Mayor's Response to County Commission's Resolutions on Sea Level Rise

September 2016
Executive Summary

EXECUTIVE SUMMARY

History

Recognizing the importance of planning for sea level rise in Miami-Dade County, the Board of County Commissioners called for the creation of a task force focused on addressing this issue in July 2013. The Sea Level Rise Task Force (Task Force), chaired by the Honorable Harvey Ruvin, Clerk of Courts, explored the myriad implications of sea level rise on our environment, economy, communities, and policies.

After working together for almost a year, the Task Force recommended the County take several steps to better prepare for rising sea levels. Their seven final recommendations became six resolutions and one urging, sponsored by Commissioner Rebeca Sosa, and were passed unanimously by the Board of County Commissioners on Jan-uary 21, 2015. In response to the resolutions, staff within the department of Regulatory and Economic Resources have been working to implement those resolutions and researching best practices. The final reports summarizing this work are the product of coordination between multiple departments, external organizations, and universities.

In the intervening time since the sunset of the Task Force, there have been several developments including the expansion of the Office of Sustainability to become the Office of Resilience. The County has also become part of Rockefeller Foundation's 100 Resilient Cities network, in partnership with the City of Miami and Miami Beach, as "Greater Miami and the Beaches." Additionally, there has been significant progress on adaptation and mitigation efforts with the Southeast Florida Regional Climate Change Compact (Compact) including the publication of the updated Unified Sea Level Rise Projections (Figure 1) which are being used consistently throughout the region.

Final sea level rise reports

While the County's work on resilience is defined more broadly, each of the final reports is focused on a separate facet of the problem in response to the structure of the six resolutions. The final reports focus on the following issues:

- Adaptation Action Areas
- The Environmentally Endangered Lands
- Developing an Enhanced Capital Plan
- Insurance and Long-term Risk Management
- Flooding and Saltwater Intrusion
- The Climate Change Advisory Task Force

SEA LEVEL RISE: WHAT CAN WE EXPECT?

Since reliable record keeping began over 100 years ago at the tide gauge in Key West, the average sea level has risen approximately 228 millimeters (or 9 inches). This rise has been primarily due to thermal expansion (as warmer water occupies more volume) and to melting from glaciers and ice sheets. Over the next century, the rate of sea level rise is very likely to accelerate due to increased melting from land-based ice sheets, in particular Greenland.

Recognizing the need for clear, consistent, and local information about future sea level rise projections, The Southeast Florida Regional Climate Change Compact developed the, "Unified Sea Level Rise Projection for Southeast Florida". The updated projection, published in 2015, was developed by a panel of well-respected and informed scientists using the most recent and best available data. The projection (Figure 1) estimates that the region can expect to see average sea levels 6 to 10 inches higher by 2030 than they were in 1992, 14 to 34 inches higher by 2060, and 31 to 81 inches higher by 2100. There is a more certain estimate for near-term changes and a greater uncertainty for estimates at the end of this century. This change in average sea levels will amplify the risks of storm surge and nuisance flooding.

