

Adapting to a Warming World

Personal and Community actions for Climate Resiliency



Haverford Township

Environmental Advisory Committee



WHAT IS Climate Resiliency?

Mitigation - reduce the warming

Adaptation - adjusting to the impacts

(Spoiler alert) Conclusion:

Mitigate as fast as you can

Adapt to expected impacts



Impacts to Delaware County

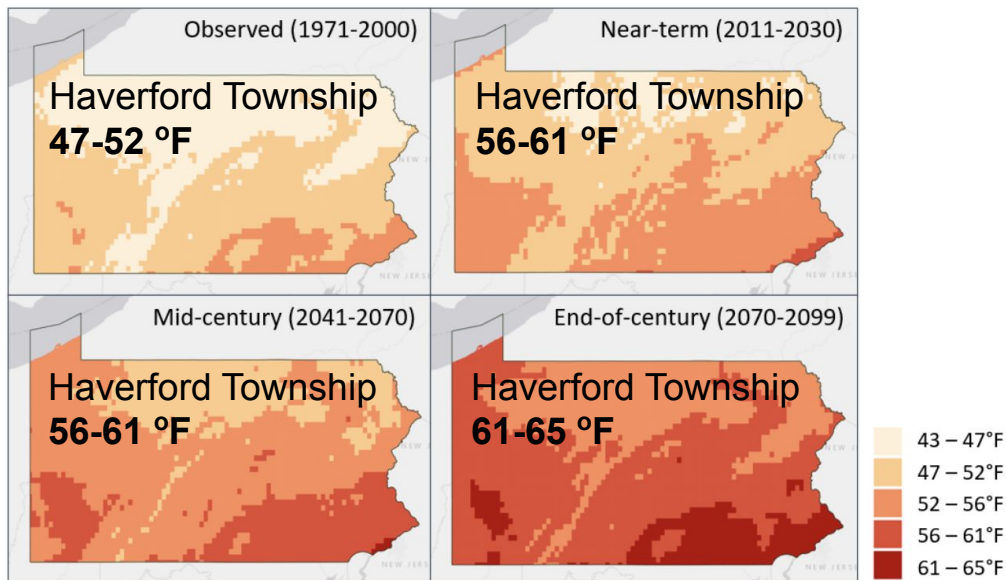
- *Increasing average temperature*
- *Heavy Precipitation and inland flooding*
- *Heat Waves*
- *Sea Level Rise and Coastal Flooding*
- *Health Impacts*
- *Ecosystems changes*
- *Economic Impacts*
- *Wildfire smoke*



Warmer and Wetter (PA DEP 2021 Climate Impact Assessment)

Our average yearly temperature is increasing

Annual Average Temperature (°F)



