Dealing with Disruption: Operationalizing Resilience in the Water Sector

Understanding Resilience, from Concept to Implementation Strategy

September 17, 2019 | 2:00 PM – 3:30 PM ET

Co-hosted by: NACWA THE VOICE FOR A CLEAN WATER FUTURE

ASSOCIATION OF METROPOLITAN WATER AGENCIES

Speakers

John Sullivan
Chief Engineer
Boston Water and Sewer Commission
Boston, MA

Kishia Powell
Commissioner
City of Atlanta Department of Watershed Management
Atlanta, GA

Hardeep Anand
Co- Chair, NACWA Climate & Resiliency Committee
Deputy Director of Capital Improvements Program
Miami-Dade County Water and Sewer Department
Miami, FL

Gareth Morgan
Director of Resilience
City of Cape Town
Cape Town, SA

Kevin Shafer
Executive Director
Milwaukee Metropolitan Sewerage District
Milwaukee, WI

Nadia Vogt
Senior Project Manager
Milwaukee Metropolitan Sewerage District
Milwaukee, WI

NACWA/AMWA Resilience Webinar Series

Dealing with Disruption: Operationalizing Resilience in the Water Sector

Part 1: *Understanding Resilience, from Concept to Implementation Strategy*

CITY OF ATLANTA DEPARTMENT OF watershed management

Kishia L. Powell, Commissioner

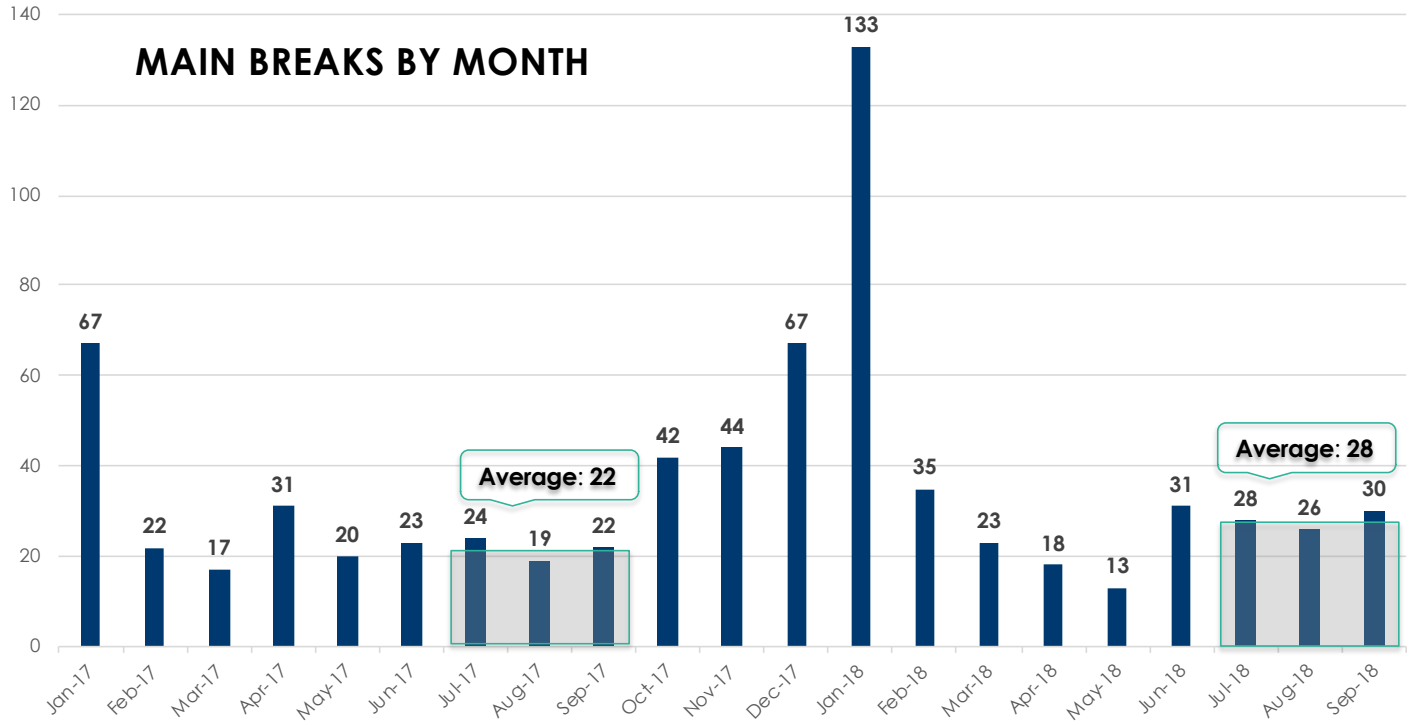
September 17, 2019

Urban Water Resilience

Resilient systems withstand, respond to, and adapt more readily to shocks and stresses to emerge stronger after tough times, and live better in good times.

- City of Atlanta is a partner in the Rockefeller Foundation's 100 Resilient Cities initiative
- Identified shocks and stresses
  - **Aging infrastructure/Infrastructure failure**
  - Cyber attack
  - **Drought**
  - Economic inequality
  - **Rainfall flooding**
  - Terrorist attack

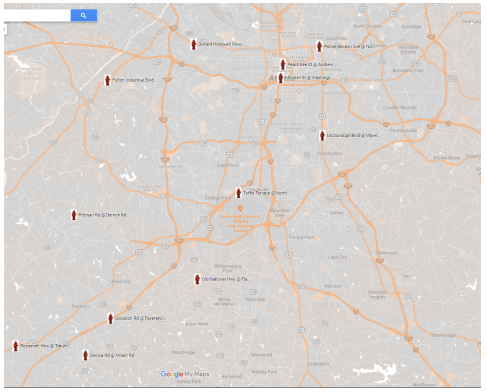
Aging Infrastructure

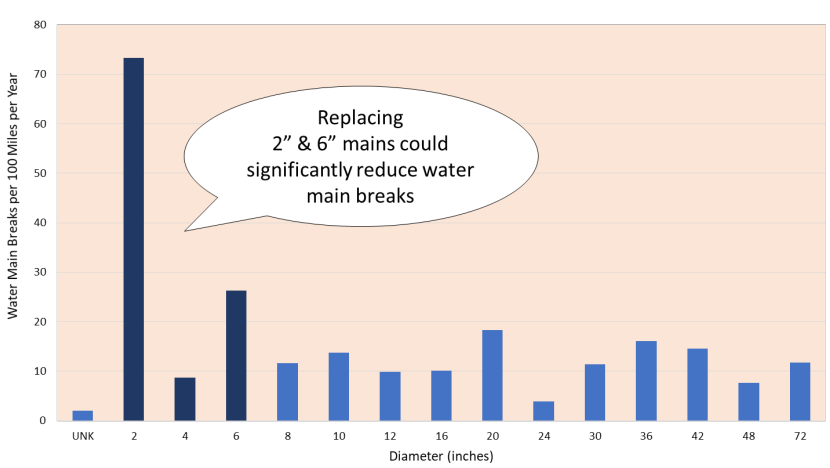


- Main Breaks are 30% higher for the first quarter of fiscal year 2019 as compared to the same time period in fiscal year 2018

Infrastructure Failure Mitigation

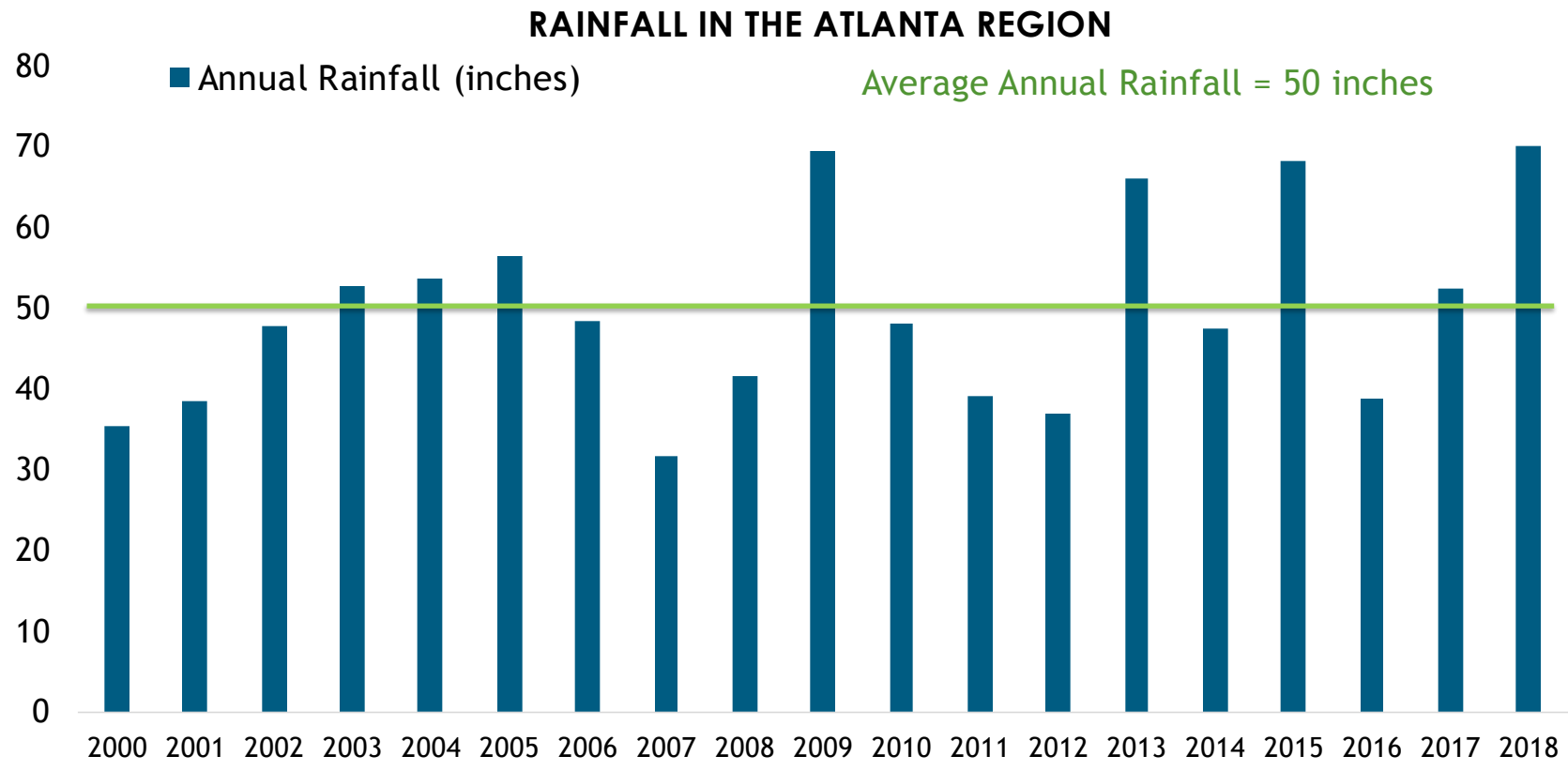
- Large Diameter Water Main Assessment Program
- Satellite Leak Detection Program
- Small Diameter Water Main Replacement Program
- Water Distribution System Optimization





Total Validated Leaks				
Type of Leak	**Non-Surfacing**	**Uncovered to Expose**	**Surfacing**	**Grand Total**
Main Leaks	3	0	12	**15 (11%)**
Main Appurtenances	6	16	10	**32 (22%)**
Residential Leaks	8	18	10	**36 (25%)**
Service Leaks	3	39	19	**61 (42%)**
Grand Total	**20 (14%)**	**73 (51%)**	**51 (35%)**	**144**

Drought

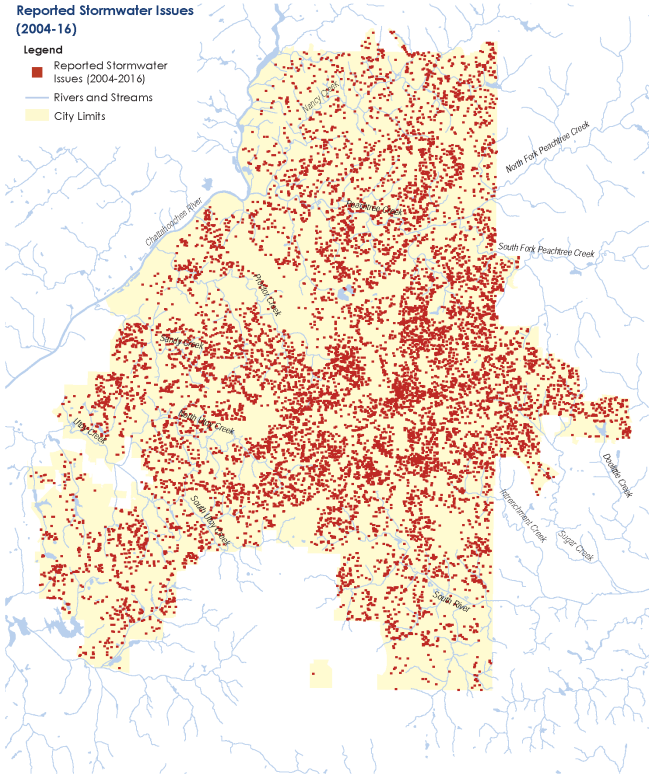

RAINFALL IN THE ATLANTA REGION
Annual Rainfall (inches)
Average Annual Rainfall = 50 inches
80
70
60
50
40
30
20
10
0
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

Water Supply Program

The WSP reflects Atlanta's **$350 million investment to address aging infrastructure and create a more sustainable water future** by creating a five-mile tunnel to repurpose an old rock quarry as a new raw water reservoir to hold 2.4 billion gallons; increasing the City's water reserves from 3 to 30 days or more and **protecting $100M a day in economic output**.

