Adaptation Action Areas: Policy Options for Adaptive Planning For Rising Sea Levels

Prepared by the

South Florida Regional Planning Council

In collaboration with the
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Broward County and the City of Ft. Lauderdale

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Objective

In 2012, the Florida Department of Economic Opportunity (DEO) initiated a five-year project to integrate sea level rise adaptation into current planning mechanisms, including the local comprehensive plan, hazard mitigation plan, and post-disaster redevelopment plan. One of the focus areas is to provide statewide guidance on how to implement an *Adaptation Action Area* at the local level. Through funding from the National Oceanographic and Atmospheric Administration (NOAA) and the Florida Department of Environmental Protection (DEP), DEO engaged the South Florida Regional Planning Council (SFRPC) to assist in the research for Adaptation Action Area implementation strategies. The SFRPC is working with the City of Fort Lauderdale, which is serving as one of the state's Adaptation Action Area pilot communities, and Broward County to test adaptation policy options to be incorporated into the City's Comprehensive Plan. In summary, the following tasks are to be completed:

I. An adaptation policy options report, providing planning tools a coastal community could employ through the designation and implementation of an Adaptation Action Area;
II. A draft Adaptation Action Area amendment to the City of Fort Lauderdale's Comprehensive Plan; and
III. A "how to" apply an Adaptation Action Area guidance document for statewide distribution, including a case study of Fort Lauderdale's sea level rise issues and planning process.

Broward County, the City of Fort Lauderdale, and the SFRPC have been key players in the ongoing efforts of the Southeast Florida Regional Climate Change Compact (The Compact). The Compact, a partnership of Broward, Miami-Dade, Monroe, and Palm Beach Counties, represents regional cooperative framework designed to set the agenda for adaptation planning in south Florida while providing a means for state and federal agencies to engage with technical assistance and support. The Compact has been successful in changing Florida planning

legislation to incorporate efforts to address a changing climate and sea level rise, and prioritize funding for this purpose.

In 2011, the Florida Legislature passed the Community Planning Act (CPA), which made significant changes to the state's growth management laws, including the addition of an optional designation of an Adaptation Action Area within a local government comprehensive plan's Coastal Management Element. The intent of such a designation would be to address coastal hazards and potential impacts to sea level rise in a specific location by pursuing adaptation planning within the designated area and prioritizing funding for infrastructure improvements.

This report should be read as resource for the state of Florida's coastal communities, providing guidance on the benefits of incorporating adaptation strategies into local planning policy and programs. The report begins with a summary of sea level rise impacts to Florida's coastal communities and the importance of engaging in adaptation planning efforts. In addition, the state's recent growth management law revision to allow for the designation of Adaptation Action Area is explained and a snapshot of Broward County's related adaptation policies are highlighted.

Following are details of planning tools a coastal community may consider to implement through the designation of an Adaptation Action Area. This section should provide the state's coastal communities with a checklist of ideas of how to amend their current planning documents and implementation mechanisms for addressing the impacts of coastal flooding and sea level rise. Finally, the report wraps up with a brief conclusion and provides links to additional resources.

Background: Sea Level Rise and Adaptation Planning

In the early 2000s, consensus by the scientific community was reached that -- due to the thermal expansion of existing oceanic waters, and the addition of more volume from melting ice reservoirs from glaciers and ice sheets -- sea level rise is unequivocally taking place. Local government officials are already experiencing and reacting to extreme coastal hazards and weather related events. This is the time for all Floridians, the majority of whom live less than 60 miles from the Atlantic Ocean or Gulf of Mexico, to question the long-term effects of sea level rise on more than 1,350 miles of our coastline, 4,500 square miles of our estuaries and bays, and over 6,700 square miles of our other coastal waters. The expansive length of the state's coastline and waterways represent a unique ecosystem made up of coastal ocean, barrier islands, bays, estuaries, lagoons, grove swamps, shellfish beds, sea grass beds, coral reefs and oyster bars. The state has a huge challenge in balancing its diverse population, built environment and economy while maintaining its unique natural ecosystems and habitats when planning for potential climate impacts. According to the Florida Oceans and Coastal Council (2010):

> Three-fourths of Florida's population resides in coastal counties that generate 79 percent of the state's total annual economy. These counties represent a built-environment and infrastructure whose replacement value in 2010 is $2.0 trillion and which by 2030 is estimated to be $3.0 trillion.

Deyle, Bailey, and Matheny (2007) reported that sea level rise will have the following four major impacts of concern related to the planning and management of public infrastructure:

a) Coastal inundation and shoreline recession.
b) Increased flooding from severe weather events.
c) Saltwater contamination of groundwater and surface water supplies.
d) Elevated coastal ground water tables.

The Southeast Florida Regional Climate Change Compact (Compact, 2011) projects that the sea will rise by approximately nine to 24 inches by 2060 in south Florida. Given the potential

impacts to our natural systems and built environment, how should the state's coastal communities move forward?

Much of the current literature on planning for a changing climate focuses on adaptation planning whereas it previously covered the need and methods for assessing a community's vulnerability, or risk, to these changes. Adaptation is fundamentally a risk management strategy; risk is a combination of the likelihood of climate impacts and the magnitude of the potential consequences (The National Academies, 2010). Response options are then evaluated for both their feasibility and potential effectiveness at reducing the identified risk(s). The research pointedly acknowledges that although adaptation planning is going to prove challenging due to political impediments, institutional restrictions and resource limitations, it is becoming a necessary planning process for many coastal communities.

