
Zoning and Land Use Planning

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YIELDING TO THE RISING SEA:

THE LAND USE CHALLENGE

Under *Lucas v. South Carolina Coastal Council*,¹ a government regulation that leaves no economic value is a regulatory taking. What if a local land use regulation prevents the reconstruction of a property destroyed by a natural disaster that is likely to reoccur, or prohibits new construction in a coastal zone that will be inundated by projected sea level rise? This is a novel case and raises one of many serious issues that are being addressed

by the coastal state and local governments.

As the scientific certainty regarding sea level rise strengthens, local land use regulators are reconsidering planning, zoning, land management, and infrastructure. Various state, local, and private entities have begun to address the problem and institute adaptive measures. This article begins with an overview of a number of these state and local initiatives. Drawing on these efforts, the article concludes with a proposed ten step process for local governments to follow in adapting to sea level rise and storm hazards.

Rising sea levels in the United States will erode beaches; drown marshes and wetlands; damage barrier islands, habitat, and ecological processes; and cause saline intrusion into freshwater ecosystems and groundwater, flooding or inundation of low-lying areas, and damage to private and public property and infrastructure.

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The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) (2007)² finds that sea level has been rising by 9 to 15 inches per century since 1993, and predicts that global average sea level will rise by 7.2 to 23.6 inches during this century. However, because the IPCC study did not consider increased melt water contributions from Greenland and Antarctica, these estimates are considered conservative. A recent report from the U.S. Climate Change Science Program notes that “thoughtful precaution suggests that a global sea-level rise of 1 [meter] to the year 2100 should be considered for future planning and policy discussions.”³

**Miami-Dade County,
Florida: Climate Change
Advisory Task Force**

“Developed Miami-Dade County as we know it will significantly change with a 3-4 foot sea level rise. Spring high tides would be at about +7 to 8 feet; freshwater resources would be gone; the Everglades would be inundated on the west side of Miami-Dade County; the barrier islands would be largely inundated; storm surges would be devastating; landfill

sites would be exposed to erosion contaminating marine and coastal environments.”⁴

In 2006, the Miami Dade Climate Change Advisory Task Force was created to provide technical assistance and advice to the Board of County Commissioners concerning mitigation and adaptation measures in response to the impacts of global climate change.⁵ The Science and Technology Committee of the Task Force published, in 2007, a statement documenting the “very real threat” posed by accelerated sea level rise. The report noted that South Florida’s relative sea level rise over the last 70 years was about eight times greater than the rise over the previous 2,500 years⁶ and projected a rise of at least 1.5 feet in the next 50 years and three to five feet by 2100.⁷

The Committee report emphasized the urgency “of reconsidering nearly every aspect of the county’s management, zoning, infrastructure, and planning,” and recommended establishing sea level rise scenarios reflecting future rise to help determine what must be done to preserve habitability and what infrastructure will “need to yield to the rising sea.”⁸ The report called for detailed docu-

mentation of infrastructure elevations, areas susceptible to erosion and pollution, drainage and storm-surge risks, and water supplies from across the county's various departments. The data and subsequent modeling of different sea level rise scenarios has been compiled in the Committee's "Climate Change Briefing Book," which discusses the County's vulnerability to sea level rise and catalogs specific adaptive steps.

INDIVIDUAL STATE RESPONSES TO SEA LEVEL RISE

The following states have taken varying levels of action to deal with the impacts of accelerated sea level rise:

Florida: Although Florida is among the states most vulnerable to sea level rise, it has been slow to develop strategies to adapt to sea level rise.⁹ In July 2007, the Governor's Action Team on Energy and Climate Change was established and tasked with creating a comprehensive Florida Energy and Climate Change Action Plan. On October 15, 2008, the Action Team submitted the report containing initial ideas for adaptation strategies to combat adverse impacts to society, public health, the economy,

and natural communities in Florida.¹⁰

Florida's regional planning councils have conducted a number of surveys on sea level rise. As part of a program sponsored by the EPA in 2002, the Southwest Florida Regional Planning Council coordinated a statewide study of sea level rise. The report of the Treasure Coast Regional Planning Council (2005) surveyed existing state and local shoreline initiatives in the area and urged that local governments consider sea level rise in all land use amendments in coastal areas of less than 10 feet in elevation; that topographic maps show one-foot contours in the coastal zone to aid local planning; and that planners consider long-term implications of sea level rise, instead of adopting a ten or twenty year time frame.¹¹

Maine: Maine has incorporated sea level rise into its planning and regulations for more than a decade. The state's Natural Resources Protection Act acknowledges the fragile and dynamic nature of dune systems and the uncertainty of the extent of future change in sea level.¹² The Act requires a permit for activities in a coastal sand dune system. The Depart-

ment of Environmental Protection in its corresponding Coastal Sand Dune Rules “anticipates that sea level will rise approximately two feet in the next 100 years,” and concludes that “[u]nder any scenario of increasing sea level, the extensive development of sand dune areas and the construction of structures increase the risk of harm, to both the coastal sand dune system and the structures themselves.”¹³ Standards for All Projects require that a project may not be permitted if “it is likely to be severely damaged” by the two-foot rise in sea level over 100 years.

Maryland: Maryland has been among the most advanced states in planning for sea level rise. Since 2000, the state Department of Natural Resources (DNR) has encouraged policies for responding to a rise of two to three feet in this century. In 2007, the governor established the state Commission on Climate Change, which includes an adaptation and response working group. In August of 2008, the Commission released its Climate Action Plan that contains an Adaptation and Response Toolbox designed to “give state and local governments the right tools to anticipate and plan for sea-level rise

and climate change.”¹⁴ Maryland’s “Living Shorelines” program presents management options that “allow for natural coastal processes to remain through the strategic placement of plants, stone, sand fill, and other structural and organic materials.”¹⁵

Maryland has also undertaken coastal protection initiatives with the neighboring states. On November 12, 2008, the Metropolitan Washington Council of Governments Board approved the National Capital Region Climate Report, which identifies areas vulnerable to sea level rise in the Washington, DC Metropolitan area and includes recommendations to help area leaders and citizens adapt.¹⁶

In 2008, under revisions to its Critical Areas legislation, Maryland expanded buffer requirements from 100’ to 200’ for new subdivisions in Resource Conservation Areas and for projects requiring site plan approval and involving a change in land use. The revisions replace impervious surface limits with “lot coverage limits,” which include gravel, stone, shell . . . permeable pavement, or any man-made material” in total coverage. The revisions require nonstruc-

tural shoreline stabilization except where it can be proved to the Department of Natural Resources that soft stabilization is not feasible.¹⁷

New York: In 2007, the State Legislature established a Sea Level Rise Task Force within the Department of Environmental Conservation (DEC). The Task Force is charged with making recommendations to the Governor by the end of 2009 to protect New York's coastal ecosystems and natural habitats, and to increase coastal community resilience in the face of sea level rise.