Pennsylvania's average precipitation is increasing

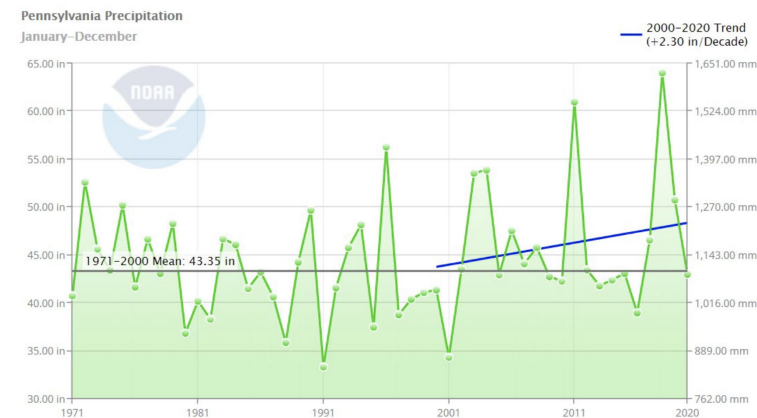


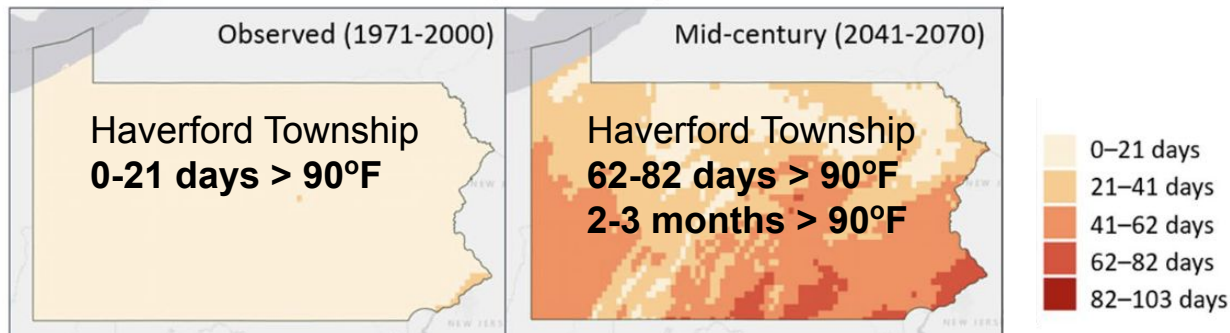
Figure 13. Annual precipitation in Pennsylvania 1971-2020

Source: National Centers for Environmental Information, Climate at a Glance- Statewide Time Series.



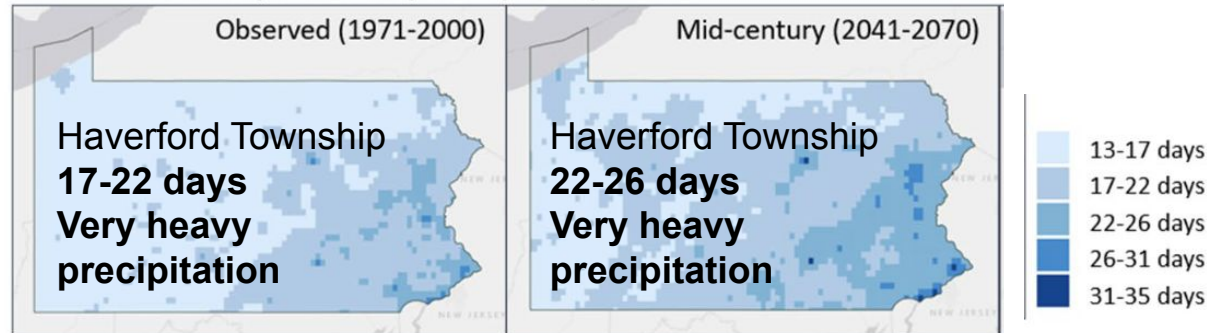
Extremes of Warmer and Wetter ([PA DEP 2021 Climate Impact Assessment](#))