Adaptation planning is a series of steps a community takes to become more resilient to the impacts of sea level rise. Listed below are the four main categories of adaptation strategies a community may use to adapt to rising seas:

a) **Protection**: Strategies that involve “hard” and “soft” structurally defensive measures to mitigate impacts of rising seas in order to decrease vulnerability while allowing structures and infrastructure to remain unaltered. Two examples are shoreline armoring and beach renourishment. Protection strategies may be targeted for areas of a community that are location-dependent and cannot be significantly altered or relocated, such as downtown centers, areas of historical significance, or water-dependent uses.

b) **Accommodation**: Strategies that do not act as a barrier, but rather alter the design through measures such as elevation or stormwater improvements, to allow the structure of infrastructure system to stay intact. Rather than preventing flooding or inundation, these strategies aim to reduce potential risks.

c) **Managed Retreat**: Strategies that involve the actual removal of existing development, their possible relocation to other areas, and/or the prevention of future development in high-risk areas. Retreat strategies usually involve the acquisition of vulnerable land for public ownership, but may include other strategies such as transfer of development rights, purchase of development right, rolling and conservation easements.

d) **Avoid:** involves ensuring development does not take place in areas subject to coastal hazards associated with sea level rise or where the risk is low at present but will increase over time. This may involve identifying future "limited development" areas within local government planning documents. A wide range of planning tools may be involved, leading to a decision to avoid development in areas subject to moderate to high risk. Regulatory tools may include the designation or zoning of lands for limited development or non-habitable uses. An avoid strategy may include land acquisition or restriction tools such as a land trust, or the transfer of development potential to areas with low or no risk due to sea level rise.

Determining suitable adaptation strategies to address sea level rise for a community or region depends on vulnerability (risk). The Center for Climate Strategies (2011) reports that an essential step in adaptation planning is to determine the areas that will receive priority focus when considering and developing adaptation policies. Those targeted impact areas should be prioritized based on projected timelines, risk level and type, consequence of risk, scope and range of impact, and frequency of impacts.

Priority areas for adaptation planning may be based on a specific geographic area (e.g., development along coastlines), by certain populations or communities (e.g., the elderly and climate-related health risks), or by natural and built systems (e.g., local stormwater drainage systems and infrastructure).

After consensus on vulnerability and adaptation priority areas has been reached, a community will need to plan and prioritize the implementation of adaptation strategies. Some of the criteria a community should consider include:

- What is the planning timeframe for sea level rise impacts?
- When are the impacts projected to occur?
- How much time will it take to react, prepare, or develop adaptation strategies?
- What are the benefits and co-benefits?
- Are there associated adverse impacts with the strategy?
- What is the cost of a strategy and how will it be funded?
- Is the strategy equitable?

Florida's Comprehensive Plan

Pursuant to the Community Planning Act (CPA, Chapter 162, Part II, Florida Statutes), all counties and municipalities in the State of Florida are required to adopt a comprehensive plan and procedures to implement the plan. The plan shall provide the principles, guidelines, standards, and strategies for an orderly and balanced future economic, social, physical, environmental, and fiscal development of the community for which it is written and adopted. The associated implementation procedures are commonly called *land development regulations*, *land development codes*, or *zoning*. All proposed and approved development in the community must be consistent with the plan and its procedures.

The comprehensive plan is divided into elements sections entitled: Goals, Objectives, and Policies that are intended to guide the future development of a community covering at least the first 5-year and 10-year period occurring after the plan's adoption. Required elements include Future Land Use, Housing, Transportation, Recreation and Open Space, Infrastructure (sanitary sewer, solid waste, drainage, potable water and natural groundwater aquifer recharge), Conservation, Capital Improvements, and Intergovernmental Coordination. In addition, coastal municipalities and counties must prepare a Coastal Management Element. A community may include optional elements, such as Economic Development, Historic Preservation, or Community Design. While a comprehensive plan is composed of these elements, the issues addressed in the elements are often interrelated; therefore, requiring the comprehensive plan to be read as a singular document.

The comprehensive plan is the strongest planning tool for coastal communities as it is the first place to incorporate adaptive strategies into a community's land-use decision making framework. Through the comprehensive plan, a community can:

- Establish the applicable rate of estimated sea level rise and set a planning timeframe for land-use decisions,

- Direct the local government to assess the community's risks and vulnerabilities, and the related impacts,
- Designate areas for special protection or restriction from further development,
- Create a schedule or mechanism for the implementation of adaptation projects.

The studies and evidence, such as risk assessments or data identifying current erosion or flooding problem areas, can serve as the data and analysis to support a community's adopted adaptation measures.

The option to address sea level rise issues within the comprehensive plan is now encouraged by Florida's growth management legislation, which has defined an Adaptation Action Area (163.3164(1), Florida Statutes) as:

> Adaptation Action Area or "adaptation area" means a designation in the coastal management element of a local government's comprehensive plan which identifies one or more areas that experience coastal flooding due to extreme high tides and storm surge, and that are vulnerable to the related impacts of rising sea levels for the purpose of prioritizing funding for infrastructure needs and adaptation planning.