The Legal Advisory Group of the Task Force, is responsible for reporting on existing laws and policies of the state that will likely be affected by the recommendations, existing and proposed methods used by the federal government, other states and their municipalities, and other countries to respond to sea level rise, and how recommendations may be affected by constitutional and common law concepts. Finally, the Group is evaluating to what extent affected property owners may have claims against planning agencies in the future if the government does nothing or otherwise fails to properly plan for sea level rise.

In addition to the Task Force and Working Group, the state created the Office of Climate Change, also within the DEC, to take the lead in the development of programs and policies to mitigate greenhouse gas emissions and to help communities and residents adapt to the effects of climate change.¹⁸

In 2008, the New York State Energy Research and Development Agency (NYSERDA) initiated a climate impact assessment project focusing on six sectors vulnerable to climate change, which include coastal zones, agriculture and ecosystems, energy and related infrastructure, transportation and communications infrastructure, public health, and water resources and related infrastructure. Currently workgroups for each sector are organizing stakeholder meetings to determine what the information needs are, what data is available, and to define the state's vulnerabilities. After the information is gathered, using modeling and case studies, potential adaptation strategies will be developed.¹⁹

NYSERDA also supports research relating to the reduction of CO₂ emissions associated with energy production as well as in projects researching adap-

tive measures in response to climate change impacts. These projects include:

- Integrated Assessment for Effective Climate Change Adaptation Strategies in New York State, a study that will identify impacts and needs specific to New York.²⁰
- The Hudson River National Estuarine Research Reserve, a partnership of the National Oceanic and Atmospheric Administration (NOAA) and coastal states to explore options for protecting shoreline, tidal wetlands, and vegetated shallows in the Hudson River from the impacts of sea level rise.
- A study of the impact of climate change and land use patterns on water storage capacity and storm water management practices in the Hudson Valley.²¹

North Carolina: North Carolina's Coastal Areas Management Act (CAMA) of 1974 aims to encourage cooperative land use planning between state and local governments. All coastal communities must adopt land use plans in conformance with CAMA. It is the policy of the state that "adequate plans for post-disaster reconstruction should be pre-

pared by and coordinated between all levels of government prior to the advent of a disaster."²²

NOAA's summary of Coastal Programs sea level rise initiatives points out that although CAMA and the state's administrative regulations do not mention sea level rise, they recognize that shorelines are constantly changing.²³ CAMA bans hardened oceanfront structures. Oceanfront setbacks are tied to erosion rates: "By their very nature, setbacks tied to long-term erosion rates take sea level rise into account, as it is one of the drivers of shoreline change from which erosion rates are determined."²⁴ Setbacks for new development on public trust shorelines must be set back 30 feet landward from the normal high water line (as opposed to the mean high tide line); this "is the ordinary extent of high tide based on site conditions such as the presence and location of vegetation, which has its distribution influenced by tidal action, and the location of the apparent high tide line."

South Carolina: South Carolina's Office of Ocean and Coastal Resource Management (OCRM) has declared in a statement of policy:

It has been clearly demonstrated that erosion problems of this State are caused by a persistent rise in sea level, a lack of comprehensive beach management planning, and poorly planned oceanfront development, including construction of hard erosion control structures, which encroach upon the beach/dune system. Sea level rise in this century is a scientifically documented fact. Our shoreline is suffering from its effects today. It must be accepted that regardless of attempts to forestall the process, the Atlantic Ocean, as a result of sea level rise and periodic storms, is ultimately going to force those who have built too near the beachfront to retreat.²⁵

OCRM concluded that “the long-range public good is the same as the long-range private good. If the dry sand beaches of this State disappear because of the failure of its people and governmental natural resource managers to protect the beach/dune system, future generations will never have the opportunity to use and enjoy this valuable resource.”²⁶ The state’s Coastal Zone Management Act of 1977 adopted retreat and re-nourishment as basic state policies for beach preservation and restoration.

Texas: The Texas Open Beaches Act of 1959 codified the public’s common-law right of access to dry beach above mean high tide. Amendments to the Act in 1991 authorized

the commissioner of the Government Land Office (GLO) to promulgate Beach/Dune rules. In a 2006 report, the GLO commissioner found that the state’s rolling easement is never fixed, but migrates landward according to natural coastal processes.²⁷

Local Sea Level Rise Initiatives

In addition to Miami-Dade, municipalities across the country have taken concrete action in response to sea level rise and storm hazard mitigation. These actions include:

- Comprehensive Planning
- Creation of a Task Force
- Adoption of a Post-Disaster Moratorium
- Post-Disaster Planning
- Implementation of No-Build Zones
- Increasing Coastal Setbacks and Buffers
- Adoption of Coastal Erosion Overlay Zone
- Limiting Shoreline Protective Structures
- Requiring Building Elevations
- Requiring Sea Level Rise Impact Analysis for Shoreline Development
- Implementation of Wetlands Regulations

City of Bainbridge Island, Washington: Environment Element

The City of Bainbridge Island has explicitly addressed the potential for sea level rise in the Environment element of its comprehensive plan. Adopted in 2004, the plan recognizes that Bainbridge Island is potentially subject to sea level related impacts including flooding and erosion. The overall goal of the element is to avoid adverse impacts where possible; to minimize, reduce, or eliminate impacts over time; and to compensate for unavoidable impacts.²⁸ The plan outlines protections for critical areas including transfer of and purchase of development rights; provides for the use of the City's Shoreline Management Master Program to address and protect marine fish and marine shoreline habitat; mandates no net loss of the city's remaining regulated aquatic resources; requires the maintenance of vegetated buffers between proposed development and aquatic resources; calls for the preservation of stream courses; and the protection or restoration of natural functions of riparian habitat.²⁹

