

City of Baltimore

Climate Change Implementation

May 20, 2014

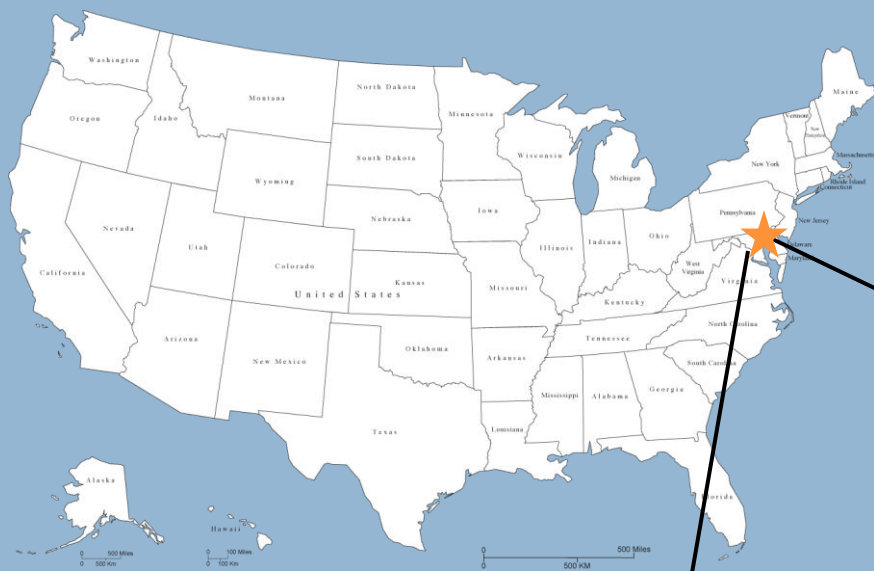
Kristin Baja

Climate and Resilience Planner

City of Baltimore, Office of Sustainability



1. **Baltimore City**
2. **Disaster Preparedness Project and Plan (DP3)**
3. **Implementation – Getting Started**
4. **Key Strategies- layers and overlaps**
5. **Examples by Sector**
6. **Climate Communications**
7. **Connecting Planning to Response and Recovery**



Baltimore

Washington DC

Chesapeake Bay

Hazards in Baltimore



Coastal Storms

more severe

Floods

more extensive

Severe Thunderstorms

more severe

Wind

increase intensity

Winter Storms

less snow, more flooding

Extreme Heat/Drought

more severe and intense

Sea Level Rise

increased threat

Air Quality

lower quality and increase risk



Disaster Preparedness Project and Plan (DP3)

Baltimore's Unique Approach

All Hazard Mitigation Plan

(Current and Historical Hazards)

+

= Resilience

Climate Adaptation Plan

(Adapt to new and predicted climate conditions)



Process



Risk Assessment



Hazard Identification

- Hazard Identification
- Review Historical Impacts
- Conduct an Asset Inventory

Vulnerability Assessment

- Determine likelihood
- Determine economic, social, legal & environmental consequence

Impacts Assessment

- HAZUS Modeling
- Integrate projected climate conditions
- Identify weaknesses

Plan Development

- Vision, Goals, Strategies, Actions
- Prioritization
- Integration
- Plan for implementation & monitoring

Sectors + Sub-Sectors



Infrastructure

Energy

Liquid Gas

Communication

Transportation

Waterfront

Wastewater

Stormwater

Solid Waste

Policy

Buildings

City Codes

Structural

Non-Structural

Natural Systems

Urban Parks &
Forests

Water Supply
and
Management

Public Services

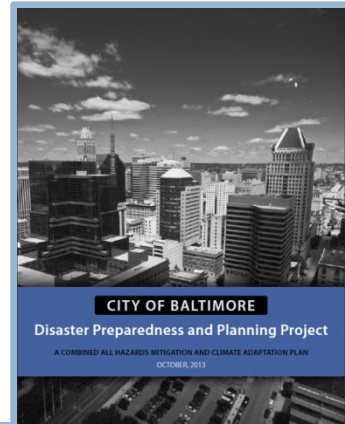
Emergency
Preparedness
& Response

Health

Education &
Outreach

Food System

Disaster Preparedness Plan



IN-15 Conduct an assessment that evaluates and improves all pipes' ability to withstand extreme heat and cold

Much of Baltimore's water system is dated and in need of upgrades. It is important to build extreme weather resilience and disaster prevention into water and wastewater systems by using both adaptation and mitigation actions. Additionally, structural and infrastructural upgrades must be made to reduce loss of water supply from the distribution system.



