

July 1<sup>st</sup>, 2013

City of Baltimore  
**DISASTER PREPAREDNESS AND  
PLANNING PROJECT (DP3)**



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# Presentation Overview





# **Hazard Mitigation and Climate Adaptation**

## Definitions



# Hazard Mitigation

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## Hazard Mitigation

**Hazard Mitigation is sustained action taken to reduce or eliminate long-term risks to people and their property from hazards. This is based on hazards we have already seen and know we are likely to see in the future.**

# Climate Adaptation

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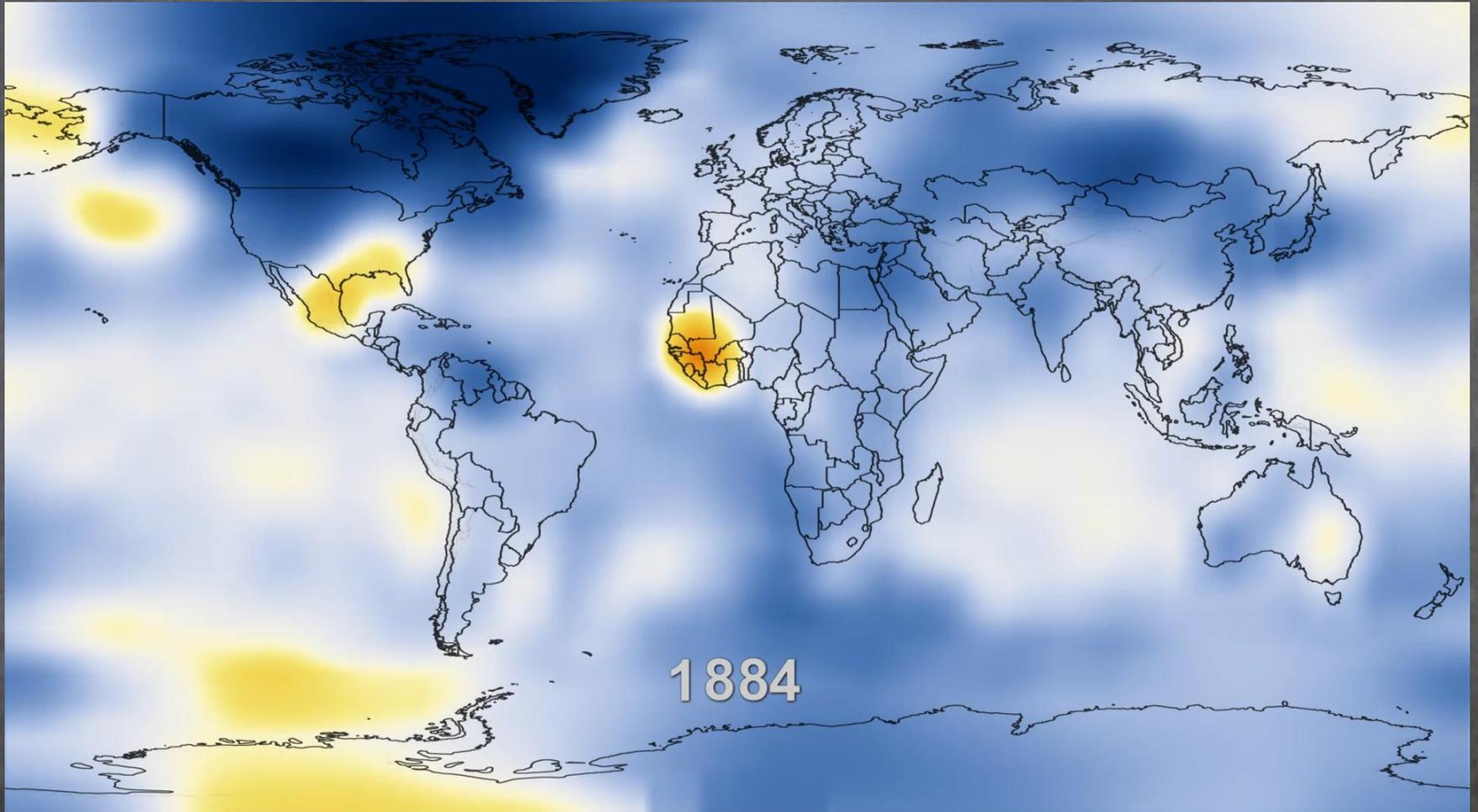
## Climate Adaptation

**Refers to changes made to better respond to new climate conditions, thereby reducing harm and taking advantage of opportunities.**

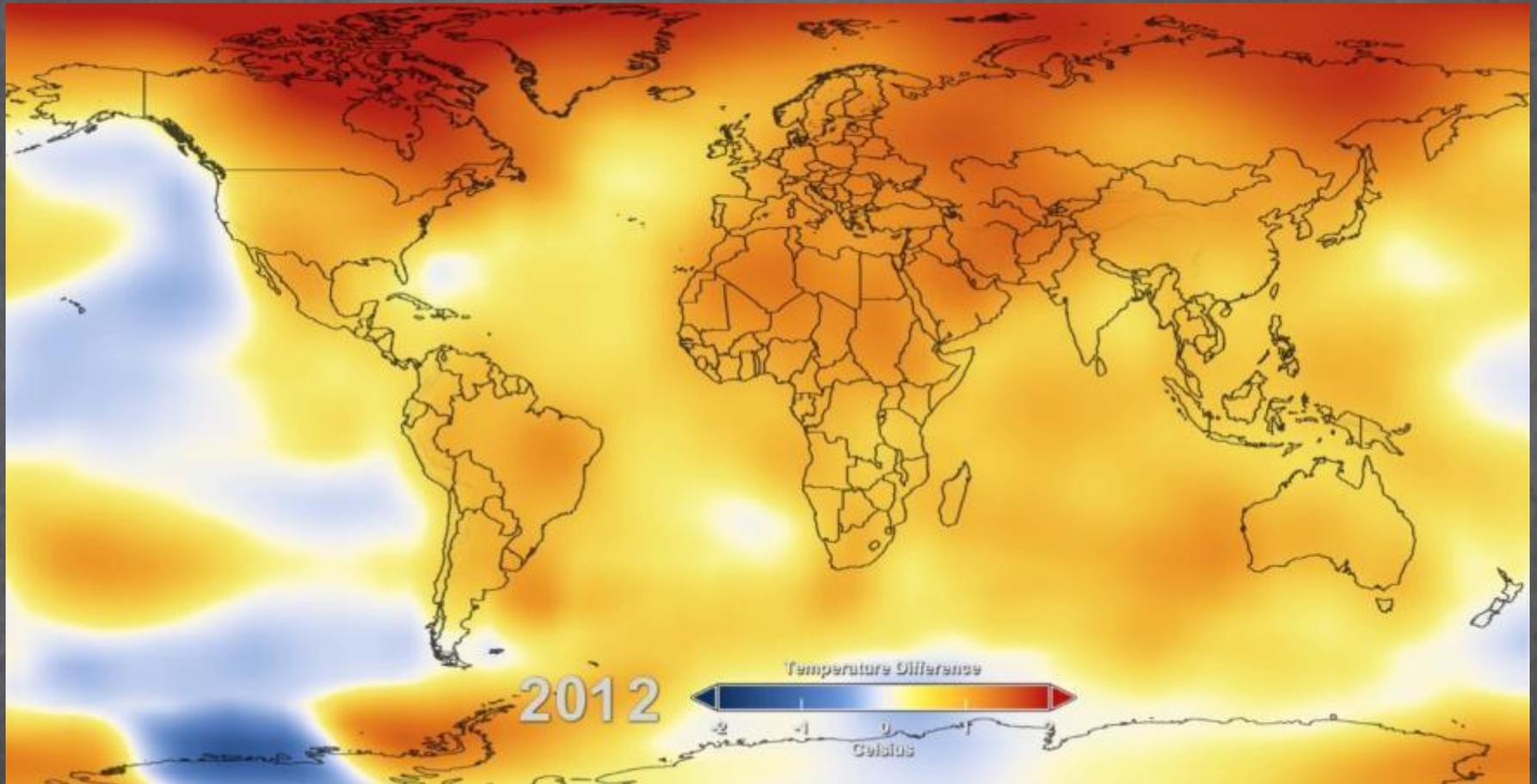
**Why are we integrating  
these two plans?**



