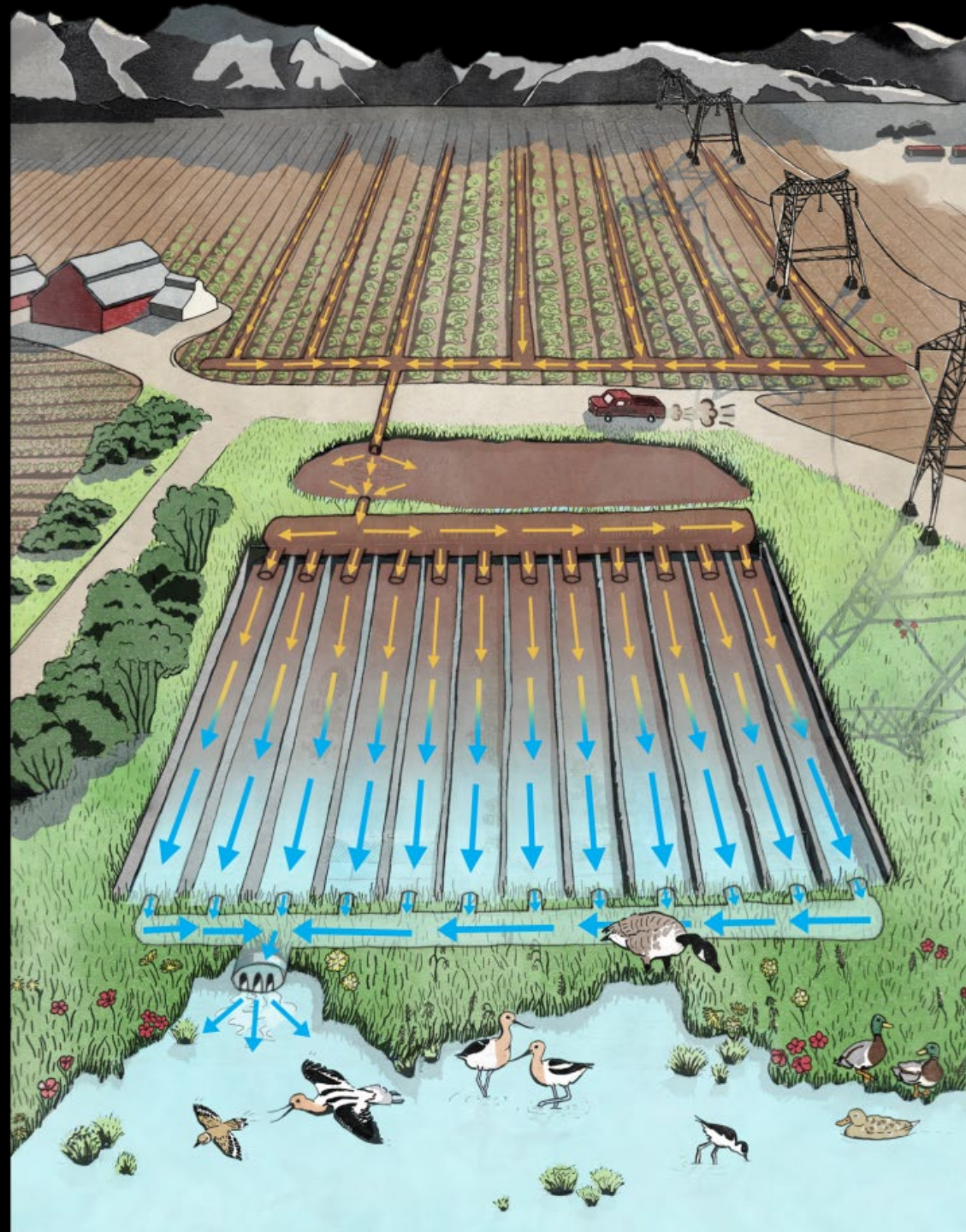
How does it help?

Removes nitrate before it enters waterways

Vegetation on bioreactor has habitat benefits

Doesn't impact in-field management

Little to no maintenance



Agriculture Finances and Legislation

	Costs	Grants/Funding	Profits/Benefits
Agroforestry	• Silvopasture: $171 per acre • Alley cropping: $202 per acre • Native Forest products: $120 per acre	• Expanding Agroforestry Project: 75% installation costs and/or $450 per acre incentive • Environmental Quality Incentives Program (EQIP)	• Sequesters 1.8 tons of carbon per acre per year • Reduce nitrate by 24-37% and erosion by 8-17% • Native fruits sell for $2-8 per pound
Reducing nutrient runoff from feed/ fertilizer	• $50-$150/farmer for education, technical assistance and incentives	• Maryland Agricultural Water Quality Cost-Share (MACS) Program: up to $300,000 per farm • Bay Restoration Fund (BRF): Up to 100% funding • Maryland Farmer Training	• Reduce Nitrogen by 57.3 pounds per acre per year • Reduced feed costs • Farmers are paid $15 per acre if plants absorb 60% of applied nitrogen
Bioreactors	• $8,000-$12,000	• Environmental Quality Incentives Program (EQIP) • Bioproduct Pilot Program: up to $5 million	• Remove 35-50% of nitrates from water

Important regulations:

- Maryland's Nutrient Management Program
- Clean Water Act (CWA) section 404
- CWA Section 303(d): TMDL "pollution diet"
- Watershed Implementation Plans

Living Shoreline

What is it?