Average Annual Number of Days with Temperatures >90°F



Heat Waves are especially dangerous for human health

Number of Days with Very Heavy Precipitation

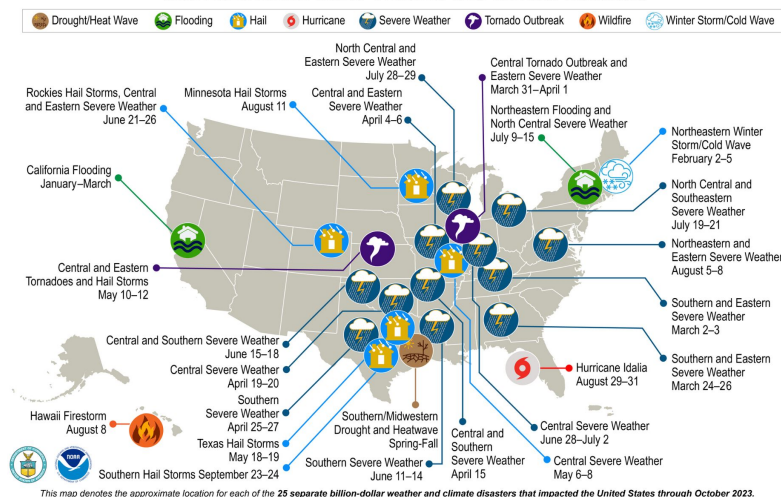


Very Heavy Precipitation can lead to localized flooding



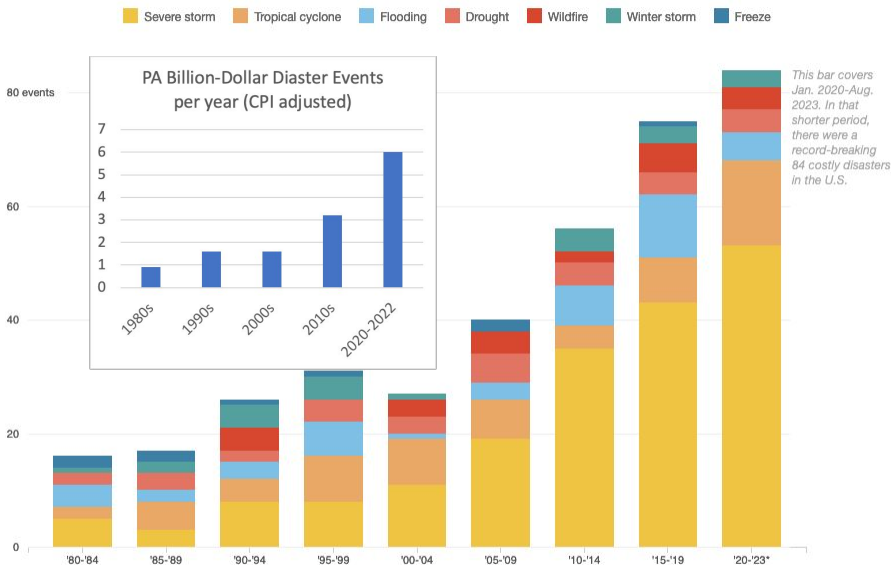
Increased Frequency and Intensity of Extreme Weather Events

U.S. 2023 Billion-Dollar Weather and Climate Disasters



Billion-dollar weather disasters are on the rise in the U.S.

In the 1980s, the U.S. experienced one (inflation-adjusted) billion-dollar disaster every four months on average. Now the country experiences one on average every three weeks.



Our main risk: Tropical Cyclones (tropical storms, tropical depression, hurricanes) and Nor'easters

<https://www.ncei.noaa.gov/access/billions/>, DOI: [10.25921/stkw-7w](https://doi.org/10.25921/stkw-7w)