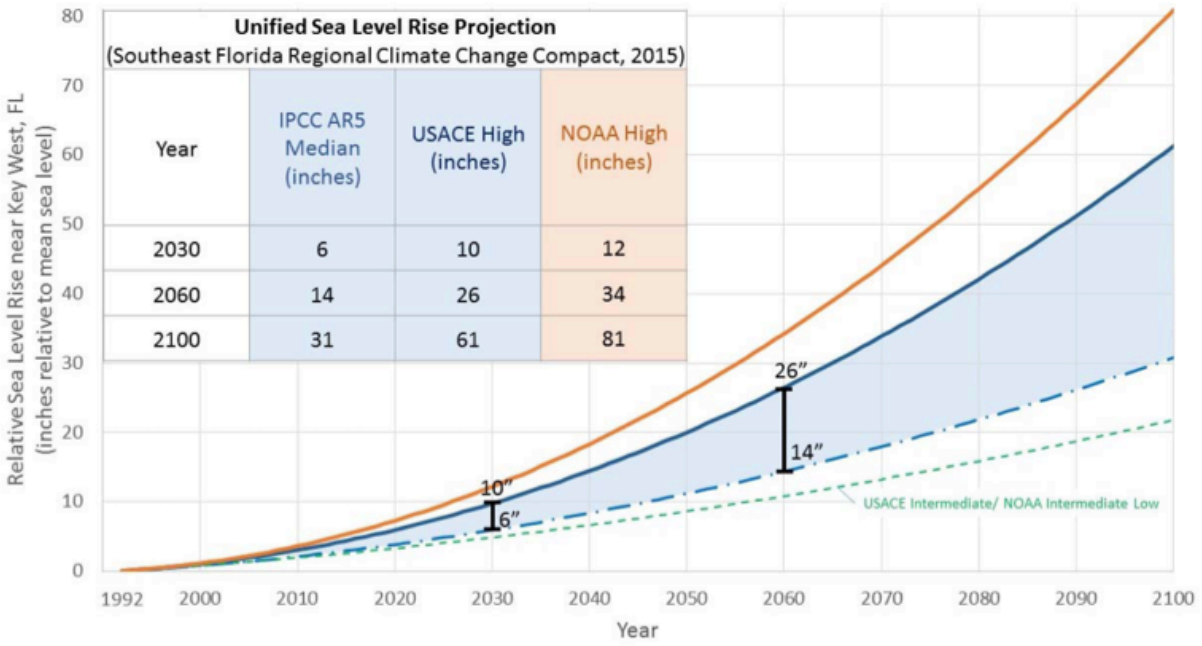


Figure 1: Unified Sea Level Rise Projection. These projections are referenced to mean sea level at the Key West tide gauge. The projection includes three global curves adapted for regional application: the median of the IPCC AR5 RCP8.5 scenario as the lowest boundary (blue dashed curve), the USACE High curve as the upper boundary for the short term for use until 2060 (solid blue line), and the NOAA High curve as the uppermost boundary for medium and long term use (orange solid curve). The incorporated table lists the projection values at years 2030, 2060 and 2100. The USACE Intermediate or NOAA Intermediate Low curve is displayed on the figure for reference (green dashed curve). This scenario would require significant reductions in greenhouse gas emissions in order to be plausible and does not reflect current emissions trends.

ADAPTATION ACTION AREAS

Feasibility assessment

In January 2015, the Board of County Commissioners passed a resolution which directed the Mayor or his designee to study the feasibility of designating Adaptation Action Areas (AAA) as recommended in the Comprehensive Development Master Plan. The Department of Regulatory and Economic Resources studied the feasibility of designating AAAs and recommended initiating a pilot project. This determination was based on the careful review of the AAA pilot project implemented in the City of Fort Lauderdale, in partnership with the South Florida Regional Planning Council, the Florida Department of Economic Opportunity, and Broward County. This project produced a comprehensive planning guidebook for local governments that outlined how other jurisdictions could establish AAAs. This report was carefully reviewed. Staff also consulted with the technical and project leads for the Fort Lauderdale pilot to understand which program components were successful and which may need to be revised for Miami-Dade. Fort Lauderdale staff felt the AAA pilot project had been a successful tool to facilitate planning and infrastructure investments. Fort Lauderdale staff reported very positive responses from their initial community engagement and they intend to continue and expand the AAAs in the future.

Adaptation Action Areas are feasible because they are largely consistent with other designations and planning approaches that have been, and are currently being, used successfully. This includes the Coastal High Hazard Areas and small area studies used by the Planning Division, the priority stormwater basins, and the Resilient Redesign studies conducted by the Compact. These approaches have successfully helped direct planning resources, prioritize investments, and capital improvement projects, and draw out innovative and forward-looking solutions for the areas studied. Most importantly, it is the flexibility and inherent ability to tailor and adjust these areas to fit the needs of communities which makes this approach an appropriate and feasible way to accelerate implementation.

Adaptation Action Areas: a flexible tool

AAAs is an inherently flexible planning tool. As part of the feasibility assessment, staff considered several alternative approaches to adopting AAAs. This report outlined four approaches, which are not necessarily entirely distinct. Elements from each approach can be selectively adopted and can be further refined or adjusted depending on priorities and resources available.