Made from plants, sand, rock, and/or oyster shells

Protects coastline from erosion and sedimentation

Living Shoreline Protection Act of 2008, applies to private owners of shoreline.

How does it help?

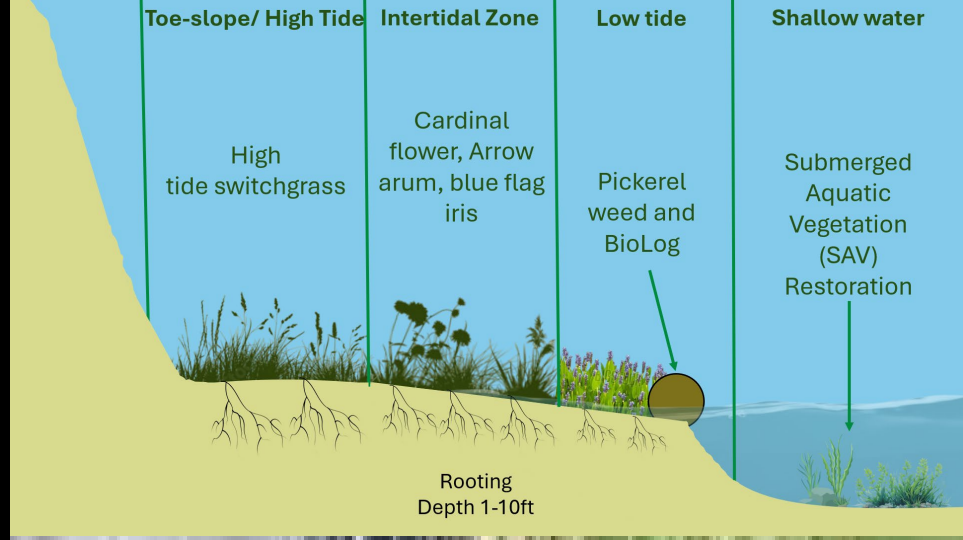
Purifies water

Buffers and cleans stormwater

Stores floodwater

Cost less than hardened shorelines which degrade over time

Stabilizes soil



Costs	Grants	Profits
$300 per linear foot	MDNR Shoreline Erosion Loan Program: 0% interest loans Chesapeake Bay Trust Watershed Assistance Grant Program: Up to $150,000	6.03 benefit to cost ratio

Havre de Grace Great Green Festival

- Time:
  - Takes place during the summer months
- Includes:
  - Rain barrel usage
  - Seed ball station
  - Making birdhouses
  - Sustainable gardening classes
  - Sponsored events

C Other Community Events

SAV Splash

- Planting native submerged aquatic vegetation that are resilient to current problems in Swan Creek.

Earth Day

- Providing additional workshops at Aberdeen Earth Day Festival.

Bayscaping Class

- Encouraging Bay-friendly landscaping with master gardeners leading the way.

Urban BMPs

Permeable pavements in neighborhoods

- Reduce ice/ flooding on roads
- Infiltrate ground underneath

Cool pavements and roofs

- Light colored materials/ painted roads
- Reduces light absorption, cooling water down

