



**NEW YORK STATE
ASSOCIATION OF
METROPOLITAN
PLANNING
ORGANIZATIONS**

**CLIMATE CHANGE
ADAPTATION STRATEGIES
FOR
METROPOLITAN PLANNING
ORGANIZATIONS**

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Climate Change Adaptation Strategies for Metropolitan Planning Organizations

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Introduction

The need to plan for climate change adaptation in the transportation sector is well-known and well documented. Federal and State agencies, as well as MPOs, have devoted significant time and resources identifying, and addressing, barriers to adaptation planning. In the space of just a few years, these agencies have helped to identify and endorse climate forecasts, explore potential impacts from climate-related events for different regions throughout the country, and create frameworks for assessing criticality and vulnerability/risk for transportation operations and infrastructure. New design standards, which take into account the potential for climate-related impacts, are also under consideration.

As these efforts become more focused on implementation at the regional level, MPOs are uniquely situated to be in the forefront of this process. However, given the vast amount of information regarding climate change, and the fact that many research and pilot projects are still ongoing, it can be difficult to determine the most feasible strategy. Further complicating matters, it is quickly becoming apparent that there is no “one-size-fits-all” approach to climate change adaptation. Differences in physical and environmental conditions, MPO staff capabilities, political support, and regional transportation priorities all underscore the need for each MPO to determine the best strategy for their region.

This document is intended to guide an MPO’s internal discussion regarding how to begin to integrate climate change adaptation into their larger efforts to confront climate change. Throughout this document, the term “adaptation strategy” refers to the course of action an MPO will take to address climate change adaptation.

Overview of Climate Change Adaptation

The transportation planning community has been at the forefront of climate change mitigation for many years. These efforts are largely designed to reduce, or mitigate, the magnitude of climate change in the future, mainly by identifying strategies to reduce greenhouse gas (GHG) emissions. Climate change adaptation, conversely, is focused on finding ways to prepare, or adapt, for the climate change impacts which are already occurring or forecasted to occur.

The prevailing consensus among most agencies is that vulnerability/risk assessments are an important first step in adaptation planning. As regional agencies with a high level of flexibility and institutional knowledge regarding transportation assets, MPOs are well-situated to take part in, or lead, these efforts. The FHWA, as part of its ongoing Adaptation Conceptual Model Pilots program, has issued a draft Risk Assessment Model. This is intended to help identify which assets are most vulnerable to climate change threats, and which could face the most serious consequences from those threats.

At its most basic, the model is made up of three steps:

1. Develop inventory of assets;
2. Gather climate information; and
3. Assess the risk to assets and the transportation system as a whole from projected climate change.

This model is designed to be quite broad, to allow for a wide amount of flexibility. However, this lack of specificity can make it difficult to know where to begin. For instance, which assets should be inventoried? What information should be included in this inventory? What are the relevant data sources for the risk assessment? Is this a project the MPO can complete, or should the MPO seek to participate in a parallel process with another agency?

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Key Considerations

To help answer these questions, three key considerations have been identified which influence how an MPO can address climate change adaptation. These include causal factors, regional priorities, and scale. All three of these factors are interrelated, making it important for each to be considered, either formally or informally, prior to committing to an adaptation strategy. The following sections of this document examine each key consideration.

Causal Factors: the anticipated climate events which are likely to affect a region. This may include sea level rise, storm surge, heat increases, extreme storm events, and/or flooding. A good starting point for transportation-related climate information is FHWA's "Regional Climate Change Effects: Useful Information For Transportation Agencies." (See page 5 for link to document.) This document breaks down the likely climate events by region, and provides an overview of related impacts and consequences. Understanding which climate-related events are most likely to occur in a particular region can help an MPO determine:

- The **impacts and consequences** the causal factor is likely to create: Each type of climate related event is anticipated to cause a different impact to infrastructure and/or operations. Understanding the broad impacts can help to define the scope of future adaptation projects to the issues most relevant to a particular region. For example, coastal areas are more likely to be concerned with storm surge and sea level rise, while inland areas may devote their attention to extreme storm events.
- The **time frame/uncertainty** of the related impact: Some types of climate-related events have a long, but relatively easy to forecast, event horizon, such as sea level rise or heat increases. Other events, such as extreme storms, are more likely to occur given climate change, but difficult to predict.
- The **type of data** needed to conduct a vulnerability/risk assessment: This might include detailed topography/LIDAR contours, surficial geology, areas prone to flooding, land use cover, or other data, depending on the causal factor.
- **Availability of data:** MPOs may not have the technical expertise to generate data regarding climate change forecasting, and so should rely on information endorsed by outside agencies such as NOAA, FHWA, NYSDOT, the state Climatologist, or other sources. However, data relating to the specific causal factor may not yet be available; in this case the MPO can monitor these data sources until the information to progress the climate adaptation strategy is made available.

Regional Priorities: the adaptation strategy objectives for the MPO. This can be developed as part of a Long Range Plan or as part of a separate adaptation planning document. These could include emergency evacuation, preventing flooding/washouts, planning for future growth/land use, or all of the above. Identifying a set of priorities will help an MPO to shape the scope and/or final products of an adaptation plan, including:

- What **type of product** would be most helpful: Depending on the interests of the MPO and/or project partners, the adaptation strategy might include any or all of the following:
 - Criticality Assessment
 - Asset Inventory
 - Risk/Vulnerability Assessment
 - Training/education materials for local boards

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- Data repository/mapping
- Active participation/staff support in non-MPO adaptation projects

The key decision for an MPO is which of these types of products will be most relevant and useable within the region.