1. Project-based
2. Enhanced adaptation planning for previously identified areas
3. Systems-based adaptation planning
4. Area planning for newly-identified vulnerable areas

Final recommendations

As highlighted in the report, there are multiple approaches to designing the Adaptation Action Areas which can build upon existing processes, internal expertise, and the best available science. All four of the approaches could feasibly be adapted and implemented with existing staff and resources. However, the fourth approach, area planning for newly-identified vulnerable areas, was determined to be the most desirable approach to begin implementation. This approach would allow for a more accurate assessment of vulnerability, a more comprehensive assessment of potential adaptation measures, and could help develop internal technical capacity and working relationships across departments, as well as in the community. As this approach will likely need to be adjusted and refined with time, staff recommended beginning the AAAs with a pilot project in 2016.

Adapting to sea level rise will require extensive collaboration, coordination, and collective learning. Small changes in sea levels will have cascading impacts throughout the system because of the interconnected nature of our regional water management systems. Addressing these changes often requires more than simple upgrades of the water and sewer infrastructure and therefore it is desirable to work across departments and directly with residents to find multi-purpose and cost-effective solutions. In many instances, it will be possible to find solutions that also enhance the quality of life in these neighborhoods. For example, increasing the buffer areas along our canals, rivers, and the ocean can reduce the vulnerability to flooding while also creating an opportunity for new linear parks and green spaces. By working with an interdisciplinary team to develop a suite of solutions for each area, it will be possible to continue to build the County's capacity to respond creatively to the challenges of changing sea levels.

Progress since the feasibility report

On January 20, 2016, the Board of County Commissioners passed Resolution R-66-16, sponsored by Commissioner Rebeca Sosa, which directed the Mayor or his designee to proceed with a pilot Adaptation Action Area.

Independently, the Urban Land Institute, a non-profit and research institute, selected Miami-Dade County as one of the communities chosen for assistance through their Advisory Services Program. Through this program the Urban Land Institute brought a Resiliency Advisory Services Panel, composed of renowned land use and urban planning experts, to the County to provide recommendations on how to improve the resilience of the Arch Creek drainage basin, one of the County's most vulnerable areas. The panelists toured the site (Figure 2), interviewed stakeholders, and presented their interim recommendations on May 27, 2016. A final report will be published early this fall with their final recommendations.

Figure 2: Engineers explain the drainage issues in the Arch Creek area

The opportunity to work alongside these experts and the Urban Land Institute was a great opportunity for the County. Staff will now be carrying these ideas forward as the Adaptation Action Area pilot is further implemented. The Arch Creek area will also be the focus on this year's Resilient Redesign effort through the Compact.

ENVIRONMENTALLY ENDANGERED LANDS

The final report in brief

This report presents a history of the Environmentally Endangered Lands (EEL) Program, its importance for adapting to climate change, and the Program's recent progress, including the acquisition of approximately 250 acres during this past year. A primary focus of the report is to identify additional potential funding mechanisms appropriate to meet short-term and long-term needs. A combination of sources described in the report will likely be required; however, additional funding from the recent passage of Amendment 1 is an important potential source.

How the Environmentally Endangered Lands Program supports climate change adaptation

Miami-Dade County's natural environments, like coastal barrier islands, mangrove forests, shallow bays, estuaries, and wetlands, are an important first line of defense against climate change. In addition to their intrinsic value as conservation lands, these rich natural resources are also the best insurance to protect our drinking water and coasts from the impacts of gradual sea level rise and extreme weather. These areas provide protection for our coastlines from erosion and storm surge. The wider and the thicker the natural buffer, the more the mangrove forest can protect the communities behind it by dampening wave energy and potentially delaying or reducing the height of storm surges. For example, a mature and healthy forest with a complex root system can help dissipate wave energy more effectively than a thinner or fragmented forest. Though exact values will vary by location, research has shown a mature mangrove forest can reduce wave energy by 20% for every 300 feet of forest. A local study found the mangroves effectively attenuated surge and reduced the area flooded during Hurricane Wilma.

In contrast to manmade flood defenses, mangrove forests have a natural ability to adapt and keep pace with rising sea levels if the environmental conditions are favorable. However, many factors may compromise their ability to acclimate. If environmental stressors impact the mangroves, they may not be able to keep up with sea level rise. As a result, if the forests are too stressed, the width of the buffer area and their protective value would diminish. Protecting the health of these ecosystems can therefore contribute to the long-term safety for the communities sheltered by them. In order to guard against reducing the protective power of our natural defenses, it is crucial to protect these vital resources through conservation and preservation with the help of the EEL Program. In order to further the goals of this successful program, sustainable funding sources need to be identified. Acquisition of these natural barriers is critical, especially in communities, such as those in south Dade.