Notes

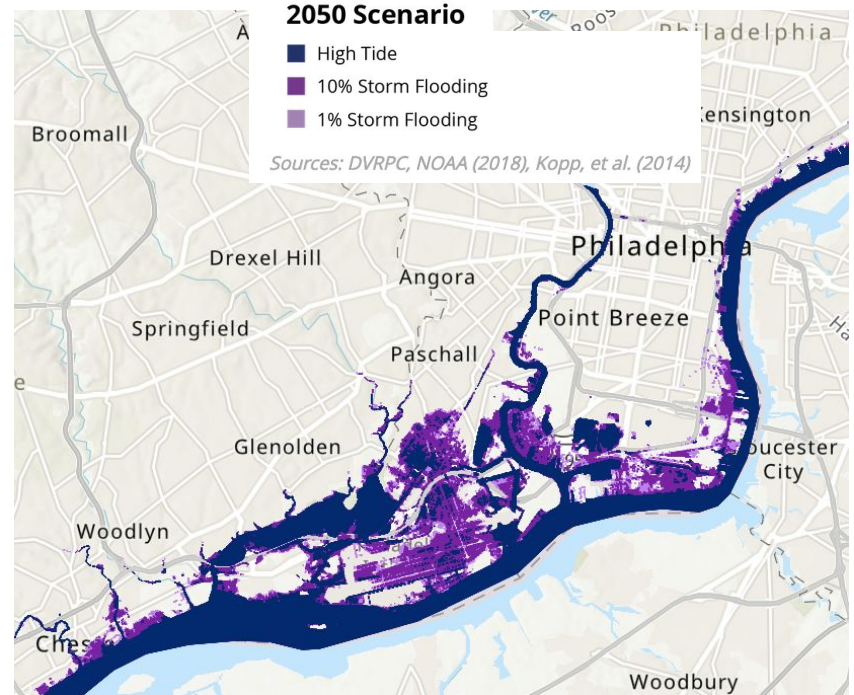
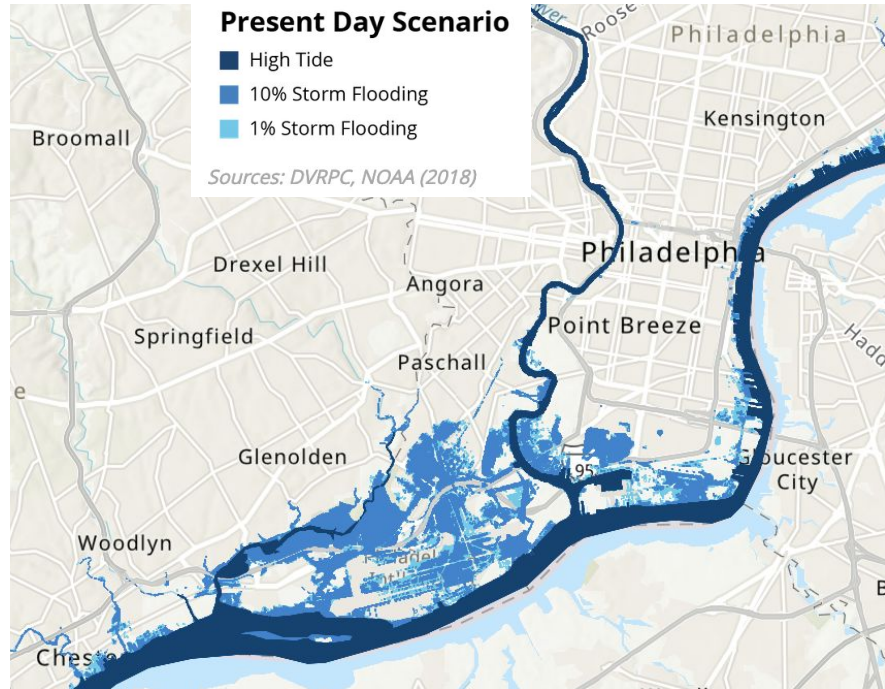
Dollar amounts are inflation-adjusted; these include insurance losses, FEMA assistance, fire suppression costs and estimates of uninsured losses. *2023 data includes January through August.

Source: NOAA's National Centers for Environmental Information

Credit: Brent Jones/NPR

Sea Level and Storm Impact

Coastal Effects of Climate Change in Southeastern PA, dvrpc



<https://dvrpcgis.maps.arcgis.com/apps/MapSeries/index.html?appid=8080c91a101d460a9a0246b90d4b4610>



Health Impacts



Air Pollution



Allergens and Pollen



Diseases Carried by
Vectors



Food and Waterborne
Diarrheal Disease



Food Security



Mental Health and Stress-
Related Disorders



Floods



Temperature Extremes



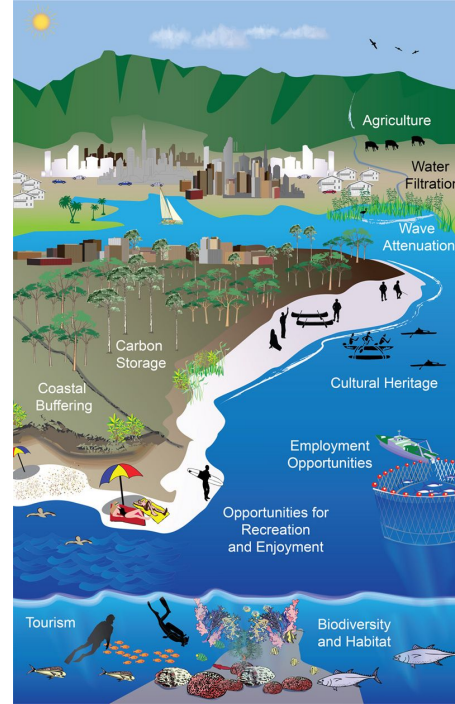
Wildfires



Changes to Ecosystems

- Our economy and culture continue to depend on natural ecosystem services for food, timber, clean water, and more.
- Species and ecosystems are experiencing significant and observable impacts from climate change. Local and global extinctions may occur when climate change outpaces the capacity of species to adapt to new conditions.
- Climate change is altering ecosystem productivity, exacerbating the spread of invasive species, and changing how species interact with each other and with their environment.