The Frequently Flooded Areas component of the Element spe-

cifically recommends mitigating measures, which include a limitation on development and the alteration of natural floodplains; preservation of stream channels and natural protective barriers; revision of the flood insurance rate map to reflect the natural migration of frequently flooded areas; and implementation of nonstructural protective methods such as setbacks and the use of natural vegetation.³⁰

Town of Duck, North Carolina: Moratorium on Rebuilding and Reconstruction

North Carolina's Coastal Areas Management Act of 1974 encourages cooperative land use planning between state and local governments³¹ and it is the State's policy that "adequate plans for post-disaster reconstruction should be prepared by and coordinated between all levels of government prior to the advent of a disaster."³² The State Design and Construction Guidelines for local hazard mitigation plans further provide that coastal communities should "outline a post-disaster permitting process that facilitates repairs but remains steadfast to the need to mitigate against future disasters."³³ One

way to accomplish this is to create a short-term building moratorium to allow the community time to assess damage and consider mitigation measures.

The Town of Duck, on North Carolina's Outer Banks, is a coastal community that has adopted local regulations implementing these state coastal policies.³⁴ The Code Chapter on Rebuilding and Reconstruction sets out procedures for assessing damage, declaring a building moratorium, and defining types of moratoriums that may be declared in the aftermath of a damaging storm.³⁵ The ordinance is intended to ensure that rebuilding occurs "in an orderly manner," and with the opportunity to identify "appropriate areas for post-storm change and innovation."³⁶

East Hampton, New York: Local Waterfront Revitalization Plan

The Town of East Hampton on Long Island has been planning and regulating for sea level rise for years and has made specific reference to sea level rise in its comprehensive plan. Adopting its Local Waterfront Revitalization Program as the Coastal Management Component of its

comprehensive plan, the town states: "Future planning efforts should examine the likely effects of global warming, including increasing sea level rise and storm and hurricane activity on the Town's coastline. Beginning to plan for these effects, assessing potential damage to public resources and infrastructure, and evaluating methods of protection and associated costs are vital for future coastal management."³⁷ East Hampton has also adopted coastal setbacks as much as 150' and no-build zones in high hazard floodplains.³⁸ East Hampton's coastal erosion overlay zone regulates the construction and alteration of shoreline protective structures.³⁹ To protect the natural shoreline, the town severely limits the construction of coastal erosion structures.

New York City Initiatives

New York City has also taken significant steps to address the threat of sea level rise around the metropolitan region. There is a citywide strategic planning process for climate change adaptation, including adaptation to sea level rise.⁴⁰ In 2008, Mayor Bloomberg launched the Climate Change Adaptation

Task Force and the New York City Panel on Climate Change to develop adaptation strategies to secure the City's infrastructure from the effects of climate change.⁴¹ The Task Force is one of the 127 initiatives proposed in PlaNYC, the City's long-term sustainability plan.⁴²

The Task Force will inventory "existing infrastructure that may be at-risk from the effects of climate change; develop coordinated adaptation plans to secure these assets based on New York City-specific climate change projections; draft design guidelines for new infrastructure that take into account anticipated climate change impacts; and identify adaptation strategies for further study that are beyond the scope of individual stakeholders."⁴³

The New York City Panel on Climate Change, modeled on the Intergovernmental Panel on Climate Change (IPCC), will advise the Task Force. The Panel will develop a unified set of climate change projections; draft protection levels to guide the design of new infrastructure; and produce a technical report on the localized effects of climate change on the City.⁴⁴

The Task Force and the Panel will build on the climate adap-

tation plan the New York City Department of Environmental Protection (DEP) issued for its assets in May 2008.⁴⁵ The plan outlines possible approaches to coastal flooding as a result of sea level rise. DEP recommendations include raising the elevations of key facilities above projected flood heights and the promotion of gradual retreat from the most at-risk areas or different use of these areas, such as for park land.⁴⁶

Other Municipalities

There are a number of other innovative methods developed by local governments. The Resource Protection chapter of Collier County's Land Development Code requires a mandatory sea level rise impact analysis for shoreline development.⁴⁷ The analysis must show that the development will remain fully functional for its intended use after a six inch rise in sea level.⁴⁸

The Town of Falmouth, Massachusetts also explicitly addresses the impacts of accelerated sea level rise through extensive wetlands regulations.⁴⁹ The wetland ordinance and regulations identify specific resource areas for protection, including coastal wetlands, beaches, dunes, and

marshes; land subject to tidal action, flooding, inundation, or coastal storm flowage; and any land within 100' of the protected resource areas.⁵⁰ The regulations require special protection for coastal floodplains immediately landward of salt marshes, coastal beaches, dunes, banks, and barrier beaches. Any buildings in these areas should be designed to incorporate a relative sea level rise of at least one foot per 100 years in FEMA designated A-zones and at least two feet per 100 years in FEMA designated V-zones.⁵¹

LOCAL PLANNING AND REGULATORY STRATEGIES

Drawing on the local initiatives detailed above, this part contains an organized comprehensive approach for municipalities looking to adopt sea level rise adaptation and storm hazard mitigation strategies to follow. The approach is organized into ten steps starting with policies for local government to adopt. It then discusses approaches to local studies and citizen participation, follows with information regarding development moratorium, planning, and concludes with illustrative regulations and intermunicipal cooperation.

I. ADOPT POLICY RESOLUTION OR MAYORAL PROCLAMATION

The local chief elected officer or legislature can set the stage for sea level rise planning and the implementation of regulatory approaches through resolutions, proclamations, policy statements, or executive orders. These policy tools represent methods of initiating local action on sea level rise and assigning responsibilities to local boards and officers.

Policy statements can take notice of certain facts and create the foundation for a strategic blueprint for locality-wide climate change adaptation.⁵² Documents may incorporate sea level rise projections and lay out the need to track this data. They can also establish the economic life of buildings (50-100 years), establish time lines for one and two foot sea level rise, provide for 10-year adjustments, and establish the need to assess infrastructure viability and emergency response. They can state the municipality's intention to proceed with certain specified actions to respond to sea level rise and storm hazards, including initiating a review of the comprehensive plan or the in-

tent to consider sea level rise issues when updating zoning and land use regulations. The policy can establish plans to seek loans and/or grants for sea level rise planning and intent to lobby the state legislature in support of key sea level rise initiatives.