Baltimore Water Pipe

Source: BaltimoreSun

1. Replace old and malfunctioning pipes with new pipes or retrofit existing pipes with new lining

Pipes that have already begun experiencing problems, or older pipes which are more vulnerable to the impacts of hazards, should be upgraded using the best available technology.

2. Evaluate and utilize new technology that allows for greater flexibility in pipes as they are replaced

It is essential to prepare for future changes in hazard events and proactively upgrade pipe systems to prevent cracking and bursting.

IMPLEMENTATION GUIDELINES

Lead Agency	DPW
Stakeholders	DOT, DPW, Water and Wastewater Utilities
Alignment with Goals	Goal 3
Connection with Existing Efforts	
Timeframe	

STORMWATER

IN-16 Enhance and expand stormwater infrastructure and systems

Future changes in precipitation frequency and intensity may require reconsideration of the design of existing stormwater infrastructure systems.

Increase resiliency and disaster prevention measures related to stormwater systems by enhancing drainage systems in stream corridors and improving and repairing stormwater conveyance pipes and outfalls.

1. Implement the requirements of Baltimore's MS4 (separate stormwater and sewer system) permit (S)
5. Review and revise storm drain design on a continuous basis, to accommodate projected changes in intense rainfall (O)

The City of Baltimore operates under a Municipal Separate Stormwater and Sewer System (MS4) permit, which protects water-quality and requires that Baltimore prevents pollution as much as possible. It is critical that the requirements of these permits are fully met.

The City's storm drains will require continual revision to incorporate new and projected changes in intense rainfall. This will ensure that the storm drains maintain adequate capacity.

2. Prioritize storm drain upgrades and replacement in areas with reoccurring flooding (S)

While proximity to a floodplain or floodway can increase vulnerability to flooding, certain measures can reduce this vulnerability. Inadequate or older pipes, which cannot accommodate the excessive amounts of stormwater, should be upgraded so as to handle extreme rainfall and storm surge events.

3. Install backflow-prevention devices or other appropriate technology along waterfront to reduce flood risk (M-L)

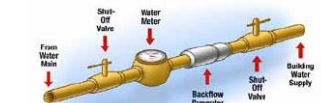
Backflow-prevention devices are used to ensure that water does not flow back through drainage infrastructure. Through the installation of backflow-prevention devices, the City can improve the performance of the drainage network and prevent risk of flooding impact along the waterfront.

4. Preserve and protect natural drainage corridors (S)

It is important to utilize natural drainage corridors and green infrastructure to capture more stormwater runoff and enhance the ability of the existing infrastructure to cope with environmental changes.

IMPLEMENTATION GUIDELINES

Lead Agency	DPW
Stakeholders	Community Groups, DOT, DPW, MOEM, MDNR, NGOs, Private Developers, Stormwater Utility
Alignment with Goals	Goals 1, 3, and 6
Connection with Existing Efforts	
Timeframe	



Backflow Preventer

Source: DemarPlumbingNYC



Implementation

[illegible]

Stakeholder Meetings



Government

- City Agencies
- State and Federal Partners
- Surrounding Counties and Cities



Neighborhoods

- Community Groups
- Non-Profit Groups
- Volunteer Groups



Other Partners

- Local Businesses
- Institutions (Universities, Hospitals, Museums)

Getting Started



- Identify timelines and priorities
- Funding and staff
- Political support
- Prioritize actions with connection to Mitigation and Adaptation
- Project management and coordination





Layers

- How can we get multiple benefits and uses out of each change (Social, Economic, Environmental)
- More comprehensive approach
- Integration of as many sectors and actions as possible

IN

BL

NS

PS

Implementation Examples



IN

INFRASTRUCTURE

Critical Facilities Engineering Study
Stormwater Infrastructure

BL

BUILDINGS

Renewable Energy
Floodplain, Freeboard, and CRS

NS

NATURAL SYSTEMS:

Tree Canopy and Proactive Pruning
Stormwater - Growing Green Initiative
Urban Agriculture

PS

PUBLIC SERVICES:

Food Resiliency Planning
Emergency Planning and Recovery
Public Outreach and Education