Rainfall Flooding

- **Challenges**
  - Areas across the City of Atlanta prone to localized ponding/flooding
  - Downtown and Midtown areas have combined sewers and high degree of impervious surface
  - Private property damage and flooding
  - Large contributing drainage areas
- **Key Indicators**
  - Average of 1300 complaints annually
  - Major flooding in Sept 2009; some areas under 2' of water

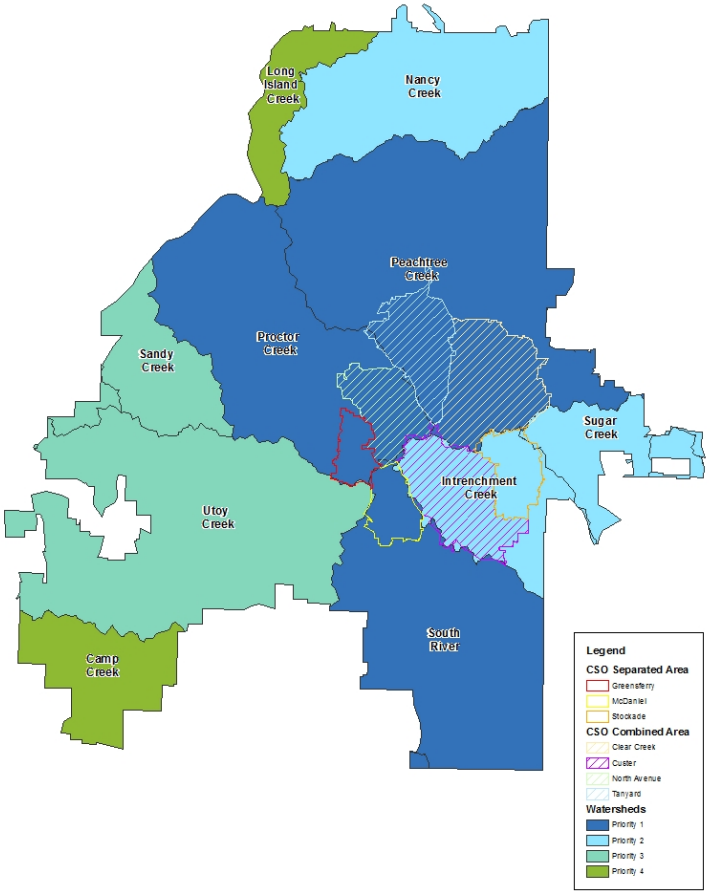


Stormwater drainage issues occur throughout the City of Atlanta

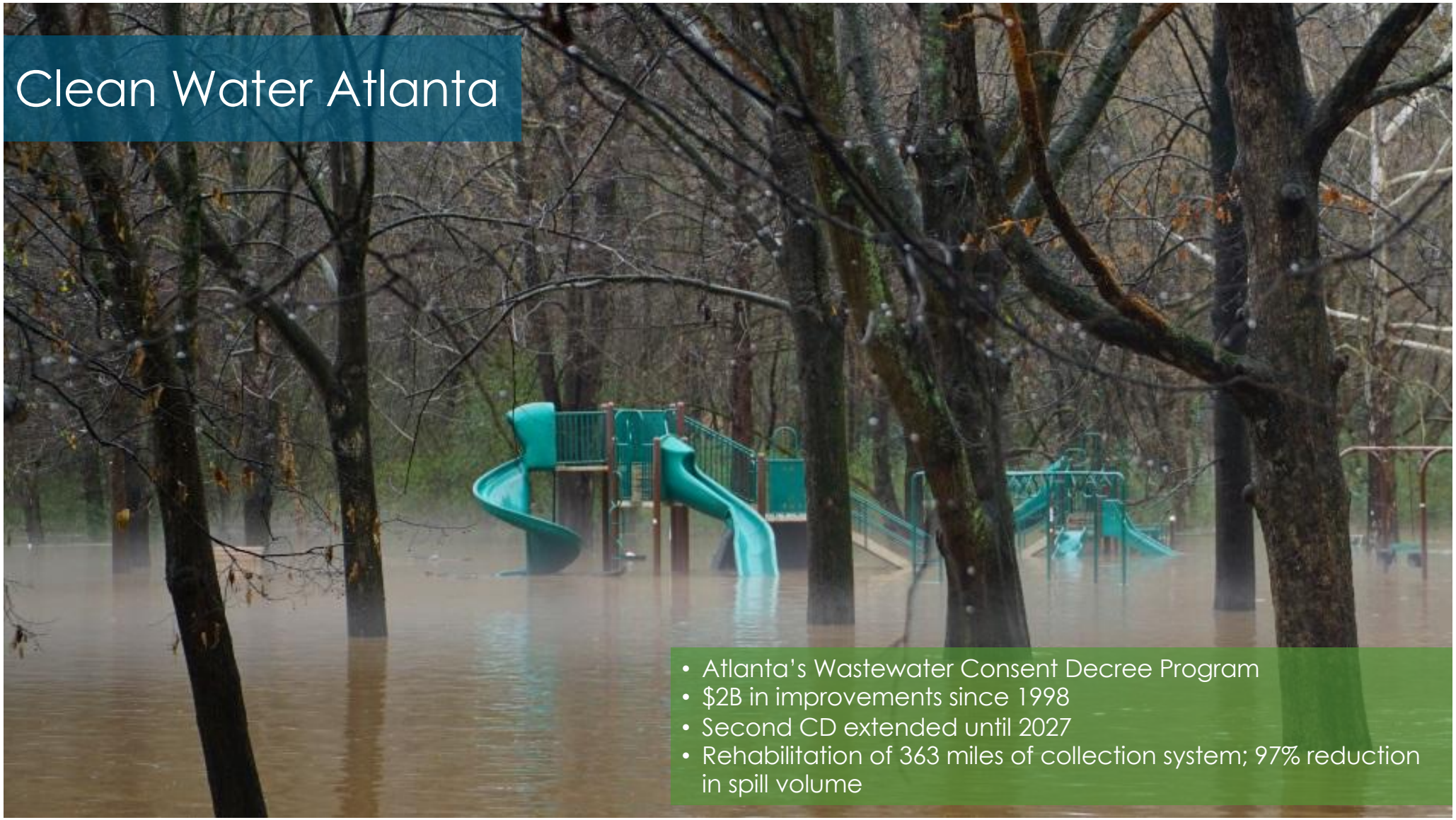
Integrated Watershed Management

Protection and restoration, on a watershed basis, to improve water quality, ensure resilience and manage resources while addressing the challenges of growth and climate change

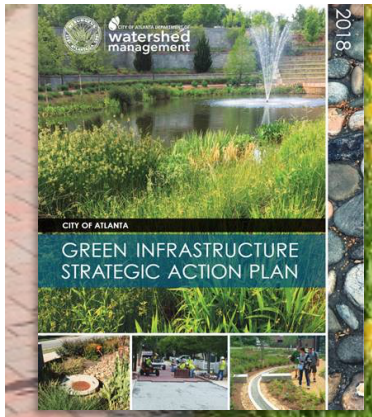
- 10 watersheds prioritized in 2012
- Watershed Improvement Plan (WIPs) updates underway
- Maintain a program in alignment with the Metro District Water Resources Management Plan (June 2017)
- Underpinned by our GI Strategy, WIPs, Clean Water Atlanta, Urban Waters Program and Water Supply Program



Clean Water Atlanta



- Atlanta's Wastewater Consent Decree Program
- $2B in improvements since 1998
- Second CD extended until 2027
- Rehabilitation of 363 miles of collection system; 97% reduction in spill volume



Green Infrastructure Strategic Action Plan

- Action Plan developed in 2012
- GI Task Force leverages multiple stakeholders
- Highlighted Atlanta as leader in GI Implementation
- Four action areas including sustainable funding and policy development

GREEN INFRASTRUCTURE GOAL:

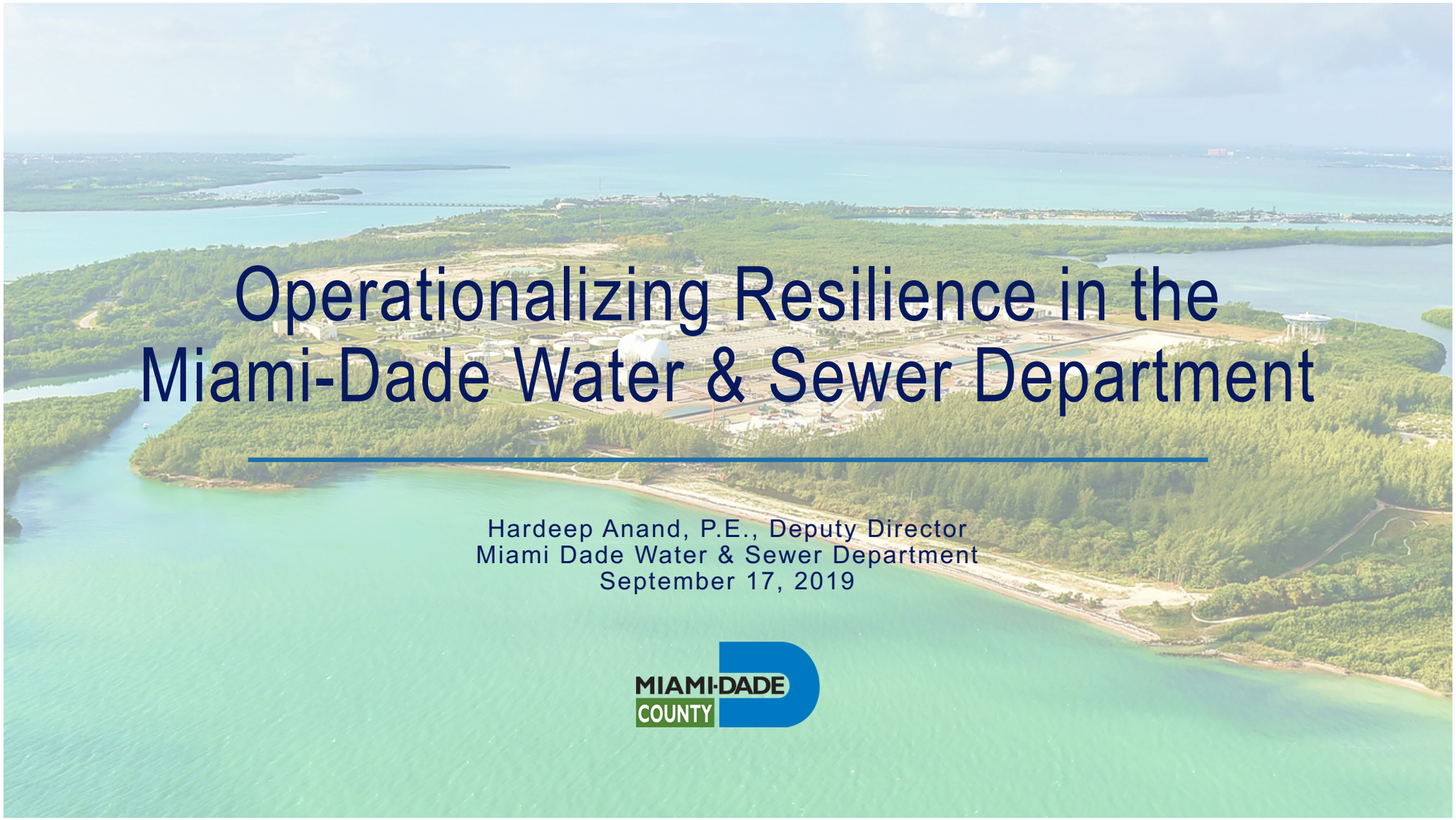
225 Million Gallon Reduction of Runoff Annually

(Annual 1% reduction in volume of runoff from a 1" storm)

Historic Fourth Ward Park

- In 17-acre park setting
- CD solution saved $15M over the grey infrastructure solution (tunnel and underground storage)
- Brownfield clean-up
- $475M in economic investment followed


Capacity Relief Ponds at
Rodney Cook Sr. Park
Substantial Completion
December 2019



Operationalizing Resilience in the Miami-Dade Water & Sewer Department

Hardeep Anand, P.E., Deputy Director
Miami Dade Water & Sewer Department
September 17, 2019

MIAMI-DADE COUNTY

MIAMI-DADE COUNTY

Agenda

- Greater Miami and the Beaches Ecosystem
- Challenges & Solutions
- Regional Leadership & 305 Strategy
- City Water Resilience Assessment
- Prioritizing Actions
- Next Steps

Resilience Can Be Defined in Many Ways

The ability to adapt to changing conditions and withstand, and rapidly recover from, disruption, due to emergencies.

— as defined by the U.S. Government

The capacity of a system to anticipate risk and potential harm, prepare, plan for, and absorb impacts, and bounce back and recover from adverse, disruptive events.

— as defined by the
U.S. Environmental Protection Agency

The capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience.

— as defined by 100 Resilient Cities

強靭 (kyo-jin)

The state of being tough and supple.

— Resilience in Japanese

Greater Miami & the Beaches Ecosystem

Greater Miami & the Beaches
Key Characteristics

- **Population Served**

  2.7 Million Residents — 5,830 People Per Square Mile Within the Urban Area

- **Coastal Community**

  6.5 feet above sea level and prone to severe weather, the region's economic drivers are weather dependent

- **Seagrass to Sawgrass**

  We have the "seagrass" of the Atlantic Ocean and Biscayne Bay to the east, and the sawgrass of the Everglades wetlands to the west

- **Conservation Areas**

  2/3 Protected Lands, Including National Parks, Marine Sanctuaries, and Water Management Areas

- **Porous Geology**

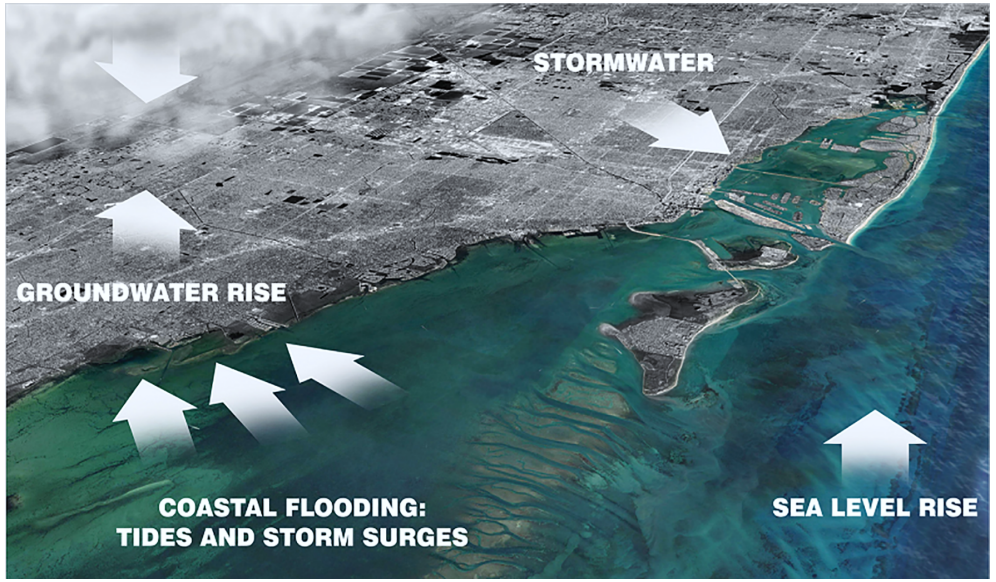
  One of the largest water management systems in the world, which includes a shallow aquifer & gravity-based drainage system

