

# Chapter 2

## Hazard Mitigation and Climate Adaptation



Hurricane Isabel approaching the East Coast, 2003

Source: [cargolaw.com](http://cargolaw.com)

## Importance of Planning to Mitigate Natural Hazards and Adapt to Climate Change

Baltimore's Disaster Preparedness and Planning Project (DP3) is a forward-thinking alternative to the standard All Hazards Mitigation Plan (AHMP). The Federal Emergency Management Agency (FEMA) requires that local governments update their AHMPs every five years. This plan, however, is much more than a routine update. In an effort to address existing hazards while simultaneously preparing for predicted hazards due to climate change, the City of Baltimore has chosen to develop an integrated AHMP, floodplain mapping, and Climate Adaptation Plan that will introduce a new comprehensive risk-preparedness system.

### What is Hazard Mitigation?

In 2000, the President signed into law the Disaster Mitigation Act of 2000 (DMA 2000). Part of this act requires local governments to develop and submit a hazard mitigation plan as a condition of receiving grant assistance for mitigation projects. According to FEMA, **HAZARD MITIGATION** is any sustained action taken to reduce or eliminate long-term risks to people and their property from hazards. The purpose of hazard mitigation planning is to identify long-range policies and actions that can be implemented to reduce current risks and future losses.

The planning process is just as important as the plan itself. Risk-based decision making guides communities become more sustainable and disaster-resistant by focusing efforts on hazards and disaster-prone areas, and by identifying appropriate mitigation actions. The process also ensures that priorities are identified along with anticipated costs. Communities have limited resources to address all concerns. The DP3 recommendations recognize and balance the expenditure of limited resources in the consideration of priorities and recommendations. As such, The DP3 acts as the foundation and clearinghouse for Baltimore's long-term strategy to reduce disaster losses, damage, and expenses. It recommends practical solutions that can be implemented by the City in partnership with businesses, non-profit organizations, community groups, volunteers, and other levels of local government. Additionally, the DP3 will follow all tasks and procedures required for local mitigation plans by FEMA.

FEMA Hazard Series	Hazard Mitigation Grant and Pre-Disaster Mitigation Program (DMA 2000 Plan Criteria)
Phase 1 Organize Resources	<ul style="list-style-type: none"> <li>Coordination among agencies</li> <li>Integration with other planning efforts</li> <li>Involve the public throughout the planning process</li> <li>State coordination of local mitigation planning</li> </ul>
Phase 2 Assess Risks	<ul style="list-style-type: none"> <li>Identify all hazards</li> <li>Profile hazard events</li> <li>Assess vulnerability</li> <li>Estimate potential losses</li> </ul>
Phase 3 Develop the Mitigation Plan	<ul style="list-style-type: none"> <li>Documentation of planning process</li> <li>Capability assessment</li> <li>Develop hazard mitigation goals</li> <li>Identification and analysis of mitigation measures</li> <li>Funding sources</li> </ul>
Phase 4 Implement and Monitor Progress	<ul style="list-style-type: none"> <li>Adoption</li> <li>Implementation of mitigation measures</li> <li>Implementation through existing programs</li> <li>Monitoring, evaluation, and updating the plan</li> <li>Continued public involvement</li> </ul>