# Global Surface Temperatures 1884



# Climate Change- GST 2012



Preparedness

+

=

Resilience

Planning





## **Natural Hazards**

Being assessed in this plan

# Flooding



# Tropical Storms

There has been a substantial increase in hurricane activity in the Atlantic since the 1970's.

Recent Tropical Storms/Hurricanes in Baltimore:

2011 Tropical Storm Lee

2011 Hurricane Irene

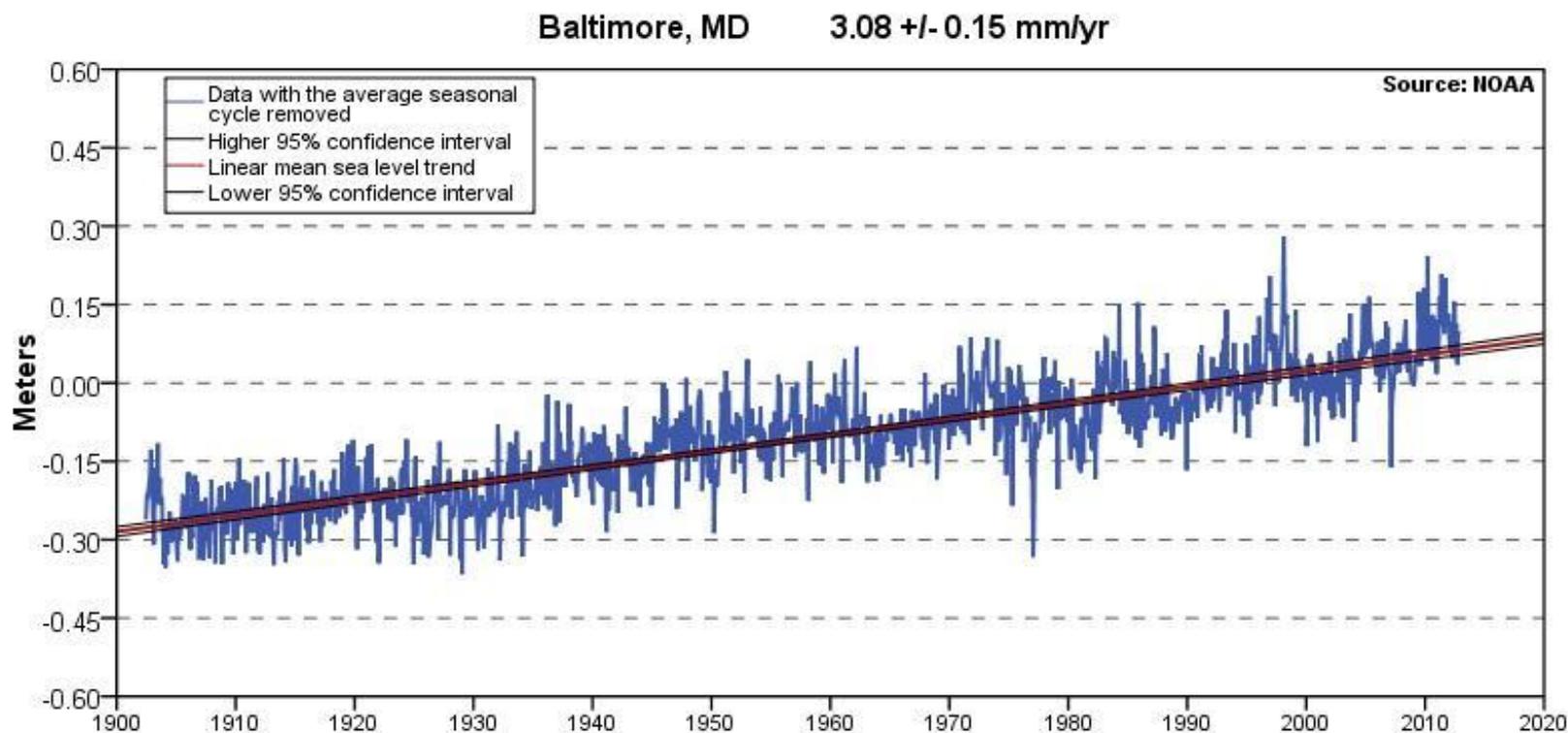
2006 Tropical Storm Ernesto

2003 Hurricane Isabel



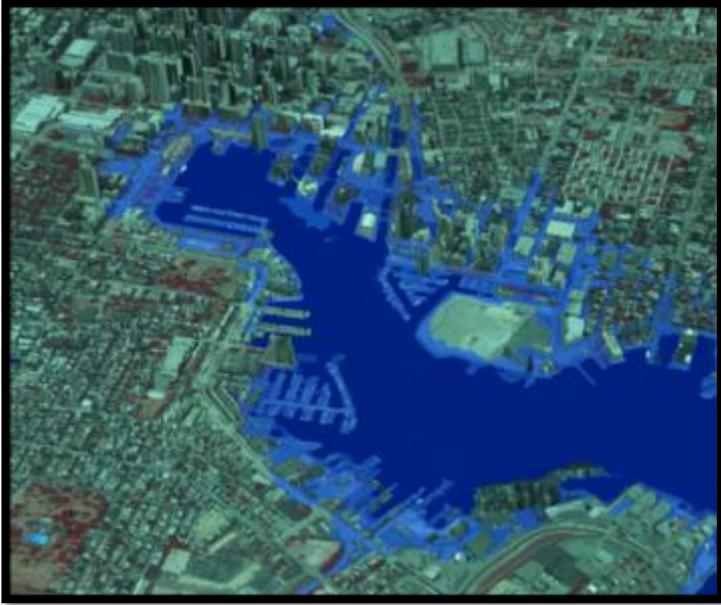
# Sea Level Rise

## Mean Sea Level Trend 8574680 Baltimore, Maryland



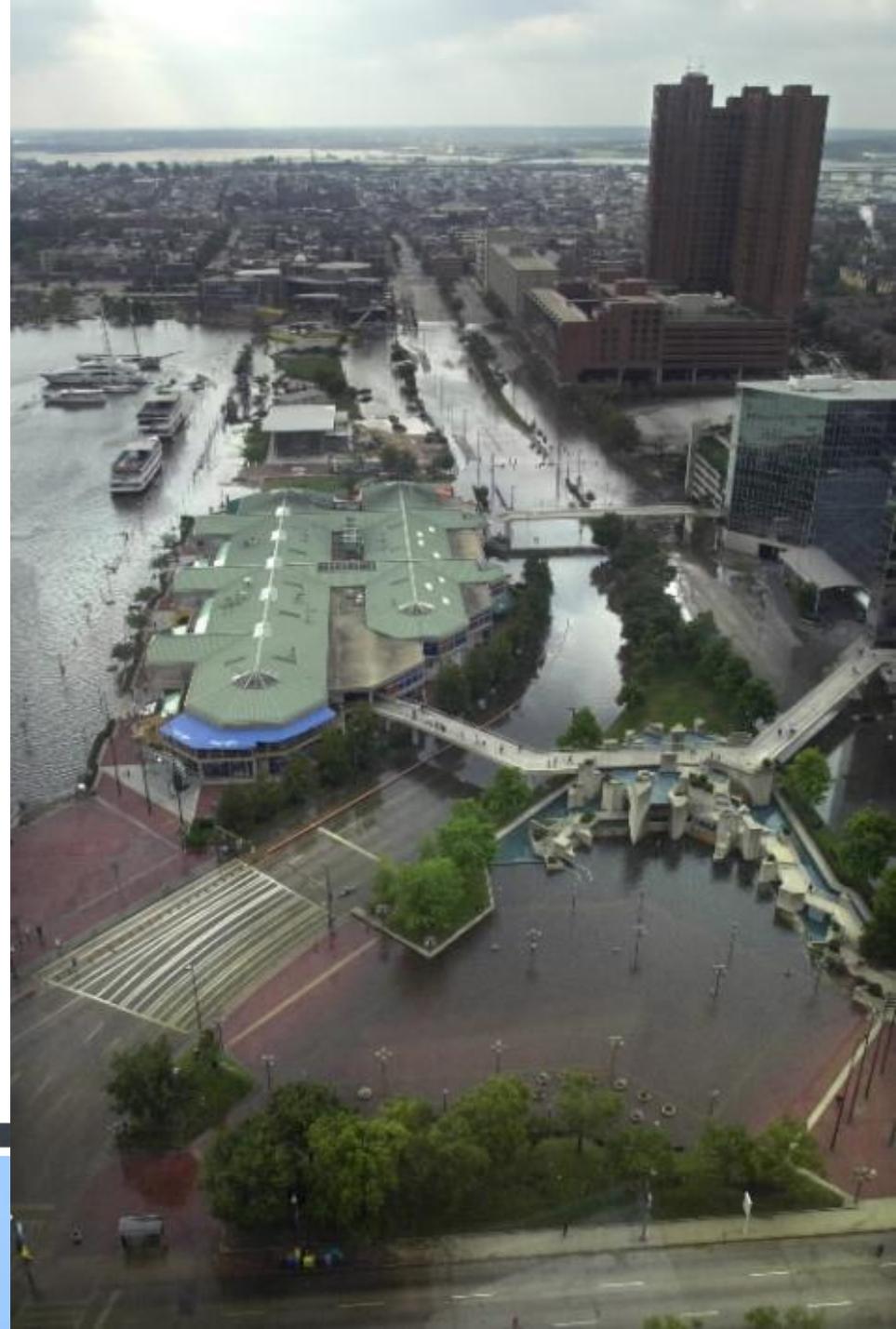
The mean sea level trend is 3.08 millimeters/year with a 95% confidence interval of +/- 0.15 mm/yr based on monthly mean sea level data from 1902 to 2006 which is equivalent to a change of 1.01 feet in 100 years.