Surrounded by Water From Every Direction

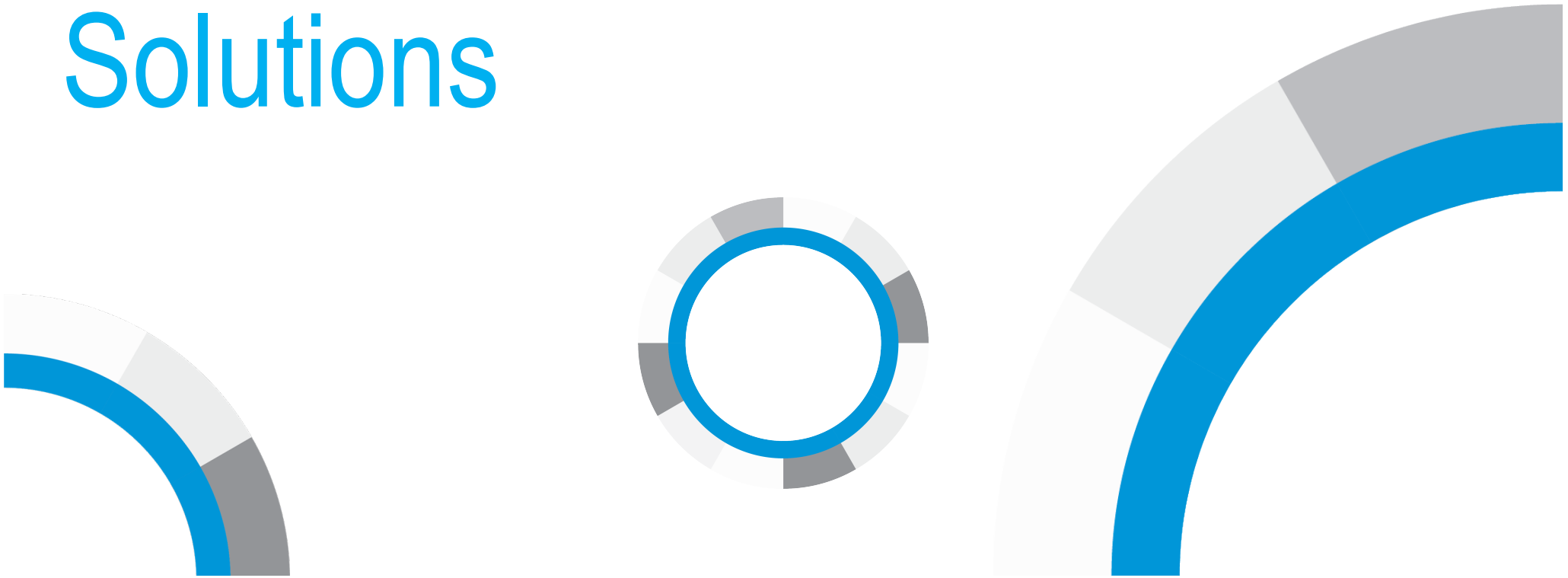






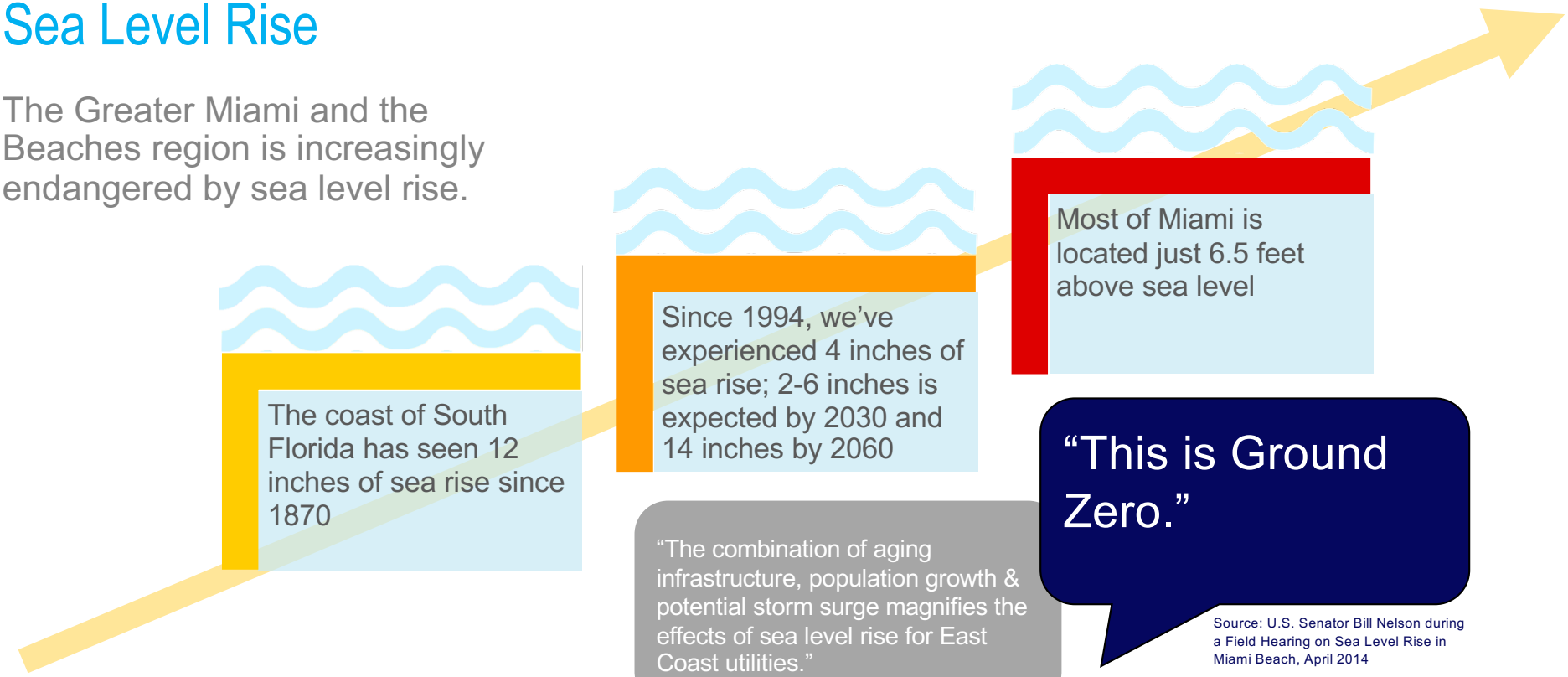




Challenges & Solutions



Sea Level Rise

The Greater Miami and the Beaches region is increasingly endangered by sea level rise.

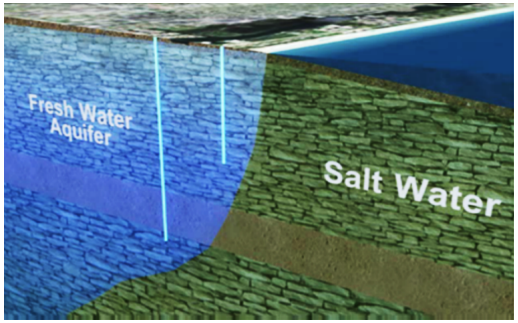


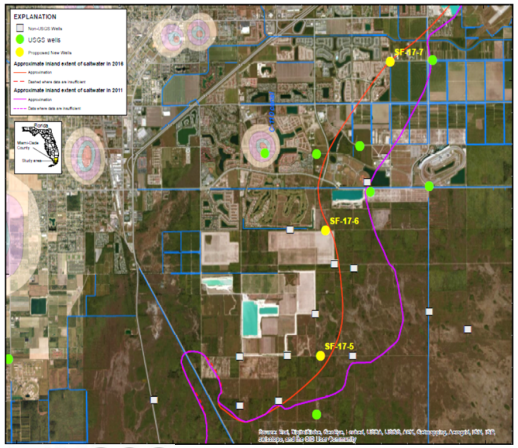
Source: National Infrastructure Advisory Council, Water Sector Final Report & Recommendations, 2016

Source: U.S. Senator Bill Nelson during a Field Hearing on Sea Level Rise in Miami Beach, April 2014

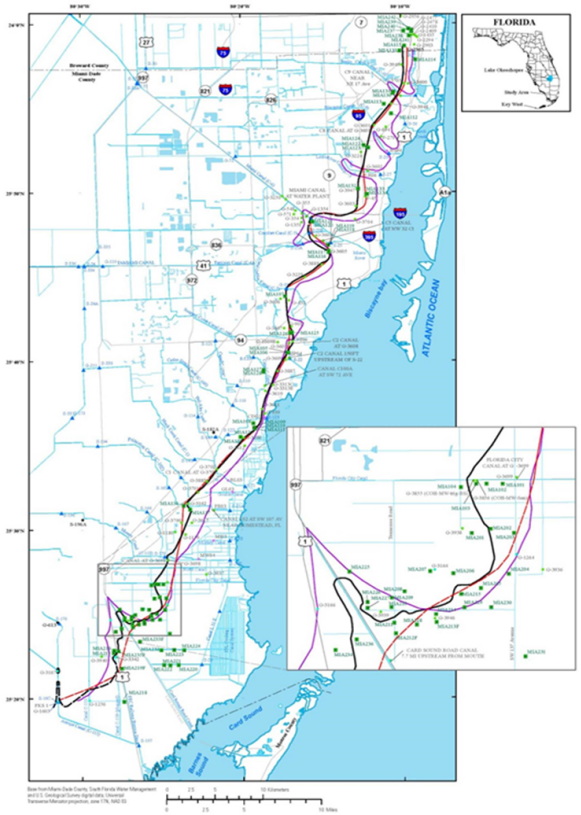
Saltwater Migration & Intrusion

- Sea-level rise, in combination with increased groundwater pumping can expand saltwater intrusion into groundwater aquifers.
- In South Dade, the salt front has moved significantly inland between 2011 and 2016.
- Saltwater intrusion into groundwater aquifers can increase treatment costs for drinking water facilities or render groundwater wells unusable.





USGS
science for a changing world



Sunny Day Flooding

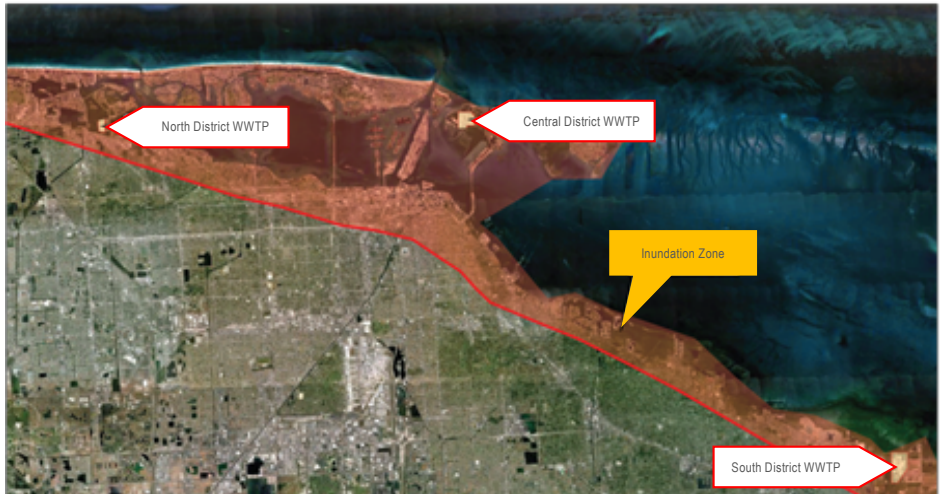
Recent examples of Sunny Day Flooding in South Florida

Hurricane Storm Surges

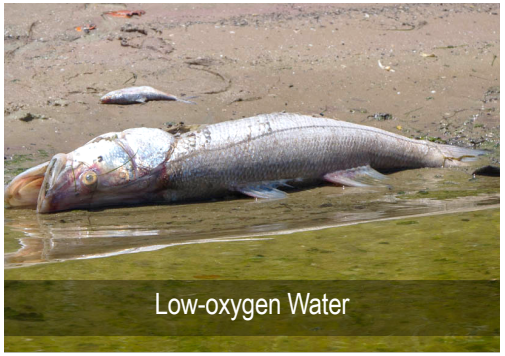
Storm surge is the greatest threat to life and property from a hurricane.

Above: Water flows out of the Miami River, flooding a walkway as Hurricane Irma passes through Miami, Florida in 2017.

Below: Three regional wastewater treatment plants are located on the coast, inside the Inundation Zone.



Environmental Degradation



Miami-Dade County Solutions

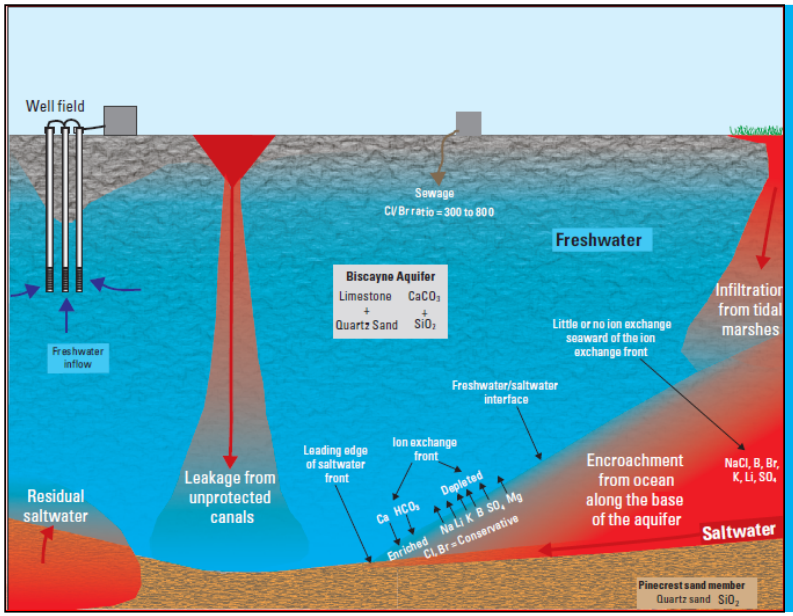
- All County infrastructure projects must consider sea level rise
- Modeling of sea level rise, storm surge and other factors
- Surface-water/groundwater flow Urban-Miami Dade model (USGS):
  - Public water supply facilities vulnerability to sea level rise
  - Septic tank vulnerability to groundwater and sea level rise
  - Impacts of groundwater and sea level rise on wastewater collection pipes
- Saltwater intrusion monitoring network — data and mapping site https://fl.water.usgs.gov/mapper
- Design Guide for Coastal Wastewater Plants (elevation and hardening)
- Design Guide for Wastewater Treatment Plants and Pump Stations

Completed Project Examples – Project By Project Basis

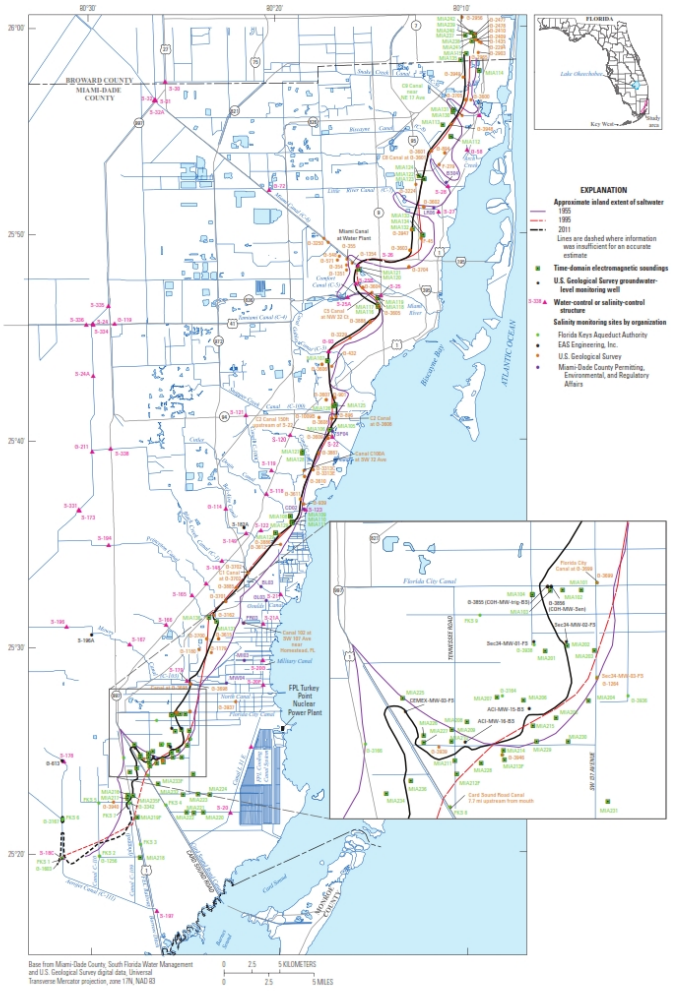
Percent of Assets Below Flood Design Elevation