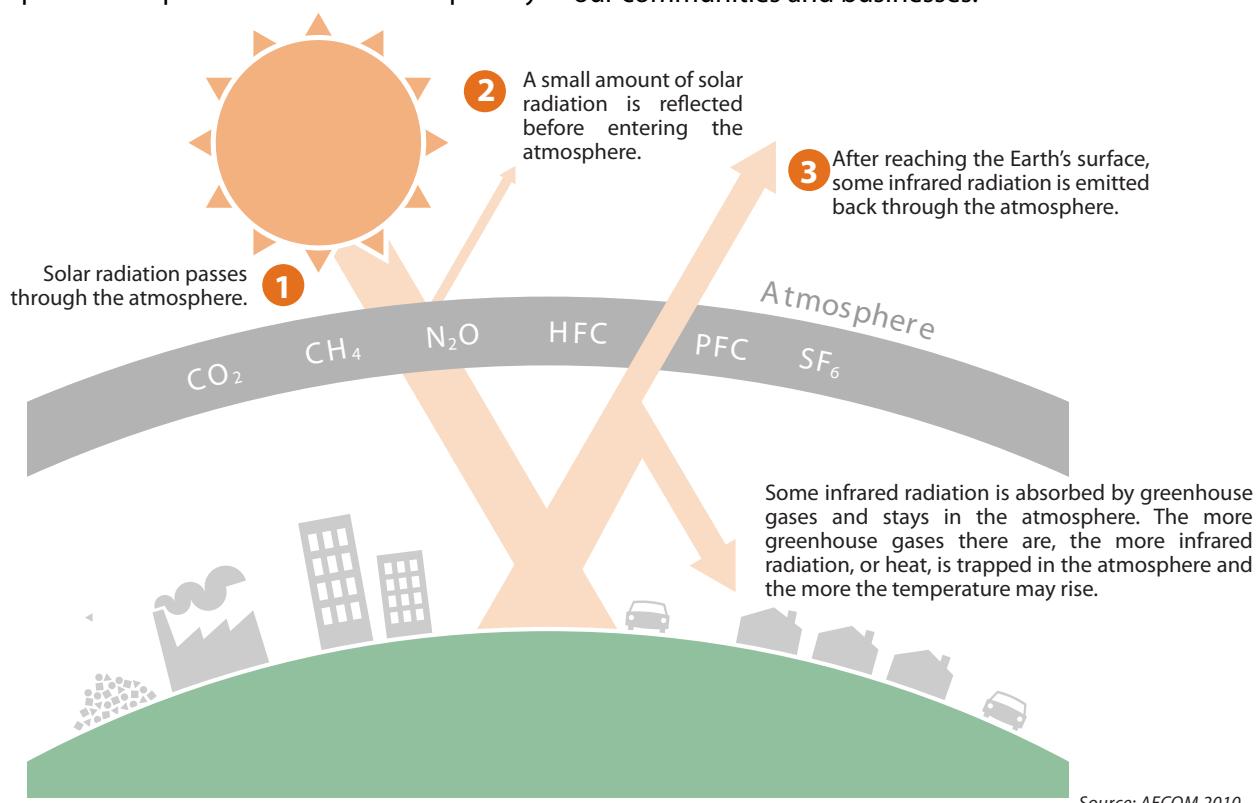
## What are Climate Change and Climate Adaptation?