# Storm Surge



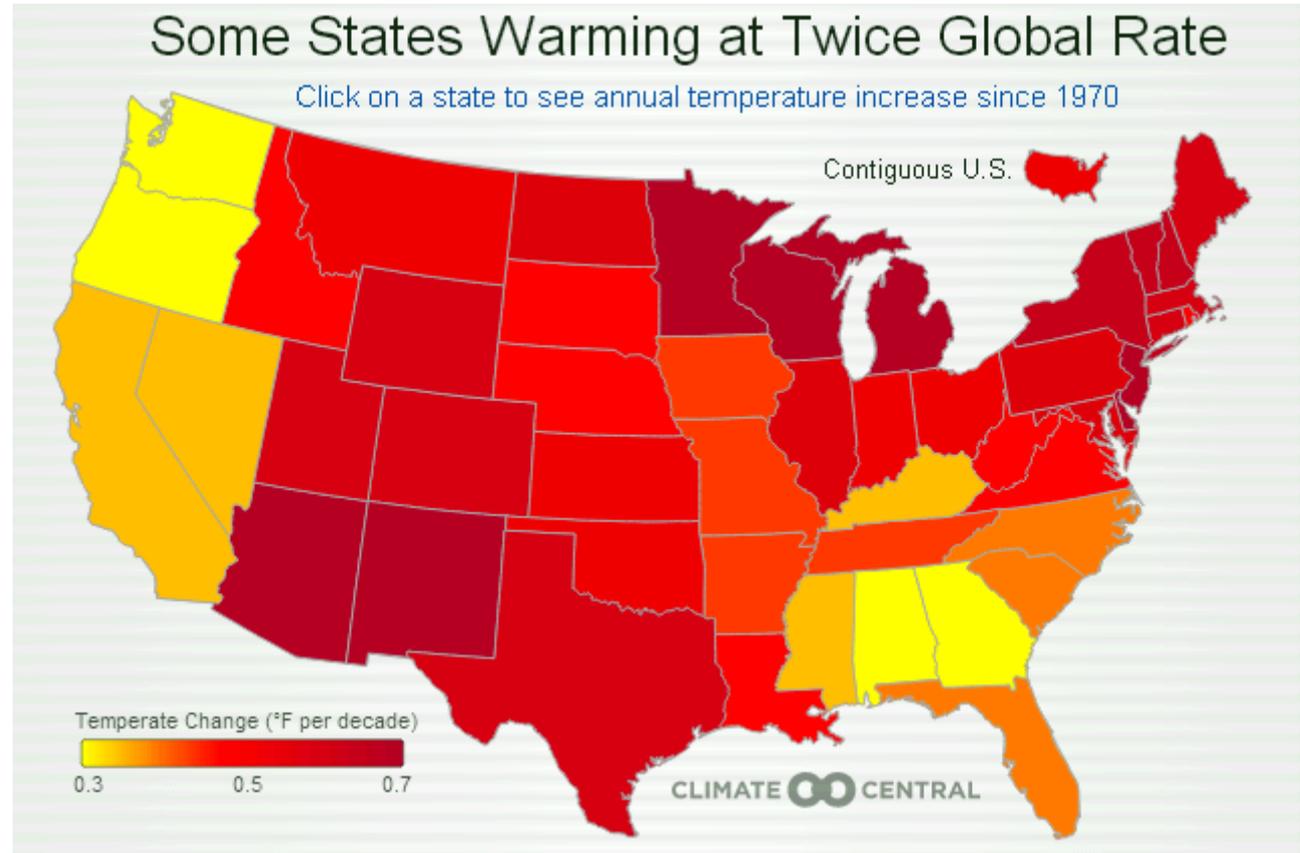
Storm surge with sea level rise

Storm Surge from Isabel, 2003

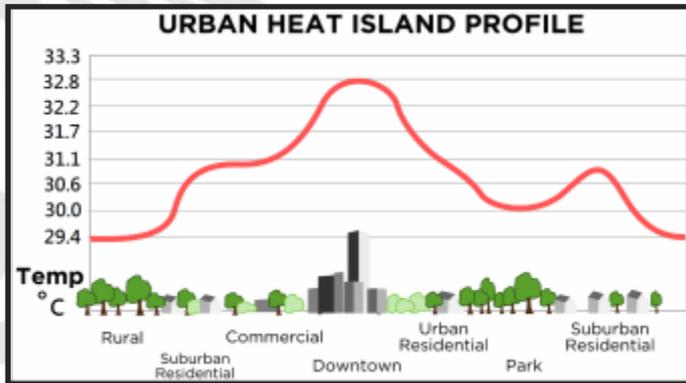


# Extreme Heat

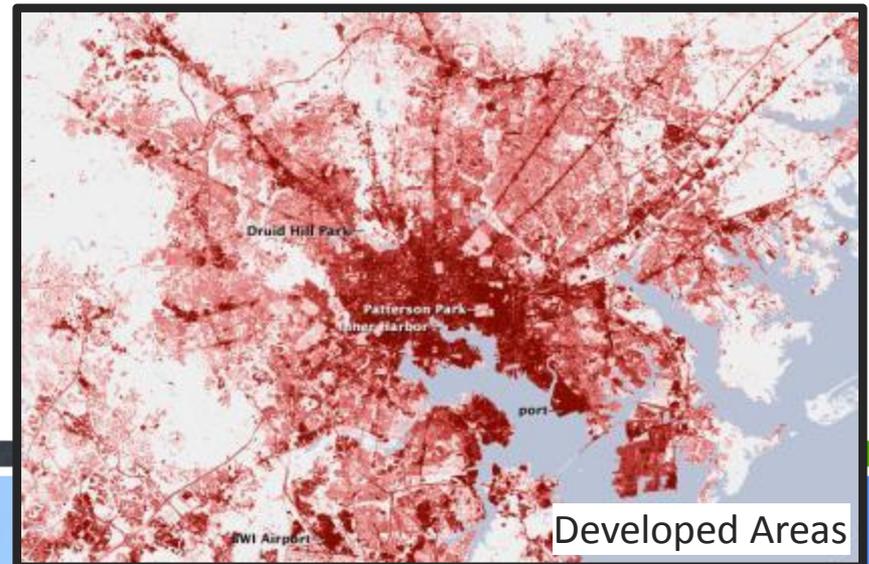
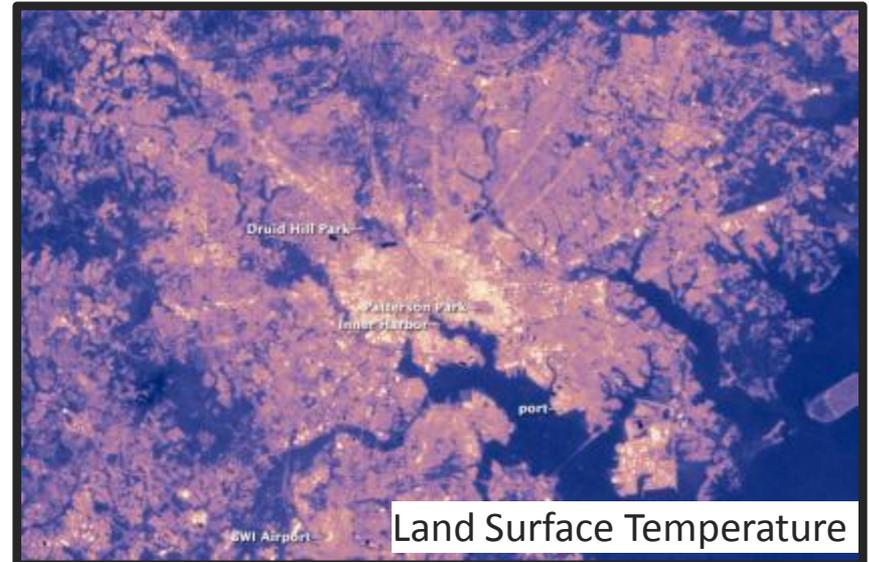
Temperatures in the contiguous United States last year were the hottest in more than a century of record-keeping.