87% at CDWWTP
72% at SDWWTP
57% at NDWWTP

Salt Water Intrusion Monitoring



Miami-Dade County in Cooperation with the US Geological Survey has one of the most technically advanced monitoring network for Salt Water Intrusion in the world



Data available on the USGS portal: https://fl.water.usgs.gov/mapper

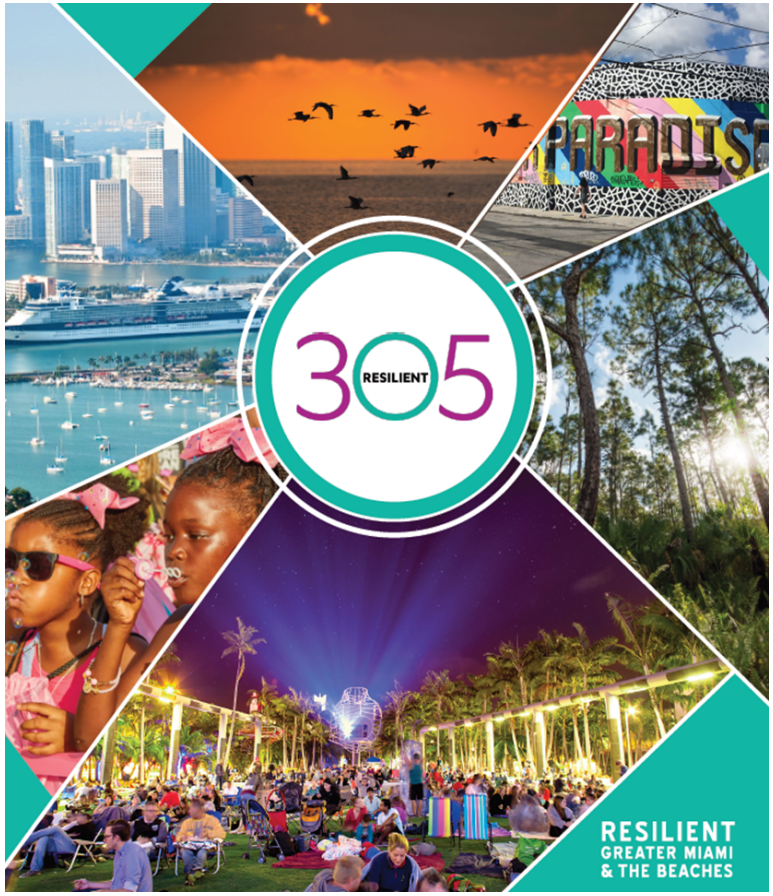
Regional Leadership & 305 Strategy

Resilient 305: A Collaborative Strategy

The Resilient 305 Leadership Team is headed by our Chief Resilience Officers.

- Jane Gilbert, Chief Resilience Officer, City of Miami
- Susy Torriente, Chief Resiliency Officer, City of Miami Beach
- James F. Murley, Chief Resilience Officer, Miami-Dade County

Resilience 305: Defined Shocks & Stresses




Hurricane


Infrastructure Failure


Coastal Flooding


Sea-Level Rise

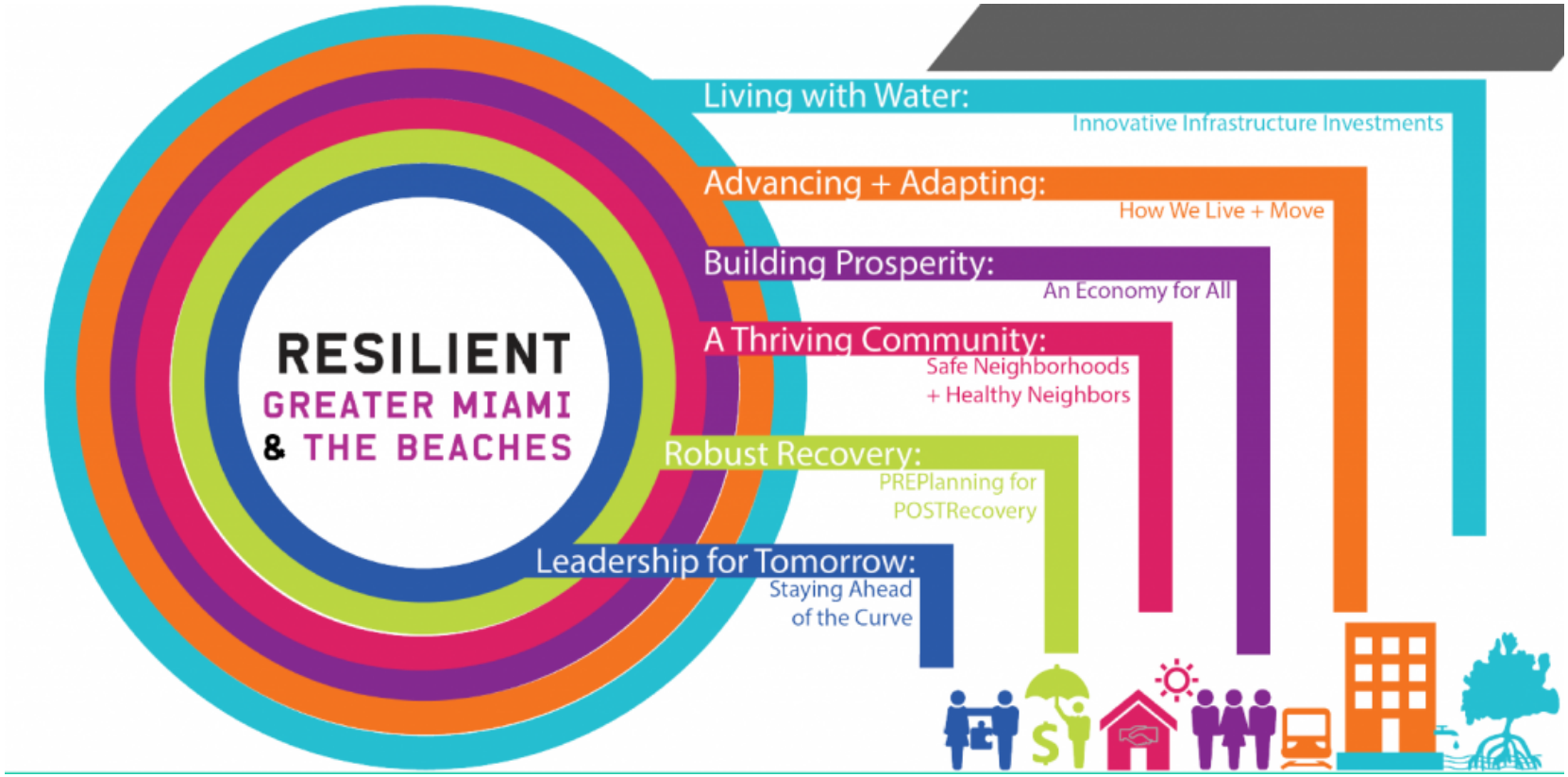

Rainfall Flooding


Transportation

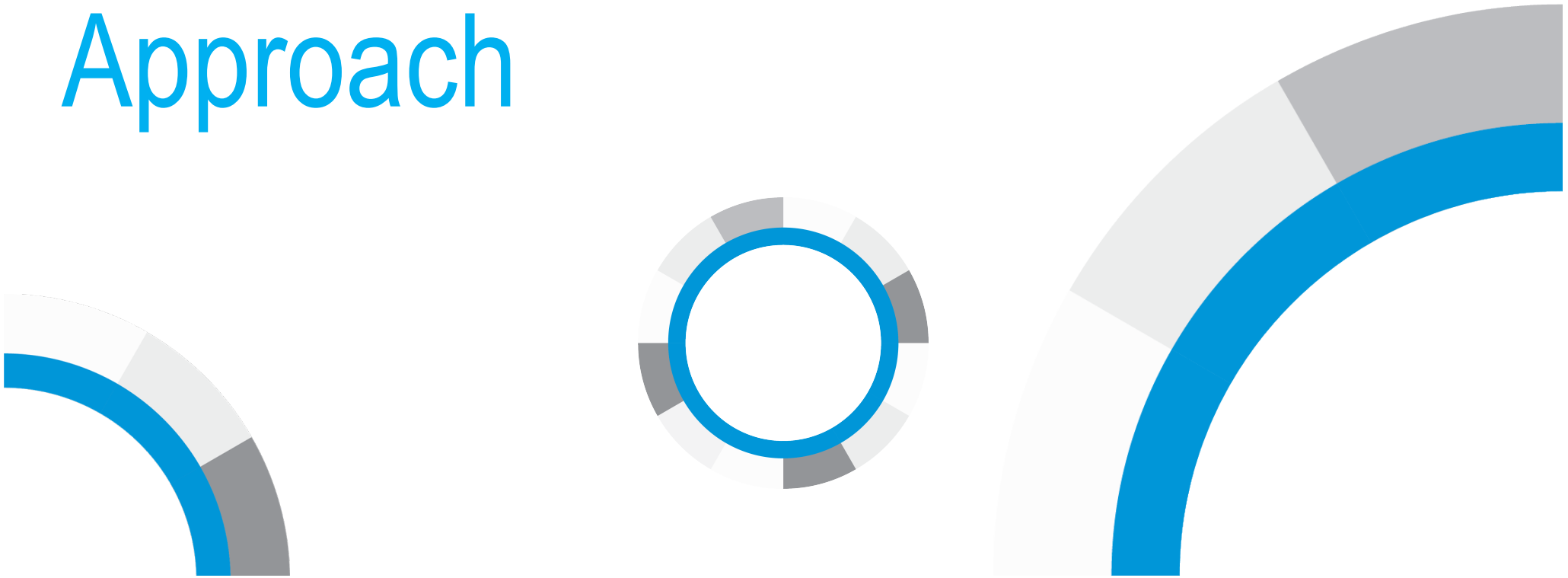

Pronounced Poverty


Affordable Housing

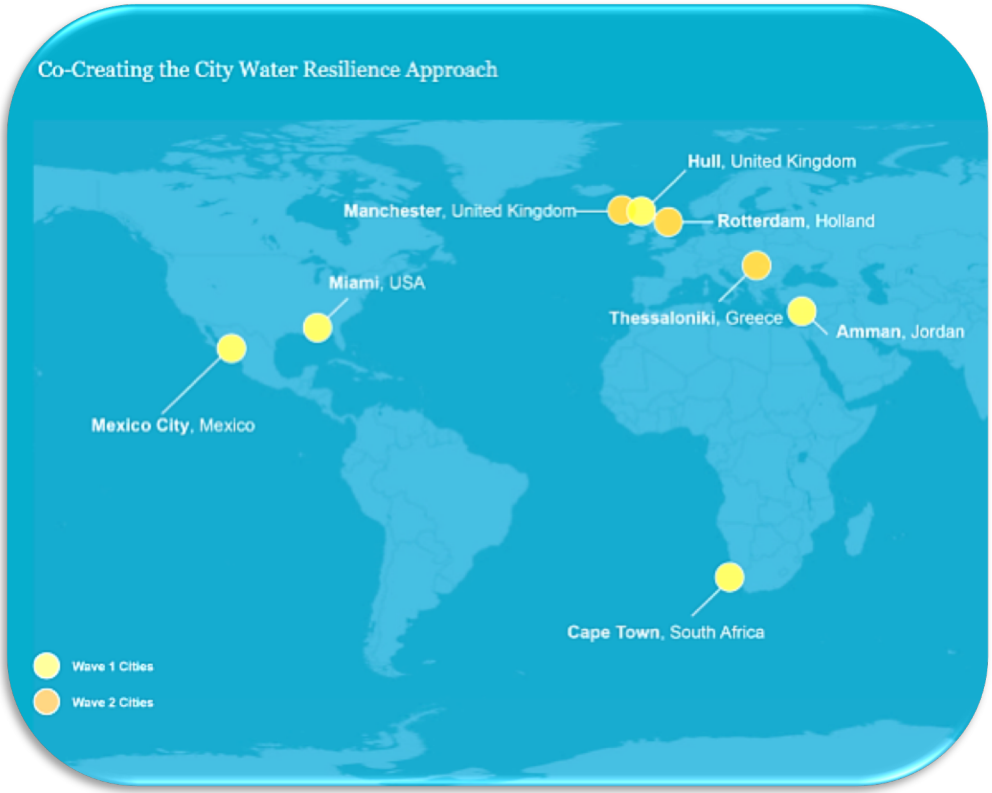
Resilience 305: Discovery Areas



City Water Resilience Approach



The City Water Resilience Approach is Addressing Global Problems Through Local Solutions



Greater Miami and the Beaches joined Cape Town, Mexico City, Amman and Hull as the regions chosen to reflect a range of geographies & challenges, different shocks and stresses, and governance models to inform a truly global framework.

A Collaborative Approach

THE RESILIENCE SHIFT

The City Water Resilience Approach is Supported by:

The ROCKEFELLER FOUNDATION

THE RESILIENCE SHIFT

Project Partners Include:

ARUP

SIWI

PIONEERED BY THE ROCKEFELLER FOUNDATION 100 RESILIENT CITIES

AGWA

OECD

Steering Group:

THE WORLD BANK

UMassAmherst

ARUP

THE RESILIENCE SHIFT

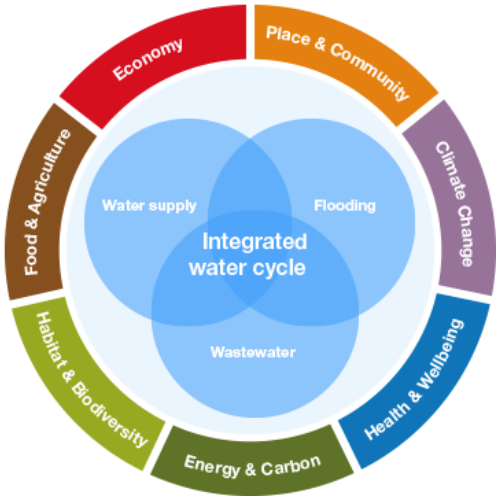
PIONEERED BY THE ROCKEFELLER FOUNDATION 100 RESILIENT CITIES

The ROCKEFELLER FOUNDATION

Resilience Requires Collaborative Governance — The One Water Approach

The collaboration between Miami-Dade County and the cities of Miami and Miami Beach through the City Water Resilience Framework program demonstrates real-world water sector cooperation in establishing a resilient circular economy.