Recent progress

Since the Program's inception, EEL, along with its partners has successfully acquired and managed more than 24,000 acres of environmentally endangered land and has identified strategic priorities for future acquisitions. These properties represent a wide range of habitats, which provide a myriad of ecosystem services to the community. Between January 2015, and January 2016, the EEL Program acquired approximately 250 acres at a cost of $1,177,081. These acquisitions include lands within the Goulds Pineland and the South Dade Wetland Pre-

serves. These acquisitions have helped reduce fragmentation between other preserves, which helps reduce management costs and improves the ecological health of the resources.

Program funding

A key consideration affecting the EEL Program's long-term success is the ability to fund the management of Preserves and addition of the remaining land on the Acquisition List. In 1990, the electorate of Miami-Dade County authorized the County to levy a two year ad valorem tax for acquisition, preservation and maintenance of environmentally endangered lands for the benefit of present and future generations. The initial funding allowed for the creation of the EEL Program. The Program has succeeded in leveraging the original investment made by taxpayers and has accrued $198 million in revenue since its inception. However, additional or recurring revenue sources of funds need to be identified and secured. The Program has endeavored to address land management needs by engaging volunteers and by securing additional intermittent sources of funds; however, additional revenue sources are needed to assure program achievements can be sustained and objectives met.

Potential funding sources

The report identifies several potential funding mechanisms including:

- Florida Constitutional Amendment 1
- Green Utility Fee
- State Legislative Proposal to Allocate Funds to the EEL Program for Exotic Plant Removal and Management
- New EEL Referendum
- Continued use of Miami-Dade County's Wetlands and Tree Trust Funds
- Stormwater Utility Fee

ENHANCED CAPITAL PLAN

The final report in brief

This report outlines the typical process other governments have taken to improve the resilience of their infrastructure, areas of expertise that exist within the County, areas where external expertise is needed, potential approaches to developing an enhanced capital plan, and finally, a recommended approach.

A typical planning process

Miami-Dade County can leverage the experience of other cities that have already initiated similar work in developing their enhanced capital plans to respond to climate change. Many planning processes have followed a generalizable pattern summarized in the report.

Expertise and information needed to proceed

The County and regional partners already have significant expertise and data on local climate risks, including localized sea level rise projections, expected changes in groundwater levels, potential storm surge heights (including sea level rise), as well as temperature and precipitation scenarios. While additional research can always be done, existing information is sufficient to begin planning. The County also has partial information on the vulnerability of its infrastructure to climate impacts. While certain departments such as the Water and Sewer Department and Parks, Recreation and Open Spaces have completed comprehensive assessments, many departments do not have the tools and expertise in-house to thoroughly assess the impact of climate change on the functionality of their systems and therefore have not yet begun this process.

External expertise could be most useful in evaluating the technical and cost-effectiveness of different adaptation strategies. Evaluating the technical effectiveness would involve comparing alternative adaptation measures (e.g. a new bulkhead or new drainage well) to determine which investment is most effective at a given location. This evaluation requires expertise in disciplines such as coastal, geotechnical, and hydraulic engineering. It is important to pair the technical analysis with an economic analysis to develop feasible adaptation measures. For example, nourishing the beach every year and raising the height of dunes to 18 feet may provide the most protection, however, this strategy may not be economically feasible. Completely eliminating risk would likely be prohibitively expensive, therefore, the County needs to systematically determine a reasonable level of risk. This requires expertise in cost benefit analysis, risk management, and economics. The timing of investment is also critical and tools exist to help phase investments, based on flexible adaptation pathways tied to certain physical triggers, such as a given rate of sea level rise or a major hurricane. Experts could also add value by developing communication and visualization tools to help convey information to a wider audience. Tools exist that allow users to move beyond reacting to a pre-defined plan and instead dynamically experiment with different combinations of investments and infrastructure projects. This helps decision makers and the community to understand physical and economic impacts, test alternative outcomes, and identify tradeoffs.