The purpose of the Coastal Management Element has always been to plan for, and where appropriate, restrict development activities that would damage or destroy coastal resources, endanger human life, and limit public expenditures in areas that are subject to destruction by natural disaster, such as within the Coastal High Hazard Area. The Element's Goals, Objectives, and Policies should provide for the maintenance, restoration, and enhancement of the coastal environmental zone and recreational uses, link to any of the community's hazard mitigation or post-disaster redevelopment plans, and potentially address insurance issues. Now the Coastal Management Element can play an important role in adaptation planning (163.3177(6)(g)10, Florida Statutes):

> At the option of the local government, develop an adaptation action area designation for those low-lying coastal zones that are experiencing coastal flooding due to extreme high tides and storm surge and are vulnerable to the impacts of rising sea level. Local governments that adopt an adaptation action area may consider policies within the coastal management element to improve resilience to coastal flooding resulting from high-tide events, storm surge, flash floods, stormwater runoff, and related impacts of

sea-level rise. Criteria for the adaptation action area may include, but need not be limited to, areas for which the land elevations are below, at, or near mean high water, which have hydrologic connection to coastal waters, or which are designated as evacuation zones for storm surge.

Broward County's Adaptive Planning Efforts

Broward County is situated on the southeast coast of Florida, directly north of Miami-Dade County, and is home to approximately 1.8 million residents. The county contains 431 square miles of urban area in the eastern portion and 796 square miles of conservation area in the west, mostly comprised of Water Conservation Areas, which are integral to Florida's Everglades ecosystem.

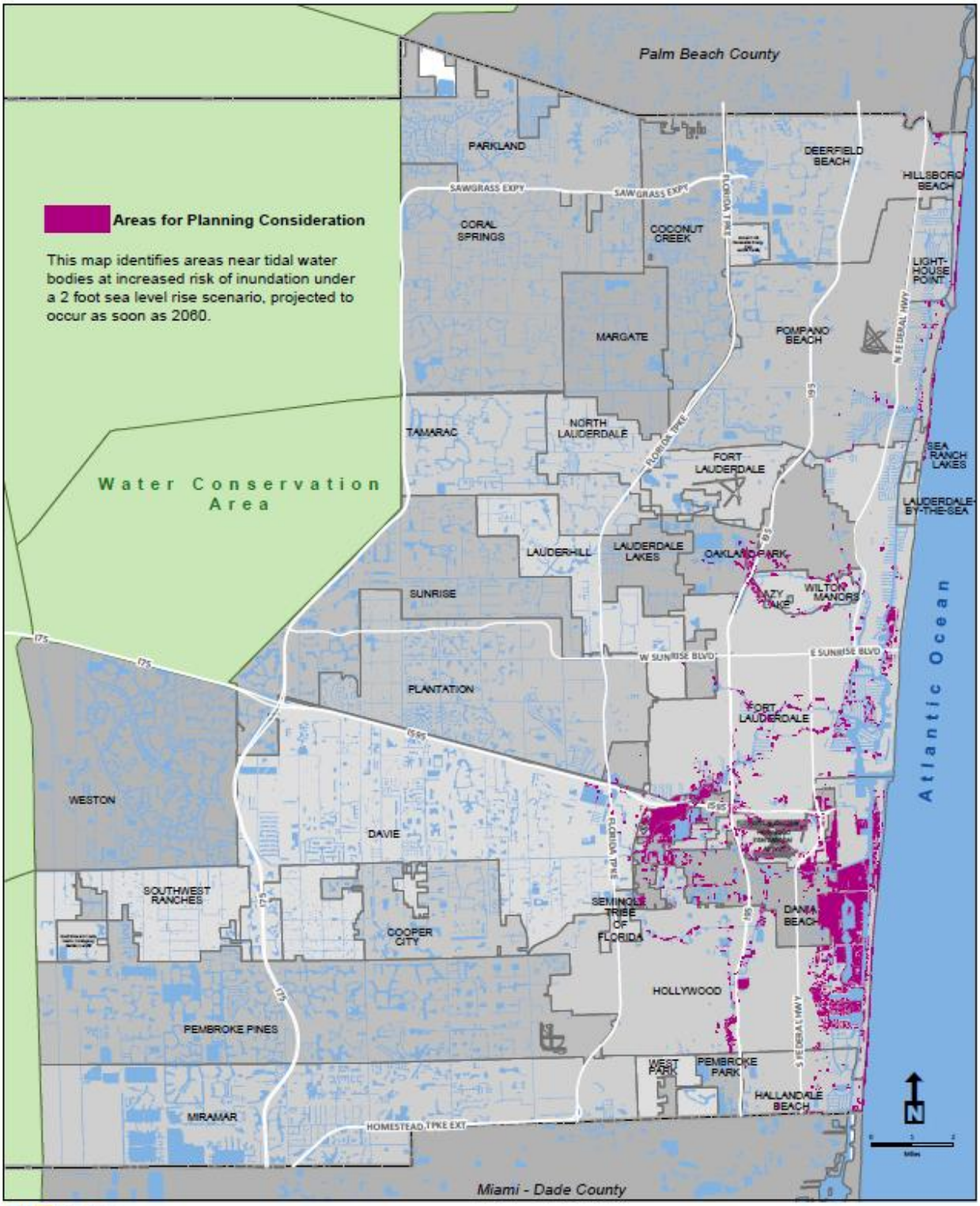
In February 2013, the County government adopted a new Climate Element into the Broward County Comprehensive Plan (Broward County, 2013a) and related amendments to its Land Use Plan (Broward County 2013b). The new Element represents an important milestone in adaptation planning in Florida as the County is the first local government to adopt such detailed policy direction related to planning for climate related impacts. In summary, the Element establishes the framework for integrating the economic, environmental, and social factors of changes to our climate into future planning and land use decisions. Objective 19.3 directs the County to "develop adaptation strategies for areas vulnerable to climate-related impacts". Those vulnerable areas have been identified in the Broward County Land Use Plan's "Priority Planning Areas for Sea Level Rise Map", illustrating areas that are at increased risk of flooding due to, or exacerbated by, sea level rise over the next 50 years as seen in the map below.