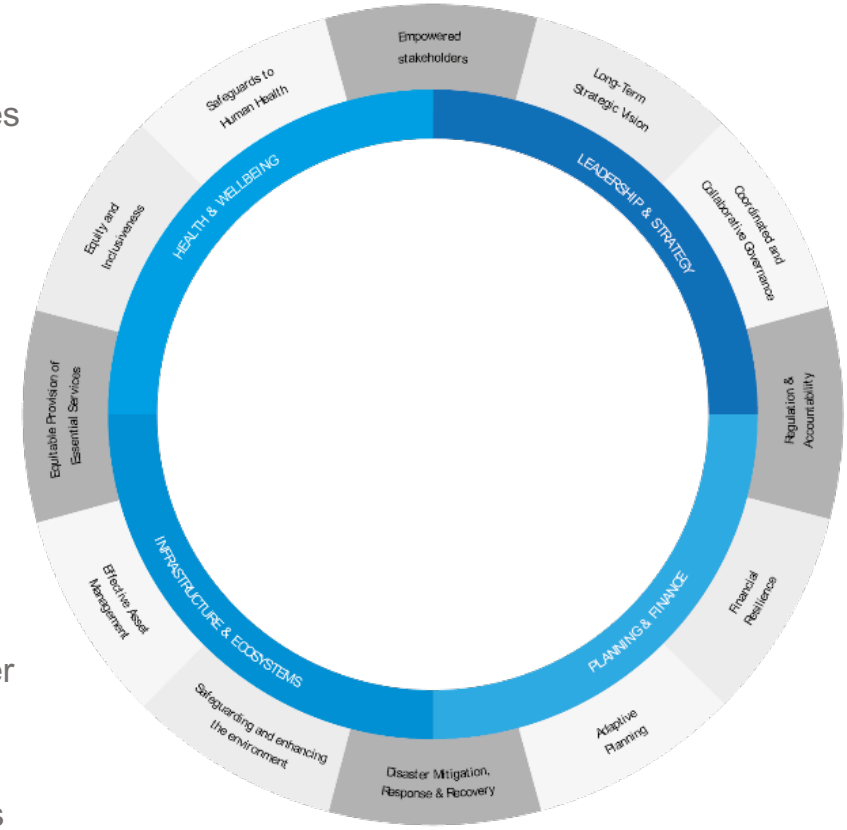
The partnership is pioneering, and it's at the heart of developing resilient urban water systems within the South Florida Water Management District.



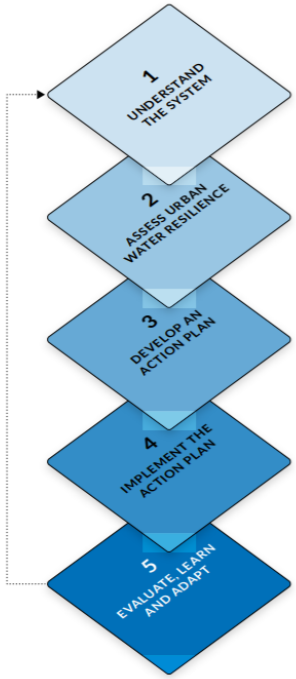
ARUP

Principles of the City Water Resilience Approach

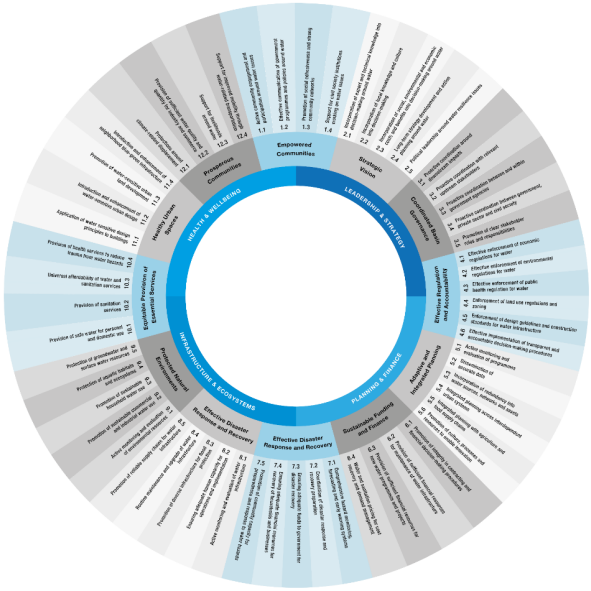
Inclusive and transparent	Brings together different perspectives from water and city stakeholders and encourages collective action
Systems-based	Takes account of inter-dependencies with other systems
Holistic	Includes leadership and strategy, planning & finance, infrastructure and ecosystems and personal, household and community resilience
Action-oriented	Encourages the ownership, development and progression of actions to improve water resilience
Scalable and global	Scalable from towns through to mega cities and applicable to a global context



Components of the City Water Resilience Approach



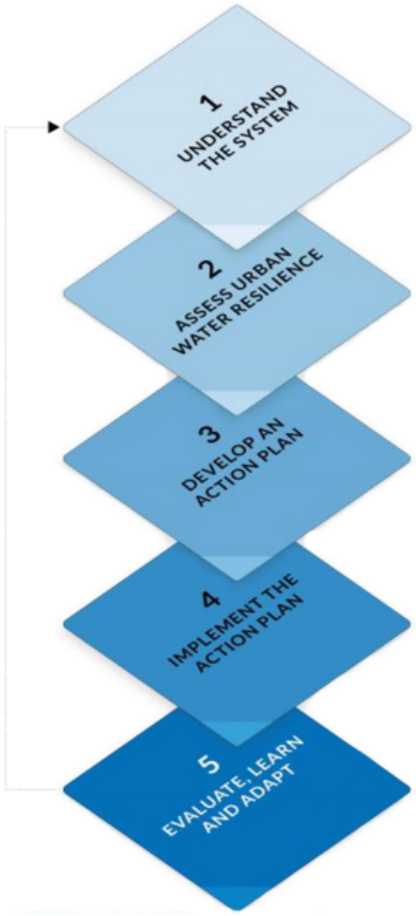
City Water Resilience Approach



City Water Resilience Framework

OurWater Governance Tool

The City Water Resilience Assessment Helps to Identify Gaps in Water Management.



The City Water Resilience Assessment has helped Greater Miami and the Beaches to identify the challenges to resilience for our region's water management.

This assessment was used to:

- Identify & develop indicators for a more resilient water supply & management system
- Improve interagency collaboration on water issues
- Develop & implement a one water resilience action plan

The City Water Resilience Framework Provides a Globally Applicable Basis for Measuring City Resilience

- **4** Dimensions
  - Leadership & strategy
  - Health & wellbeing
  - Planning & finance
  - Infrastructure & ecosystems

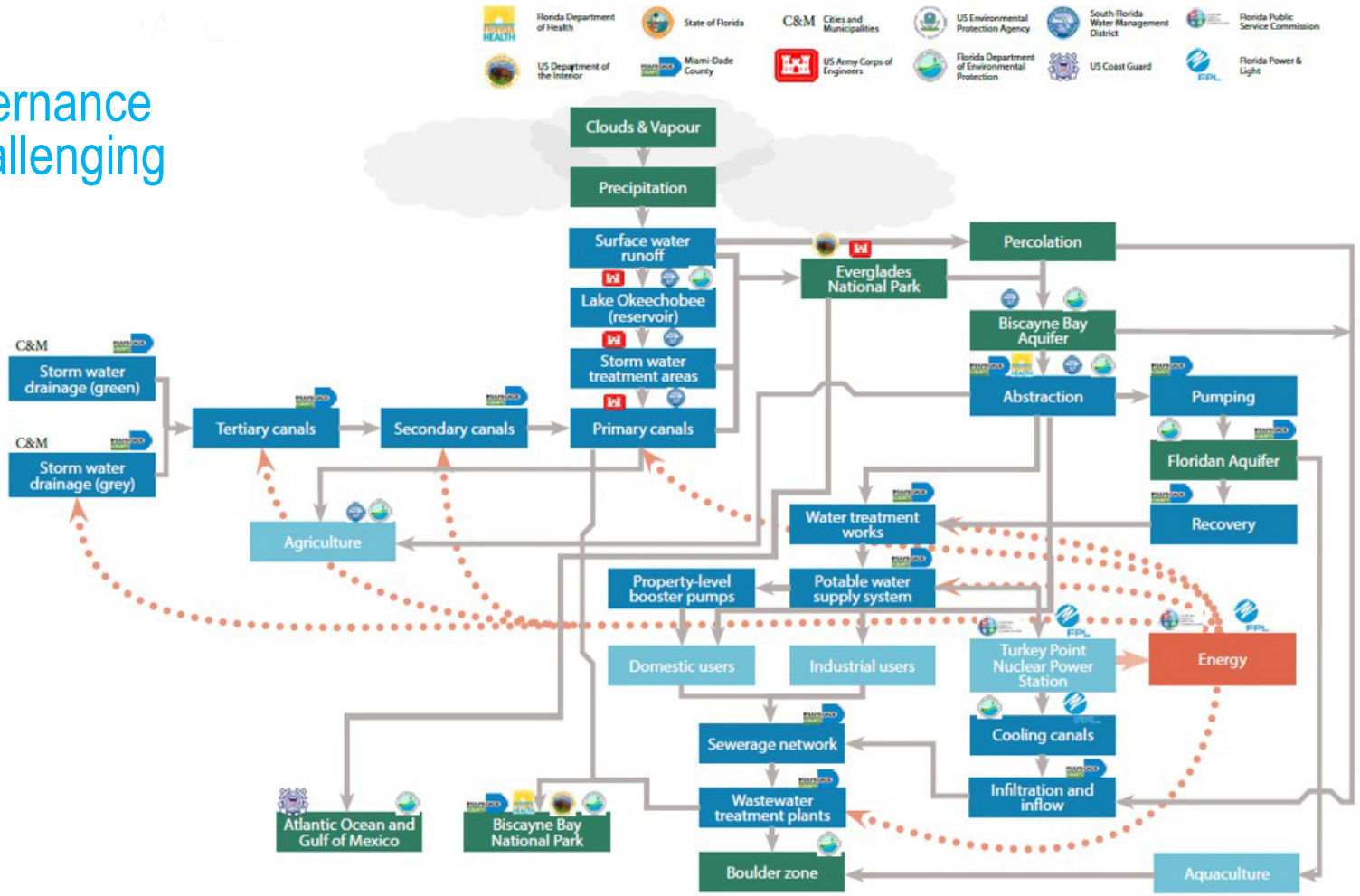
- **12** Goals
  - Empowered communities
  - Strategic vision
  - Coordinated basin governance
  - Effective regulation & accountability
  - Adaptive & integrated planning
  - Sustainable Funding & Finance
  - Effective disaster response & recovery
  - Protected natural environments
  - Equitable provision of essential services
  - Healthy urban spaces
  - Prosperous communities
  - Empowered communities

- **57** Indicators (shown at left)

✱ The CWRA's **4** Dimensions of Resilience Directly Align With the Goals & Objectives of the Resilient 305 Strategy

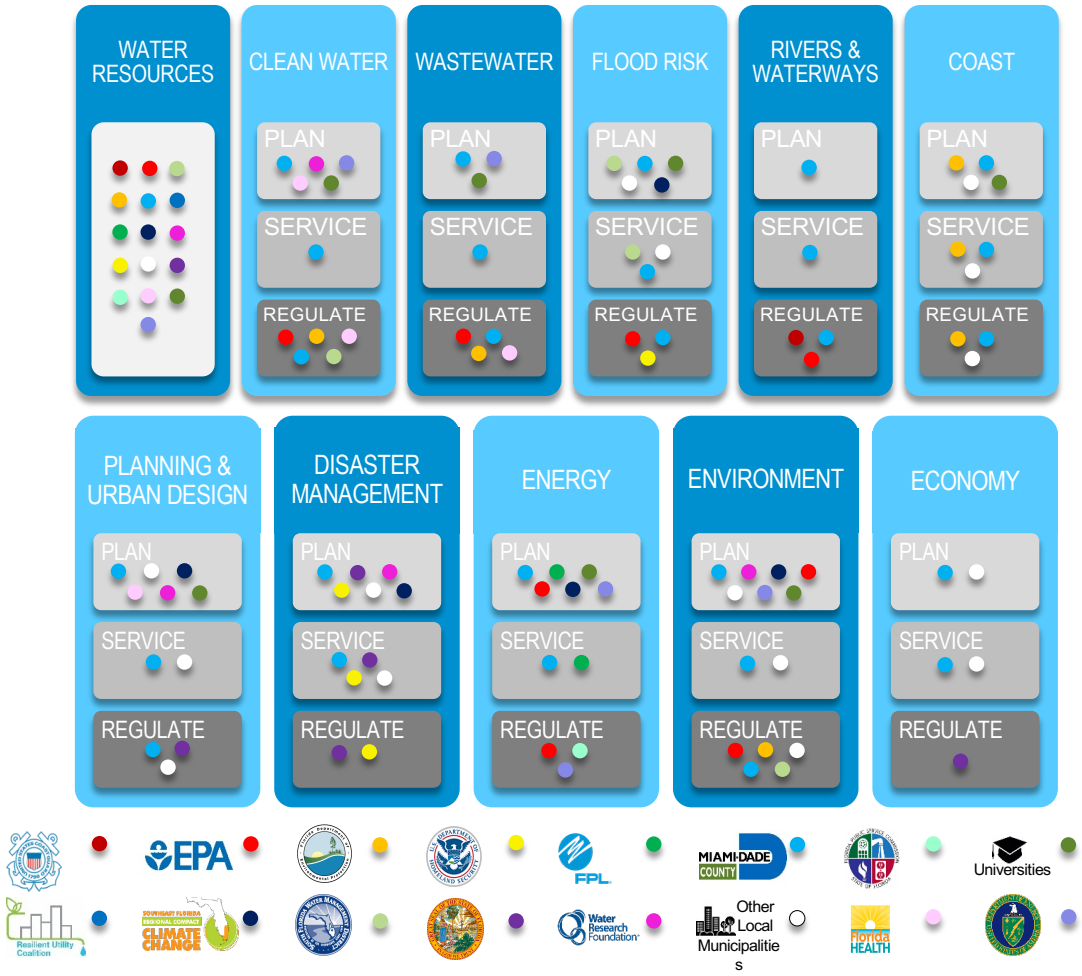
South Florida's Water Cycle Governance is Complex & Challenging

https://app.OurWater.city

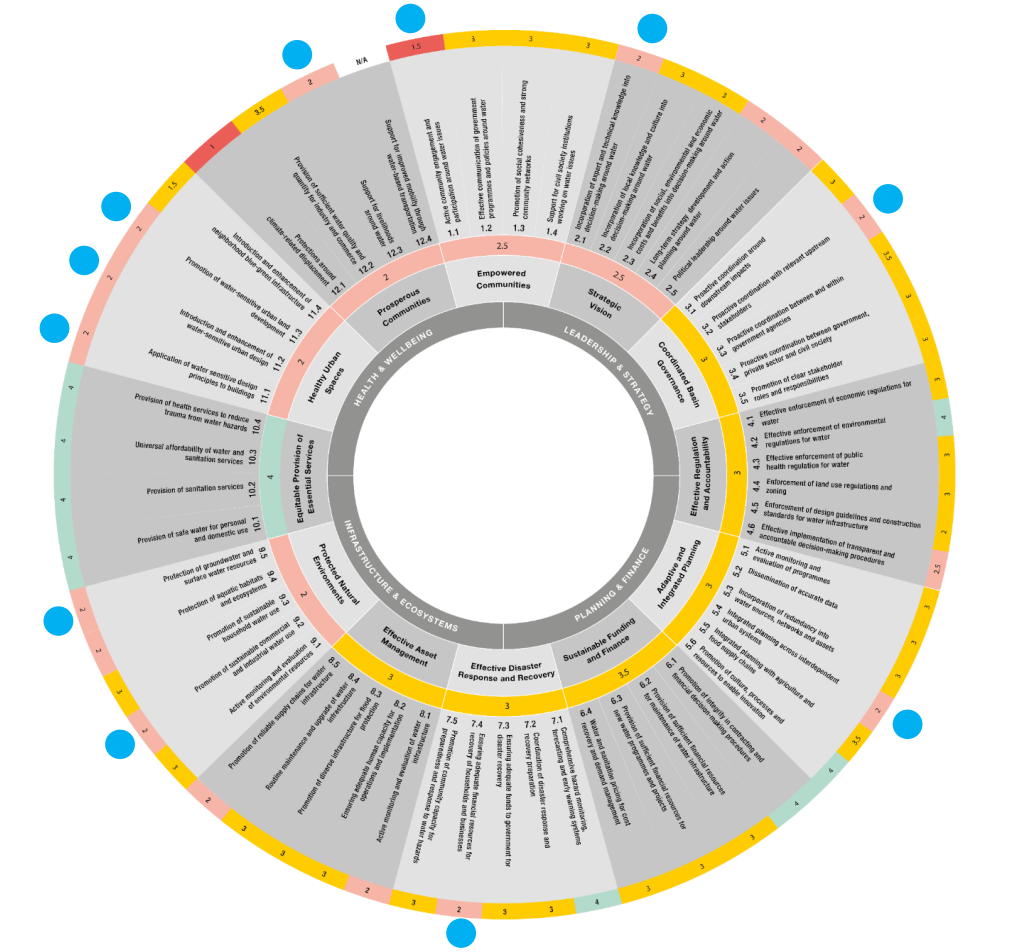


The Systems Stakeholders Work Within are Complicated

- Governance
- Natural Ecosystems
- Community
- Industry



Greater Miami and Beaches Water Resilience Profile



Highlights from the CWRA Workshops

Leadership & Strategy

- Resilience is increasingly well-recognized by Miami leadership but long-term planning for resilience is needed
- Efforts are needed to promote coordination with upstream stakeholders (agriculture, SFWMD, etc.)