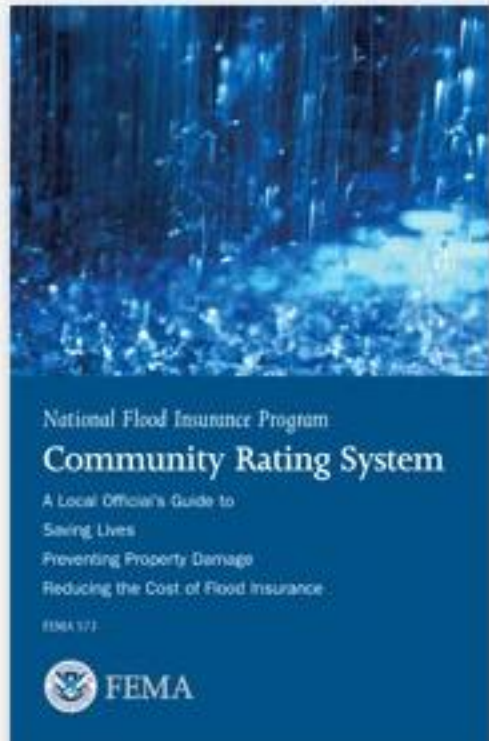


National Flood Insurance Program (NFIP)

Community Rating System (CRS)
Voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements.

Outcomes:

Flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions



Floodplain Changes



Stormwater Management

IN

Issues:

- High percentage of impervious surface
- Lots of encroachments on stream channels (structures, bridges, railways)
- Inadequate storm sewer drains (wood pipes) and debris



Implementation:

- Blue alley projects
- Replacing and upgrading pipes
- Stormwater Remediation Fee

Tree Canopy



Tree Species Database



Database of Trees

- Climate Conditions now and predicted
- Species that do well in those conditions
- Maintenance and soil requirements
- Planting specs and additional considerations



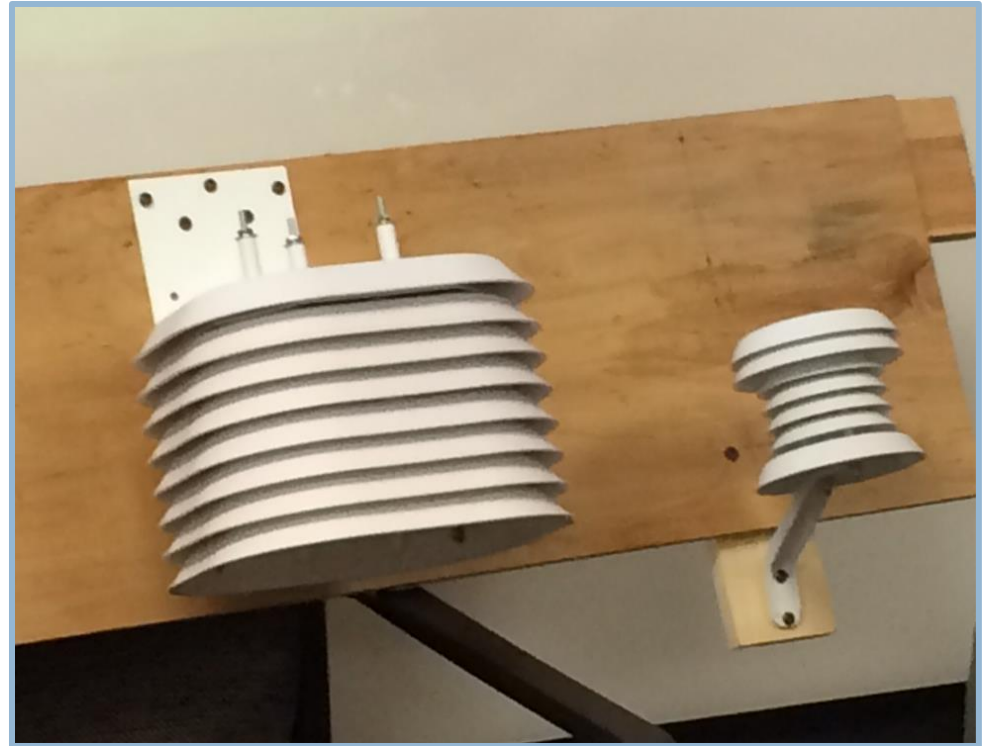
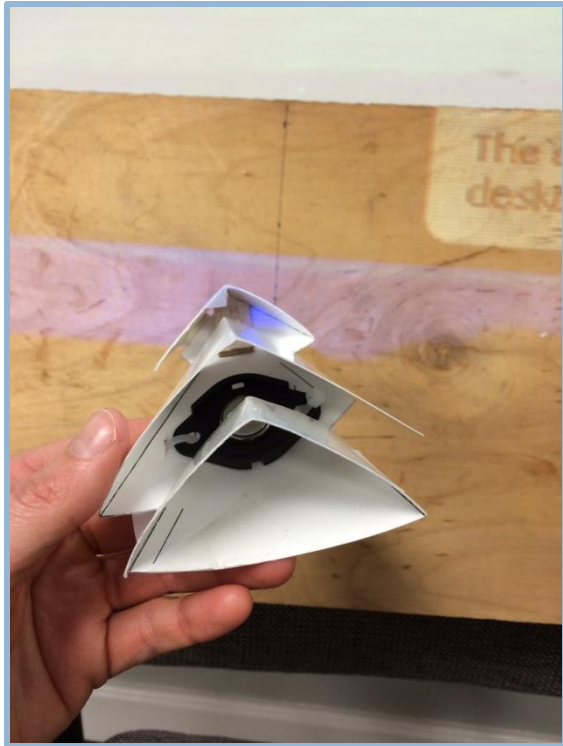
Spatial Analysis Tool