Potential approaches to developing an enhanced capital plan

- Top down: replicating the Dutch approach
- Bottom up: replicating WASD's approach
- Hybrid: replicating Boston and New York's approach

Recommended approach to developing an enhanced capital plan

Given the value of holistic planning, but recognizing the relevance of pre-existing efforts, the County would be best served by adopting a hybrid approach similar to Boston or New York. A hybrid approach would incorporate both the best elements of the Dutch approach, while moving more quickly by leveraging the work done by other departments. This could be done by simultaneously developing an enhanced capital plan and a rapid action team.

Rapid Action Team

This portion would focus on identifying the most urgent vulnerabilities to critical infrastructure. A project team, comprised of key staff from selected departments and the consultants, would help identify critical needs, compare all proposed projects, quickly prioritize them, and create a phasing strategy to expedite implementation.

Enhanced Capital Plan

Simultaneously, the County could create an enhanced capital plan that addresses medium and long-term risks. This would evaluate alternative resiliency strategies based on their technical efficacy, economic impacts, and co-benefits to the community. The plan will ultimately influence the County's Capital Improvements Program.

Potential costs of retaining external experts

The cost of retaining external experts to develop an enhanced capital plan depends directly on how detailed and comprehensive the County chooses to make the plan. As demonstrated by the costs of other similar projects detailed in Appendix 2, resources between $1.5 and $5 million would likely be needed to fully complete this work. As an example, creating *A Stronger, More Resilient New York* required approximately five months and five million dollars. Total funding needs could be reduced by drawing more on internal County resources. Following Hurricane Sandy, New York City temporarily pulled together more than 40 staff members from different agencies to work cooperatively for five months to develop their resiliency plan. The County could pursue a similar strategy.

Conclusions

Developing an enhanced capital plan with the support of external experts could help integrate risks into capital planning. There are useful precedents to draw upon and following an approach similar to New York's may be an expedient path forward. There are many firms with expertise in the range of disciplines needed and there are opportunities to involve local universities and organizations. Completing an enhanced capital plan has the potential to prioritize and develop consensus around preferred adaptation measures. This could ensure short-term investments are not only reacting to visible, short-term issues, such as nuisance flooding, but are proactively contributing to the community's long-term resilience. The additional funding allocated to the Office of Resilience and allocated to hire consultants to support this work will expedite this process.

INSURANCE & RISK MANAGEMENT

The report in brief

This final report first describes why the County chose to focus on insurance in the context of climate change and provides a summary of the key considerations and long-term risk management options available to the County that were discussed at an insurance roundtable discussion hosted in January, 2016.

Why focus on insurance and risk management?

Miami-Dade County is vulnerable to multiple natural hazards. These risks will likely be exacerbated by climate change, due to rising sea levels, the potential increase of more intense hurricanes, and changes in precipitation patterns. Despite projected risks, the County has a long history of preparing for similar hazards. Since Hurricane Andrew, the County has made substantial investments in preparing for hurricanes by strengthening building codes to minimize wind damage and improving internal capacity. As a result, the County can now draw upon both deep internal expertise within emergency management, risk management, water management, and regional partners such as the South Florida Water Management District, the Southeast Florida Regional Climate Change Compact, and the Florida Climate Institute, to better prepare for projected hazards.

As losses from disasters around the world increase, governments are recognizing the importance of prioritizing investments in the long-term economic resilience. Hurricanes Sandy and Katrina underscore the importance of continually improving preparations and adopting new tools and best practices. The insurance and reinsurance industries have made significant improvements to their risk management tools and therefore, leveraging their expertise can help the County better identify, prepare for, and insure the risks that cannot be mitigated.

Insurance and risk management are key components of Miami-Dade's long-term economic resilience. County residents annually pay more than $147 million in flood insurance premiums alone. The County, therefore, will continue to work cooperatively with the private sector and others to identify opportunities to more effectively prepare for hazards that will be exacerbated by climate change.