Health & Wellbeing

- GMB needs strategies to integrate community voices into policy and planning around water
- Focused outreach is needed to include vulnerable and disadvantaged groups in planning efforts

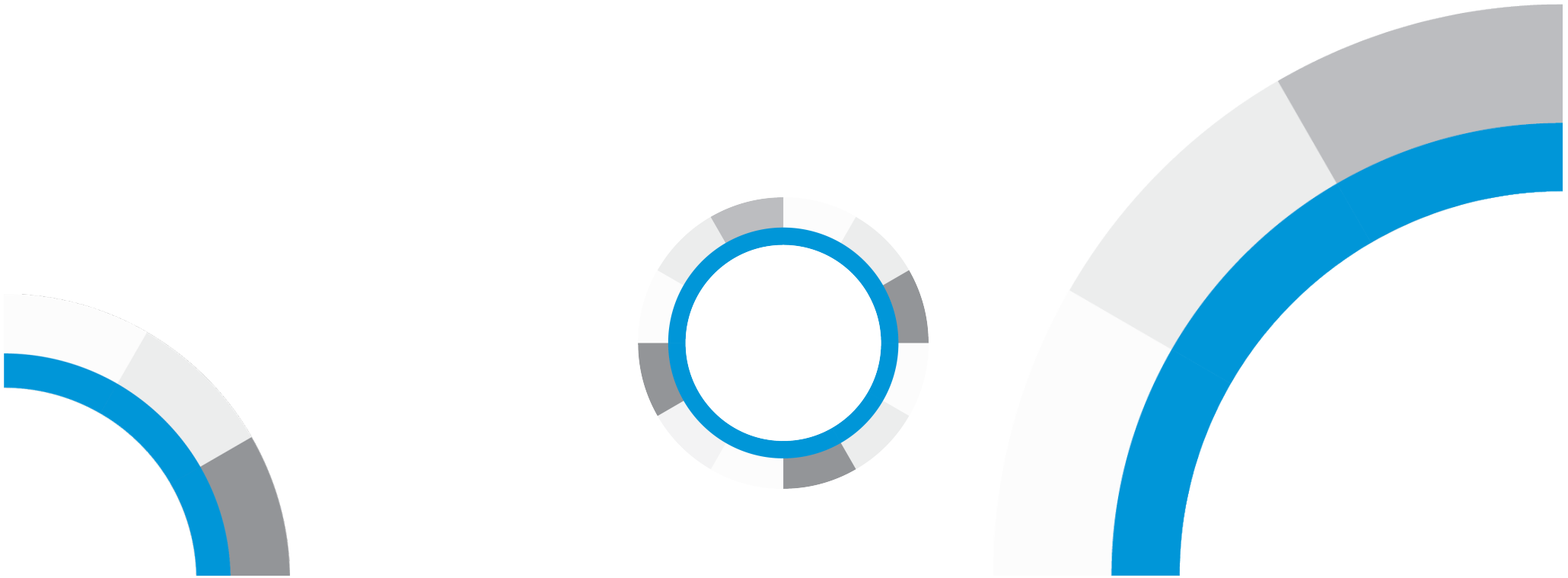
Infrastructure & Ecosystems

- Early warning systems and preparedness programs are generally good for shocks & disasters, but communities are often less equipped to respond to chronic stresses
- Emphasis is needed to promote green infrastructure in GMB

Planning & Finance

- More can be done to integrate planning across different regional agencies (e.g. transportation, water and sewer, urban planning, etc.)
- There is more to do to promote post-recovery plans

Prioritizing Actions



The Challenge

Evidence-based decisions: Water & environmental data for decision-making

Priority Action 1

- Create an open-data portal to improve data accessibility and sharing between key stakeholders to support sound decision-making

Resilient305 Action Connections: RCAP Recommendation Alignment

The Challenge

Institutionalizing Resilience

Priority Action 2

- Establish a One Water Knowledge Platform to improve capacity and knowledge sharing around resilience, including online training, seminars, and case studies for water stakeholders

Resilient305 Action Connections: RCAP Recommendation Alignment

The Challenge

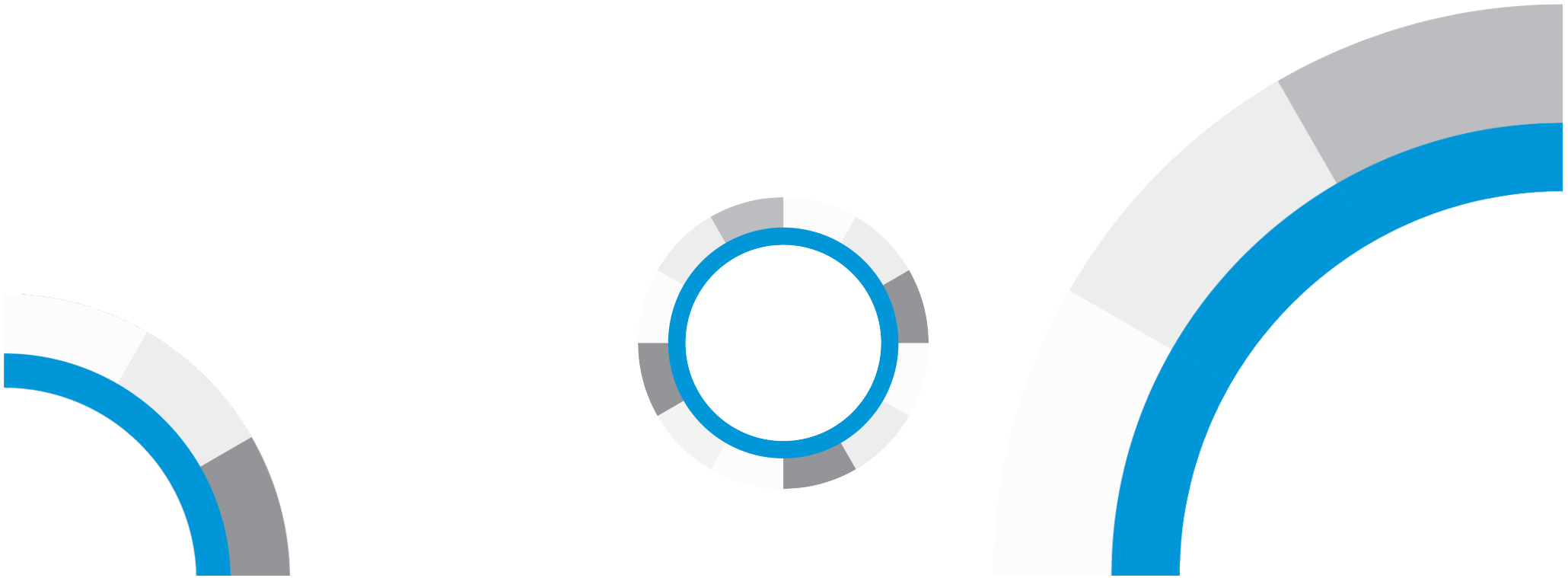
Institutionalizing Resilience

Priority Action 3

- Build collaboration between governmental, community, academia, and other stakeholder groups to monitor advancement of actions addressing areas of lower-scoring quantitative and qualitative indicators, as well as to advance key joint projects to achieve outcomes that benefit all

Resilient305 Action Connections: RCAP Recommendation Alignment

Next Steps



Global Commission on Adaptation

Launched in October 2018 and Led by:

Ban Ki-Moon
8th Secretary General
of the United Nations

Bill Gates
Co-founder, Bill and Melinda
Gates Foundation

Kristalina Georgieva
CEO
World Bank Group

Managing Partners:

GLOBAL COMMISSION ON ADAPTATION

WORLD RESOURCES INSTITUTE

Goals

- Increase political will
- Champion bold solutions
- Accelerate adaptation action

33 Commissioners include:
heads of state, local government leaders, international organizations, civil society organizations and private companies

Community of Practice

ARUP

GLOBAL COMMISSION ON ADAPTATION

Deltares
Enabling Delta Life

THE RESILIENCE SHIFT

ONE Water

100 RESILIENT CITIES

IWA
the international water association

SIWI

AGWA

Thank You!

MIAMI-DADE COUNTY

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

RESILIENT CAPE TOWN

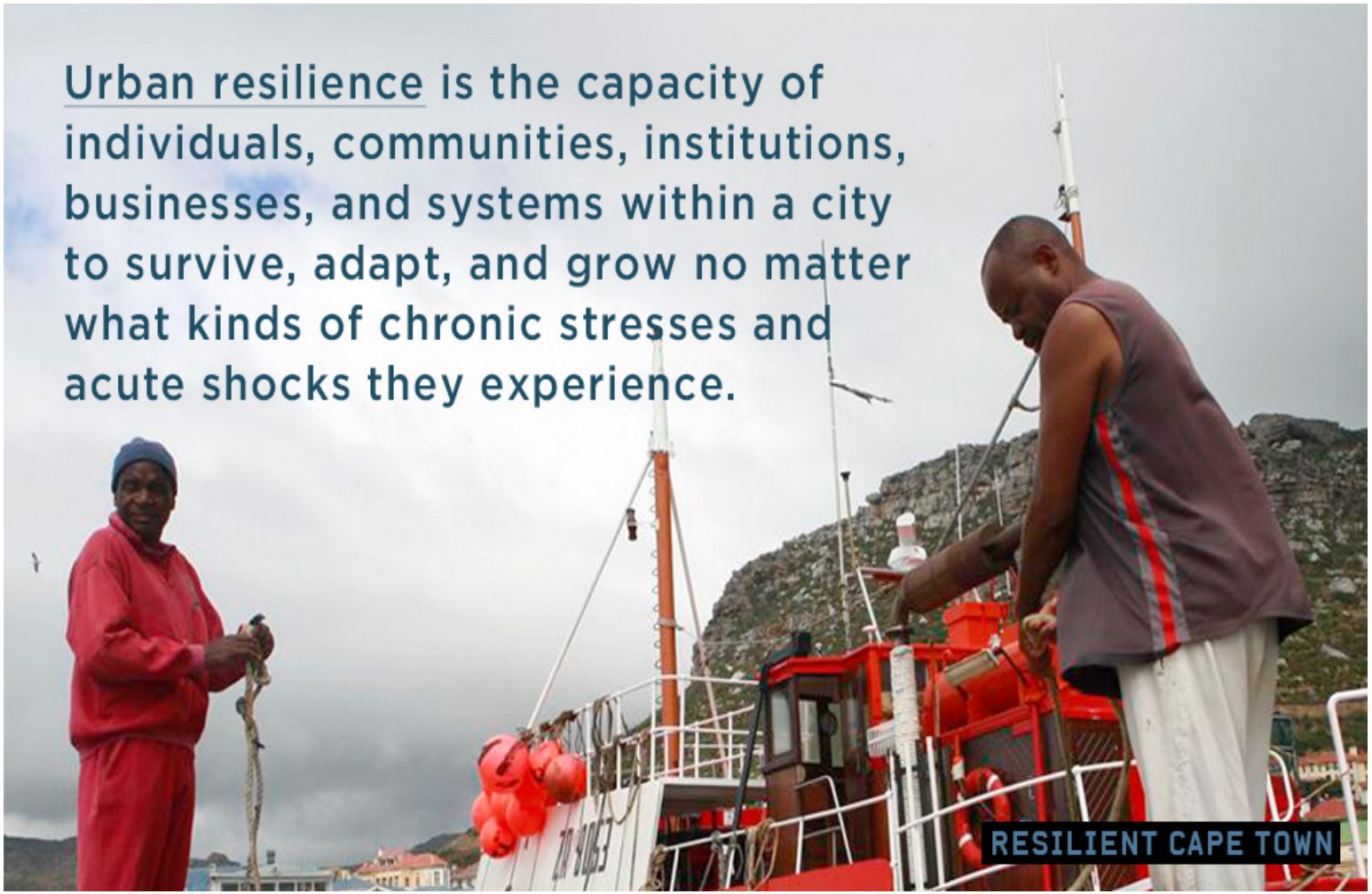
Leveraging off the Cape Town Drought

NACWA / AMWA Resilience Webinar

Gareth Morgan – Director: Resilience

17 September 2019

Making progress possible. Together. ther.



Resilience is a guiding principle of the City Integrated Development Plan 2017 to 2022

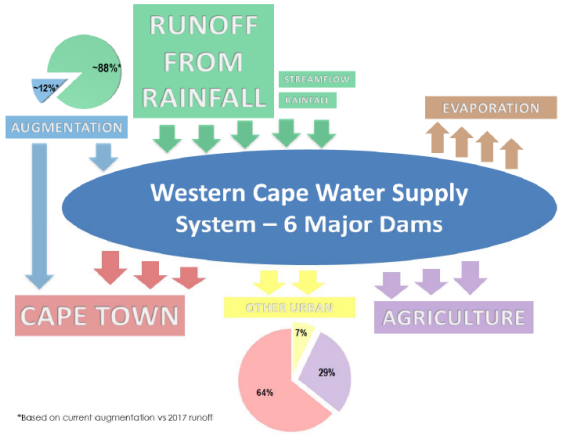
RESILIENT CAPE TOWN

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

PIONEERED BY THE ROCKEFELLER FOUNDATION
100 RESILIENT CITIES

The Western Cape Water Supply System

- The City of Cape Town is part of the Western Cape Water Supply System (WCWSS).
- The WCWSS consists of 6 dams, supplying Cape Town, agriculture and other urban areas.
- The current system is almost entirely dependent on rainfall.
- The National Department of Water and Sanitation (DWS) manages the 3 largest dams in the system and is primarily responsible for bulk water provision. The City manages the other 3 large dams
- Dam levels rise mainly from runoff from rainfall in catchment areas, with some impact from streams flowing into the dams, and rainfall over the dams.
- Small amount of augmentation from other sources including groundwater in Atlantis and small-scale desalination.