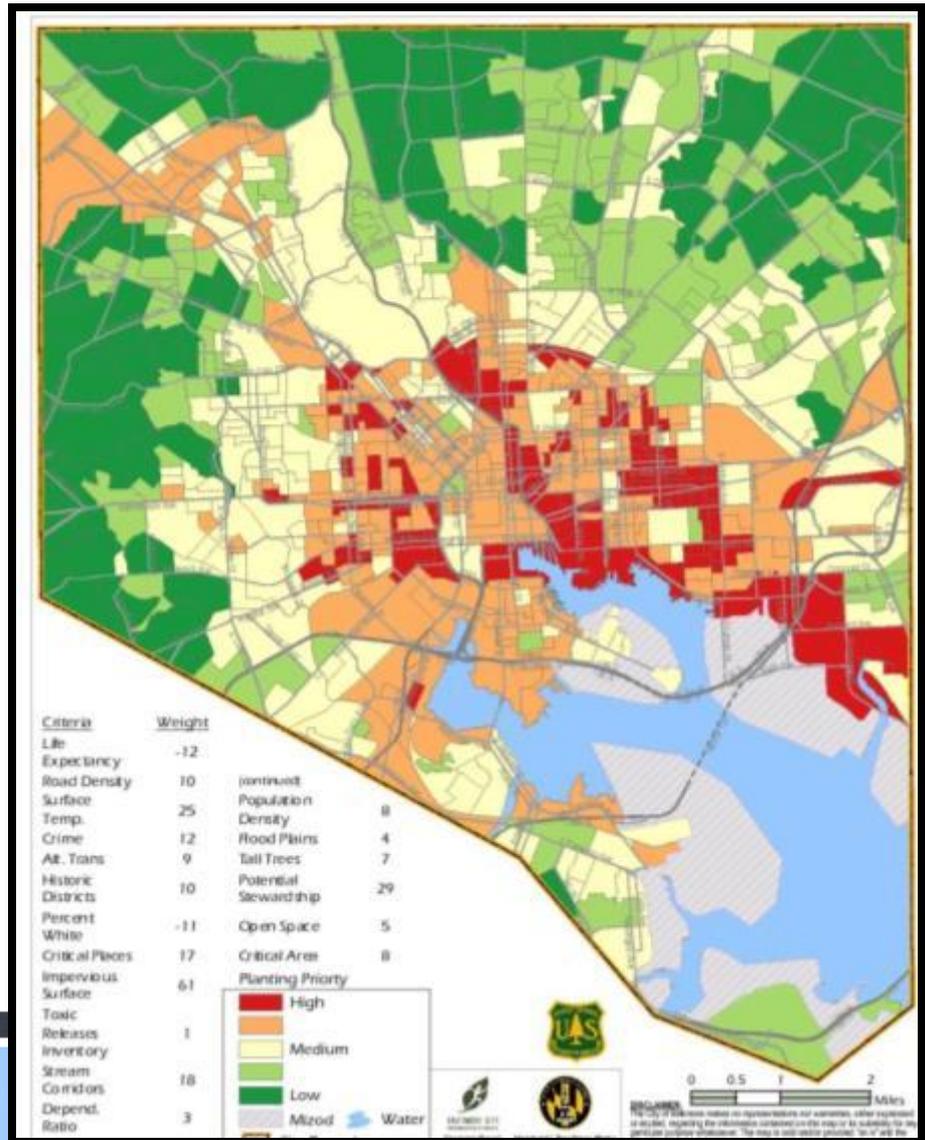
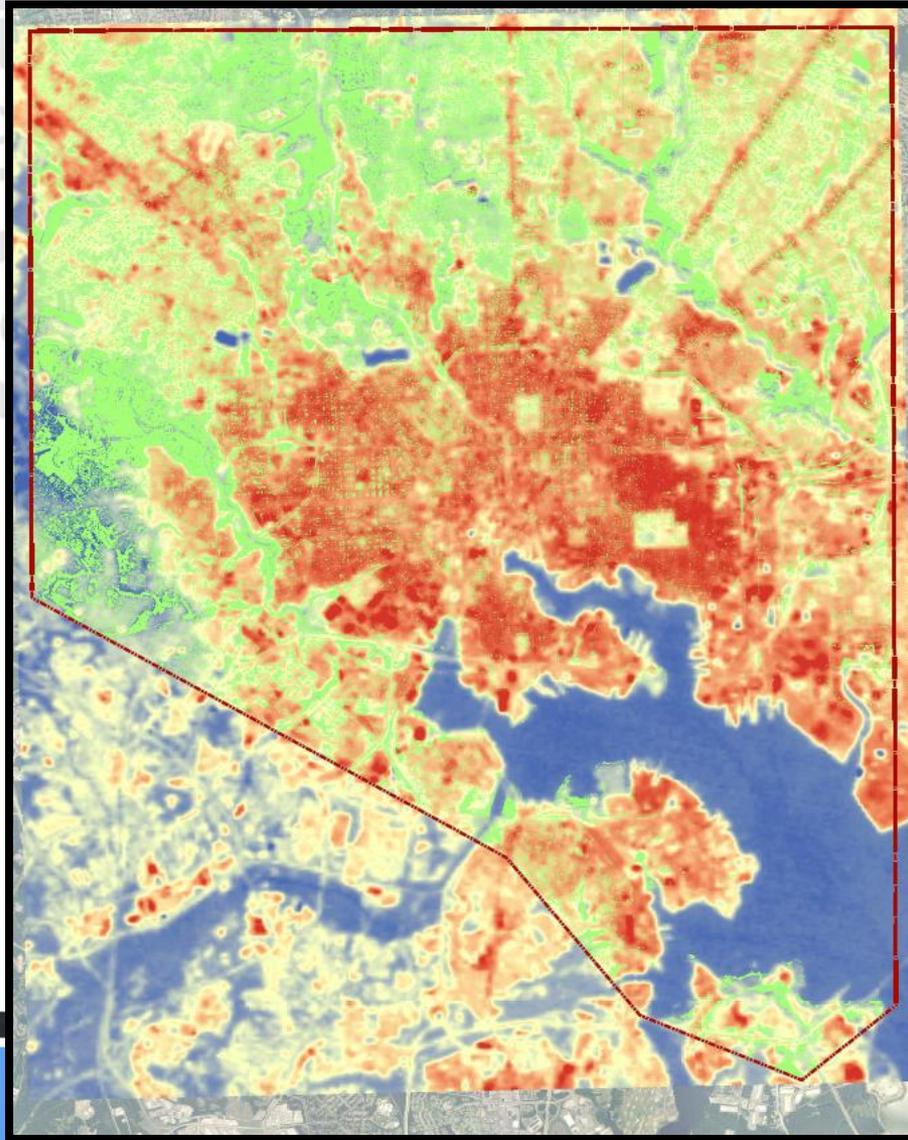
# Urban Heat Islands



A metropolitan area, which is consistently hotter than the surrounding area due to human activities.



# Urban Heat Islands in Baltimore





# Winter Storms

The