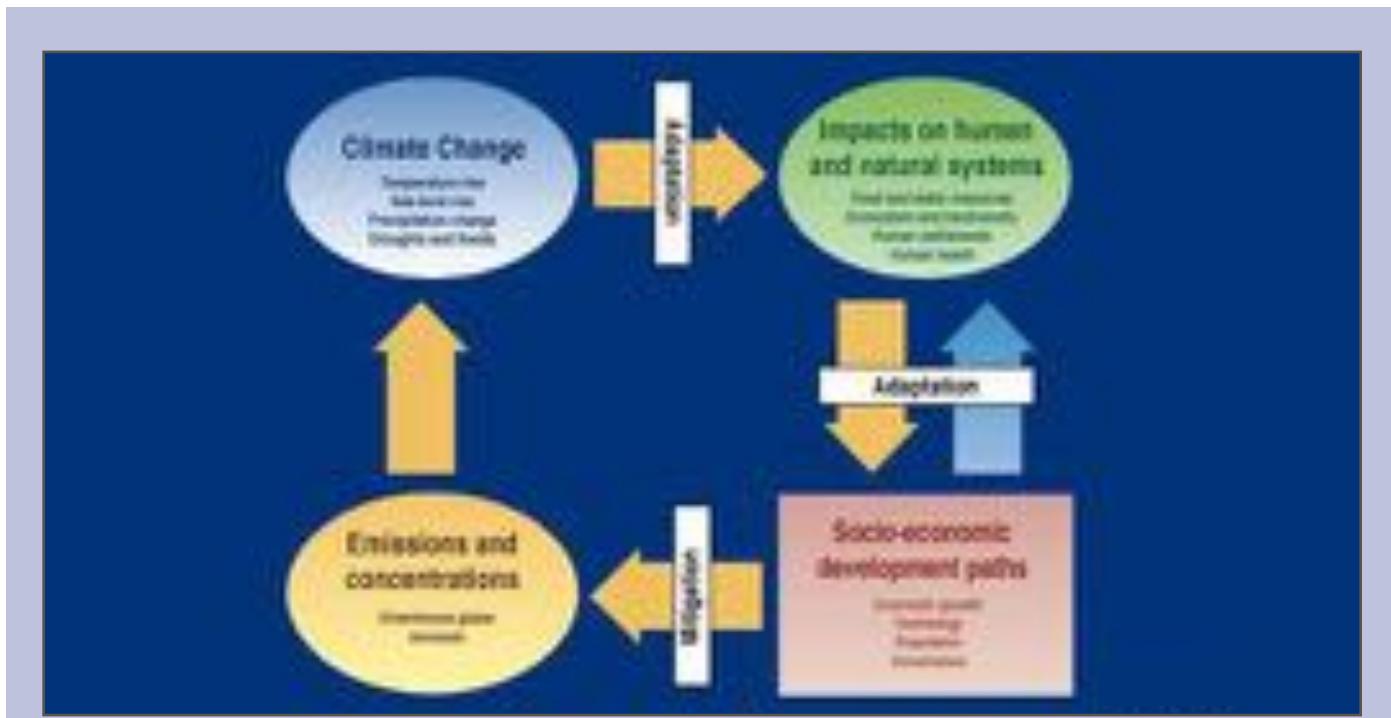
**CLIMATE CHANGE** refers to any significant change in the measures of climate lasting for an extended period of time. Both human and natural activities are influencing changes in Earth's atmosphere, oceans and local governments. Changes include significant shifts in temperature, precipitation, wind patterns, and ecological effects which may occur over several decades or longer. For example, over the past century, Maryland's average temperature has risen by 1.8°F and is projected to continue rising. These rising temperatures have been accompanied by changes in local weather and climate, including more high-impact weather events, longer and more frequent heat waves, and a rise in relative sea level, just to name a few. A changing climate is now affecting many of the natural hazards that influence affect daily life, causing these events to become more extreme over time. Simultaneously, new hazards have been presenting which will introduce additional planning challenges for public safety and policy makers alike.

Nevertheless, many of the impacts associated with climate change may still be prevented by reducing greenhouse gas (GHG) emissions. Baltimore's Climate Action Plan (CAP) (discussed in Chapter 1) is the City's most recent effort to establish policies and programs that focus on this task. The CAP highlights the GHG emission reduction measures that also have adaptation impacts and identifies priority

strategies for this and other future adaptation planning strategies. While GHG mitigation initiatives continue to be essential to stabilizing the climate in the long-term, it will indeed take time for our planet to respond to GHG reductions. Consequently, GHG concentrations already present in our atmosphere commit us to a range of climate change impacts that we can expect to face in the near future.

Baltimore cannot entirely prevent the changes in climate which have already been set in motion. Without taking additional measures, a reduction in GHG emissions will not be a sufficient response. Instead, it is increasingly accepted that we must learn to live with, or adapt to, a modified climate. **CLIMATE ADAPTATION** is a process that intends to reduce long-term risks from hazards associated with climate variability and climate change. More specifically, adaptation refers to changes that are made to better respond to new climate conditions, thereby reducing harm and taking advantage of present opportunities. Climate-related impacts are already affecting Baltimore residents. Heat waves, relative sea level rise, and flooding due to more extreme precipitation events can impact the City's environmental, social, and economic systems. Building adaptation measures into this plan allows Baltimore to reduce risk to people and property while increasing resiliency of our communities and businesses.





Climate Mitigation and Adaptation

Source: IPCC

## How are Hazard Mitigation and Climate Adaptation Connected?

We must remember that climate change is going to happen over the foreseeable future and that development lasts for decades. It takes time to see the results of successful proactive planning. For decades to come, the City may continue to experience risks associated with elevated GHG emissions. While these changes cannot be prevented, Baltimore can prepare by incorporating the anticipated risks associated with climate change into hazard mitigation planning efforts. Integrating hazard mitigation planning, which focuses on past events, with climate adaptation planning, which focuses on what will likely happen in the future, offers a positive, win-win solution for Baltimore City. Both processes require a risk assessment which includes a detailed inventory of natural hazards and a vulnerability analysis. These efforts then inform actions to mitigate hazards and to adapt to predicted climate impacts. This provides clear guidance and a unified strategy that supports Baltimore's sustainability and resilience goals.

