

Vulnerability of Water to Climate Uncertainty and How to Adapt Effectively

MNGWPD Utility Climate Resiliency Study



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**CDM
Smith**®

Preview

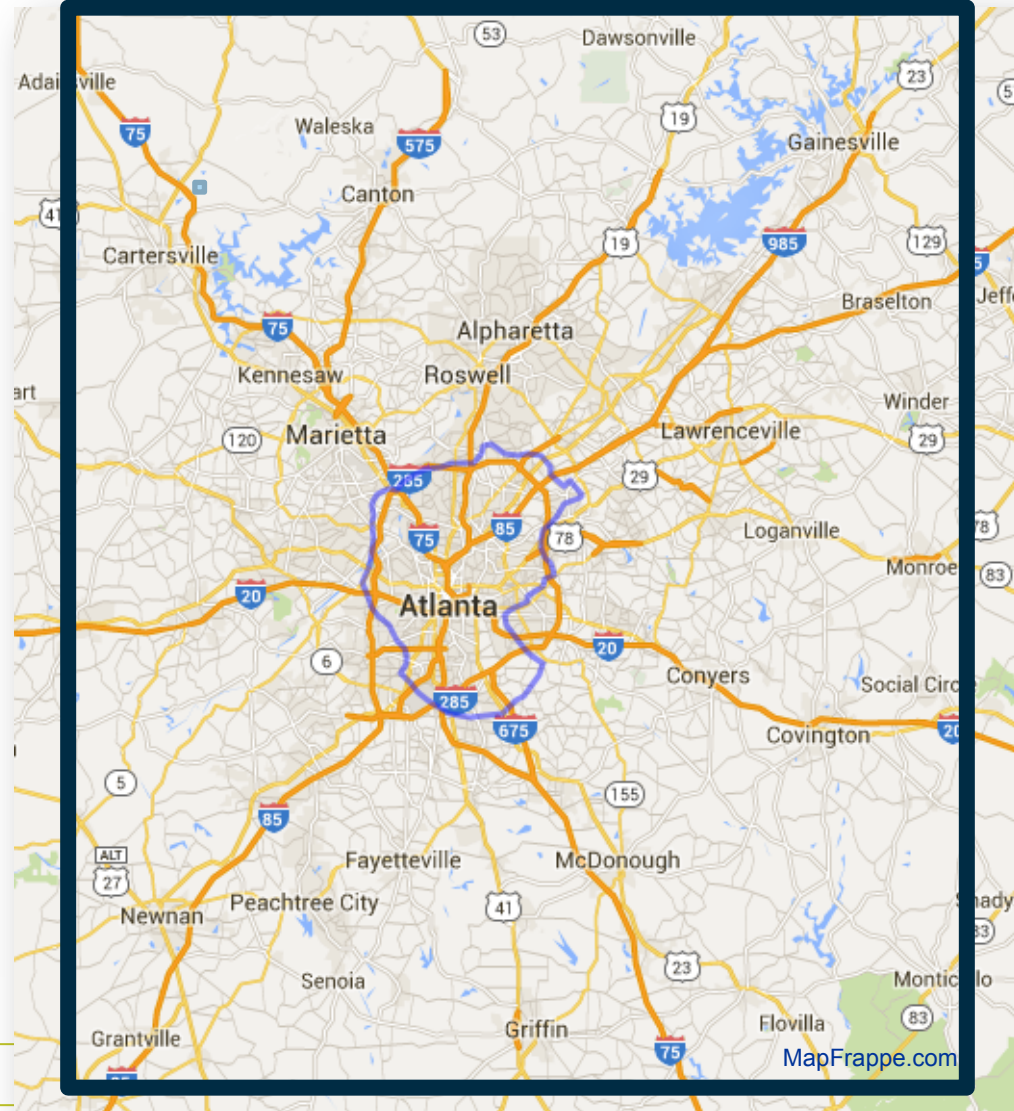
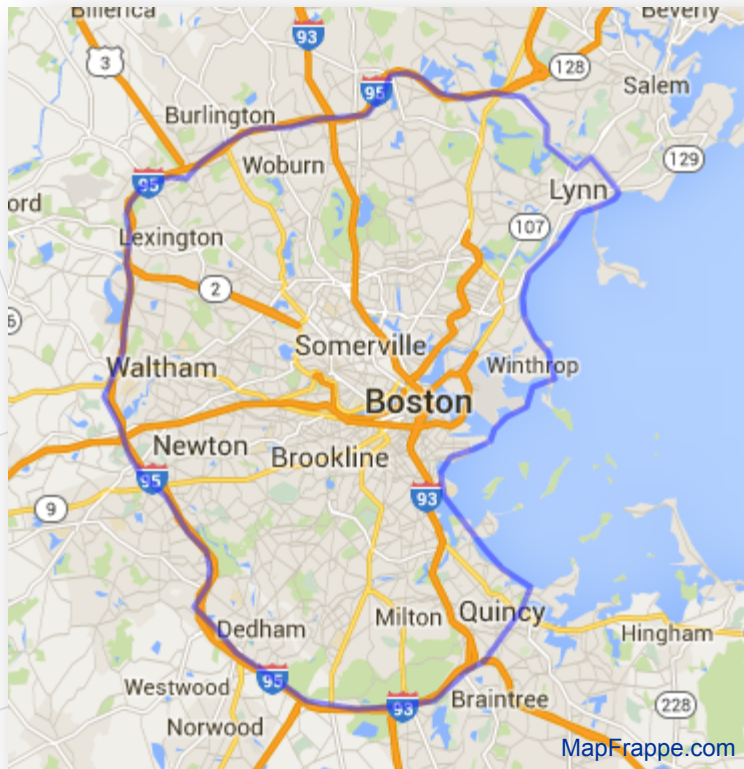
- **Introduction**
- **Goals of the Study**
- **Review of Climate Vulnerability Impacts**
- **Adaptive Strategies**
 - Adaptive Measures for Issues of Greatest Concern
 - Opportunities to Realize Multiple Benefits
 - Considering Preemptive Measures