The map legend explains that the priority planning areas are areas near tidal water bodies which are at increased risk of inundation under a two-foot sea level rise scenario, projected to occur as soon as 2060. The County produced the map in partnership with the South Florida Water Management District and the National Oceanographic and Atmospheric Administration, utilizing LiDAR (Light Detection Ranging) data that was developed for the Florida Division of Emergency Management.

The associated Priority Planning Areas policies direct the County to discourage land use plan amendments that would place additional residential and non-residential development at risk of flooding from sea level rise. Please note that Broward's charter gives the County government countywide land use authority established with the passage of Chapter 59- 1154, Laws of Florida, Special Acts of 1959. The County is also tasked with coordinating with its local municipalities to help designate adaptation action areas, per Florida State Law, using the Priority Planning Areas as a basis for identifying vulnerable areas and to enhance funding opportunities for adaptation projects.

Coastal communities in the state are encouraged to follow Broward County's efforts to address sea level rise impacts. In fact, Broward County is holding itself accountable through Policies 19.3.4 and 19.3.7, requiring the County to update its "Priority Planning Area for Sea Level Rise Map" and infrastructure vulnerability assessments, every five years, so that decisions regarding adaptation planning and investments can be based on best available data.

PRIORITY PLANNING AREAS FOR SEA LEVEL RISE



Designating Adaptation Action Areas

Local governments wishing to designate Adaptation Action Areas must create the policy framework within the Coastal Management Element of their comprehensive plan. In order to set the stage for designating adaptation action areas, local governments should consider policy language which:

1. Recognizes the value of, and states the intent to, designate adaptation action areas to improve the resilience of built and natural areas to coastal flooding and related impacts of sea-level rise.
2. Provides the criteria to consider when identifying areas of concern for potential designation.
3. Describes mechanisms the local jurisdiction may use to create the actual designation.
4. Describes how funding will be prioritized to address designated areas.
5. Identifies potential funding mechanisms to implement the adaptation action needed.

Criteria for the adaptation action area may reference the state statute for Adaptation Action Area or identify more specific local concerns that fall within the state guidelines. Once the local government adopts a comprehensive plan policy to use adaptation action areas to improve community resilience, mechanisms for designating the geographical borders of an Adaptation Action Area may vary based on internal procedures. These may include, but are not limited to:

- Designation in the comprehensive plan through narrative description of the location or maps,
- Use of the capital improvement plan,
- Adoption of a resolution or an ordinance,
- Review and support by a jurisdiction's sustainability board or green team.

Prioritizing funding for infrastructure improvements in adaptation action areas and identifying funding mechanisms will be important to implement these policies. Funding may be targeted from a variety of sources such as federal or state infrastructure improvement funds, local capital improvement dollars, special assessments, modified utility fee structures or impact fees. A more in-depth discussion of planning tools and funding mechanism are provided in the next section.

Planning Tools and Initiatives to Implement Adaptation Action Areas

This section of the report outlines various adaptation planning strategies a coastal community could establish and implement through their local comprehensive plan or other strategic plans. The tool or initiative is identified, its benefit of use for adaptation planning discussed, and examples of policy strategies are provided.

The tools and initiatives discussed may be familiar to communities who are proactively conserving natural resources such as fresh water supplies, protecting citizens and businesses from hazards and natural disasters, expanding its pool of affordable housing, promoting energy efficiency, or prioritizing future public investments, to name a few. The challenge for coastal communities is going to be: (1) how to tailor traditional planning tools to include sea level rise adaption planning goals and (2) how these tools can be used to support the development of new, creative ways to also tackle this complex multi-faceted issue.

Coastal communities are encouraged to apply adaptation policies universally to all of their planning documents beyond the Coastal Management Element of a comprehensive plan. Policies can be linked to any or all of a plan's elements. For example, adaptation projects could be identified in the 5-Year Schedule of Capital Improvements within the Capital Improvements Element, or policies outlining specific coordination efforts can be adopted within the Intergovernmental Coordination Element. In addition, a coastal community's efforts to adapt the built environment to climate related impacts can be written into building codes, land development and zoning regulation, emergency management plans, local mitigation and post-redevelopment plans, water resource management plans, transportation plans, flood control and stormwater management plans, community redevelopment plans, and future visioning plans. Coastal communities should consider coordinating efforts with their respective regional Water Supply Plans, Metropolitan Planning Organization's Long Range Transportation Plan, applicable public school district's adopted five-year work plan, and applicable local and regional

natural systems and park management plans, such as the Comprehensive Everglades Restoration Plan.

Zoning and Overlay Zones

Zoning codes provide the legal, regulatory framework that governs a community's use and development of land within its jurisdiction. A zoning map is divided into districts based on the types of uses that are permitted, such as residential, commercial, and industrial. Design requirements are specified within each zoning district, including but not limited to setbacks, building height and density, and intensity of use.

An overlay zone or district is an area applied over one or more established land uses or zoning districts to establish *additional, stricter standards, or criteria for development* in addition to those of the underlying land use or zoning district. An overlay is often used to protect special features (wetlands, waterfronts), promote special development (mixed-use, or affordable housing), or discourage certain densities or intensities of development for the protection of natural resources or public safety.