- Overlay areas at risk of specific climate threats
- Overlay soils, demographic information, water/salt water info
- Develop list of trees best for those conditions

Energy: Adaptation/Mitigation



UHI Study and Heat data



Critical Facilities



Conducting an engineering study on critical infrastructure in riverine and coastal areas



Building upon our energy and renewable work, develop a pilot project to integrate solar into critical facilities in lower income areas



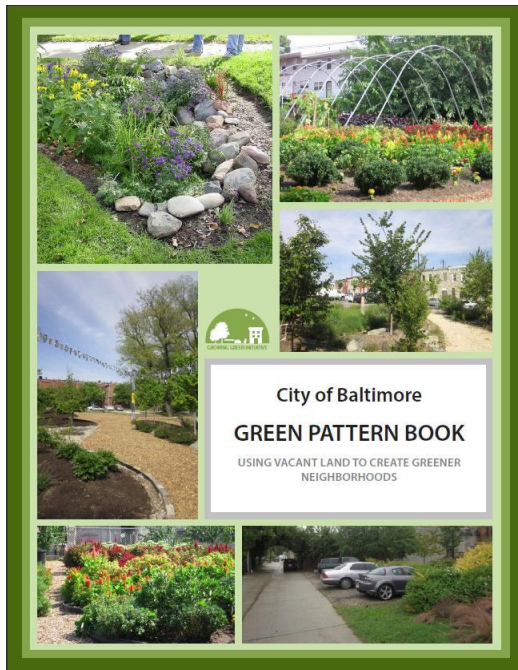
City of McKinney, Texas

Growing Green

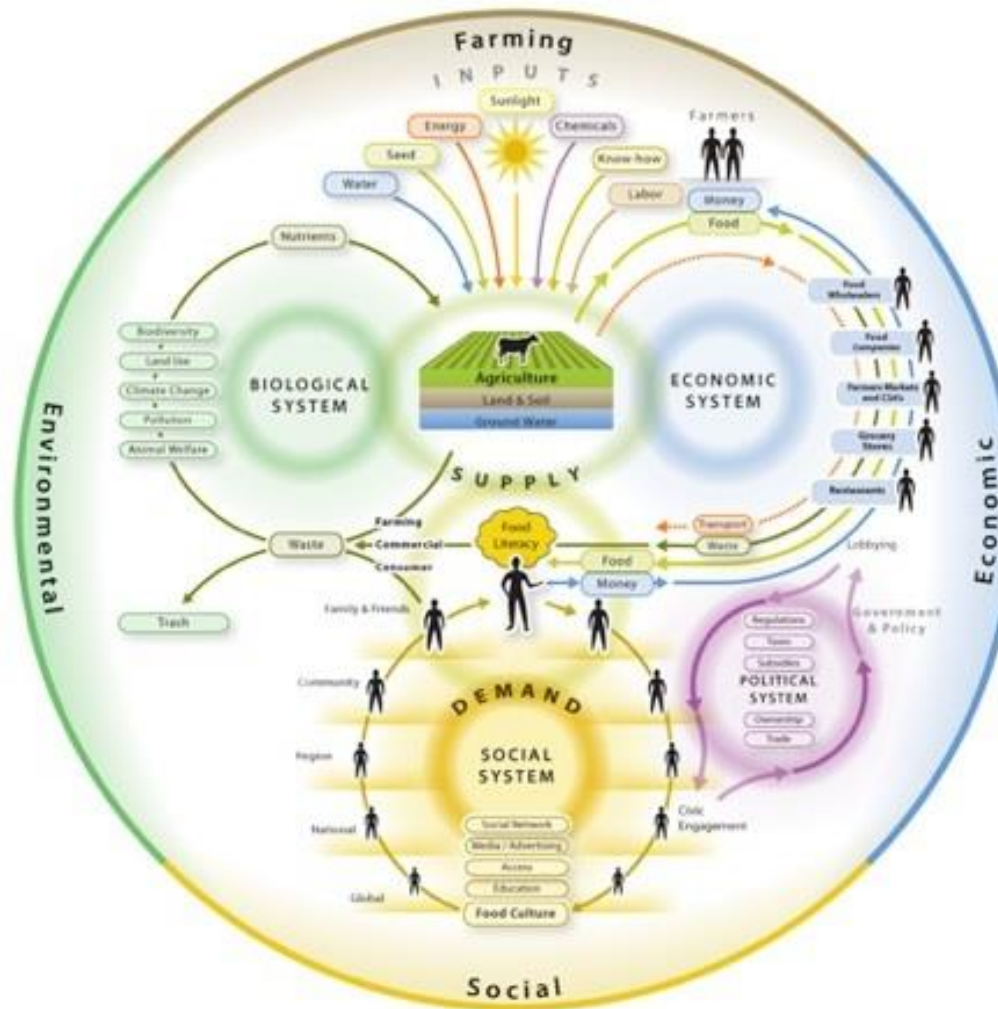


NS

Effort focused on re-using vacant land to green neighborhoods, reduce stormwater runoff, grow food, and create community spaces that mitigate the negative impacts of vacant properties



Food Resiliency Plan



Urban Agriculture



- Soil Safety Policy and Guidance Document
- Two new farm leases and multiple other sites under consideration
- Assessing underused parkland for flower farming
- Using funds for soil testing to support new farm sites
- Bill to reduce tax burden on urban farms