Darby Creek Community Science Monitoring Program



Economic Impacts

Direct Impacts

- Reduced Agricultural Productivity
- Increased Frequency of Extreme Weather Events
- Higher Energy Costs
- Public health impacts
- Ecosystem Disruption

Secondary Impacts

- Social unrest
- Higher Insurance premiums
- Increased inflation
- Strain on health care system



Some recent headlines

PENNSYLVANIA NEWS

Pennsylvania officials warn of flash flooding dangers

by: [James Wesser](#)

Posted: Sep 25, 2023 / 01:24 PM EDT

Updated: Sep 25, 2023 / 01:25 PM EDT

Torrential rains, flash flooding in Pennsylvania leave 5 dead, 2 children missing

BUSINESS

[Nation](#) Updated on Jul 16, 2023 6:37 PM EST — Published on Jul 16, 2023 6:05 PM

Nation at risk of winter blackouts as power grid remains under strain

Federal regulator warns much of the country faces an elevated threat of outages in the event of storms or prolonged cold snaps

We have the power to make a difference!

Mitigation: 45% of US emissions are controlled by citizens



calculations by Joy Baxter for average PA households data from eia.gov

Adaptation: We can adapt and prepare



Personal Resiliency Strategies - Energy/Economic

Mitigation/Adaptation

- Energy audit / efficiency
- Solar PV on roof (if you can)
- Electrify (including heating - Cold Climate heat pumps or geothermal)
- Plant shade trees

Adaptation

- Home generator or battery system
- Ceiling Fans or High-efficiency AC



Personal Resiliency Strategies - Water

Adaptation/Mitigation

- Rain gardens
- Water conservation

What we do affects
our local downstream
neighbors!

Adaptation

- House gutter condition/ size
- Sump systems
- Rain barrels
- Permeable pavement



Personal Resiliency Strategies - Transport

Mitigation / Adaptation

- Electric Car
- Bike / Electric Bike
- Public Transportation
- Walking!



Personal Resiliency Strategies - More..

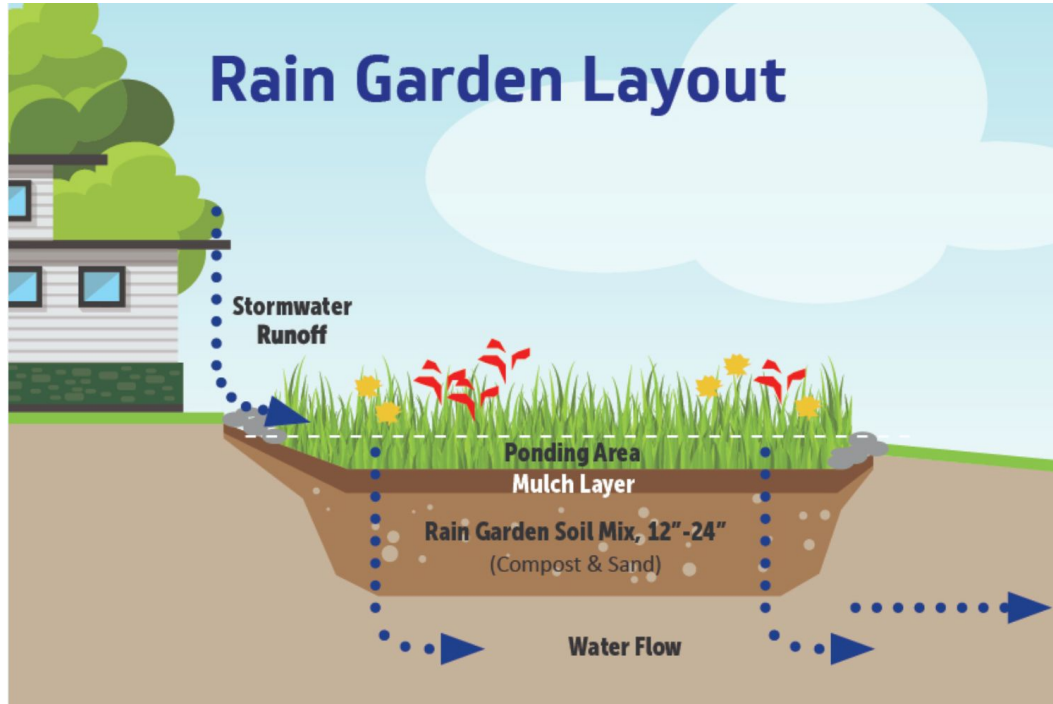
- Grow some food at home
- Emergency Preparedness
- Know who in your neighborhood might be at risk in a Heat wave
- HEPA filter in home