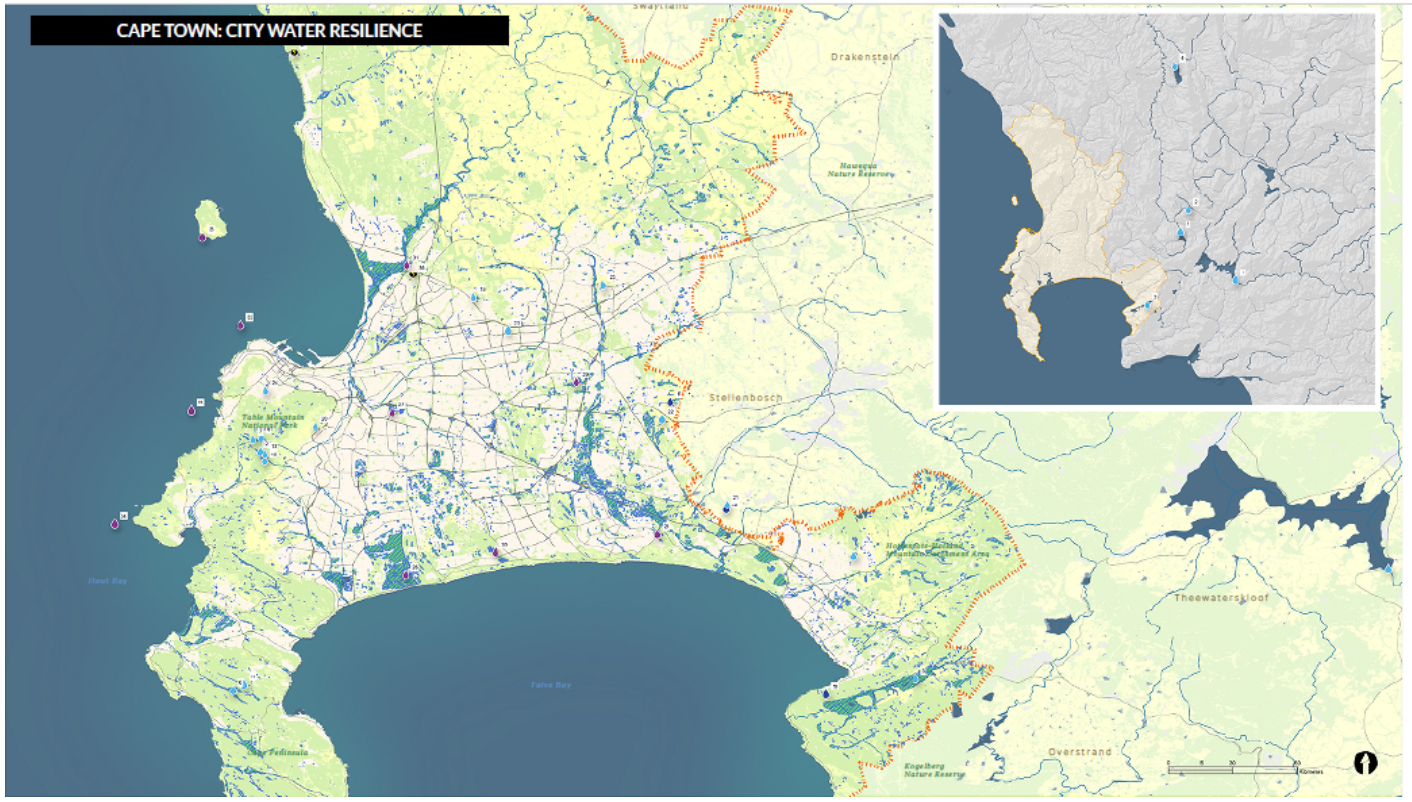


RESILIENT CAPE TOWN

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

PIONEERED BY THE ROCKEFELLER FOUNDATION
100 RESILIENT CITIES

Cape Town and the Western Cape Water Supply System

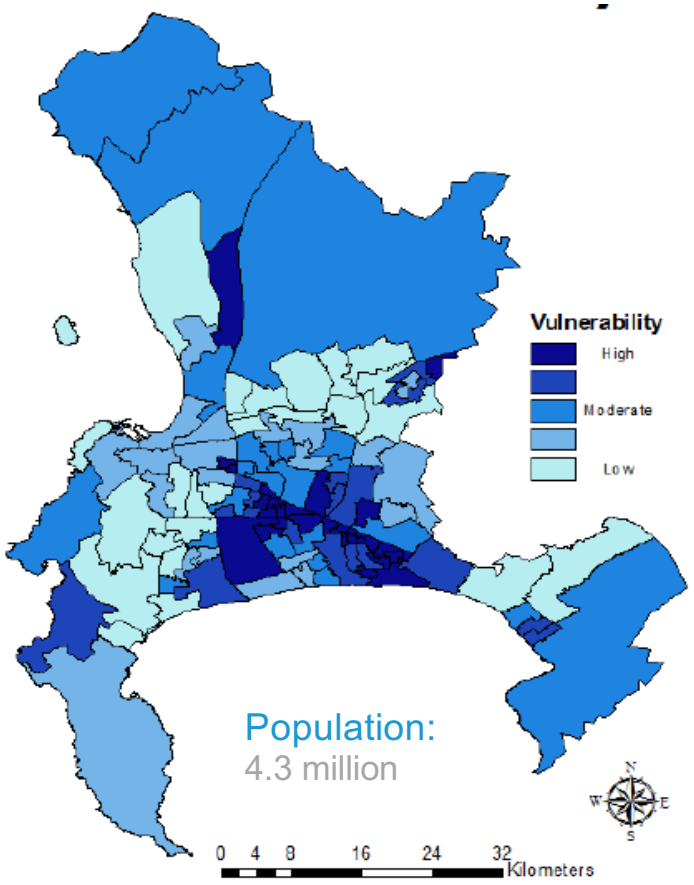


RESILIENT CAPE TOWN

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

PIONEERED BY THE ROCKEFELLER FOUNDATION
100 RESILIENT CITIES

Shocks and Stresses confronted by Cape Town and the WCWSS



Stresses

- Rapid urbanisation
- Large informal settlements
- Sanitation in certain areas
- Aging infrastructure
- Unemployment
- Climate change
- Poverty

Shocks

- Drought
- Financial crisis
- Flooding
- Storm surge
- Civil unrest

RESILIENT CAPE TOWN

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

PIONEERED BY THE ROCKEFELLER FOUNDATION
100 RESILIENT CITIES

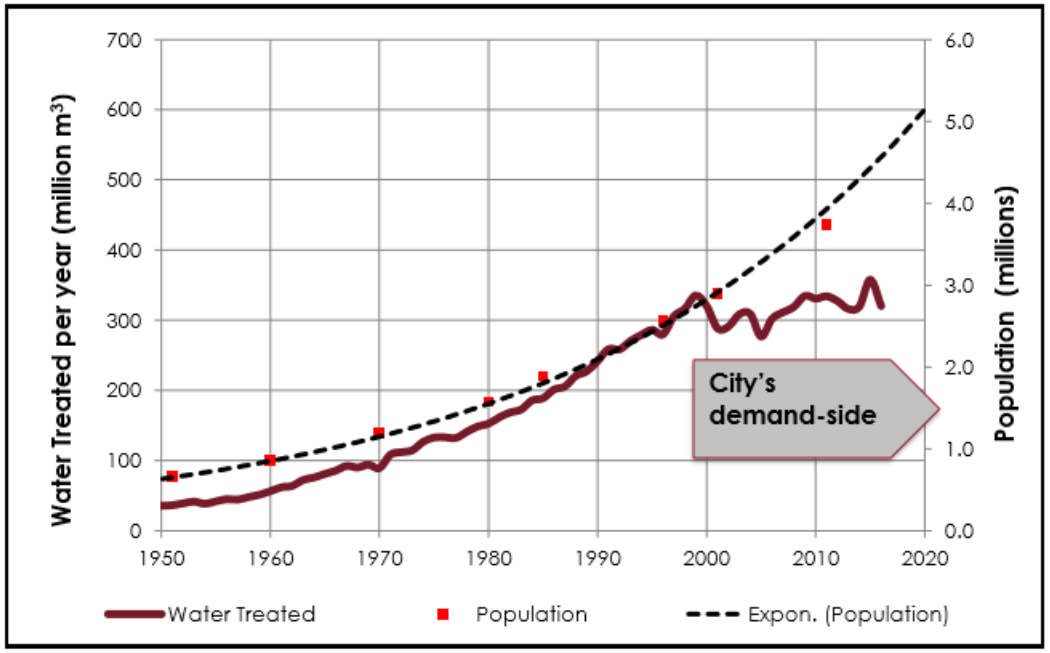
2005 – 2015 Cape Town makes great strides in reducing water consumption

From 2000 the water consumption starts to flatten, consumption per capita starting to fall.

Water demand management strategy implemented in 2001 to reduce water demand by 20% in 2010

Demand managed through:

- Water pressure management
- Minimising water leaks
- Substituting potable with non-potable sources
- Increasing tariffs
- Addressing water leaks in low income households
- Pipe replacement programme
- Education & awareness



RESILIENT CAPE TOWN

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

PIONEERED BY THE ROCKEFELLER FOUNDATION
100 RESILIENT CITIES

Drought shock strikes

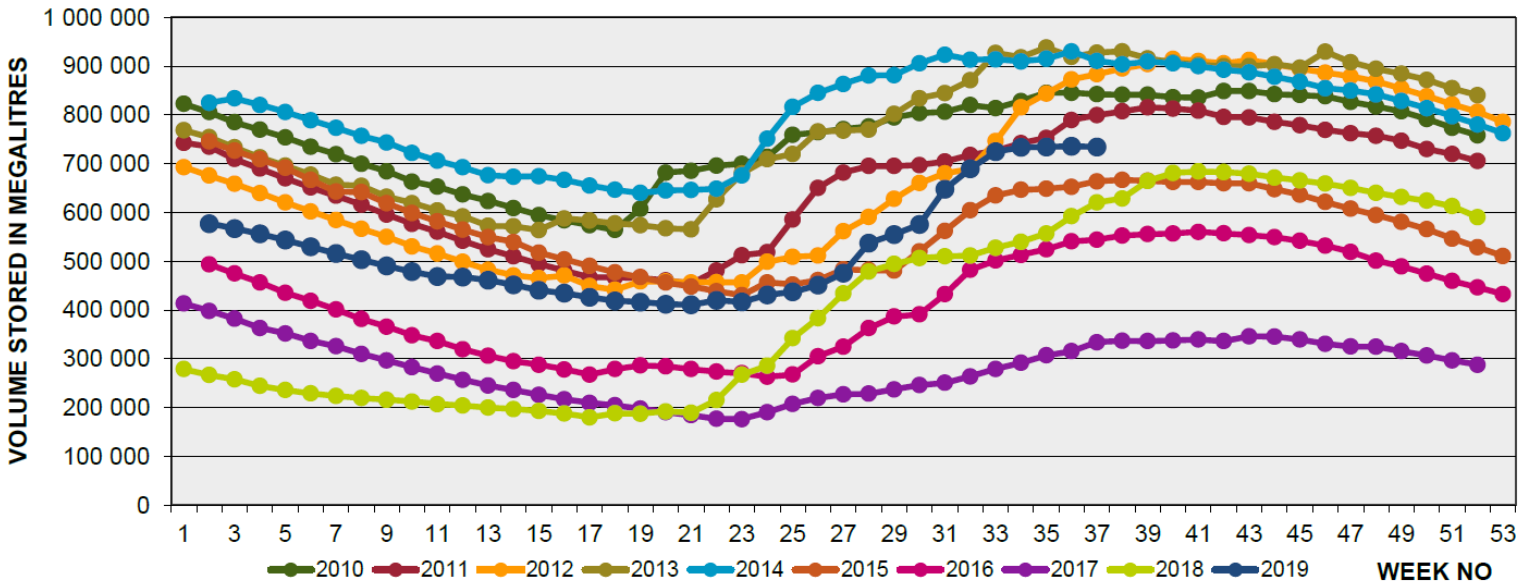
The most severe multi-year drought in over 100 years in the region

RESILIENT CAPE TOWN

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

PIONEERED BY THE ROCKEFELLER FOUNDATION
100 RESILIENT CITIES

Volume stored in dams of the Western Cape Water Supply System



RESILIENT CAPE TOWN

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

PIONEERED BY THE ROCKEFELLER FOUNDATION
100 RESILIENT CITIES

Water restrictions were in place from 1 January 2016
Restrictions started becoming very severe mid-2017