biggest rainstorms and snowstorms are getting bigger.

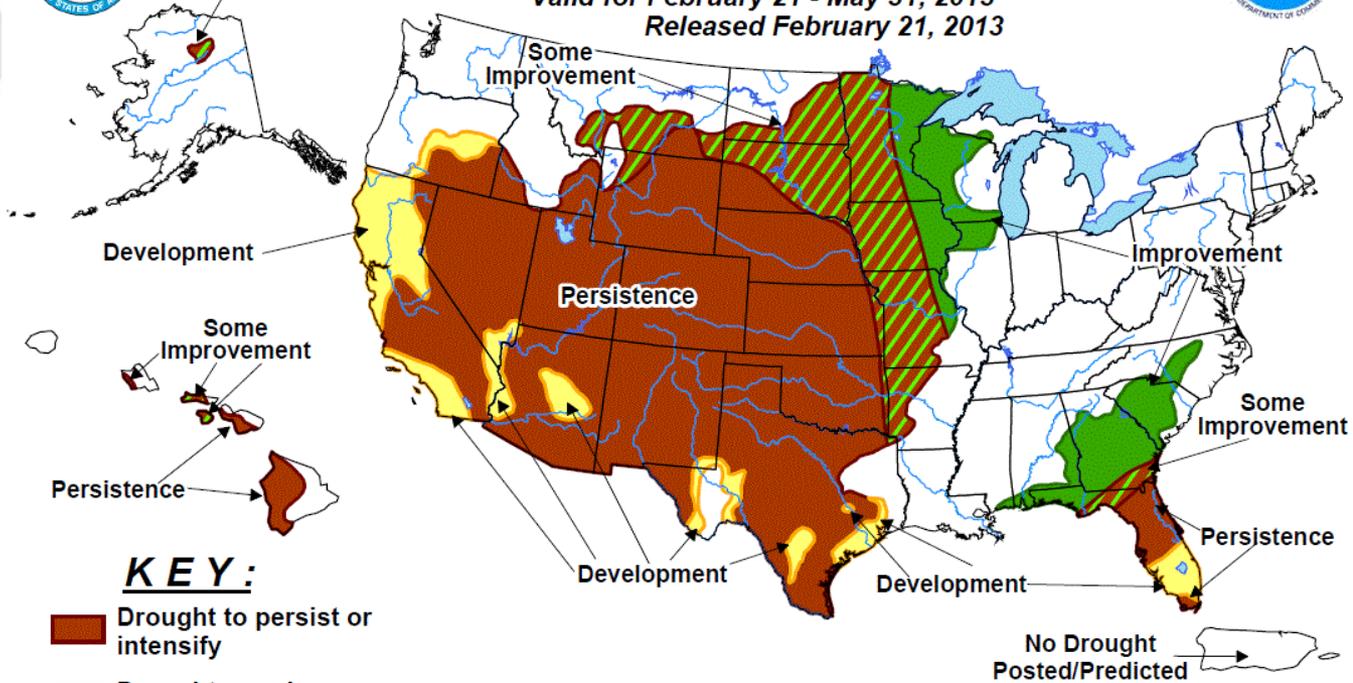


# Drought



Some Improvement

## U.S. Seasonal Drought Outlook Drought Tendency During the Valid Period Valid for February 21 - May 31, 2013 Released February 21, 2013