A policy statement can set the stage for further action by creating a Task Force of public and private actors to conduct studies, research, and lay out goals for land use training and education. The Task Force can also be charged with preparing an action plan and to work with each of the municipality's departments to formulate work programs and budgets.

II. APPOINT TASK FORCE AND AUTHORIZE STUDIES

To further the policy declaration a Task Force can be created and charged with determining threats posed by sea level rise and storm hazards, determining adequacy of current local laws and programs, and considering possibility of amending the comprehensive plan and zoning and land use laws.

- a. Creating the Task Force and Charging it to Conduct a Study.

The community may create a Sea Level Rise Task Force by legislative action and instruct it to retain consultants, conduct surveys, gather data, study the results, build citizen awareness of local problems, and work with experts to develop an effective strategy for adaptation. The Task Force should determine the adequacy of current local laws and consider the possibility of amending the comprehensive plan to reflect the hazards of sea level rise and storms and adjusting local land use law accordingly.

In order to enable the community to determine sea level rise risks and mitigation measures, the Task Force may commission a formal sea level rise study. The Task Force can discover and incorporate studies that have been completed with regard to projections and inundation by reputable organizations and collect any maps that may exist for their municipality. The Task Force may hire consultants to gather available data at the regional and local level and supplement that data as new information becomes available. It may also commission a citizen survey to identify the critical issues facing the community, ensuring that the survey is distributed broadly to

local citizens and supplemented by community meetings. Surveys not only gather information, but serve to educate constituents and build support. The study may document infrastructure elevations, areas susceptible to erosion and pollution, drainage and storm-surge risk areas, and the vulnerability of water supplies. It may also establish sea level rise scenarios reflecting future rise to help determine what must be done to preserve and protect property, the environment, and public infrastructure.

b. The Task Force should be composed of stakeholders representing all relevant constituencies.

The Task Force should include those whose support is necessary to implement sea level rise adaptation plans and regulations and those who will be affected by these changes.⁵³ These groups and individuals may include elected officials, members of the planning board and zoning board of appeals, the administrative enforcement officer, the municipal assessor, the highway superintendent, the park and recreation commissioner, members of the Conservation Advisory Coun-

cil, a local historian, the sewer/water superintendent, developers, representatives of local utilities, business groups, civic groups, neighborhood associations, members of the school board, and local environmental organizations. Representation from key stakeholder groups on the Task Force helps to avoid the risk that the studies and surveys will not discuss and consider valuable data and views necessary for future planning. In turn, failure to address important considerations may ultimately generate opposition.

c. The Task Force should take measures to ensure sufficient citizen participation.

Involving key community leaders in addressing the critical issues identified through sea level rise studies equips them with the knowledge to educate other local citizens and land use officials. Consensus building among local leaders and citizens of the community is a vital element to successfully implementing a mitigation and adaptation plan. Knowledgeable leaders aided by professional staff and consultants may guide local discussion toward consensus among community

stakeholder groups, build consensus among them, and achieve the best possible sea level rise and storm hazard mitigation strategies for the area.⁵⁴

In order to gather all available ideas and secure the support of the entire community, meetings may be conducted on a communitywide basis, in neighborhoods, over long weekends, or in a series. Meetings with representatives of the media can be held; updates on the process of the study development or early drafts may be placed in local papers; and special mailings may be sent to all local postal addresses. Efforts should be made to identify divergent groups and views within the community, and to involve key representatives in the preparation of the study. Such representatives may be appointed to the Task Force or may be invited to join one or more special issue committees to assist in preparation of the study.

A critical issue is whether and how to provide training and education to the citizens and land use officials of the community. It may be necessary to not only involve key citizen leaders in the development of the policy document and studies, but to conduct broader out-

reach, training, and educational programs.

III. ADOPT A MORATORIUM, IF CALLED FOR, TO ALLOW TIME FOR PLANNING AND ADOPTING NEW REGULATIONS

Assuming that the study phase reveals that sea level rise measures must be adopted and that existing land use regulations are insufficient, the local legislature may adopt a moratorium that suspends the right of developers and land owners in sea level rise vulnerable areas to obtain development approvals and building permits while the community prepares a plan and implementing regulations. In coastal areas this can give communities dealing with destructive sea level rise impacts including extensive storm damage, erosion or flooding, time to rethink their land use plan and local laws and adopt smarter approaches that more properly manage growth.

A moratorium preserves the status quo for a reasonable time while the municipality develops a land use strategy to respond to new problems and prevents developers and property owners from rushing to

develop their land under current land use rules that the community wishes to change. Moratoriums may be issued prior to the adoption of a local overlay zone, a new subdivision law, the designation of a critical environmental area, or the adoption of an environmental constraints ordinance. The moratorium will forestall additional negative impacts from the type of development that the new law or regulation is designed to prevent or mitigate.

IV. DECIDE WHETHER THE COMPREHENSIVE PLAN NEEDS TO BE AMENDED, BASED ON STEPS I & II, AND, IF SO, USE THE SEA LEVEL RISE TASK FORCE TO PREPARE IT

Taking Steps I-III allows the municipality to build political and factual support and decide whether it is worth adding a sea level rise component to its comprehensive plan amendment process. It is appropriate to adopt a comprehensive plan amendment for a portion of the community, such as a coastal hazards zone, where changes are happening and special circumstances exist.

V. ADOPT A COMPREHENSIVE PLAN SEA LEVEL RISE COMPONENT

A sea level rise component may recognize the susceptibility of a locality to flooding, erosion, sea level rise, and severe storm events. It may include information concerning the negative consequences to the community posed by these threats and will call the public's attention to the issue. A detailed sea level component can include information about the topography that will be affected by sea level rise including impacts on dunes, tidal wetlands, and environmental functions of groundwater. The level of detail is such that the plan can be the basis for certain regulatory approaches that will be discussed later.

New land use regulations will be needed to adapt to sea level rise. In most states, all local land use regulations must conform to the community's comprehensive plan.

A comprehensive plan amendment can be used to integrate planning for other programs, qualify the municipality for additional funding, and provide for coordinated implementa-

tion of related plans. A FEMA approved all-hazard mitigation plan is required for municipalities to be eligible for its Hazard Mitigation Grant Program.⁵⁵ If the municipality has an existing all-hazard mitigation plan, then that plan can be incorporated by reference in the new sea level rise component in the comprehensive plan.