vs.



April 25-28, 2016



Did You Mean “Climate Variability?”

The screenshot shows the Georgia USA website with a search bar containing "climate change". Below the search bar, there is a "NEW GEORGIA NEWSROOM" banner. The search results section shows "Results 1 - 1 of 1." and a single result: "Georgia welcomes 2009 BIO International Convention to Atlanta". The result text includes: "ATLANTA, May 18, 2009 — Governor Sonny Perdue today welcomed the 2009 BIO International Convention to Atlanta on May 21 and is expected to draw up to 15,000 industry professionals in the bioscience and biotechnology sectors to Georgia's strategic industries, and hosting the 2009 BIO International Convention is expected to create 10,000 jobs. For more information, visit <http://www.georgia.org/newsroom/press-releases/georgia-welcomes-2009-bio-international-convention-to-atlanta>."

The screenshot shows the City of Atlanta website with a search bar containing "climate change". The search results section shows "Search" and "Did you mean: [climatechange?](#)". Below this, it states: "Your search - 'climate change' - did not produce any results." and "Suggestions:" followed by a list of suggestions:

- Make sure all words are spelled correctly.
- Try different keywords.
- Try more general keywords.
- Try fewer keywords.

Drought-Stricken South Facing Tough Choices

By BRENDA GOODMAN OCT. 16, 2007



- Home
- News
- Travel
- Money
- Sports
- Life
- Tech

News » Nation » Census » Troops at Risk » Lotteries



Some men fish from the shore of a section of Lake Sidney Lanier in Buford, Ga. Lake Lanier is the main source of water for metropolitan Atlanta.

By Greg Bluestein, AP

Ruling leaves North Georgia with water crisis

Updated 8/19/2009 10:13 AM | Comment | Recommend

E-mail | Print

Worst-case analyses indicate that Lake Lanier, the main water source for Atlanta, could be drained dry within four months. Pouya Dianat/The Atlanta Journal-Constitution

Atlanta Suffers as Southeast Drought Continues



Tri-state water wars: Florida, Georgia governors meet in secret

By The Associated Press on June 09, 2015 at 5:58 PM

Georgia officials give drought the silent treatment

The governor declines to declare that one exists. Critics say it's all about business.

Flooding more widespread across metro Atlanta, north Georgia

© 10:59 p.m. Thursday, Dec. 24, 2015 | Filed in: Local News

AJC.com



6:32 80°
RAIN CAUSES FLOODING AT LOCAL APARTMENTS
ATLANTA
CBS 46

Atlanta 48° Overcast
11 AM 51°
2 PM 58°

WSB-TV 2 ATLANTA

HOME NEWS WEATHER VIDEO TRAFFIC 2 INVESTIGATES SPO

HOME > NEWS > LOCAL

Updated: 11:33 a.m. Tuesday, Dec. 29, 2015 | Posted: 12:35 p.m. Monday, Dec. 28, 2015