Level 4: 100 litres pp/day, Jun 2017

Social Media, Posters, Billboards, Radio, Website

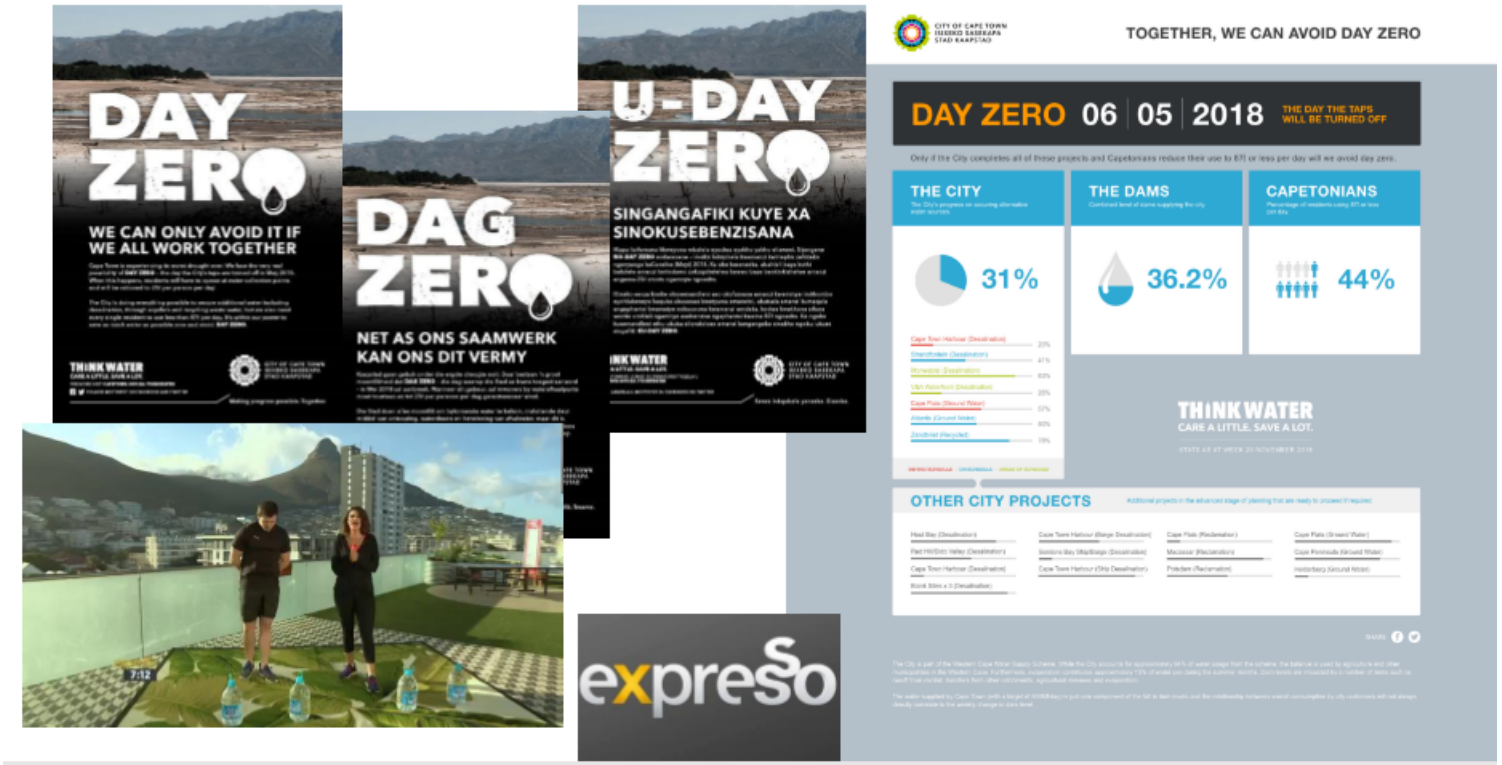
RESILIENT CAPE TOWN

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

PIONEERED BY THE ROCKEFELLER FOUNDATION
100 RESILIENT CITIES

The Day Zero Campaign

Level 5 – Level 6: Day Zero, Nov 2017 – Jan 2018



RESILIENT CAPE TOWN

CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD

PIONEERED BY THE ROCKEFELLER FOUNDATION 100 RESILIENT CITIES

Critical Water Shortages Disaster Plan

Level 6 – Level 6B: Jan - Feb 2018

RESILIENT CAPE TOWN

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

PIONEERED BY THE ROCKEFELLER FOUNDATION
100 RESILIENT CITIES

Using Data to drive consumer behaviour

Cape Town Water Map: Jan-Oct 2018

Collaboration between the City and the University of Cape Town

Month	No. of dark green dots <6000 litres / month	No. of light green dots <10 500 litres / month	Total dots
January 2018	153,819	159,743	313,562
February 2018	203,144	166,184	369,328
March 2018	218,705	167,008	385,713
April 2018	211,497	171,640	383,137
May 2018	217,271	182,404	399,675
June 2018	217,254	183,284	400,538
July 2018	211,487	185,697	397,184
August 2018	212,720	186,631	399,351
September 2018	203,620	,189,663	393,283
October 2018	190,165	191,974	382,139

RESILIENT CAPE TOWN

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

PIONEERED BY THE ROCKEFELLER FOUNDATION
100 RESILIENT CITIES

Drought recovery

DATE	ACTIVITY
March 2018	Day Zero is cancelled for 2018
May 2018	Two emergency desalination plants come online
July 2018	New water tariffs introduced; separating cost of water and infrastructure maintenance
Oct 2018	Restrictions dropped to Level 5
December 2018	Restrictions dropped to Level 3
May 2019	New Cape Town Water Strategy approved by Council
August 2019	Cape Town Resilience Strategy approved by Council

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

City of Cape Town: Dam Levels Report

16 September 2019

DAM STORAGE (%)

81.7

WEEKLY DAM LEVEL CHANGE (%)

0.1 ↑

AVG DAILY WATER USAGE (FOR THE PAST WEEK) ALL WATER SOURCES (Ml/d)

581

(Target 650Ml/d)

Lessons from the Drought

Invest in partnerships beyond the City

Share information to build public trust

Increase redundancies in the system

Embrace the realities of climate risk

Strengthen adaptive leadership capabilities

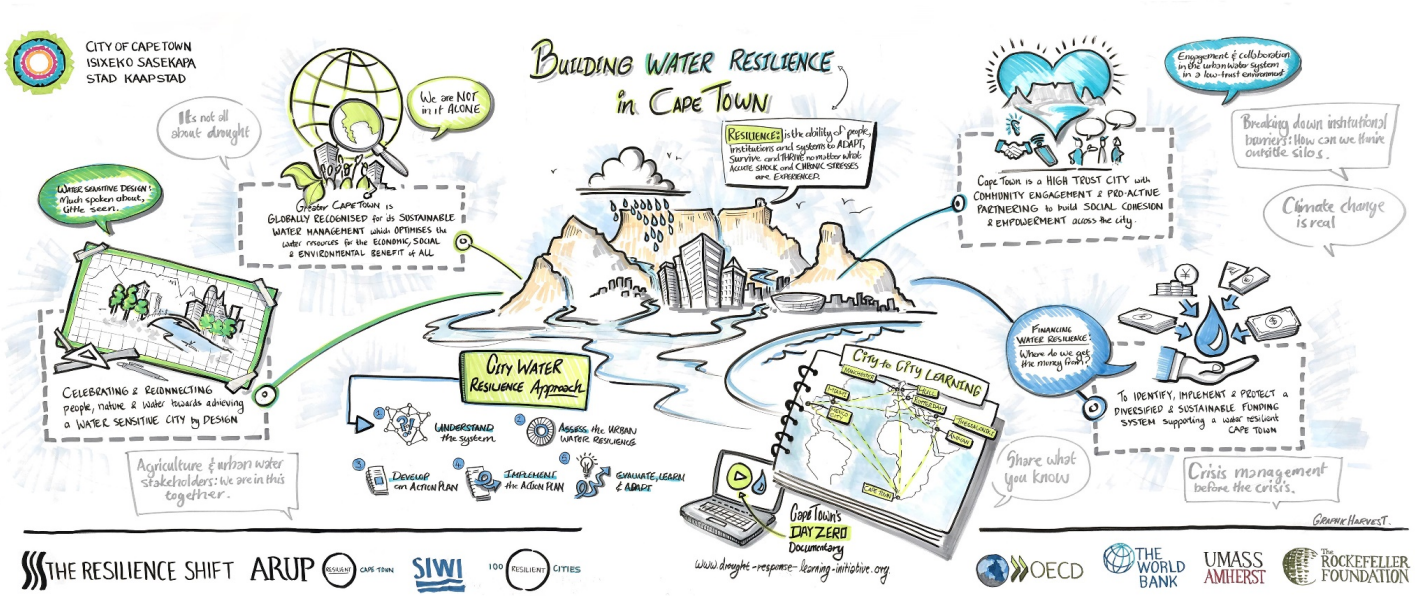
RESILIENT CAPE TOWN

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

PIONEERED BY THE ROCKEFELLER FOUNDATION
100 RESILIENT CITIES

The City Water Resilience Framework

Cape Town selected as first city in the world to deploy the tool



Over 40 stakeholders from government, civil society, academia and business took part in the assessment workshops in June 2019

Previously, in June 2018, Cape Town had been one of the fieldwork cities used to develop the factors of water resilience

The City Water Resilience Framework
Cape Town selected as first city in the world to deploy the tool

Qualitative results are still in draft while report is being finalised

Provisionally Cape Town on the qualitative profile is rated:

Fair:
- Strategic Vision
- Coordinated Basin Management
- Effective regulation & accountability
- Adaptive & integrated planning
- Sustainable funding & finance
- Effective asset management
- Equitable provision of essential services
- Prosperous communities

Low
- Empowered communities
- Effective disaster response & recovery
- Protected natural environment
- Healthy urban spaces

RESILIENT CAPE TOWN

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

PIONEERED BY THE ROCKEFELLER FOUNDATION
100 RESILIENT CITIES

Example of the qualitative scoring within a dimension

OF CAPE TOWN
KO SASEKAPA
KAAPSTAD

PIONEERED BY THE ROCKEFELLER FOUNDATION
100 RESILIENT CITIES

CWRF is action orientated

Stakeholders used the draft assessment results to develop actions.

Actions designed were within the following identified themes:

- **Water sensitive design: much spoken about, little seen**
- **Engagement & collaboration in a low trust environment**
- **Financing water resilience: where do we get the money from?**
- **We are not in it alone (partnering across the system)**

RESILIENT CAPE TOWN

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

PIONEERED BY THE ROCKEFELLER FOUNDATION
100 RESILIENT CITIES

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

Thank You

Gareth.morgan@capetown.gov.za

Making progress possible. Together.

Resilience Plan: A Milwaukee Metropolitan Area Case Study

September 17th, 2019

Kevin L. Shafer, P.E.
Executive Director

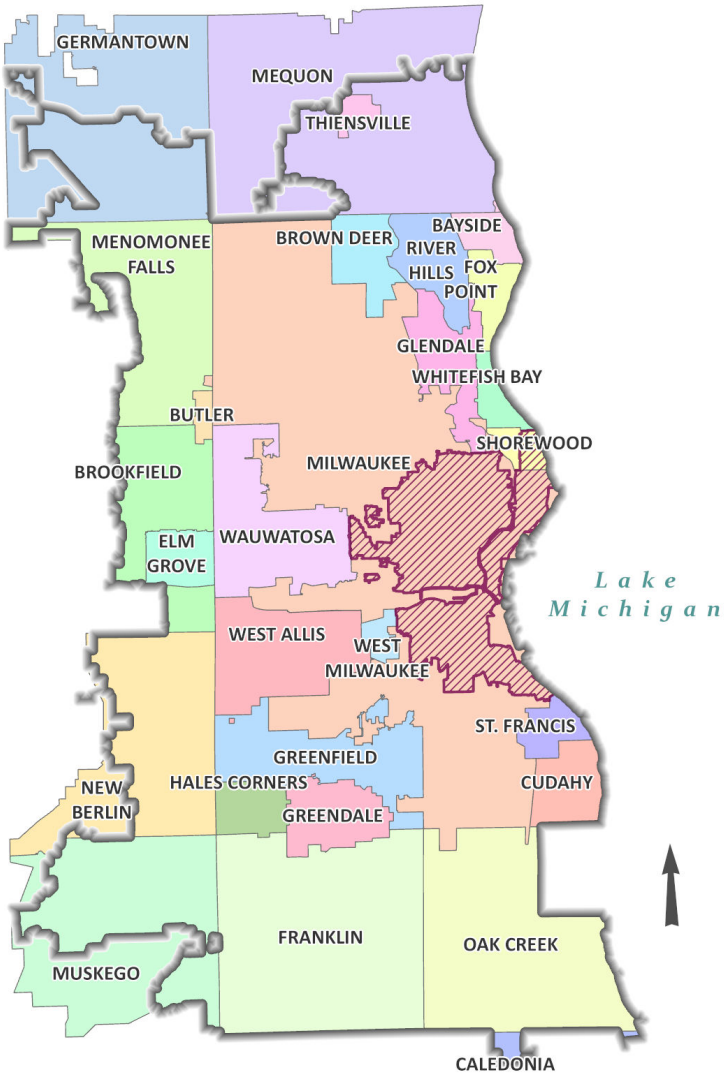
Nadia Vogt
Senior Project Manager

MMSD
PARTNERS FOR A CLEANER ENVIRONMENT

What Does MMSD Do?

Water Reclamation

Manage Flooding



Who Does MMSD Serve?

1.1 Million Customers

28 Municipalities

411 Square Miles

Why Does A Utility Care About Resilience

- Everything is connected!
- Critical infrastructure (power, drinking water, wastewater, communications) are dependent on each other and equally vulnerable to changing urban conditions.
- MMSD relies on a strong tax base (influenced by businesses, transportation, amenities, public services, etc.) to fund repair and replacement of critical infrastructure.
- MMSD has a vested interest in the economic, environmental and social well-being of the region.

Resilience

The purpose of the Resilience Plan is the identification, evaluation, and prioritization of risks followed by coordinated and economical application of recommendations to minimize, monitor and control the probability or impact of unforeseen events or to maximize the realization of opportunities.

Meeting MMSD Objectives

- Supports the 2035 Vision
- 2050 Facilities Plan addresses internal risk
- Resilience Plan develops a coordinated approach to manage external systematic risks

Regional Challenges

- Distribution of minority populations aligns with significant disparities in income, poverty rates, and educational attainment between minority and non-minority populations
- Levy limits pose a challenge for how municipalities pay for critical services (police, schools, infrastructure, etc.)
- Climate change puts additional stress on our critical infrastructure when it must be maintained, improved, and expanded in uncertain financial and physical environments

Resilience Plan Objectives

- Identify and address challenges and risks in a proactive way
- Identify specific actions that stakeholders can implement in a cost-effective way that meets multiple goals
- Reduce the effect of the identified risks using a collective impact strategy in order to move in the same direction
- Risk has no geographic boundaries and often times risks and solutions are correlated

Risk Workshops & Stakeholder Engagement

Identified Risks

- Distribution Of Public Services
- Social Equity
- Ability To Adapt To Job Market Changes
- Vulnerability Of Critical Infrastructure
- Climatic Hazard
- Financial Constraints

VISION 1

Make the Milwaukee region a better place to live by improving the public's participation in decision making and their environment.

Environment & Society

8 Actions

VISION 2

Boost the region's economic vitality through innovative job creation and access to equal opportunities.

Economy & Society

6 Actions

VISION 3

Adapt infrastructure to the challenges of the 21st century.

Infrastructure & Environment

6 Actions

Implementing Resilience

- Internally
  - MMSD will integrate actions into current and future projects
- Externally
  - Will continue work with elected officials to identify which actions are priorities
  - Participate on City/County Climate Change and Social Equity Taskforce
  - Continue to meet with external partners such as businesses, economic development organizations, and workforce development groups to integrate actions

Thank You & Questions

Nadia Vogt

nvogt@mmsd.com

414-225-2052

MMSD

PARTNERS FOR A CLEANER ENVIRONMENT

Resources

- The City Water Resilience Approach
  https://www.arup.com/perspectives/publications/research/section/the-city-water-resilience-approach
- Resilient 305 – Miami's Strategy to Effectively Tackle Emerging Global Challenges and Trends
  www.reilient305.com
- Cape Town Resilience Strategy
  http://www.governmentpublications.lib.uct.ac.za/news/cape-town-resilience-strategy
- Milwaukee Metropolitan Sewerage District (MMSD) Resilience Plan
  https://www.mmsd.com/about-us/news/mmsd-2019-resilience-plan

Discussion

John Sullivan
Chief Engineer
Boston Water and Sewer Commission
Boston, MA

Kishia Powell
Commissioner
City of Atlanta Department of Watershed Management
Atlanta, GA

Hardeep Anand
Co- Chair, NACWA Climate & Resiliency Committee
Deputy Director of Capital Improvements Program
Miami-Dade County Water and Sewer Department
Miami, FL

Gareth Morgan
Director of Resilience
City of Cape Town
Cape Town, SA

Kevin Shafer
Executive Director
Milwaukee Metropolitan Sewerage District
Milwaukee, WI

Nadia Vogt
Senior Project Manager
Milwaukee Metropolitan Sewerage District
Milwaukee, WI

Upcoming Webinars

Dealing with Disruption:
Operationalizing Resilience in the Water Sector

Part 2: December 5, 2019 | 2:00 PM - 3:30 PM ET

Part 3: February 26, 2020 | 2:00 PM - 3:30 PM ET

Part 4: June 3, 2020 | 2:00 PM - 3:30 PM ET

Learn more by visiting **nacwa.org/19rw**