VI. ADOPT EXPANDING OVERLAY ZONE FOR SEA LEVEL RISE VULNERABLE AREAS IN THE COMMUNITY

Once a community completes the planning process, it can adopt an expanding overlay zone for the sea level rise vulnerable areas identified in the sea level rise component of the amended plan.⁵⁶ The provisions of the overlay ordinance are applied in addition to those in the underlying zoning regulations. All as of right and specially permitted uses allowed under the existing zoning are still permitted, except that the uses must meet the standards established in the overlay zone. The zoning resolution adopting this new zone may specify that it will “expand” as sea level rise projections change, by referencing a reliable source of information and providing that as

the source changes projections, those new projections are incorporated automatically into the overlay zone’s definition.

The overlay zoning provisions can state that all as-of-right uses in the underlying zones require a special permit and that such permits can be issued only if the proposed uses meet the standards articulated in the overlay zone. The planning board should be authorized to impose conditions on the issuance of special permits to ensure that these standards are met. Step VII outlines the application requirements and possible conditions for the special use permit.

An overlay zone should contain the following provisions:

- a. Define Expanding Overlay Zone
 - i. Identify location of area vulnerable to sea level rise and storm hazards.
- b. Describe and map the environmental characteristics in the overlay district, including for example:
 - i. General environmental characteristics of the zone,
 - ii. Areas subject to inundation upon seal level rise,
 - iii. Inundation Buffers,
 - iv. Habitats,

- v. Slopes,
 - vi. Dunes,
 - vii. Erosion Prone Areas, etc.
- c. Standards Established for Each Identified Characteristic by Science and Engineering
- i. For example: If an area is prone to flooding, then the standard could be an elevation requirement. If it contains critical habitat, those should be avoided by development.
 - ii. Option: Low impact development standards
- d. Option: Add additional uses that are permitted in the overlay zone, such as those uses consistent with coastal ecosystem protection.
- e. Option: Alternatively the community may choose to repeal the underlying zoning and to make the vulnerable area a new zoning district. This requires prescribing new and appropriate as-of-right uses and adopting prescriptive standards, like set backs and others such as those listed above. Conditional uses can be very limited or of an intermediate intensity and the municipality can establish standards for governing these conditional uses.
- i. WARNING: There are a number of difficulties and disadvantages associated with this approach. Rezoning significantly alters the current expectations of the landowners and will result in political opposition. In addition, environmental conditions within

the sea level rise area are not consistent throughout the district.

VII. APPLICATION REQUIREMENTS AND STANDARDS FOR SPECIAL USE PERMITS

The overlay zone suggested above converts all as-of-right uses to specially permitted uses and, perhaps, adds a few low impact uses that are compatible with the preservation of coastal ecosystems and sea level rise. Either in the overlay zone itself or in the special permit section of the community's zoning ordinance, there must be added special use application requirements to allow the local staff and planning board to receive the information needed and to impose conditions on special use permits to carry out the objectives of the overlay zone.

Application requirements: In addition to the information and material required to be submitted with other special use permit applications, an applicant for a special permit in the overlay zone must be required to submit detailed maps showing all relevant environmental conditions on the site subject to the application.⁵⁷ A base map must be submitted at an appropriate scale and on that map must be

added the location of all conditions relevant to the enforcement of the overlay zones standards such as slopes, vulnerable soils, special vegetation, wetlands, habitats, surface waters, etc.

Applicants should be required to submit a sea level rise analysis for various levels of sea level rise.⁵⁸

Conditions Imposed: The planning board must be authorized in this section of the law to impose conditions necessary to accomplish the objectives of the overlay zone. Examples of the types of conditions that may be imposed include:

- No-build and limited-build buffers & shoreline setbacks⁵⁹
- Elevation requirements for permitted building⁶⁰
- Limits on impervious surface
- Required storm water retention and management practices
- Mandatory clustering—requires clustering away from sensitive areas⁶¹
- Require applicant to prove compliance with sensitive area protections⁶²
- Prohibit shoreline protective structures (hard/soft solutions)⁶³
- Require Deed Restrictions/Conservation

Easements before property is inundated⁶⁴

- Require deed restrictions on building on all but small portion of the site
- Subject developers/landowners to development agreements governing future assurances.⁶⁵

VIII. AMEND SITE PLAN AND SUBDIVISION REGULATIONS TO CROSS REFERENCE SPECIAL PERMIT REQUIREMENTS CREATED IN STEP VII

Many of the standards and techniques listed above for the special permit may be cross referenced or added to the community's subdivision and site plan regulations. In subdividing land or specifying development on an individual site, the details of the proposed development may be more clearly articulated and the planning board should be authorized to require the same information specified in the special permit section above and to impose further conditions of the type listed above in approving a subsequent subdivision or site plan proposal. Alternatively, the application for the subdivision or site plan approval can be simultaneous with the application for the special use permit, which

will require that the applicant comply with all regular subdivision and site plan submission requirements as well as those contained in the special use permit requirements in the overlay zone.

IX. PLACE LIMITATION ON REBUILDING IN OVERLAY ZONE IF SUBSTANTIAL DESTRUCTION

The municipality can include a provision that requires the landowner to meet the standards in the new expanding overlay zone if a building is substantially destroyed. The municipality can define substantially destroyed (i.e. 50%). The landowner would have to apply for the special use permit and would be subject to the standards of the overlay zone, application requirements, and the imposition of conditions.

X. ESTABLISH MORATORIUM FOLLOWING FUTURE STORM EVENTS (POST DISASTER MORATORIA) OPTION

A municipality can adopt a post disaster moratorium that puts into effect a moratorium on all development upon the occurrence of specified storm events.

The municipality can choose to:

- f. Limit all building pending a post-storm damage survey within a fixed time.⁶⁶
- g. Limit all building not connected with required infrastructure.⁶⁷
- h. Adjust zones and regulations to the post storm landscape.
- i. Regulate all post storm rebuilding according to changes in land and the landscape.

Additional Considerations and Tasks

In addition to these ten steps, there are a number of other considerations and tasks a municipality should consider.