- The **likelihood of regional support/implementation**: Although an MPO may be eager to take on adaptation planning, it is important to consider whether these projects will have support among the communities in the region. Climate change may not be the most pressing issue to member communities, due to a variety of factors. Framing the issue in terms of infrastructure preservation may have less political connotation, and may therefore be more readily accepted.
- Whether the **priorities are already being addressed** through non-MPO planning efforts: In New York, the Climate Action Council and ClimAID programs are actively pursuing several adaptation strategies. If the highest priority turns out to be maintenance of state-owned transportation infrastructure, an MPO could seek to actively partner with state agencies on these efforts, rather than produce a separate product.
- The **assets/operations which will be included in the analysis** (if any): Adaptation strategies should take into account any existing priorities within the MPO, such as transit, safety, and/ or sustainability. This can help tailor the scope of the adaptation product.

Scale: refers to both the specificity of the intended final product, and the range of issues the project will address. Adaptation strategies can range from broad-based assessments to site-specific inventories, and can also address many climate change factors simultaneously, or be devoted to one topic at a time. Finding the balance between feasibility and applicability will be a key factor. This may include the following considerations:

- The **level of detail** of the data required, and **whether additional data will need to be collected**: It may be possible to complete some broader-based projects, such as regional vulnerability assessments, using existing GIS-based data sources. However, more specific projects, such as the vulnerability of culverts to extreme storm events, would require a highly detailed analysis. It is likely in this case that additional data would need to be collected. MPOs will therefore need to determine whether that data collection could feasibly be completed using staff resources, or whether consultant services or project partners will be necessary.
- The **resources (staff and financial) necessary** to complete the project: Large-scale projects which address multiple issues may not be feasible for some MPOs to complete, in which case phasing of the project, limiting the scope to a small geographical area, or partnering with other agencies may be a good option. Similarly, highly focused projects may require outside expertise to complete.
- The **assets/operations which will be included in the analysis**: Broad regional assessments may take into consideration only federal-aid eligible roads, where more specific local analyses may be targeted to all roadways and bridges within a municipality. The scale should be considered for operational assets as well.

Potential Partners

Addressing the considerations listed above should help guide an MPO's strategy regarding climate change adaptation. In many cases, the way forward will involve working closely with other agencies, as the MPO plays a role as a project lead or an active participant. Below is a partial list of some of the agencies which may be a beneficial partner for climate change adaptation efforts, organized by expertise. This is not intended to be a complete listing of all relevant agencies, but merely as a starting point for an MPO to begin planning an adaptation strategy.

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Expertise	Relevant Agency
Climate change forecasting/environmental impacts	NOAA NYS Climatologist EPA NYSERDA NYSDOT NYSDEC ACOE
Risk/Vulnerability Assessments FHWA	FTA ACOE NYSDOT NYSDEC Local Transit Agencies Thruway/Port Authorities Local/County DPW
Emergency Response FEMA	FTA FHWA Dept. of Homeland Security Local Fire/Police Departments Local Transit Agencies Local/County DPW

Useful Resources

Several useful resource documents and websites have been listed below. This is not intended to be an all encompassing list, but merely to help MPO staff begin to research climate change adaptation strategies.

FHWA. *Applications of Geographic Information Systems (GIS) for Transportation and Climate Change*. August 2011.

http://gis.fhwa.dot.gov/documents/Climate_Change_Report_Aug2011.pdf

FHWA. *Assessing Vulnerability and Risk of Climate Change Effects on Transportation Infrastructure: Pilot of the Conceptual Model*.

http://www.fhwa.dot.gov/hep/climate/conceptual_model62410.htm

FHWA. *Literature Review: Climate Change Vulnerability Assessment, Risk Assessment, and Adaptation Approaches*. July 24, 2009.

<http://www.fhwa.dot.gov/hep/climate/ccvaraaa.htm#Toc236233837>

FHWA. *Regional Climate Change Effects: Useful Information for Transportation agencies*. May 10, 2010.

http://www.fhwa.dot.gov/hep/climate/climate_effects/

FTA. *Flooded Bus Barns and Buckled rails: Public transportation and Climate Change Adaptation*. August

2011. <http://www.fta.dot.gov/research>

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Meyer, Michael D. *Design Standards for U.S. Transportation Infrastructure: The Implications of Climate Change*. 2008. <http://onlinepubs.trb.org/onlinepubs/sr/sr290Meyer.pdf>

NYS Climate Action Council. *New York State Climate Action Plan Interim Report*. November 9, 2010. <http://nyclimatechange.us/InterimReport.cfm>

NYSDOT. *Mainstreaming Climate Change Adaptation Strategies into New York State Department of Transportation's Operations*. October 31, 2011. <http://www.utrc2.org/research/assets/193/synthesisfinalReport1.pdf>

NYSERDA. *Report 11-18 Response to Climate Change in New York State (ClimAID)*. <http://www.nyserdera.ny.gov/Publications/Research-and-Development/Environmental/EMEPPublications/Response-to-Climate-Change-in-New-York.aspx>

Schwartz, Henry G. "Adapting to Climate Change: Another Challenge for the Transportation Community". *Transportation Research Circular E-C152: Adapting Transportation to the Impacts of Climate Change State of the Practice 2011*. June 2011.

Transportation Research Board. *Special Report 290: Potential Impacts of Climate Change on U.S. Transportation*. 2008. <http://onlinepubs.trb.org/onlinepubs/sr/sr290.pdf>