Rain barrels

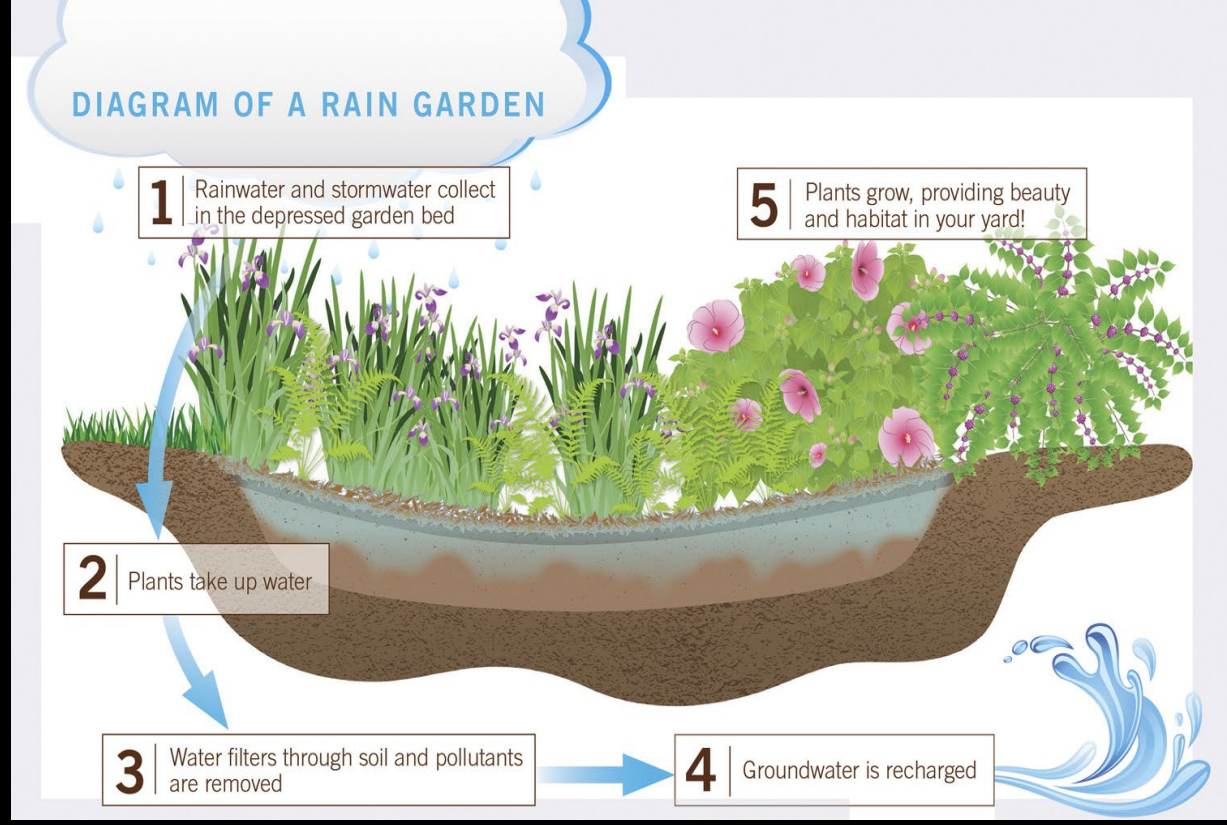
- Store and cool rainwater from spouts
- Reduce erosion and conserve water

GIS consultations

- Use of LiDAR
- Use of APG's environmental outreach

Planting at Home

- Rain Gardens/Bayscaping Workshops
- Green roof incentives
- Native wildflowers to replace lawns
- Diverse “grass-looking” plants
  - Switchgrass, Little Bluestem, Prairie Dropseed, Golden Groundsel, Butterfly Weed
- Low-mow zones
- Green mulch
  - Moss phlox, Christmas Fern, Pennsylvania Sedge

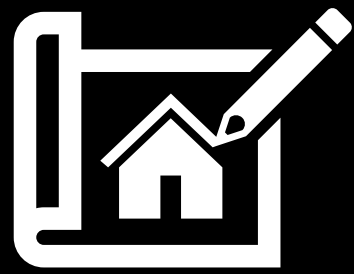


Urban Finances and Legislation

	Costs	Grants/Funding	Profits/Benefits
Permeable pavements	$12 per square ft	Rain Check Rebate Program: Up to $6,000	Reduce runoff by 98%
Cool pavements & roofs	$4-$20 per square yd	Inflation Reduction Act (IRA): $2-$3 billion	Reduce building temperatures by 30%
Rain barrels	$60 for barrel $100 for installation	Chesapeake Bay Trust Outreach and Restoration Grant Program: Up to $150,000	Reduce nitrate and phosphorus entering waterways by 10%
GIS Consultation	$100,000 annual salary	APG Environmental Outreach Maryland Sea Grant	Community Environmental Stewardship

Important regulations:

- Critical Area Act
- Maryland Stormwater Management Act of 2007
- CWA Section 303(d): TMDL "pollution diet"
- Watershed Implementation Plans



Looking Forwards

Ecosystem revisited- Impact Assessment

Soils:

Reduced erosion:

- 80% less sediment escaping soils

Decreased nutrient load:

- 50% less P and 75% less NO3 not being absorbed by plants

Aquatics:

Cooler stormwater temperatures, increasing DO

Reduced nutrients and sediments:

- less sediment infiltrating water
- Less Nitrate and Phosphorous that could lead to eutrophication

Wildlife:

Enhanced habitat quality through increased vegetation and green infrastructure

Decreased wildlife fragmentation and support native species

Forestry:

Increased species diversity and abundance

Stronger forest resilience

More protection from flooding and intense storm events

Watershed Resilience in a Changing Climate

7 Inch Sea Level Rise	Revitalize shorelines
0.7-0.9° F Temperature Increase	Focus on temperature-reducing BMPs

MEMA Hazard Mitigation Plan:

Medium High coastal hazard risk High drought and flood hazard risk	Restore streams and riparian buffers Conserve water

POLLUTION BUSTERS

Thank you!