Community Resiliency Strategies

Rain Garden

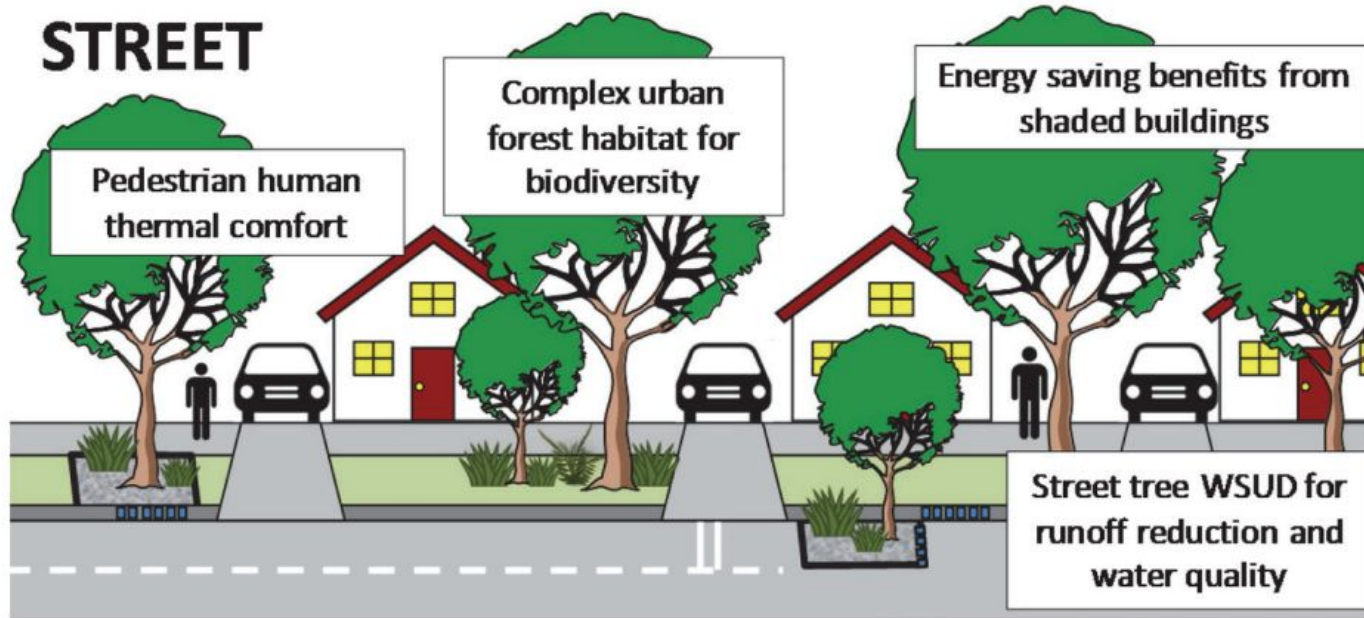
havaraingarden@gmail.com



Community Resiliency Strategies

Urban Forestry

Can reduce air temp by up to 10F or surface temp by 20 to 45F.