Climate Communications

Framework



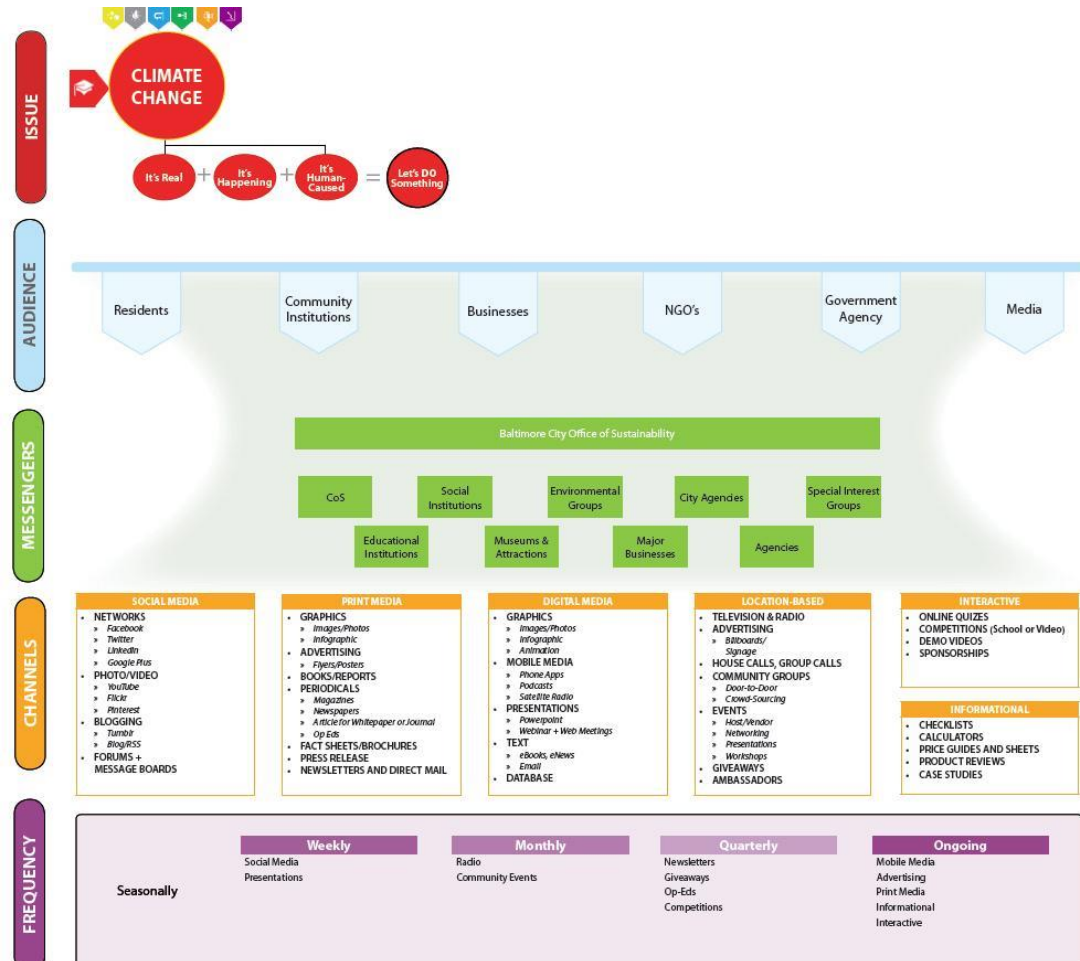
Issue

Audience

Messengers

Channels

Frequency





Channels

Website

- More Sustainable and Resilient Baltimore

Interactive Community Events

- Held in communities more vulnerable to the impacts of high heat and flooding
- In collaboration with local, State and Federal agencies, non-profit groups, and private partners

Peer to peer education and outreach

A MORE SUSTAINABLE & RESILIENT BALTIMORE

A MORE SUSTAINABLE & RESILIENT BALTIMORE

[HOME](#)[CLIMATE CHANGE ▾](#)[DISASTER PREPAREDNESS ▾](#)[FLOOD INFORMATION ▾](#)[ENERGY EFFICIENCY](#)[BLOG](#)

Responding through
preparedness, adaptation, &
mitigation

[STEPS YOU CAN TAKE ▸](#)[GET PREPARED ▸](#)[ENERGY PERFORMANCE ▸](#)

FEATURED

[WELCOME + ABOUT](#)

ENERGY, FEATURED

[ENERGY](#)

FEATURED

[PREPAREDNESS](#)[TRANSLATE THIS SITE!](#)[En Español](#)

DOWNLOADS

[Climate Action Plan](#)[DP3 Plan](#)[Isabel Map of Impact](#)[Preliminary Flood Rate Insurance Maps \(FIRM\)](#)[The Baltimore Sustainability Plan](#)

EVERY DAY, TIPS

[TIPS FOR EVERY DAY](#)

ON THE GO, TIPS

[TIPS ON THE GO](#)

@ HOME, FEATURED, TIPS