We must also recognize that it takes a significant amount of time to reach our long-term goals. Therefore, we must act now and prepare for the future by proactively mitigating natural hazards and adapting to climate change. Proactively planning for a hazard is much more effective than responding to impacts following a disaster. Additionally, a proactive method can provide significant cost savings. For instance, every dollar FEMA spends on natural hazard mitigation will produce, on average, \$4 in future benefits.<sup>1</sup> More importantly, proactively planning for hazard mitigation and climate adaption protects the health and well-being of Baltimore's residents, and supports a sustainable, growing City.

## What is a Risk Assessment?

The purpose of an AHMP is to identify policies and actions that can be implemented over the long term to reduce risk and future losses. In order to do so, a major component of the AHMP is a risk assessment. This process is a necessary first step for DP3, identifying the nature, location, intensity and probability of a threat, and then determining Baltimore's vulnerabilities and exposure to those threats while considering the capacities and resources available for the City to address or manage threats. Baltimore's risk assessment comprises the bulk of the DP3 report, with the individual steps of this analysis divided between the coming chapters.

The first step in a **RISK ASSESSMENT** is the identification of all natural hazards that have impacted, or may impact, the City. The **HAZARD IDENTIFICATION** process helps highlight the historical nature and extent of natural hazards that have impacted the City of Baltimore, considering the unique characteristics and potential consequences of each. This process also incorporates the magnitude associated with each hazard and the probability of the hazard occurring in the future. Chapter 3 discusses the historical and contemporary impacts and extent of individual hazards, using this recorded data alongside scientific projections to estimate the probability of future occurrences.



- A **VULNERABILITY ASSESSMENT** complements the hazard identification process. Chapter 4 Risk and Vulnerability Assessment, further develops the risk assessment by examining Baltimore's current exposure (measure(s) of defense), sensitivity (degree to which the City could be affected), and adaptive capacity (ability for the City to recover). After addressing general, city-wide concerns for Baltimore City as a whole, the Risk and Vulnerability Chapter evaluates key areas of exposure, sensitivity, and adaptive capacity with regards to each individual hazard. Additionally, by looking ahead, the vulnerability assessment explores what, specifically, may be vulnerable (i.e. what assets — including community assets (vulnerable populations, economic assets, etc.) and critical facilities — could be at risk) to the future impacts of climate change. The vulnerability assessment includes an inventory of assets which identifies, where possible, what specific properties and resources may face greater impact, considering precisely how severe that impact may be during future events.

The initial elements examined in the vulnerability assessment lay the foundation for the **IMPACT ASSESSMENT**. This assessment identifies the degree to which, and in what manner, hazards will impact Baltimore's people, places, and economy. The impact assessment determines, for instance, how many people will be impacted, and how so. In other words, the impact assessment identifies what stands to be damaged due to a hazard event, and the cost of such a loss.

Hazard identification and vulnerability assessments are the first stages of the risk assessment. Once the possible impacts are identified, investing in appropriate hazard mitigation and climate adaptation methods can reduce the risk. To this end, the information discovered in each stage of the risk assessment (hazard identification, vulnerability assessment, and impacts analysis) is utilized in the decision-making process, and contributes to the development of the strategies and actions identified in Chapter 5. The recommendations in this report, through an understanding of the information revealed in the course of the risk assessment, aim to mitigate any risk and prepare the City to adapt to any projected changes in Baltimore's climate.

### The Risk Assessment's Broader Purpose

The DP3 risk assessment complements existing and ongoing hazard mitigation and climate adaptation efforts in the City of Baltimore. Serving as a foundation for the City, the DP3 Plan will be used to guide all of Baltimore's emergency and long-term resiliency planning efforts. The risk assessment provided herein is the first step in assessing current and future possible risk from all natural hazards. It will not only inform what is happening through Threat and Hazard Identification and Risk Assessment (THIRA) trainings and other local emergency planning training programs, but it will also help inform what is happening regionally as the City collaborates with surrounding Counties and with the State of Maryland.