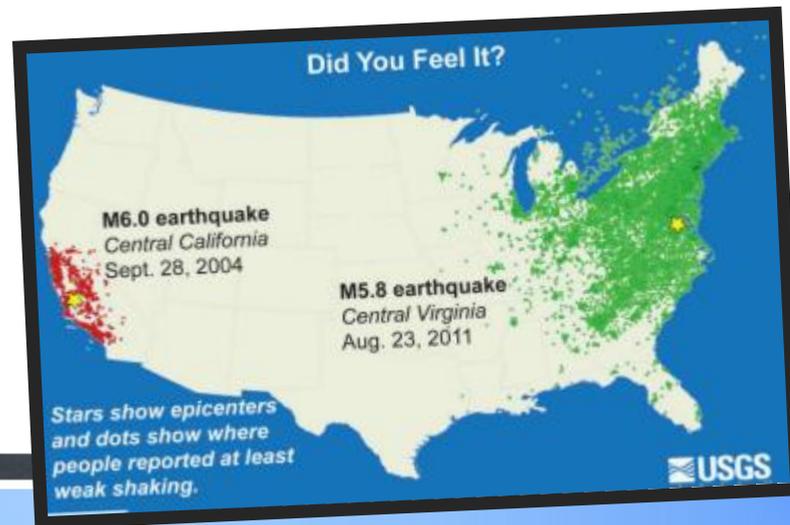


### KEY:

- Drought to persist or intensify
- Drought ongoing, some improvement
- Drought likely to improve, impacts ease
- Drought development likely

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance. Use caution for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.

# Other Natural Hazards in Baltimore



# Quick Review of Hazards

**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**

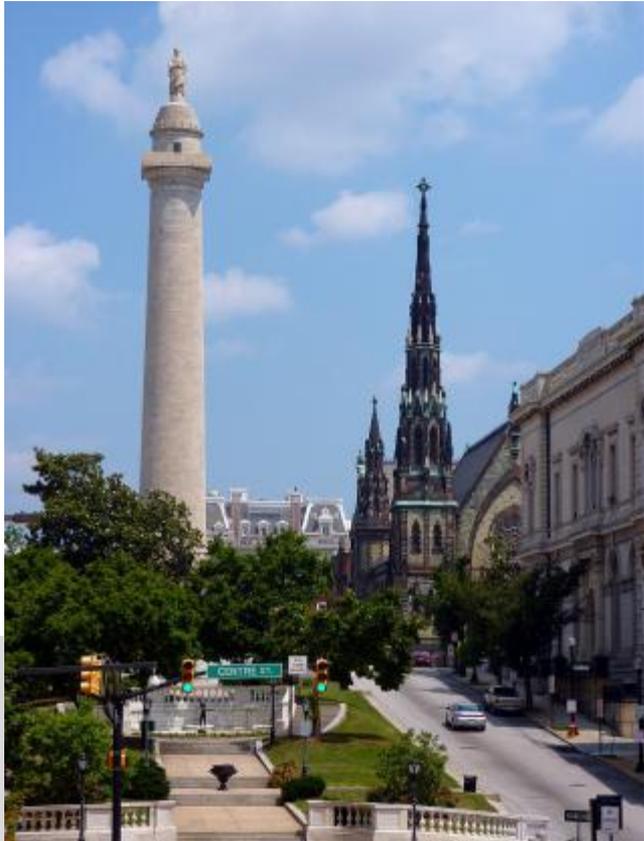
**Air Quality**

**lower quality and increase risk**



# Disaster Preparedness and Planning Project (DP3)

Office of Sustainability and Department of Planning Staff



## Purpose of this project

- A unified All Hazards Mitigation and Climate Adaptation Plan will improve community **sustainability** and **resilience**.
- Proactive approach
- Funding opportunities and savings

# Methodology- integration of planning processes

## LOCAL MITIGATION PLAN REVIEW CROSSWALK

### INSTRUCTIONS FOR USING THE PLAN REVIEW CROSSWALK FOR REVIEW OF LOCAL MITIGATION PLANS

Attached to a Plan Review Crosswalk based on the *Local Multi-Hazard Mitigation Planning Guidance*, published by FEMA in July, 2005. This Plan Review Crosswalk is consistent with the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended by Section 302 of the Disaster Mitigation Act of 2000 (P.L. 106-360), the National Flood Insurance Act of 1968, as amended by the National Flood Insurance Reform Act of 2004 (P.L. 108-264) and 44 Code of Federal Regulations (CFR) Part 201 -- Mitigation Planning, inclusive of all amendments through October 31, 2007.

#### SCORING SYSTEM

**N – Needs Improvement:** The plan does not meet the minimum for the requirement. Reviewer's comments must be provided.  
**S – Satisfactory:** The plan meets the minimum for the requirement. Reviewer's comments are encouraged, but not required.

Each requirement includes separate elements. All elements of a requirement must be rated "Satisfactory" in order for the requirement to be fulfilled and receive a summary score of "Satisfactory." A "Needs Improvement" score on elements shaded in gray (recommended but not required) will not preclude the plan from passing.

When reviewing single jurisdiction plans, reviewers may want to put an N/A in the boxes for multi-jurisdictional plan requirements. When reviewing multi-jurisdictional plans, however, all elements apply. States that have additional requirements can add them in the appropriate sections of the *Local Multi-Hazard Mitigation Planning Guidance* or create a new section and modify this Plan Review Crosswalk to record the score for those requirements. Optional matrices for scoring in the review of sections on profiling hazards, assessing vulnerability, and identifying and analyzing mitigation actions are found at the end of the Plan Review Crosswalk.