Both the rate and impact of sea level rise and storm hazards challenge the capabilities of local, volunteer decision makers. If the techniques recommended above are adopted a new set of complicated responsibilities will be added to the responsibilities of planning board members. Against the weight of these pressures, the local land use decision makers need to understand the scope of their responsibility and authority under law, and need to be armed with the tools for land and other resource protection, as well as,

consensus building and decision-making tools and techniques. It is important to involve them in the formulation of these new standards, procedures, and techniques and to ensure that they are trained in their use.

After adopting an overlay zone and other special permit, site plan, and subdivision provisions, a municipality can adopt enforcement mechanisms to ensure compliance with its new sea level rise zoning. In addition, municipalities can enter into Intermunicipal Agreements to regulate shared coastal resources and/or shared risk prevention and mitigation. There are numerous things a municipality can choose to do with adjacent communities.

With the risks of sea level rise and storm hazards comes state and federal technical assistance and grants. The municipality can charge its Task Force, if it created one, or other relevant board or staff to monitor these opportunities and apply for such assistance and funding when available.

OTHER TOOLS AND TECHNIQUES

Many states allow municipalities to establish transfer of de-

velopment rights programs that concentrate development in receiving districts and provide for the transfer of development rights from sending districts. In smart growth terms, the receiving district is the designated growth area and the sending area is a conservation or natural resource protection area.

Public acquisition of private land is sometimes necessary to achieve the resource preservation and environmental protection objectives of local governments.⁶⁸ A municipality can purchase the owner's entire fee interest in the property, development rights, or a conservation easement. The state or federal government may provide funding for local acquisition through a variety of devices. There are also several methods that local governments may use to raise the funds needed for land acquisition, where authorized by state statute.

¹Lucas v. South Carolina Coastal Council, 505 U.S. 1003, 112 S. Ct. 2886, 120 L. Ed. 2d 798, 34 Env't. Rep. Cas. (BNA) 1897, 22 Env't. L. Rep. 21104 (1992).

²IPCC, Climate Change 2007: Physical Science Basis; Summary for Policymakers (February 2007).

³"Coastal Sensitivity to Sea-Level Rise: A Focus on the Mid-Atlantic Region," U.S. Climate Change Sci-

ence Program, available at <http://www.climatescience.gov/Library/sap/sap4-1/final-report/default.htm> (Jan. 15, 2009).

⁴Science and Technology Committee, *Statement on Sea Level in the Coming Century*, in SECOND REPORT AND INITIAL RECOMMENDATIONS MIAMI-DADE COUNTY CLIMATE CHANGE TASK FORCE, Presented to the Miami-Dade Board of County Commissioners (Apr. 2008), available at http://www.miamidade.gov/derm/library/08-10-04_CCATF_BCC_Package.pdf.

⁵MIAMI-DADE COUNTY, FLA., CODE, art. CXXVI, §§ 2-1941 to 1946 (2008), available at <http://www.miamidade.gov/govaction/matter.asp?matter=061152&file=true&yearFolder=Y2006>.

⁶MIAMI-DADE COUNTY, FLA., CODE, art. CXXVI, §§ 2-1941 to 1946, at 1 (2008), available at <http://www.miamidade.gov/govaction/matter.asp?matter=061152&file=true&yearFolder=Y2006>.

⁷MIAMI-DADE COUNTY, FLA., CODE, art. CXXVI, §§ 2-1941 to 1946, at 3-4 (2008), available at <http://www.miamidade.gov/govaction/matter.asp?matter=061152&file=true&yearFolder=Y2006>.

⁸MIAMI-DADE COUNTY, FLA., CODE, art. CXXVI, §§ 2-1941 to 1946, at 4 (2008), available at <http://www.miamidade.gov/govaction/matter.asp?matter=061152&file=true&yearFolder=Y2006>.

⁹S. Mulkey, *Climate Change and Land Use: Report to the Century Commission* (June 2007).

¹⁰Governor's Action Team on Energy and Climate Change, Florida Action Team Final Report (Oct. 2008), available at <http://www.flclimatechange.us/documents.cfm>.

¹¹See The Treasure Coast Regional Planning Council, *Sea Level Rise in the Treasure Coast Region* (December 5, 2005), available at http://www.tcrpc.org/special_projects/TCRPC%20SLR%20Report%2012-05-05.pdf.

¹²MAINE NATURAL RESOURCES PROTECTION ACT, 38 M.R.S.A. § 480-A (2009).

¹³Maine Department of Environmental Protection Rules Ch. 355(1), available at <http://www.maine.gov/sos/cec/rules/06/chaps06.htm>.

¹⁴Maryland Commission on Climate Change, Climate Action Plan, Phase I: Sea-level rise and coastal storms 25 (Aug. 2008), available at <http://www.mde.state.md.us/Air/climatechange/index.asp>.

¹⁵Maryland Commission on Climate Change, Climate Action Plan, Phase I: Sea-level rise and coastal storms 22 (Aug. 2008), available at <http://www.mde.state.md.us/Air/climatechange/index.asp>.

¹⁶See The Metropolitan Washington Council of Governments, *National Capital Region: Climate Change Report* (Nov. 2008), available at <http://www.mwcog.org/uploads/pub-documents/zldXXg20081203113034.pdf>.

¹⁷See Critical Area Commission, Maryland House Bill 1253, Overview of 2008 Legislation (May 20, 2008).

¹⁸New York State Department of Environmental Conservation, Office of Climate Change, <http://www.dec.ny.gov/about/43166.html>.

¹⁹See Summary of the Sea Level Rise Task Force Steering Committee Meeting Summary, November 24, 2008 (on file with the author). See also New York State Energy Research and Development (NYSERDA), <http://www.nysesda>.

[org/programs/environment/emep/home.asp](http://www.nyserda.org/programs/environment/emep/home.asp).

²⁰Columbia University Center for Climate Systems Research (CCSR) is currently developing estimates of sea level rise for New York City and the NYSERDA Integrated Assessment for Effective Climate Change Adaptation Strategies, will use CCSR expertise to refine these estimates for coastal New York State and the Hudson River north to the Federal Dam in Troy. See Sea Level Rise Task Force Steering Committee Recommendations for Sea Level Rise Planning, November 14, 2008 (on file with the author).

²¹See New York State Energy Research and Development (NYSERDA), State Level Initiatives to Study Greenhouse Gas Emission, available at <http://www.nyserda.org/programs/environment/emep/home.asp>.