A coastal community could define and establish an Adaptation Action Area overlay zone or district with associated implementation policies. The boundaries of the overlay should be based on known impacts or a vulnerability assessment using the best available data to determine the areas of land most susceptible to coastal flooding and rising sea levels. A community may consider utilizing the existing Coastal High-Hazard Area (CHHA) boundary as a base for an overlay. The coastal high-hazard area as defined by the Community Planning Act: "...the area below the elevation of the of the category 1 storm surge line as established by a Sea, Lake, and Overland Surges from Hurricanes (SLOSH) computerized storm surge model...". Per Chapter 163.3177(6)(g)6, F.S., public expenditures that subsidize development are to be limited in the CHHA. A map depicting the adaptation action area overlay could be included either in the Coastal Management Element, on the Future Land Use Map, or within the Comprehensive Plan's Map Series.

An adaptation action area overlay would be an all-encompassing sea level rise strategy that could implement a variety of community protection, accommodation and retreat strategies, including any of the tools and initiatives discussed in the remaining report.

Floodplain Regulations

In order to participate in the National Flood Insurance Program (NFIP), local governments must impose minimum regulation on development in floodplains wherein structures in flood susceptible areas must be constructed to minimize flood damage. Such regulations include elevating structures to or above base flood levels and anchored to withstand wind and wave action in 100-year floodplain areas (known as A-Zones and V-Zones). X-Zones represent the 500-year floodplain and do not require regulations. The Federal Emergency Management Agency (FEMA), who administers the NFIP, is responsible for developing the Flood Insurance Rate Maps (FIRMs). The maps are created using only historical flood data, but *do not* account for projected sea level rise impacts, which are expected to increase flood risks outside of existing coastal zones.

Floodplain regulations are a regulatory tool that a coastal community could amend to impose additional restrictions on development in floodplains above the NFIP minimum standards, such as "use" restrictions within the 100-year floodplain areas (only allow limited residential, recreational, or agricultural uses), and/or impose design requirements in the 500-year floodplain areas that are currently not required (elevation requirements). Within a designated Adaptation Action Area a community could create policy to:

- Encourage structures to be elevated with additional freeboard, a factor of safety usually expressed in feet above a flood level for purposes of floodplain management, in the 100-year floodplain. Provide incentives to homeowners and business owners who develop or redevelop structures above the minimum requirements of the NFIP.

- Limit public expenditures to build or maintain infrastructure in the 100-year and 500-year floodplains.

- Disallow public expenditures of new infrastructure projects in the 100-year floodplain.

Building Codes and Design

Building codes and design standards are regulatory tools that establish the minimum requirements for building construction to maximize their capacity for safety. Building codes generally include the standards for structure, placement size, usage, foundations, floor assemblies, roof structures, energy efficiency, mechanical, electrical, plumbing, site drainage and storage, fixture standards, occupancy rules, parking rules, traffic impacts, fire code, and requirements for resistance to extreme weather events in disaster prone areas such as earthquakes, hurricanes, tornados and flood events.

A coastal community could elect to establish a local amendment to the Florida Building Code to extend building code requirements to currently unregulated areas that may become vulnerable to flooding in the future, such as the 500-year floodplain discussed previously. Within a designated Adaptation Action Area, a community could create policy to:

- Require two or more feet of freeboard for structures located in tidally influenced floodplain; foundations that are more resilient to erosion and wave impacts; and/or flood-resilient construction materials in new development and redevelopment projects.

- Encourage the use of strategies in new development and redevelopment projects to maintain the form and function of natural resources, such as incorporating vegetative buffers or natural water feature (wetlands).

- Delineate the minimum technical and safety requirements for the design and construction of residential and commercial structures that are vulnerable to sea level rise impacts.

In order to fund implementation of these actions, the local jurisdiction could develop policies to prioritize the pursuit of financial assistance, such as FEMA's Hazard Mitigation and Flood Mitigation Assistance grant programs, to 1) retrofit homes that have been repetitively damaged by flood, elevate structures, move structures, or demolish damaged homes; and 2) retrofit structures to reduce or eliminate the long-term risk of flood damage.

Setbacks and Buffers

Setbacks are building restrictions that require development be set back a certain distance from a baseline, such as from a transportation right of way or shoreline feature (high water mark, vegetative line). Buffers, or buffer zones, require landowners to leave portions of property that support natural functions, undeveloped such as existing wetlands. Buffers can naturally provide for the protection from flooding, stormwater management, preserve views, provide recreational opportunities, serve as noise barriers, and preserve existing ecosystem functions.

Setbacks and buffers are regulatory tools that can be established through zoning, subdivision and/or floodplain codes. The use of setbacks and buffers not only serve to protect and extend the life of structures and their inhabitants, but they can provide natural protection and preservation of coastal wetlands, estuaries, beach dunes and state beaches; allow for inland migration of habitats; and serve as alternatives to hard- and soft-armoring. They can be applied for the short and near-long term solutions for sea level rise impacts.

A coastal community who wishes to use these regulatory tools should establish setbacks and/or buffer area policy based on a projected shoreline position that assumes specific increases in sea level or erosion rates over the life of the structure. Within a designated Adaptation Action Area, a community could create policy to:

- Establish mandatory construction setbacks to a specified distance from the seawall, mean high water line or applied to only those properties within the Coastal Construction Control Line.

- Establish erosion-based setbacks requiring the structure be set back by the projected shoreline position over a specific time frame (could either be based on a SLR projection (such as two feet by 2060 or determined by the life expectancy of the structure).