The Mayor, the Office of Resilience, the Beacon Council, and the British Consulate General in Miami convened a second roundtable discussion on January 11, 2015, with key representatives from the private and public sectors. The three principle goals of this discussion were to draw upon the technical expertise of the private sector to help Miami-Dade County staff:

1. Better understand the physical and economic risks to Miami-Dade County,
2. Improve the future insurability of County and privately-owned assets, and
3. Understand best practices and their potential implementation in Miami-Dade County

Key considerations

- Recent development, population growth, and rising sea levels have increased the exposure of assets vulnerable to flooding and storms in Miami-Dade County
- The Federal Emergency Management Agency is currently remapping coastal areas within Miami-Dade County and insurance rates are likely to change in certain areas
- Many businesses and families vulnerable to flooding do not have adequate insurance
- The County's economy and credit rating could be affected by a natural disaster
- Some flood insurance premiums are underpriced and do not fully reflect actuarial risk

Recommended long-term risk management practices

- Mitigate the County's own exposure
- Promote the Community Rating System
- Work to address gaps in coverage, particularly for sub-groups which are more vulnerable to disasters and are least able to afford insurance coverage
- Work more closely with the insurance and reinsurance sector to share knowledge and expertise to identify risk and develop risk transfer solutions
- Promote more resilient development

Conclusions

There was resounding consensus at this year's insurance roundtable that hosting an annual or bi-annual discussion around these issues would be fruitful. It will be particularly helpful to continue the dialogue between the public and private sectors because the issues of climate change, risk management, and risk modeling are quickly evolving. In the intervening time, smaller internal working groups will continue to meet to implement and refine recommendations discussed in this report. These groups will initially focus on four areas:

1. Expediting the County's own risk mitigation efforts,
2. Effectively communicating these efforts to the industry,
3. Engaging the industry and others to stay abreast of the most current data and tools, and
4. Addressing issues of affordability and public education for the uninsured and underinsured.

These work groups will report back and provide the Mayor with specific recommendations for how Miami-Dade County can stay ahead of these issues and be a leader in this field.

FLOODING & SALTWATER INTRUSION

The report in brief

This report provides a summary of the major efforts, complete or underway, to understand the implications of sea level rise on increased risks for flooding and saltwater intrusion. This report also explores potential funding mechanisms for adaptation measures and details research gaps and next steps.

Flooding and saltwater intrusion

This report was developed in partnership with multiple agencies including the U.S. Geological Survey, The South Florida Water Management District, and The Army Corps of Engineers. The County has worked with these entities and many others to conduct a comprehensive review of the studies and adaptation work going on to address flooding and saltwater intrusion. This report presents only a partial snapshot of the extensive on-going efforts as millions of dollars have, and are being directed to answering and addressing these questions. Multiple entities are engaged in this research including local and state universities, multiple federal, state, regional and local agencies, the private corporations, non-profits, and the Southeast Florida Regional Climate Change Compact. The County is fortunate to have the support of many world-class entities dedicated to understanding the issues.

This report also provides a roadmap to where updated information can be found. Many institutions, including the National Aeronautics and Space Administration, The National Climate Assessment, the South Florida Water Management District, National Oceanographic and Atmospheric Administration, and many non-profit groups have helped synthesize the existing information and made it into publicly accessible, user-friendly webpages.

This report also includes a review of on-going efforts to understand and mitigate the risks of flooding and saltwater intrusion. The amplifying impact of sea level rise on these risks is an active area of study; however, the available information on sea level rise is being incorporated into on-going programs. For example, to improve their ability to reduce the risks of flooding, the South Florida Water Management District is working to evaluate the current and future levels of flood protection to identify and prioritize long-term infrastructure needs. The agency is conducting studies to identify hazards and possible mitigation activities, and is collaborating with Dutch experts to share expertise, strategies and information. The County is also partnering with the U.S. Geological Survey to analyze groundwater flows and map changing groundwater levels. A partnership with the RAND Corporation is allowing the County and Compact partners to study the interactions of new infrastructure and land use changes on future water management needs and potential flooding damages. The County is also assisting the Federal Emergency Management Agency in revising and updating the County's Flood Insurance Rate Maps to more accurately reflect current conditions. Some projects are bringing together several partners like the U.S. Army Corps of Engineers, the U.S. Geological Survey, and the Nature Conservancy, to study risk mitigation alternatives and assess the potential for nature-based coastal defenses. Miami-Dade is also working with local and national universities through

research initiatives like the Sustainability Research Network-Urban Resilience to Extremes. It is worth underscoring the contribution the Compact has made to coordinating a regional approach and attracting additional resources.

Re-evaluating complex water management systems (Figure 3) and evaluating the appropriate adaptation measures for different components of the system is underway, but will take years to fully complete. The process could be expedited with additional funding or could be accelerated by prioritizing investments in known mitigation needs. For example, there are more than 1,000 projects that are part of the Local Mitigation Strategy that could reduce the community's vulnerability to known hazards.