²²North Carolina General Policy Guidelines for the Coastal Area, 5A NCAC 07M.0501.

²³NOAA/Rhode Island Sea Grant/University of Rhode Island, *Summary of Coastal Program Initiatives that Address Sea Level Rise as a Result of Global Climate Change*, at 42 (February 2008).

²⁴NOAA/Rhode Island Sea Grant/University of Rhode Island, *Summary of Coastal Program Initiatives that Address Sea Level Rise as a Result of Global Climate Change*, at 42 (February 2008).

²⁵S.C. CODE OF REGULATIONS, Ch. 30, § 30-1(C)(4).

²⁶S.C. CODE OF REGULATIONS, Ch. 30, § 30-1(C)(7).

²⁷See Eddie R. Fisher & Angela R. Sunley, *A Line in the Sand: Balancing the Texas Open Beaches Act and*

Coastal Development, Proceedings of Coastal Zone 07, Portland, OR (July 2007).

²⁸See The City of Bainbridge Island Comprehensive Plan, Environmental Element, available at http://www.ci.bainbridge-isl.wa.us/comprehensive_plan.aspx.

²⁹See The City of Bainbridge Island Comprehensive Plan, Environmental Element, available at http://www.ci.bainbridge-isl.wa.us/comprehensive_plan.aspx.

³⁰See The City of Bainbridge Island Comprehensive Plan, Environmental Element, at 8, available at http://www.ci.bainbridge-isl.wa.us/comprehensive_plan.aspx.

³¹The North Carolina Coastal Area Management Act of 1974, N.C. GEN STAT. §§ 1131-100 to 134.3 (2009), available at <http://dcm2.enr.state.nc.us/rules/cama.htm>.

³²15A N.C. ADMIN. CODE § 07M.0501 (2008), available at <http://www.nccoastalmanagement.net/Rules/Text/t15a-07m.0500.pdf>.

³³North Carolina Design and Construction Guidelines 15, available at http://149.168.212.15/mitigation/Library/Full_Tools_and_Tech.pdf.

³⁴In 2005, Duck adopted, and the State of North Carolina certified, the town's CAMA CORE Land Use Plan, which calls for sea level rise mitigation planning. See TOWN OF DUCK, N.C., CAMA Core Land Use Plan (2005), available at <http://www.townofduck.com/pzi.landuseplan.pdf>.

³⁵TOWN OF DUCK, N.C., CODE, ch. 152 (2008).

³⁶TOWN OF DUCK, N.C., CODE, ch. § 152.03 (2008).

³⁷Town of East Hampton, N.Y., Comprehensive Plan: Coastal Management Component at C-5 to C-6.

³⁸TOWN OF EAST HAMPTON, N.Y., CODE § 255-4-40.

³⁹TOWN OF EAST HAMPTON, N.Y., CODE, Ch. 255: Zoning § 255-3-80.

⁴⁰Climate Change Report, available at http://www.nyc.gov/html/planyc2030/downloads/pdf/report_climate_change.pdf.

⁴¹Press Release, *Mayor Bloomberg Launches Task Force to Adapt Critical Infrastructure to Environmental Effects of Climate Change*, August 12, 2008, available at http://www.rockfound.org/about_us/press_releases/2008/081208cc_nyc.shtml.

⁴²PlaNYC, available at <http://www.nyc.gov/html/planyc2030/html/home/home.shtml>.

⁴³Press Release, *Mayor Bloomberg Launches Task Force to Adapt Critical Infrastructure to Environmental Effects of Climate Change*, August 12, 2008, available at http://www.rockfound.org/about_us/press_releases/2008/081208cc_nyc.shtml.

⁴⁴Press Release, *Mayor Bloomberg Launches Task Force to Adapt Critical Infrastructure to Environmental Effects of Climate Change*, August 12, 2008, available at http://www.rockfound.org/about_us/press_releases/2008/081208cc_nyc.shtml.

⁴⁵Press Release, *Mayor Bloomberg Launches Task Force to Adapt Critical Infrastructure to Environmental Effects of Climate Change*, August 12, 2008, available at http://www.rockfound.org/about_us/press_releases/2008/081208cc_nyc.shtml.

⁴⁶*Potential Adaptation Strategies For DEP, in THE NYC DEP CLIMATE CHANGE PROGRAM ASSESSMENT AND ACTION PLAN: A REPORT BASED ON THE ONGOING WORK OF THE DEP CLIMATE CHANGE TASK FORCE 55* (May 2008), available at http://www.nyc.gov/html/dep/html/news/climate_change_report_05-08.shtml.

⁴⁷COLLIER COUNTY, FLA., LAND DEVELOPMENT CODE, § 3.03.05 (2008).

⁴⁸COLLIER COUNTY, FLA., LAND DEVELOPMENT CODE, § 3.03.05 (2008).

⁴⁹FALMOUTH, MASS., CODE, ch. 235 (2008); Falmouth Wetlands Regulations, FWR § 10.00 (2008).

⁵⁰Falmouth Wetlands Regulations, FWR § 10.02.

⁵¹Falmouth Wetlands Regulations, FWR § 10.38. FEMA flood zone designations available at http://www.fema.gov/plan/prevent/floodplain/nfipkeywords/flood_zones.shtml.

⁵²New York City, PlaNYC, <http://www.nyc.gov/html/planyc2030/html/home/home.shtml>; PlaNYC Report on Climate Change, available at http://www.nyc.gov/html/planyc2030/downloads/pdf/full_report.pdf.

⁵³The Miami-Dade County, Florida's Climate Change Task Force consists of twenty-five appointed members representing various sectors of the Miami-Dade community including government agencies and educational institutions. See The Second Report and Initial Recommendations Miami-Dade County Climate Change Task Force, Presented to the Miami-Dade Board of County Commissioners (Apr. 2008), available at http://www.miamidade.gov/derm/library/08-10-04_CCATF_BCC_Package.pdf.

⁵⁴The City of Olympia's Comprehensive Plan stresses community involvement. The City recognized that "citizens will not give grudging support to (land use) actions if they do not understand the reasons for them,"

and created *Olympia's Plan to Grow Smart*. Through this plan, the City conducts an aggressive education program for citizens of all ages, and encourages their participation in environmental issues. The plan helps to create a sense of community and creates locally approved goals for the city's land use planners based on community feedback. See *Olympia's Plan to Grow Smart*, <http://search.mrsc.org/Subjects/Governance/trust/o46-41.pdf>.