- Establish a tiered setback system that would allow for varying setbacks based on the size and risk of a structure determined by the annual average rate erosion over a specified number of years.

- Limit the development on a property if sufficient setback requirements cannot be met.

- Designate coastal buffer zones in areas that have existing important natural resources and/or could be part of a mitigation corridor as shorelines erode or tidal habitats shift.

- Expand existing green buffer areas that are experiencing significant erosion or increased inundation.

- Reduce property exposure to erosion and storm damage through shoreline vegetative buffers. For example, a minimum of 25-feet vegetated buffer for all new beachfront development in the coastal zone; or 100-feet from existing natural resource assets like protected wetlands, shores, or streams.

Incentives

Incentives are market tools that can be used to encourage property owners to develop property in a certain way or to provide desired amenities in exchange of economic benefits or services to the owner. For instance, some communities offer density bonuses or tax relief, abatement, or credits if a developer agrees to include a certain amount of affordable housing or an increased level of open space within a development. Incentives, such as Transfer of Development Right (TDR) programs, can be used to compensate an owner for giving up the right to develop portions or all of a property. Incentives are often viewed by property owners as a fair way to limit development since he or she receive something in return for any lost privileges.

Incentives can work well for accomplishing certain public objectives, such as protecting vulnerable areas from the impacts of sea level rise. A community would want to first investigate the feasibility of providing incentives in various forms (tax breaks, density or intensity bonuses, local services) to achieve improved resilience through adaptation. planning and investments. Within a designated Adaptation Action Area, a community could create policy to:

- Provide landowners with lower tax assessments if beach berm buffers and dune restoration are incorporated into new development and redevelopment projects in vulnerable areas.

- Provide landowners with tax deferment if he or she legally restricts the use of the entire property for recreational or conservational uses.

- Provide tax deductions to landowners who donate an easement on a portion of their land for conservation purposes, such as wildlife corridors and vegetative buffers.

- Create a Payments for Ecosystem Services (PES) program for land management, restoration, conservation, and sustainable use activities, and thus have significant potential to promote sustainable ecosystem management and reduce habitat "squeeze".

- Reduce permit application fees for new development and redevelopment within vulnerable areas that incorporate conservation features and flood protection measures above and beyond the minimum requirements in the building code.

- Provide additional density bonuses for landowners who participate in the local TDR program on preferred upland areas.

- Provide tax rebates to landowners who retrofit their homes or businesses to be more resilient to storms and flooding.

- Provide business tax credits to businesses for relocating from the coastal area to infill development areas upland.

Hard- and Soft-Armoring Permits

The protection of property and structures from flooding and erosion through shoreline armoring has been practiced for years. Armoring includes both hard-engineered (hard-armoring) structures such as onshore or offshore bulkheads, sea walls, dikes, tide gates, storm surge barriers, often used in cities or historic districts; or soft-armoring techniques which are man-made barriers that replenish or mimic natural buffers such as living shorelines, or elevate land, such as beach renourishment, dune creation, or wetlands restoration often used in rural areas or parks. Many studies report that hard armoring does more damage in the long run

because flooding and erosion on neighboring properties can be exacerbated and natural resources such as beaches and wetlands can be damaged or stunted from migrating naturally.

A coastal community who wishes to protect property in areas vulnerable to the impacts of sea level rise may want to investigate the best options for shoreline armoring over the short and long-term. A community may wish to pursue policies or regulations which limit all hard-armoring in new development, or encourage the use of soft-armoring through development incentives.

Conditional Development

Special conditions are regulatory tools a community can impose on a landowner, to be collected on a one-time basis as a condition of approval being granted for new development or redevelopment in order to mitigate the impacts of development. Examples of conditions include:

- Dedications – require landowners to dedicate lands for public purposes.
- Impact Fees and Exactions – proportionate fees imposed to help recover related public infrastructure costs (streets, water and sewer systems, fire and police services).
- Land-Use Restrictions – restrict land to be developed to a specified use.

Dedications, impact fees and exactions are beneficial in that they provide land and income to local governments without raising local property or taxes. Conditional development overall can help discourage new development in vulnerable areas by charging higher rates for extending public infrastructure to those areas. In this way, exactions can create incentives for infill development outside of vulnerable areas. Within a designated Adaptation Action Area, a community could create policy to:

- Place restrictions on building coastal hard-armoring as a form of flood protection.
- Require landowners to remove certain structures as they become inundated due to shoreline changes inward.

- Require the dedication of easements to preserve natural buffers, floodways, or provide public access.
- Require impact fees to additionally cover the costs of future emergency response, armoring, and flood proofing of infrastructure and services in vulnerable areas.
- Require development be built above the minimum requirements of flood protection.
- Rezone the use of a property in a vulnerable area.

Rebuilding Restrictions

Rebuilding restrictions are regulatory tools a community can use to limit, or even prohibit, what is allowed to be rebuilt on a property that has been damaged or destroyed by natural hazards. Rebuilding restrictions already exist federally. FEMA's "50 Percent Rule" states that a facility is considered repairable when disaster damages do not exceed 50 percent of the cost of replacing a facility to its pre-disaster condition, i.e., the cost of repairing/rebuilding must be less than half of the value of the property and that it is feasible to repair the facility so that it can perform the function for which it was being used immediately prior to a disaster. Any structure built after the creation of the NFIP is subject to this rule and must be rebuilt to conform to NFIP minimum standards.