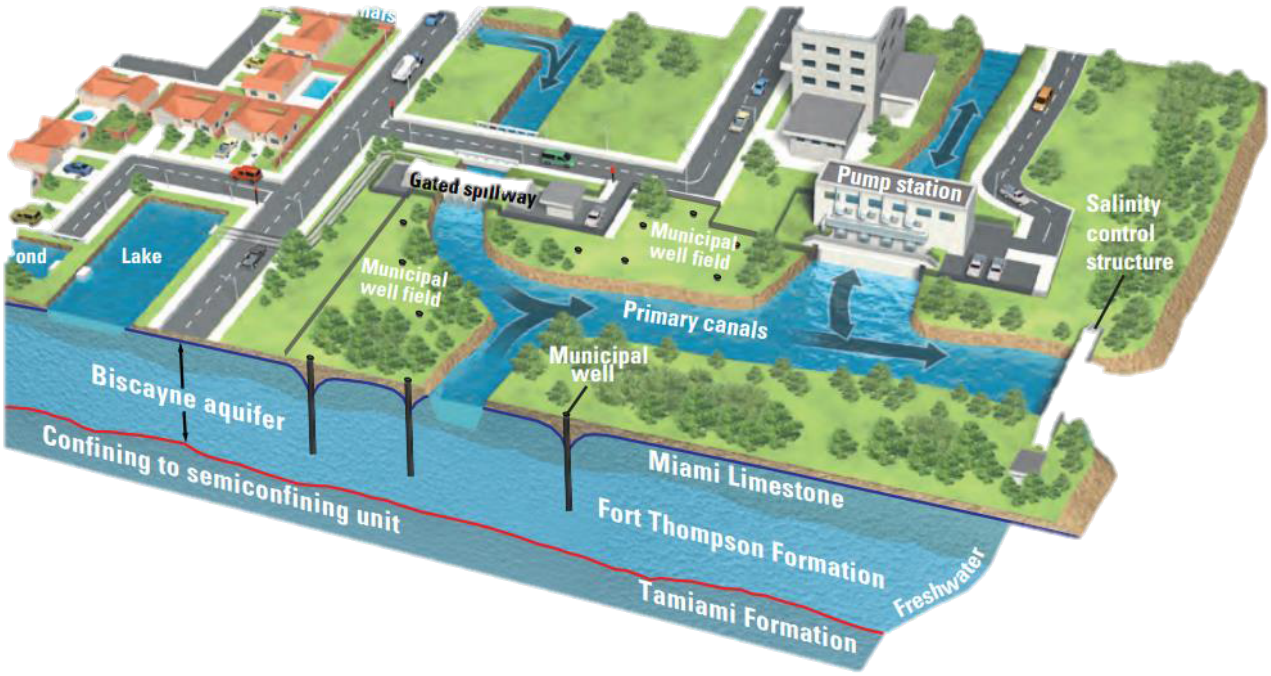
Potential funding sources

The report also includes a summary of potential adaptation measures and funding mechanisms. One of the primary mechanisms for supporting adaptation measures will likely be grants and special assistance programs from federal, state, regional and private entities. The report includes a preliminary list of grants that may be suitable for certain project types. In addition to grants and government-based funding, resiliency measures may require innovative sources of financing. Though funding opportunities explicitly for climate adaptation are relatively new, there are resources and best practices that can help guide communities as they explore new sources.

Relevant research from local universities

Finally, the report includes a snapshot of the relevant research being conducted at area universities.

Figure 3: Conceptual diagram of the components of the surface water management system in Miami-Dade County



CLIMATE CHANGE ADVISORY TASK FORCE

The report in brief

This report discusses the history of the Climate Change Advisory Task Force (CCATF) and the evolution of the final recommendations created by the CCATF. The report details recent progress on related initiatives including on GreenPrint, the County's sustainability plan, and the Compact's Regional Climate Action Plan. Finally the report recommends steps to accelerate the implementation of mitigation and adaptation goals.