The example below illustrates how to fill in the Plan Review Crosswalk:

| Assessing Vulnerability: Overview  |  |   | SCORE: |   |
|--|--|---|--------|---|
| Requirement 6291.603(2)(D): (The risk assessment shall include a) description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(c) of this section. This description shall include an overall summary of each hazard and its impact on the community. |  |   | N      | S |
| Element  | Location in the Plan (article or annex and page #) | Reviewer's Comments   |        |   |
| A. Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?   | Section II, pp. 4-18                               | The plan describes the types of assets that are located within geographically defined hazard areas as well as those that would be affected by worst storms.   |        |   |
| B. Does the new or updated plan address the impact of each hazard on the jurisdiction?   | Section II, pp. 18-20                              | The plan does not address the impact of two of the five hazards addressed in the plan.<br><b>Required Revisions:</b> <ul style="list-style-type: none"> <li>Include a description of the impact of flood and earthquakes on the assets.</li> </ul> <b>Recommended Practices:</b> <ul style="list-style-type: none"> <li>This information can be presented in terms of dollar value or percentages of damage.</li> </ul> |        |   |
| <b>SUMMARY SCORE</b>   |  |   |        |   |

JULY 1, 2008

6-1

## FEMA

**Conduct a Risk Assessment-** Identify Hazards, Profile Hazards, Assess Vulnerability

**Create a Hazard Mitigation Strategy-** Goals, Actions, Implementation

**Plan Maintenance-** Monitoring, Evaluating, Updating the Plan & Public Involvement

## ICELI Five Milestone Process

**Milestone One:** Conduct a Climate Resiliency Study

**Milestone Two:** Set Preparedness Goals

**Milestone Three:** Develop a Climate Preparedness Plan

**Milestone Four:** Publish & Implement Preparedness Plan

**Milestone Five:** Monitor & Reevaluate Resiliency



# Process



## Impacts Assessment

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

## Vulnerability Assessment

- HAZUS Modeling
- Integrate projected climate conditions
- Identify weaknesses

## Risk Assessment

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

## Plan Development

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

# Advisory Committee:

- Key stakeholders
- 11 City Agencies, 11 community representatives, 4 State Agencies, NGO's, Private sector, and Federal government.
- Meet four times as a full committee and six times in subcommittees



# Infrastructure:

- **Energy Systems**
  - Power supply, Substations
- **Transportation Systems**
  - Highways and Roads, Bridges, Tunnels, Public Transportation
- **Communication Systems**
  - Technology, Redundancy
- **Water and Wastewater Systems**
  - Drinking Water, Water Supply, Sewers, Pumping Stations
- **Stormwater Systems**
  - Flooding and Erosion, Maintenance
- **Solid Waste System**



# Buildings:

- **City Codes**
  - Building Codes, Zoning Codes
  - Insurance
- **Non-Structural**
  - Improve Efficiency
- **Structural**
  - Retrofits and Upgrades, Flood proofing, Critical Facilities
- **Design**
  - Design Guidelines



# Natural Systems:



- **Land Use**
  - Land Acquisition, Land Preservation
- **Greening**
  - Tree Canopy, Landscape, Policy, Vacant Lots
- **Maintenance and Operations**
  - Trees and Vegetation, Debris, Ecological Buffers
- **Water Supply**
  - Drinking Water Quality and Supply, Drought Preparedness
- **Stormwater Management**

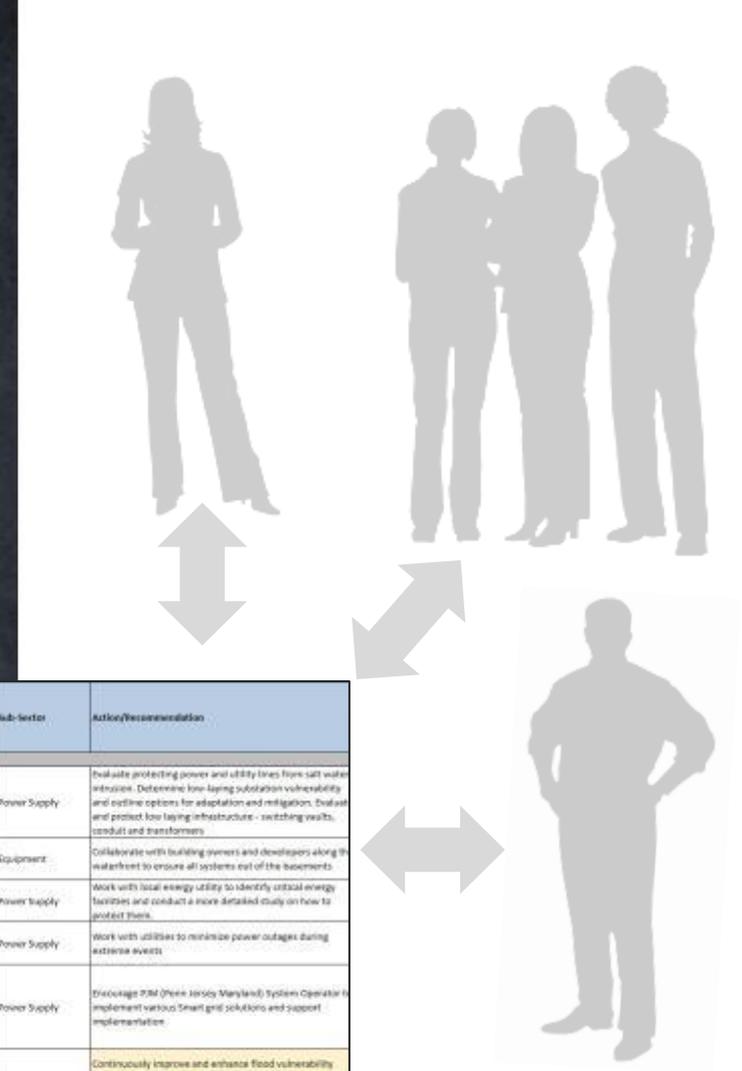
# Public Health and Human Services:

- **Emergency Preparedness**
  - Hazard Awareness, Community Groups, Messaging and Instructions
- **Emergency Response**
  - Code Red and Code Blue, Cooling Centers, Regional and State Partners, Equipment
- **Outreach and Education**
  - Flood Insurance, Training, Curriculum, Messaging

# List of Recommendations

- Extensive list of strategies and actions generated by the subcommittees
- All Strategies and Actions connect to one of six goals
- Final list ready for review and online

| Item # | Hazard(s) Addressed | Hazard Mitigation or Climate Adaptation? | Category       | Sub-Sector   | Action/Recommendation  |
|--------|---------------------|--|----------------|--------------|--|
| HA-1   | Sea Level Rise      | Adaptation                               | Energy Systems | Power Supply | Evaluate protecting power and utility lines from salt water intrusion. Determine low-laying substation vulnerability and outline options for adaptation and mitigation. Evaluate and protect low lying infrastructure - switching vaults, conduit and transformers |
| HA-2   | Sea Level Rise      | Mitigation                               | Energy Systems | Equipment    | Collaborate with building owners and developers along the waterfront to ensure all systems out of the basements.   |
| HA-3   | All                 | Mitigation                               | Energy Systems | Power Supply | Work with local energy utility to identify critical energy facilities and conduct a more detailed study on how to protect them.  |
| HA-4   | All                 | Both                                     | Energy Systems | Power Supply | Work with utilities to minimize power outages during extreme events.   |
| HA-5   | All                 | Mitigation                               | Energy Systems | Power Supply | Discourage PJM (PJM Jersey Maryland) System Operator to implement various Smart grid solutions and support implementation.   |
| HA-6   | Flooding            | Mitigation                               | All            |              | Continuously improve and enhance flood vulnerability data.   |
| HA-7   | All                 | Both                                     | Energy Systems | Power Supply | Identify how a natural disaster event will impact important energy supply systems such as the Trigen/Notus steam system, chilled water loop, and the BRSCO facility.   |



# Structure of the DP3 Plan

## Six Main Goals

Overarching goals for the plan

## Hazards

Sections divided by hazard

## Strategies

Strategies for each hazard

## Actions

Actions divided into four sectors:

Infrastructure, Buildings, Natural Systems,  
Public Health and Human Services

### Example:

**Hazard** Heat

**Strategy** Reduce vulnerability to increased heat

**Recommendations:** Environment, Equity, Economy

**Infrastructure:**

Reduce damage to asphalt from changes in climate and determine a repaving strategy that incorporates better maintenance and operations.