Most of Georgia still at risk for flooding

Atlanta Flooding Update: Heavy Rain Shuts Down Roads In Metro Area

BY JESSICA MENTON ON 05/31/15 AT 5:25 PM



IBT

Hell and High Water hits Georgia



CLIMATE PROGRESS

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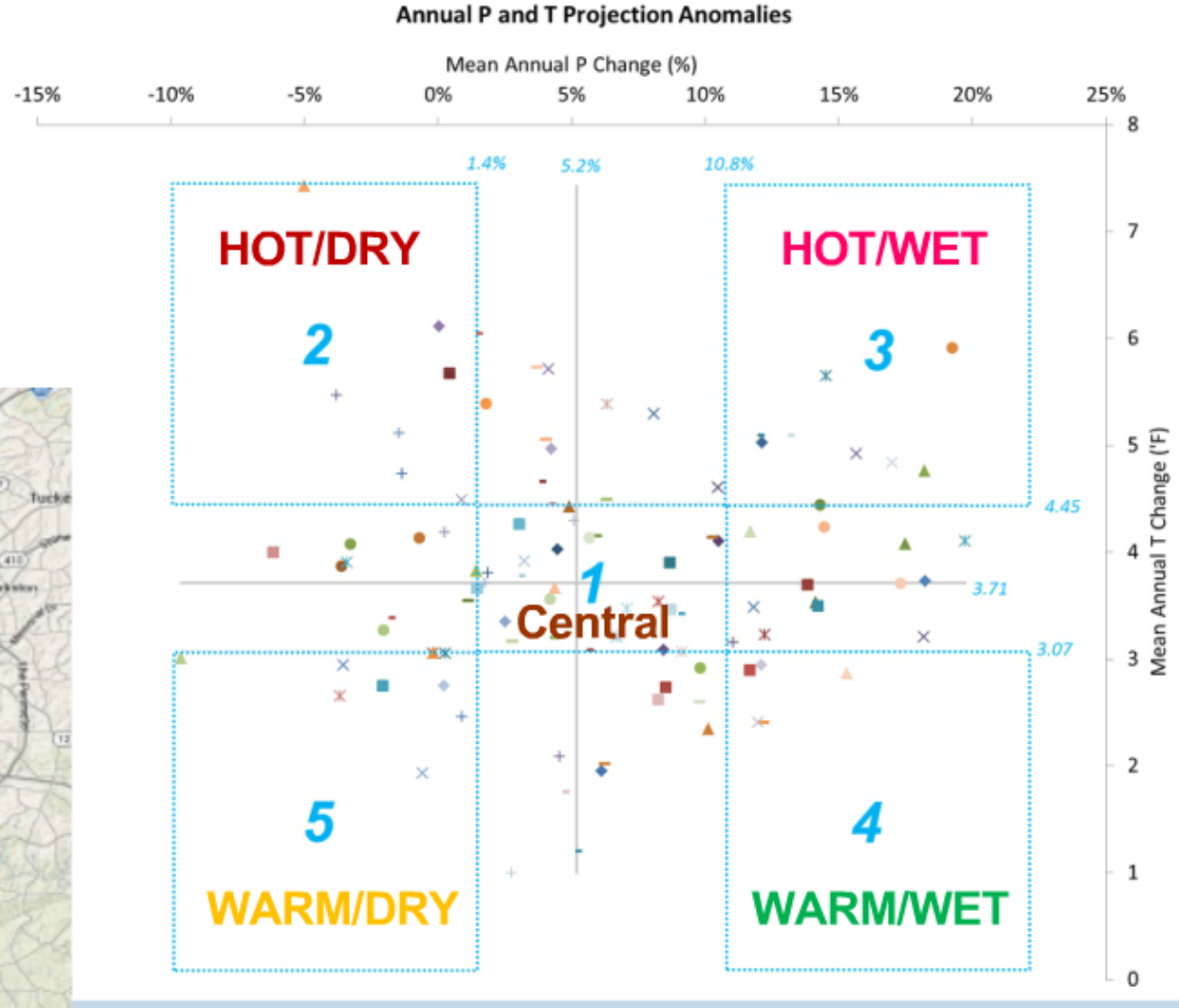
Goals of This Study

- Assess the potential vulnerability of water resources and related infrastructure within the MNGWPD to potential climate conditions in the future.
 - The purpose was **NOT** to predict future climate conditions or the likelihood that certain conditions could occur.
 - The purpose **WAS** to identify potential climate conditions that, if they do occur, could create specific risks to the water resources within the District:
 - Water demand
 - Water supply
 - Water quality
 - Storm intensity and frequency
 - Pollutant loading
 - Water related infrastructure