[TIPS @ HOME](#)

TOPICS

[Select Category ▾](#)

A MORE SUSTAINABLE & RESILIENT BALTIMORE

A MORE SUSTAINABLE & RESILIENT BALTIMORE

HOME CLIMATE CHANGE ▾ DISASTER PREPAREDNESS ▾ FLOOD INFORMATION ▾ ENERGY EFFICIENCY ▾ BLOG 🔍

Responding through preparedness, adaptation, & mitigation

STEPS YOU CAN TAKE ▾

GET PREPARED ▾

ENERGY PERFORMANCE ▾

TRANSLATE THIS SITE!
En Español

DOWNLOADS
Climate Action Plan
DP3 Plan
Isabel Map of Impact
Preliminary Flood Rate Insurance Maps (FIRM)
The Baltimore Sustainability Plan

TOPICS
Select Category ▾

MAKE A PLAN

Reducing Baltimore's vulnerability to the impacts of natural hazards begins with its residents. Make sure that you and your family are prepared with your own emergency plan before a disaster hits. Knowing ahead of time what your role will be, where to meet loved ones, and how to contact each other, among additional considerations, will help you avoid any unnecessary pressures and ensure that you can instead focus your attention on staying safe.

More information and resources specifically for Baltimore residents will be coming soon. In the mean time, be sure to find out how to make your own emergency plan.

TWEET TWEET!