**Buildings:**

Require reflective roof systems or vegetative roofs for all new commercial, industrial, multifamily, and city-owned development

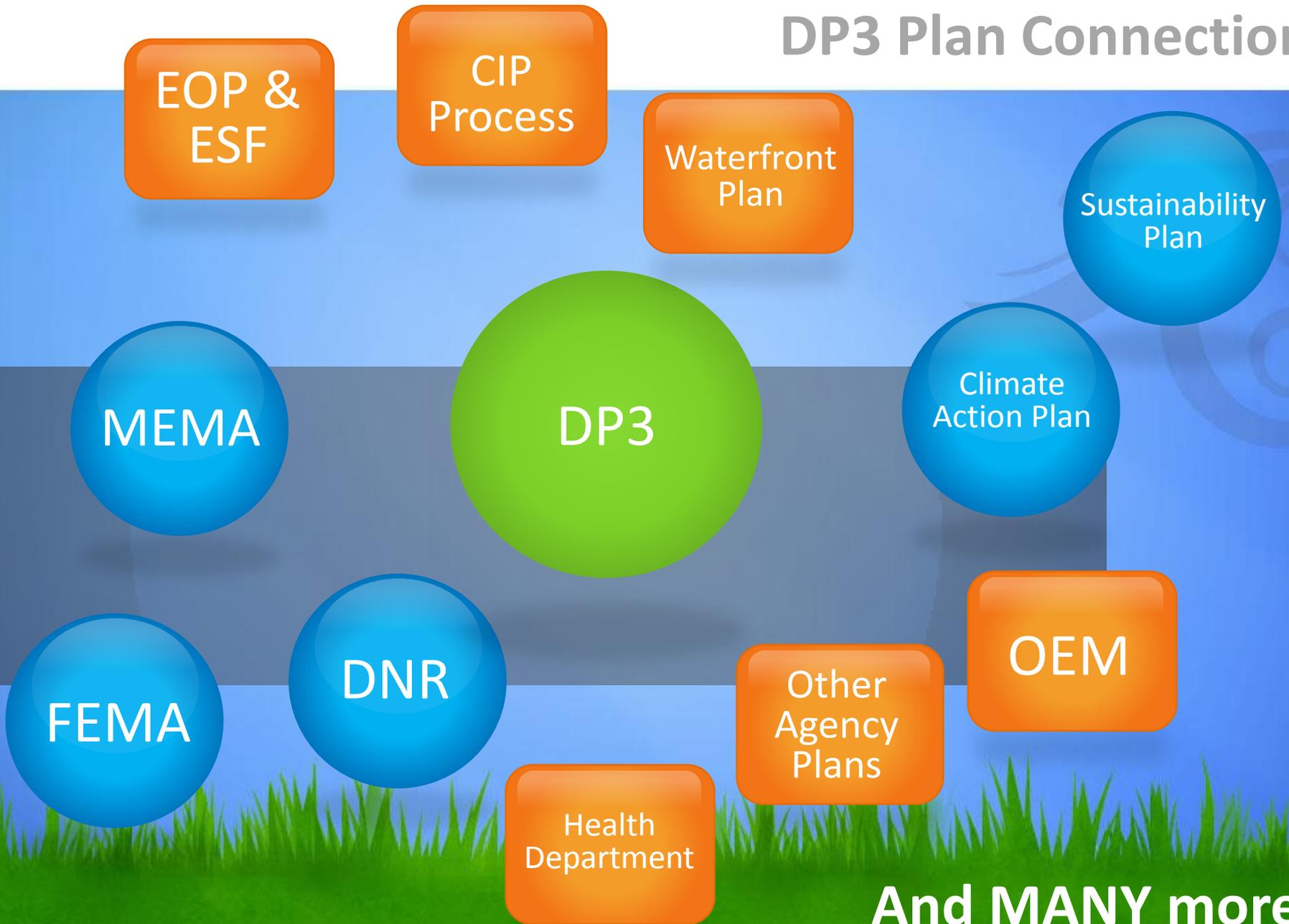
**Natural Systems:**

Increase the urban tree canopy and target areas with urban heat island impacts

**Public Health:**

Ensure redundancy of energy systems at all city cooling centers

# DP3 Plan Connections



**And MANY more**

# Additional Elements

- Health Impact Assessment
- Cost-Benefit Analysis
- Extensive Community Education & Outreach
- Historical Considerations





# Flood Maps



# New FEMA Flood Map Integration

City of Baltimore has New Tidal Flood Maps

Before



After



# FEMA Flood Maps

- We are currently in the appeal phase and anticipate final legislative adoption sometime in the spring 2014.
- There will also be floodplain code changes that are proposed as part of the Disaster Preparedness and Planning Project.
- Recommend going above and beyond FEMA's new maps



# **Progress and Next Steps**



# Progress to Date

- Completed hazard identification and assessment
- Identified 55 hazard mitigation and climate adaptation strategies
- Generated list of lead agencies, stakeholders and co-benefits
- Identified timeframe and initial prioritization
- Conducting HAZUS analysis to identify risk and vulnerabilities
- Conducted public outreach meetings focused on floods

Currently completing data analysis and writing the plan



## **DP3** Next Steps

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### » **Public Meetings**

Small community meetings focused on heat  
Second Town Hall event in the end of July

### » **Document Review and Comment**

Public comment and review period in July-August

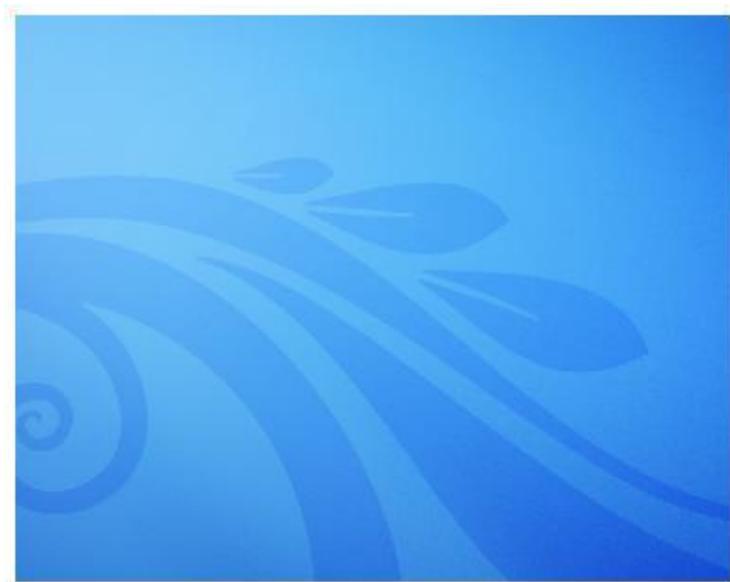
### » **Approval from Sustainability Commission**

Third week in August, 2013

### » **Seek approval from the Planning Commission**

September, 2013





**QUESTIONS?**