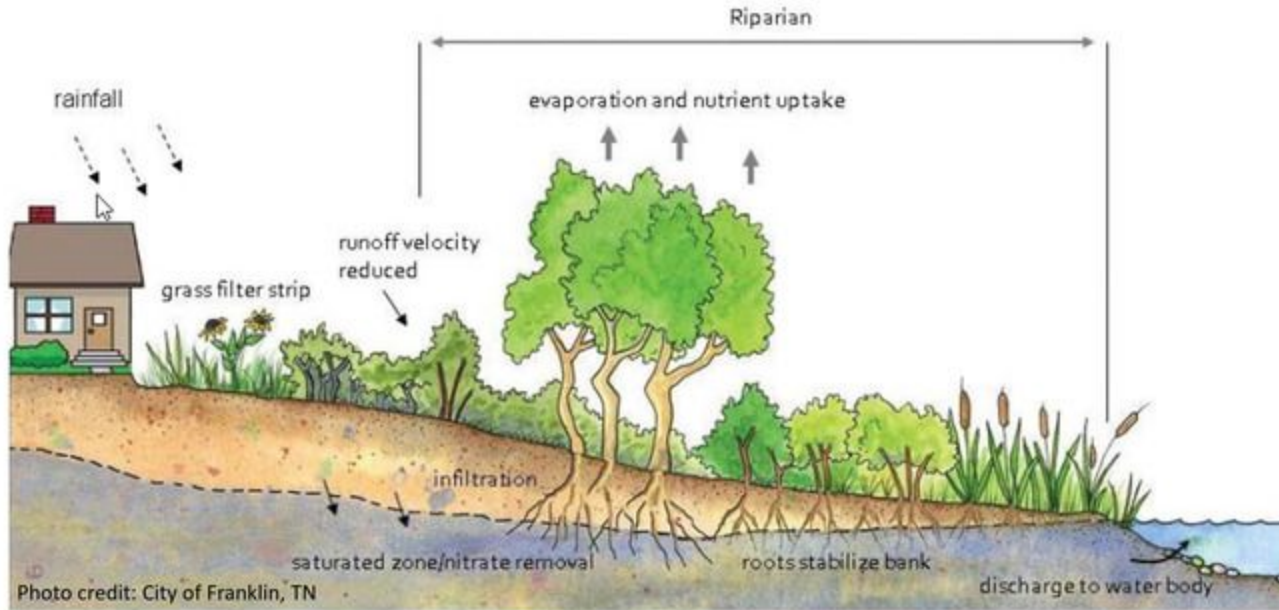


WSUD = Water Sensitive Urban Design



Community Resiliency Strategies

Riparian Buffer and Wetland Rehabilitation



More Community Resiliency Strategies

- Infrastructure upgrades
 - Municipal stormwater upgrades
 - Sidewalks and Bike lanes
- Riparian buffer repair
- Cooling centers (FEMA ranks our heat wave community resilience at very high)
- Community response plans
- Social support networks



Ongoing Local Resilience programs

- PECO Energy Audits
- Solarize DelCo
- Shade Tree Commission
- Hav-a-rain garden (100 gardens in 10 years, need replacement of key volunteers to keep this going)
- Riparian Buffer repair/ tree planting (through township, volunteers welcome, DCVA)
- Rain barrel workshops (PRC, some available through township)
- Backyard composting
- EAC workshops: Heat Pumps, EVs, Solar, Permeable Pavement, Composting



Resources

<https://haverfordclimateaction.org/>

<https://www.dep.pa.gov/Citizens/climate/Pages/PA-Climate-Action-Plan.aspx>

<https://www.ready.pa.gov/BeInformed/Know-The-Threats/Pages/Extreme-Heat.aspx>

[PA DEP 2021 Climate Impact Assessment](#)



Conclusion

Mitigate as fast as you can
Adapt to expected impacts



Questions ? ? ? ?





FEMA

BUILDING COMMUNITY RESILIENCE WITH NATURE-BASED SOLUTIONS

A GUIDE FOR LOCAL COMMUNITIES

LEVERAGING NATURE-BASED SOLUTIONS IN AN ERA OF CLIMATE CHANGE

- **WATERSHED OR LANDSCAPE SCALE:** Interconnected systems of natural areas and open space. These are large-scale practices that require long-term planning and coordination.
- **NEIGHBORHOOD OR SITE SCALE:** Distributed stormwater management practices that manage rainwater where it falls. These practices can often be built into a site, corridor, or neighborhood without requiring additional space.
- **COASTAL AREAS:** Nature-based solutions that stabilize the shoreline, reducing erosion and buffering the coast from storm impacts. While many watershed and neighborhood-scale solutions work in coastal areas, these systems are designed to support coastal resilience.

https://www.fema.gov/sites/default/files/documents/fema_riskmanagement-nature-based-solutions-guide_2021.pdf