Rebuilding restrictions could also be implemented by reducing existing potential development in vulnerable areas. In addition, if flood damage occurred due to a natural disaster or rising sea levels, reconstruction could be further limited by only allowing smaller, more resilient structures with additional setbacks and conditions, or a government can completely prohibit rebuilding of structures that are repetitively damaged or have been cut off from public infrastructure systems. Within a designated Adaptation Action Area, a community could create policy to:

- Restrict rebuilding of structures damaged by flooding and sea level rise in vulnerable areas.
- Reevaluate existing disaster and post-storm redevelopment policies to take into account sea level rise impacts.

- Target sites that repeatedly are damaged from flooding for future public acquisition.
- Prohibit additional allowances in intensity and density standards in vulnerable areas.
- Establish post-disaster reconstruction criteria for size (compared to the original structure prior to the storm event), base floor elevation, and/or other design standards.
- Establish a post-disaster building moratorium to evaluate and plan redevelopment in vulnerable areas.

Transferable Development Rights

A transferable development rights (TDR) program is a market tool a community can use to achieve land preservation by allowing one landowner to sever development rights (the "sender" or sending lot or area) in exchange for compensation from another landowner who wants their development rights to increase (the "receiver" or receiving area). The receiving area is allowed to have increased intensity or density, thusly, the program shifts development from resource sensitive areas to locations with full municipal services. TDR programs can be mandatory or voluntary. Mandatory TDRs have pre-designated sending and receiving areas and the sending area's development potential is automatically downsized. In voluntary TDRs, the landowner has the option to receive payment for their transferable development rights.

The benefits of a TDR program include the ability of a local government to decrease intensity and density standards while conserving and/or protecting threatened properties in areas vulnerable to sea level rise. In addition, TDRs help governments avoid large expenditures on preservation by acquisition as a market for development rights opens up. The areas that are allowed additional intensity and density are usually infill development areas that have existing infrastructure. Private landowners can be compensated for forgone development through a TDR program.

Disadvantages of TDRs may include uncertainty. Because TDR programs are inherently voluntary, one cannot be sure which landowners will participate and how many acres will be

preserved. This is true for most land preservation programs to varying degrees—purchase of development rights programs also are voluntary—but uncertainty seems especially salient for tdrs. More development may occur than there otherwise would have been. Some parcels that would have stayed undeveloped even without a tdr program may have their development rights transferred and used on another parcel. Programs can be complicated to design and implement, and may take a good deal of ongoing analysis and management to be successful.

A coastal community could establish a voluntary Adaptation Action Area TDR program to provide incentives to landowners to develop at higher densities in environmentally non-sensitive and low-risk areas upland with a mix of uses in very low risk areas outside a designated Adaptation Action Area. The efforts of such a program would be considered a retreat strategy as a community would be directing develop away from the coastal, high-risk areas. Communities may wish to develop a statewide or regional sea level rise TDR program with a plethora of receiver site options to provide property owners more incentive to participate.

Stormwater Utility

Under Florida Statute 403.0893, local governments may establish a stormwater utility to address construction, operation or maintenance of the stormwater management system. Stormwater management fees are a potential source of revenue to fund drainage infrastructure improvements in coastal areas. Policies in the comprehensive plan can set the stage for introducing the topic to stakeholders. Adaptation action areas may provide boundaries for instituting the stormwater utility or for establishing a differential rate structure commensurate with the potential benefits to reduce flooding.

Special Assessments

Ad valorem and non-ad valorem assessments can be made on local property tax bills to meet specific public purposes. These may be in the form of a "capital project assessment". Policies which contemplate special assessment in adaptation action areas could be used to help fund specific improvements that aid in adaptation and protection of targeted locations.

Impact Fees

An impact fee is a development tool imposed on developers to help pay for the expansion of public infrastructure by requiring that developers pay their proportionate share of costs associated with servicing said development.

A coastal community could develop an appropriate methodology of calculation and assess an Adaptation Action Area impact fee for all residential and non-residential development (office, retail, commercial) to help cover the costs of various capital improvement projects related to the protection of coastal infrastructure within a designated Adaptation Action Area. Funds could be applied to cover a portion of costs related to adaptation, such as coastal armoring projects, acquisition of lands for buffering and conservation, and payment to property owners for development restrictions. Since the fee would only apply to new development and redevelopment within vulnerable areas, it would be considered both a protection and accommodation strategy.

Conservation Easements

A conservation easement is a market tool used by local governments for the permanent conservation of private lands by placing a restriction on the uses and/or allowable amount of development on a property to protect its associated resources while still allowing the owner to live, retain and develop the property with limitations. The easement can apply to all or a portion of a property. The property must have significant conservation values. Usually, a

conservation easement preserves a portion of property in its natural state. Easements are recorded legally, binding all future property owners. Landowners receive tax deductions and relief in return for the reduction in value associated with the donated easement.

Conservation easements can serve as natural flood buffers, open space or wildlife migration corridors in areas vulnerable to sea level rise. To qualify for an easement in vulnerable areas, a property should have significant conservation values (coastal wetlands, beaches with natural berms and/or dunes, endangered species habitats, and historic or archaeological resources). Additional covenants could be incorporated into a conservation easement to further protect a property from sea level rise, such as prohibiting certain shoreline armoring, prohibiting the removal of vegetation, or restricting land uses on the entire property so as not to put additional community residents at risk.

Another form of a conservation easement is a rolling conservation easement. This type of easement does not restrict land use, but provides shoreline protection of coastal property. As the sea advances on the property over time, the easement automatically rolls landward, allowing coastal habitat to migrate naturally. Landowners can still build upland on a property. Rolling easements have minimal impacts on property values, which some landowners find to be more beneficial than a traditional conservation easement.