The history of the Climate Change Advisory Task Force

The Climate Change Advisory Task Force was created in 2006 and chaired by the Honorable Harvey Ruvin, Clerk of Courts. The Task Force was supported by nearly 200 community members drawn from academia, the private sector, and government. The CCATF and its seven subcommittees hosted technical experts, met over 50 times over five years and developed a series of recommendations to both prepare for many of the expected impacts of climate change ("adaptation") and to reduce the County's contribution to the problem ("mitigation"). The recommendations have many co-benefits such as increasing the County's operational efficiency, saving tax dollars, reducing local air pollution, improving public health, improving public spaces and natural areas, and improving the livability and attractiveness of our community. The CCATF released its first recommendations in April of 2008 and the Final Report and Recommendations in April 2011. These recommendations were taken into consideration in the development of both GreenPrint and the Compact's Regional Climate Action Plan.

Recent progress

In 2010, while the CCATF was developing recommendations, the Southeast Florida Regional Climate Change Compact was formed. The Compact has become the regional clearinghouse for much of the region's work on climate change. Through this ground-breaking partnership, County staff work closely with peers in other governments, state and federal agencies, community-based organizations, and universities. This close collaboration and pooling of resources has allowed the County to make substantially more progress than would have been possible working independently. The collaboration has helped secure additional funding and technical assistance from a number of state and federal agencies and private foundations. This external support has also allowed County staff to work collaboratively with experts from the Netherlands, New Orleans, New York and other areas.

Through the Compact, the County also contributed to the development of the Regional Climate Action Plan. This plan contains over 100 recommendations which focus on sustainable communities, transportation planning, water supply, management and infrastructure, natural systems, agriculture, energy and fuel, risk reduction and emergency management, and outreach and public policy. Compact members, both municipalities and counties, track the implementation of these recommendations and share best practices through work groups, publication of case studies, regular implementation workshops and accompanying guidance documents, which have focused on issues such as transportation, water supply planning, stormwater management, and Adaptation Action Areas.

The nexus of the County-specific work on climate change is GreenPrint, a county-wide sustainability plan. GreenPrint's final chapter contains the County's Climate Action Plan, which lays out aggressive goals to reduce the County's greenhouse gas emissions by 80% by 2050. The plan includes adaptation measures and a detailed analysis of emissions sources. GreenPrint builds directly on the CCATF process. During the development of GreenPrint, members of the development team attended CCATF meetings throughout the entire process which facilitated incorporation of recommendations into GreenPrint. While the specific wording is often different, many of the same themes are central to both. For example, both focus heavily on reducing the County's emissions through greater energy efficiency, increasing the use of more fuel-efficient vehicles and public transportation.

Staff are currently revising GreenPrint and this year's timely review of the CCATF recommendations has facilitated a thorough review of which concepts are most aligned with strategic goals. Many CCATF recommendations included in the first iteration of GreenPrint will be carried forward. In other instances priorities have changed. For example, several recommendations focused on improving the fuel efficiency of medallion-holding taxi cabs; however, because the market is so substantially different today, the next version of GreenPrint will focus on other transportation initiatives such as increasing transit ridership, walking, and biking. Additionally, by utilizing the Clearpath software to measure and monitor emissions, the County can now more carefully estimate the effectiveness of various reduction strategies. This tool is being used to help determine the most impactful emission reduction strategies.

PRIORITY INITIATIVES: ENHANCED IMPLEMENTATION NEEDS

Given the scale of the challenge, additional resources are required to implement the County's climate mitigation and adaptation goals. There is also a need to focus efforts on the most important initiatives that are likely to yield results. Therefore, the CCATF recommendations are grouped into three larger baskets that are critical priorities.

- Priority I: Reduce greenhouse gas emissions by increasing energy efficiency
- Priority II: Reduce greenhouse gas emissions from transportation
- Priority III: Adapt to climate change and rising sea levels

Both the County and the Compact have laid out ambitious goals for mitigating and adapting to climate change. As the next iteration of GreenPrint and the Regional Climate Action Plan are developed, the CCATF's recommendations will continue to serve as a foundation upon which to implement more current and relevant initiatives. Furthermore, the CCATF recommendations will serve as a source of information and inspiration as the County works with its partners, the City of Miami and the City of Miami Beach, to develop a resilience strategy for Greater Miami and the Beaches, as part of the Rockefeller 100 Resilient Cities. It is through these key action documents that implementation of the CCATF recommendations will continue, and these recommendations will serve as a sound foundation for action.