Neighborhood or Site Scale



Rain Gardens



Permeable Pavement



Vegetated Swales



Tree Canopy



Green Roofs



Tree Trenches



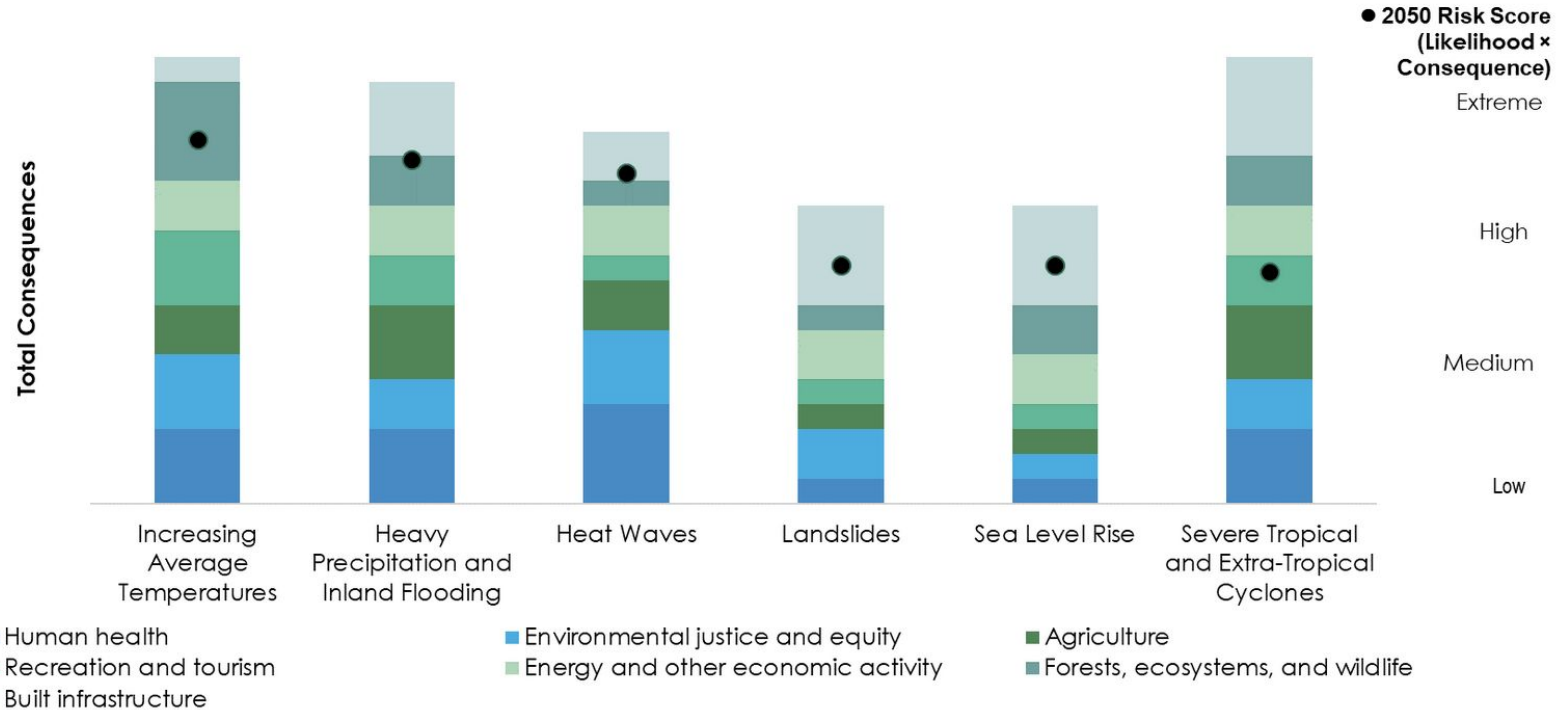
Rainwater Harvesting



Green Streets



2021 Climate Change Impacts Assessment, PA DEP



<https://www.dep.pa.gov/Citizens/climate/Pages/impacts.aspx>



<https://www.ready.pa.gov/BeInformed/Know-The-Threats/Pages/Extreme-Heat.aspx>