⁵⁵Federal Disaster Mitigation Act of 2000, 44 CFR Part 201.6 (2008), calls upon states to plan for disasters by developing a mitigation plan that outlines processes for identifying the natural hazards, risks, and vulnerabilities of the area under the jurisdiction of the government to be approved by the government. Preparation and adoption of a jurisdiction wide natural hazard mitigation plan is a condition of receiving project grant funds under the Hazard Mitigation Grant Program. An enhanced plan that demonstrates that the state is committed to a comprehensive state mitigation program by engaging local governments qualifies for more grant money than a standard plan.

⁵⁶See Tillamook County, OR, Land Use Ordinance, § 3.085, Beach and Dune Overlay District. Tillamook County, Oregon is highly vulnerable to ongoing coastal erosion, landslides, and sand inundation of permitted structures in the fore-dune areas of the coast. The county code incorporates a Beach and Dune (BD) Overlay Zone that prohibits development in active dune areas subject to flooding and other natural hazards; requires erosion and groundwater draw-down be minimized in coastal areas; and provides that only properties developed before a certain date may

obtain permits for beachfront protective structures.

⁵⁷See TOWN OF SOUTH KENSINGTON, R.I., CODE § 601, High Hazard Overlay. Special use permits for construction behind the fore-dune zone may be granted and may require additional information including a detailed map with extensive environmental information such as high and low tide levels, soil type, dunes and other natural protective barriers, existing flood and erosion control methods, and current drainage elevations and contours, as well as a detailed plan which lays out the proposed uses for the lot.

⁵⁸See COLLIER COUNTY, FLA., COMPREHENSIVE PLAN, Policy 10.3.4, Coastal Zone Management; Sea Level Rise Analysis. The Resource Protection chapter of the County's Land Development Code requires a mandatory sea-level-rise impact analysis for shoreline development, which must demonstrate that the development will remain fully functional for its intended use after a six (6) inch rise in sea level and if the applicant cannot meet this requirement, a list shall be provided by the applicant of the changes necessary in order for the development to meet the standard.

⁵⁹See Town of East Hampton, NY: Code § 255-4-30, Coastal and Wetland setbacks and buffers. Wetland setbacks are provided for all areas of the town. Construction is prohibited within a wetland; sewage disposal devices must be set back 150 feet from the upland boundary of a wetland; turf may not be established nearer the upward boundary than 50 feet; and coastal setbacks of 100 to 150 feet, from bluff lines or dune crests, are created in addition to primary and secondary setbacks, feet are established. Where multiple setbacks may affect a property, compliance with

each setback is required, unless non-feasibility can be shown by the landowner.

⁶⁰See CITY OF MALIBU, CAL., CODE §§ 10.4(A),(B),(O),(Q); 10.6(C), Coastal Zone Shoreline and Bluff Ordinance. Development standards expressly require the consideration of sea level rise and mandate setbacks of a sufficient distance landward and elevations to a sufficient finished floor height, which will “eliminate or minimize to the maximum extent feasible hazards associated with anticipated sea level rise over the expected 100 year economic life of the structure.”

⁶¹See Escambia County, Fla., Comprehensive Plan, Chapter 11, Coastal Conservation and Management Element. Where development in sensitive areas is permitted, adverse impacts must be minimized through the use of clustering, variance of the county lot and setback requirements, a reduction in construction “footprints,” modified or innovative construction techniques, and land use and development techniques which minimize negative environmental impacts or results.

⁶²See Maine Department of Environmental Protection, Rules Ch. 355(1), Coastal Sand Dune Rules. Standards for all projects in sand dune areas provide that a project may not be permitted if “it is likely to be severely damaged” by a two-foot rise in sea level over the next 100 years.

⁶³See TOWN OF EAST HAMPTON, NY, CODE, Ch. 255: Zoning § 255-3-80, Coastal Erosion Overlay District. East Hampton’s coastal erosion overlay regulates the construction and alteration of shoreline protective structures. The zoning establishes four coastal erosion zones to protect the natural shoreline, where the con-

struction of new coastal erosion structures is prohibited or require a special permit.

⁶⁴See CITY OF MALIBU, CAL.: CODE §§ 10.4(A),(B),(O),(Q); 10.6(C), Coastal Zone Shoreline and Bluff Ordinance. Ordinance requires deed restrictions against properties that can be sited and designed to not require a shoreline protection structure as part of the proposed development or at any time during the life of the development. The restrictions ensure that “no shoreline protection structure shall be proposed or constructed to protect the development approved.”

⁶⁵See BARNSTABLE, MASS., CODE, Ch. 168, Regulatory Agreements Ordinance. The ordinance allows the Town and/or the Cape Cod Commission to enter into a development agreement with a qualified applicant for land use approvals within a mapped district.

⁶⁶See TOWN OF DUCK, N.C., CODE, ch. 152 (2008). Damage assessment team assesses property damage immediately following a storm and makes recommendations to the town’s Building Inspector, who then inspects and categorizes structures according to the degree of damage. When a building moratorium is declared in the Town of Duck, North Carolina, an “initial moratorium” extends for 48 hours, during which no building permits may be issued. A “destroyed structure moratorium” extends for 30 days following the expiration of the initial moratorium and during this period, no permit for replacement of a destroyed structure will be issued. In order to receive building permits, all replacement building and repairs following moratoriums must meet applicable town zoning and other code requirements. A major “damaged structure morato-

rium” also extends for 7 days following the initial moratorium and a “minor damaged structure moratorium” coincides with the 48-hour initial moratorium.

⁶⁷See TOWN OF NAGS HEAD, N.C., CODE, §§ 48-741 to 48-744, General Use Standards for Redevelopment in Ocean Hazard Areas. After the close of a building moratorium destroyed or major damaged structures may not be reconstructed unless an on-site

inspection of the lot by zoning administrator is performed, a septic improvements permit is granted, the water is restorable at the street frontage of the lot, the electrical service is restorable to building site, and there is direct, uninterrupted approved vehicular access to the lot.

⁶⁸“Land Preservation,” Ch. 3, *Environmental Law Practice Guide: State and Federal Law* (Michael B. Gerrard, ed., 2003).