Representative Summary of Climate Models for 2050

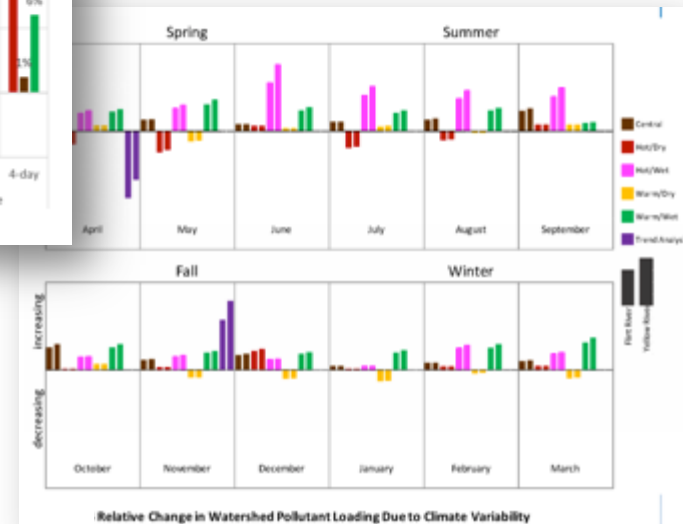
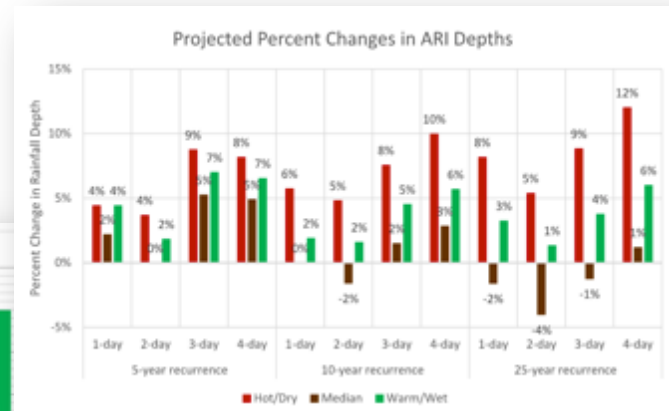
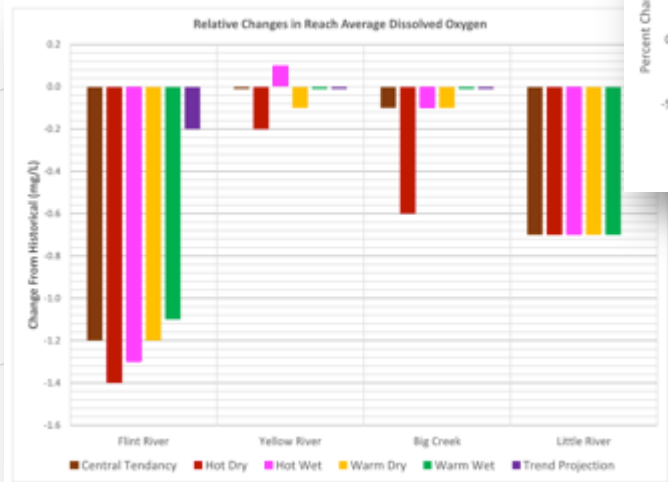
5 representative scenarios of possible future climate conditions

1 additional scenario developed by extending historic records through 2050.



Climate Vulnerability Analysis of Water Resources

- Employed existing models and developed analytical spreadsheet models for case study/pilot areas.
- Water demand, water supply, water quality, and watershed characteristics