Tweets

BmoreSustainability @SustainBmore 21m
Engaging conversation about flood resistant building codes with @GreenworksBos @SustainableNW @PLANYC and @GreenovateBos
Expand

BmoreSustainability @SustainBmore 19h
Take a moment to complete this Biocyte Attitudes Study from Bikemore & JHSPH—ESPECIALLY if you don't already ride! [on lyh2017](#)
Expand

BmoreSustainability @SustainBmore 21h
Office of Sustainability is in NYC participating in a 2 day five-cities meeting about flooding, sea-level rise and working with FEMA.
Expand

Tweet to @SustainBmore

EXTERNAL LINKS

A MORE SUSTAINABLE & RESILIENT BALTIMORE

HOME CLIMATE CHANGE ▾ DISASTER PREPAREDNESS ▾ FLOOD INFORMATION ▾ ENERGY EFFICIENCY ▾ BLOG 🔍

Responding through preparedness, adaptation, & mitigation

STEPS YOU CAN TAKE ▾

GET PREPARED ▾

ENERGY PERFORMANCE ▾

TRANSLATE THIS SITE!
En Español

DOWNLOADS
Climate Action Plan
DP3 Plan
Isabel Map of Impact
Preliminary Flood Rate Insurance Maps (FIRM)
The Baltimore Sustainability Plan

TOPICS
Select Category ▾

SMALL SCALE RENEWABLES

While a major first step to reducing energy resource demands is conserving energy use, we can also reduce our demands by using renewable energy sources instead of finite resources like fossil fuels.

A [clean energy revolution](#) is taking place across America, underscored by the steady expansion of the U.S. renewable energy sector. *-Energy.gov*

In recent years, you may have noticed more and more Baltimore businesses installing renewable energy systems on their properties. Have you seen the Science Center's new solar array shading their parking lot?

Solar Arrays shade the parking lot at the Science Center in Baltimore. Source: Megan Griffith

TWEET TWEET!

Tweets

BmoreSustainability @SustainBmore 24m
Engaging conversation about flood resistant building codes with @GreenworksBos @SustainableNW @PLANYC and @GreenovateBos
Expand

BmoreSustainability @SustainBmore 19h
Take a moment to complete this Biocyte Attitudes Study from Bikemore & JHSPH—ESPECIALLY if you don't already ride! [on lyh2017](#)
Expand

BmoreSustainability @SustainBmore 21h
Office of Sustainability is in NYC participating in a 2 day five-cities meeting about flooding, sea-level rise and working with FEMA.
Expand

Tweet to @SustainBmore

EXTERNAL LINKS

Baltimore City Planning Department

Baltimore Community Foundation

Baltimore Energy Challenge

Baltimore Office of Sustainability

Baltimore Tree Trust

Bike Maryland

Bikemore

Blue Water Baltimore

Civic Works

Climate Communication Consortium of Maryland

Compare Floodplain Maps!

A MORE SUSTAINABLE & RESILIENT BALTIMORE

A MORE SUSTAINABLE & RESILIENT BALTIMORE

HOME CLIMATE CHANGE ▾ DISASTER PREPAREDNESS ▾ FLOOD INFORMATION ▾ ENERGY EFFICIENCY ▾ BLOG 🔍

Responding through preparedness, adaptation, & mitigation

STEPS YOU CAN TAKE ▾

GET PREPARED ▾

ENERGY PERFORMANCE ▾

TRANSLATE THIS SITE!
En Español

DOWNLOADS
Climate Action Plan
DP3 Plan
Isabel Map of Impact
Preliminary Flood Rate Insurance Maps (FIRM)
The Baltimore Sustainability Plan

TOPICS
Select Category ▾

IT'S EASY GOING GREEN!

STEPS YOU CAN TAKE

As Baltimore takes climate change adaptation and mitigation actions, there are some steps you can take to help. Click the links below to learn about tips for making little changes each day, at home, at work, at your business, and on the go!

EVERY DAY

ON THE GO

@ HOME

TWEET TWEET!

Tweets

BmoreSustainability @SustainBmore 18m
Engaging conversation about flood resistant building codes with @GreenworksBos @SustainableNW @PLANYC and @GreenovateBos
Expand

BmoreSustainability @SustainBmore 18h
Take a moment to complete this Biocyte Attitudes Study from Bikemore & JHSPH—ESPECIALLY if you don't already ride! [on lyh2017](#)
Expand

BmoreSustainability @SustainBmore 21h
Office of Sustainability is in NYC participating in a 2 day five-cities meeting about flooding, sea-level rise and working with FEMA.
Expand

Tweet to @SustainBmore

EXTERNAL LINKS

Baltimore City Planning Department

Baltimore Community Foundation

Baltimore Energy Challenge

Baltimore Office of Sustainability

Baltimore Tree Trust

Bike Maryland

Links to State websites and other regional efforts

Plan, Kit, Help Each Other



- First event on April 22nd, 2014 (earth day)
- Community Preparedness and Resilience
- Simple and Easy to Understand Message
- 300 people attended (including kids)
- Collaboration between a number of City agencies and non-profits

Make a Plan



- Work with experts from the City to create a family emergency plan at the event.
- Maps with Evacuation Routes, Shelter locations, Hospitals, Schools, Etc.