A coastal community could identify areas of, or parcels within, a designated Adaptation Action Area where conservation easements would be encouraged. Specifically, target lands with coastal wetlands, natural beach berms and/or dunes, and historic or archaeological resources. Within a designated Adaptation Action Area, a community could create policy to:

- Identify and prioritize properties in that could be purchased for a conservation or rolling conservation easement. Properties should provide a benefit to the locality through existing habitat or natural buffers, or where ecosystems can migrate inland as sea levels rise.

- Investigate federal and state funding sources to help establish a local conservation easement program, such as the National Oceanographic and Atmospheric Administration Coastal and Estuarine Land Conservation Program.

- For properties with recorded rolling easements, require structures be removed when the shoreline encroached on public lands and encourage structures be smaller or more mobile so they can be easily relocated if retreating from a vulnerable area in the future.

- Provide incentives to landowners who donate rolling and conservation easements.

Real Estate Disclosures

When selling a property, a seller is required to disclose certain information such as special property taxes, the presence of lead-based paints, and natural hazards that can put a property at risk (flooding). The intent of disclosure laws is to fully inform the buyer of the conditions of a property prior to its purchase.

Disclosure laws could be enacted to require alerting potential buyers of any property within a designated Adaptation Action Area of the property's vulnerability to flooding and other impacts from sea level rise. The disclosure could identify the current and projected erosion rates, projected rate of sea level rise based inundation, and any statutory setback or buffer restrictions.

Coastal Land Acquisition Programs and Land Trusts

An acquisition program is a tool a local government can establish to purchase lands using public or private funds for the purpose of conserving land for its natural, recreational, scenic, productive and/or historic value. The state of Florida already has a long, successful purchase history dating back to the 1960s and currently has almost 10 million acres of managed conservation land. The focus of the state's conservation has been to halt the destruction of natural resources that was occurring in conjunction with rapid population growth; preserve the tourist economy, which relies on the state's natural resources; and contain urban sprawl.

Focusing on coastal properties that are vulnerable to sea level rise impacts can be added to the list of benefits land acquisition programs provide. Acquired lands could help prevent further

hazards against health, safety and welfare as a flood buffer for existing development. These lands also have the potential to provide for the preservation of coastal habitats and upland migration corridors.

A coastal community could initiate a coastal land acquisition program to conserve lands that will provide a natural barrier between lands most susceptible to sea level rise inundation and lands at higher elevation with low risk. A designated Adaptation Action Area can be the property base for which a community focuses its acquisition efforts. Then a community can develop criteria for the prioritization of lands to be purchased, such as those lands severely damaged by recent storms, at highest risk of being damaged in the future, or are currently undeveloped and ideal to serve as a buffer to rising sea levels. A community should investigate possible funding sources for a coastal land acquisition program or trust, such as applying for federal and state funding programs (National Oceanographic and Atmospheric Administration Coastal and Estuarine Land Conservation Program), levying a special coastal tax, charging a coastal permit fee for all new construction and renovation, and/or providing tax or cash incentives for donated properties or land trades.

The efforts of an acquisition program would be considered a retreat strategy, as the intent is to move future development away from the high-risk coastline.

Coastal Community Task Force

A coastal community could create a funding and capital improvements task force made up of both technical, planning, and budget staff, and interested community businesses and residents to 1) investigate federal, state and local funding assistance and grants, 2) determine how collected funds (including those from any imposed Adaptation Action Area impact or concurrency fees) will be prioritized; and 3) link desired capital improvement projects with other regional, infrastructure, public service, and/or emergency management and hazard plans the local government may have adopted or could benefit from partnering with.

Adaption Outreach Campaign

A coastal community could create and manage a sea level rise outreach campaign to inform community residents and business owners of 1) the potential impacts of sea level rise, 2) the initiatives and programs the community will be or has implemented to address said impacts (such as an Adaptation Action Area designation), and 3) develop a relationship and understanding of the community needs, including addressing vulnerable populations and health risks associated with sea level rise.

Conclusion

Coastal communities can to adopt adaptation action areas policies within their local comprehensive plan to identify "one or more areas that experience coastal flooding due to extreme high tides and storm surge, and that are vulnerable to the related impacts of rising sea levels for the purpose of prioritizing funding for infrastructure needs and adaptation planning."

This report is a starting point for the State of Florida's coastal communities to review and consider adaptation policy strategies that could be employed through the designation of an Adaptation Action Area.

As coastal communities around the state begin to designate adaptation action areas and related adaptation policies, the application of strategic responses of coastal communities to the threat of coastal flooding will improve the resilience of our coastlines against sea level rise. Communities are encouraged to work together, sharing data and lessons learned from their implementation of adaptation planning efforts.

Additional Resource Links:

Florida Department of Economic Opportunity, Community Planning and Development:
http://www.floridajobs.org/community-planning-and-development/programs/technical-assistance/community-resiliency/adaptation-planning

National Oceanic and Atmospheric Administration, Ocean and Coastal Resource Management:
http://coastalmanagement.noaa.gov/

Southeast Florida Regional Climate Change Compact:
http://southeastfloridaclimatecompact.org/

Georgetown Climate Center, Adaptation Case Studies:
http://www.georgetownclimate.org/adaptation

Virtual Climate Adaptation Library:
http://research.fit.edu/sealevelriselibrary

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