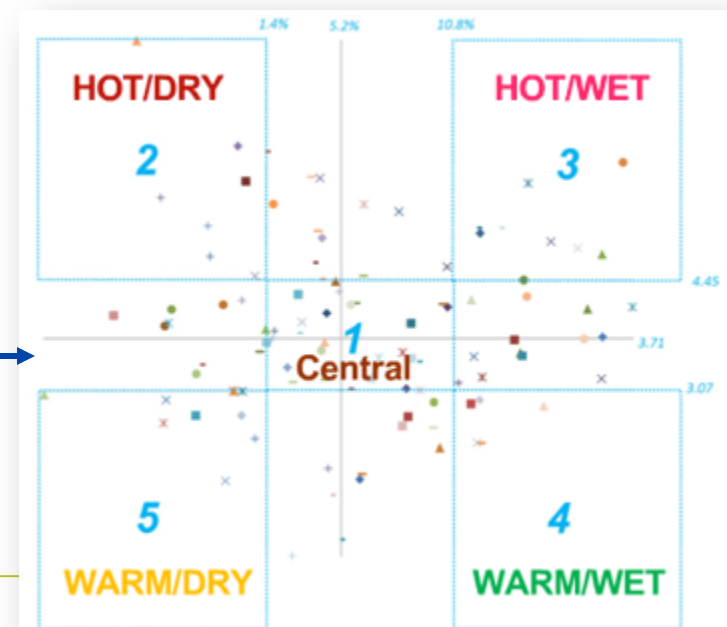


Main Climate Impacts

- **Water Demand**
 - Increase (1.3%-3.8%)
- **Water Supply**
 - Potential decrease in firm yield for some reservoirs (5-10%)
- **Water Quality**
 - Decrease in annual low flows
 - Increase in water temperatures of 0.1-2.9°F
 - Decrease in DO by up to 1.4 mg/L
- **Watershed Impacts**
 - Increase in storm frequency and intensity (0-12% depth)
 - Higher peak streamflow (5-11% for 5-yr storms)
 - Increase in pollutant loading (-1 to +15% range across scenarios)
- **Drought**
 - Tendency toward more frequent and severe droughts

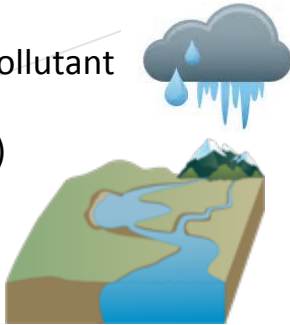
Adaptation Strategies Methodology

- Utility/Infrastructure Focus
 - Water Treatment Plants
 - Wastewater Treatment Plants
 - Stormwater Conveyance Systems
 - Dams and Levees
 - Wastewater Collection Systems
 - Streams and Ecosystems
 - Reservoirs
- Literature Review (including 2009 Metro Water District Plans, Expert Consultation)
- Adaptive vs. Preemptive Actions



Impact

Increased pollutant loading
(-1 to +15%)



Issues

More stringent effluent regulations



Scenarios

- ✓ Central
- ✓ Hot/Dry
- ✓ Hot/Wet
- ✓ Warm/Dry
- ✓ Warm/Wet
- ✓ Trend

Key Adaptation Strategies

- **Regulate** point sources and non-point source pollutant sources
- **Land use planning** changes
- Mitigate non-point source pollution increases through **green infrastructure**

Links to 2009 Wastewater Plan

- Consider potential for more stringent regulation during planned **plant upgrades** (Action 6.3)
- Help protect water quality through better planning and **maintenance of septic and decentralized systems** (Actions 8.1-8.6)

Impact

Increased storm frequency and intensity (0-12% depth increase)



Issues

Capacity issues leading to increased street flooding



Scenarios

- Central
- Hot/Dry
- Hot/Wet
- Warm/Dry
- Warm/Wet
- Trend

Key Adaptation Strategies

- **Increase capacity** of stormwater collection, conveyance, and storage systems.
- Design **green infrastructure** to reduce stormwater volumes.
- Conduct **extreme precipitation event analyses** with climate change to understand the risk of impacts to the stormwater water collection system.
- **Monitor and inspect** the integrity of existing infrastructure.
- **Reduce inflow/infiltration** by preventing illegal connections and leaks to reduce flow volumes.

Links to 2009 Watershed Plan

- Consider increased storm depths for development stormwater management (Action 5.A.1)
- Ensure **best practices** in place for stormwater design (Action 5.C.2)
- Effectively **manage existing assets** to maintain capacity (Actions 5.D.1 – 5.D.5)

Multi-Benefit Solutions

Example:

Green Infrastructure



Reduce flooding from increased storm depth

Reduce need for back-up WTP and WWTP

Reduce need for increased dam and levee level of service

Reduce non-point source pollutant loads

Wastewater treatment effluent regulations

Limit need for changes in WTP treatment processes

Many Preemptive Measures were Policy Recommendations

- Adaptive management: Monitor weather trends including precipitation and temperature.
- Design system-specific drought management plans.
- Participate in community planning and regional collaboration related to climate considerations.
- Establish mutual aid agreements with neighboring utilities.
- Adopt insurance mechanisms and other financial instruments, such as catastrophe bonds, to protect against financial losses associated with infrastructure losses.
- Regulate point source and non-point source pollutant loads.

Conclusions

- Any future climate variability will create risks to water and water-related facilities.
- We don't know which trends are most likely, so:
 - Monitor climate trends and plan **adaptively**
 - Identify triggers for action
 - Prioritize climate-induced actions as part of Plan Integration by considering the severity of risks and the range of potential causes
 - Consider **preemptive** measures that will yield benefits regardless of climate trends:
 - Drought management plans
 - Incentivizing green infrastructure, which helps avoid numerous risks

Acknowledgements

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- CDM Smith Team

- Questions?

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