Build a Kit

Free Emergency Kits

Materials Provided

- Crank/Battery Radio
- Flashlight & Batteries
- Water Bladder
- First Aid Kit
- Personal Fan
- Manual Can Opener
- Whistle
- Dust Masks
- Sanitizing Wipes
- Sanitary Bags
- Help/Safe Sign

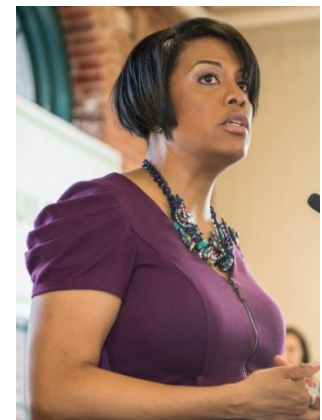


Help/Safe Sign

- Builds Neighborhood assistance capacity
- Lets neighbors know if you need assistance by placing appropriate side in window



Help Each Other



Input and interactive activities



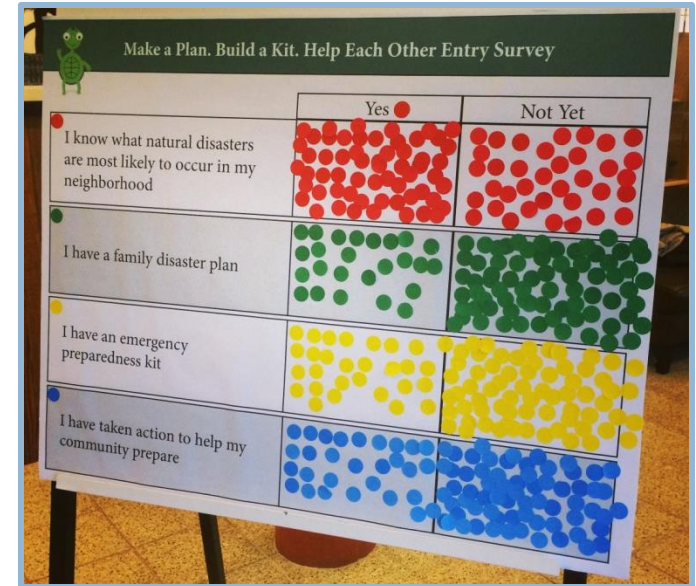




Event Success



- Busing provided to residents in low income areas without access to transportation
- Entirely hands-on and interactive meeting. No presentations
- Free food, free kits, free trees, and information
- Community building and interaction integrated



Building on the success



- Neighborhoods can sign up to have a “Make a Plan. Build a Kit. Help Each Other” meetings with experts from the City
- Identify Climate Ambassadors and CERT Leaders
- Continue to collaborate with other city agencies, state, federal and non-profit partners



Turtle

- Turtle as a Sustainability and Resiliency advocate
- Used by other City agencies at events
- Fun way to engage people via social media





Going beyond meetings

- Tie Climate Ambassadors outreach into our Baltimore Energy Challenge network and outreach
- Create a ninth section of our Community Emergency Response Teams (CERT) training. CERT leaders will be used to go out and engage communities on preparedness and climate change.
- Connect to Public Safety Initiatives and Health Department Initiatives



Response and Recovery

Building on the success



- Mayor wants integration of resiliency into After Action Reporting
- First test cases with small businesses and communities impacted by the April 30th flooding event



Implementation



- Move directly from plan development to implementation to capitalize on momentum
- Identify overlaps with existing efforts and plans
- Word spreads about successful campaign and events – more city agency buy-in and support from political leaders
- Incorporate resilience into Capital Improvement Planning (CIP) Process
- Funding opportunities through a variety of grants related to hazard mitigation, floodplain management, and climate adaptation



Questions?

Kristin Baja

Climate and Resilience Planner

City of Baltimore, Office of Sustainability

kristin.baja@baltimorecity.gov