Planning for Sea Level Rise in the Matanzas Basin

Appendix H2:

Planning for Sea Level Rise Toolkit

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NATIONAL ESTUARINE RESEARCH RESERVE

PLANNING FOR SEA LEVEL RISE TOOLKIT

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HP

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REGULATORY ACTION

PROTECTION: HARD ARMORING

GRANTING OF ARMORING PERMITS

LEGAL ASPECTS

Responsible Authority: local, state, and federal governments

Basis of Authority: local permitting authority; state coastal management; Rivers & Harbors Act, Clean Water Act, and Endangered Species Act

Likelihood of Legal Challenges: LOW- some possibility that neighboring property owners or sea-turtle advocates could challenge a permit

MOST APPROPRIATE LAND USE

Urban and suburban lands

FEASIBILITY

Political Feasibility: MEDIUM to HIGH- while not as favored as it once was, armoring remains the assumed option for many areas that have not yet fully assessed the long-term costs of this option

Technical Feasibility: MEDIUM- armoring in Florida poses challenges because in some parts of the state it frequently needs to be coupled with improved drainage systems

Economic Feasibility: HIGH when protecting relatively high-elevation and high-value land;
LOW when protecting very low-lying areas as then drainage becomes a significant cost

EFFICACY

Short-term: MEDIUM- may provide good protection from some flooding or erosion, but can still be overtopped by larger storm or surge events

Long-term: LOW- storms and surge will overwhelm many defenses much more frequently as sea levels increase. Protection from flooding will be decreased due to drainage issues even if water is not coming over a protective structure

EXAMPLES

NOTES

Very challenging to use armoring as a primary region-wide response in very low-lying areas as this requires some level of uniformity of height and strength for the armoring to be effective; this can be challenging if many owners already have private armoring of varying heights, some of which are insufficient.

RESOURCES

Implementation:

Consulted/ Reviewed:

Australian Department of Climate Change. Climate Change Risks to Australia's Coast. 2009. http://www.climatechange.gov.au/climate-change/adapting-climate-change/australias-coasts-and-climate-change/coastal-risks-0/climate

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

REGULATORY ACTION

PROTECTION: HARD ARMORING

INTENSIFY EXISTING DEVELOPMENT

LEGAL ASPECTS

Responsible Authority: local government

Basis of Authority: local planning, zoning, and permitting authority

Likelihood of Legal Challenges: MEDIUM- some property owners may be unhappy, but increasing minimum zoning density is probably less problematic than decreasing it

MOST APPROPRIATE LAND USE

Urban

FEASIBILITY

Political Feasibility: MEDIUM to HIGH- local government may favor this as redevelopment at higher densities grows the lower tax base

Technical Feasibility: MEDIUM- in appropriate areas, protection for the short and medium term should be assessed as highly feasible. Long-term technical feasibility presents more challenges due to the uncertain nature of long-term (i.e.--greater than 75-100 years) sea levels

Economic Feasibility: HIGH

EFFICACY

Short-term: HIGH

Long-term: MEDIUM to LOW

EXAMPLES

This could potentially work to the advantage of areas that could feasibly be protected for long periods by increasing the number of people and properties among which to spread the costs of structural protections. This potential benefit must be weighed against the potential increase in exposure to hazard. Possible specific legal impediments in Florida might include statutory direction to not increase subsidies in hazardous areas, limitations on floodplain development due to participation in the NFIP, and evacuation zone requirements.

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

NOAA & EPA. Achieving Hazard-Resilient Coastal & Waterfront Smart Growth. Undated.

REGULATORY ACTION

PROTECTION: SOFT ENGINEERING

BEACH NOURISHMENT

LEGAL ASPECTS

Responsible Authority: local, state, and federal governments

Basis of Authority: local permitting authority; state coastal management; Rivers & Harbors Act, and Clean Water Act

Likelihood of Legal Challenges: MEDIUM- While often enjoying political support, beach nourishment has increasingly come under attack for environmental reasons and from property rights activists

MOST APPROPRIATE LAND USE

Urban, suburban, and environmentally sensitive lands

FEASIBILITY

Political Feasibility: MEDIUM to HIGH- Florida Statutes indicate that beach nourishment is an important public purpose

Technical Feasibility: HIGH- extensive technology and experience supports beach nourishment

Economic Feasibility: MEDIUM- costs for beach nourishment vary greatly, largely dependent on available sand supply. Initial construction and maintenance are quite expensive

EFFICACY

Short-term: HIGH

Long-term: MEDIUM to LOW- it is not clear that nourishment alone can keep up with sea level rise, especially in areas of very low elevation

EXAMPLES

NOTES

RESOURCES

Implementation: federal, state, local and private funding

Consulted/ Reviewed:

Australian Department of Climate Change. Climate Change Risks to Australia's Coast. 2009. http://www.climatechange.gov.au/climate-change/adapting-climate-change/australias-coasts-and-climate-change/coastal-risks-0/climate

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

REGULATORY ACTION

PROTECTION: SOFT ENGINEERING

DUNE CREATION

LEGAL ASPECTS

Responsible Authority: local, state, and federal governments

Basis of Authority: local permitting authority; state coastal management; Rivers & Harbors Act, and Clean Water Act

Likelihood of Legal Challenges: MEDIUM to LOW- while property owners have mounted several legal challenges based on loss of view, these suits have typically not fared well

MOST APPROPRIATE LAND USE

FEASIBILITY

Political Feasibility:

Technical Feasibility:

Economic Feasibility:

EFFICACY

Short-term:

Long-term:

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

REGULATORY ACTION

PROTECTION: SOFT ENGINEERING

LIVING SHORELINES

LEGAL ASPECTS

Responsible Authority: federal (USACOE & EPA); local Water Management District

Basis of Authority: Clean Water Act; Florida Statutes Ch. 373

Likelihood of Legal Challenges: LOW

MOST APPROPRIATE LAND USE

All current land use types can benefit, but benefits greatest in low-energy shoreline scenarios

FEASIBILITY

Political Feasibility: MEDIUM to HIGH- over the last few years, many have worked hard to overcome numerous permitting barriers to living shorelines

Technical Feasibility: MEDIUM to HIGH

Economic Feasibility: HIGH

EFFICACY

Short-term: MEDIUM to HIGH

Long-term: MEDIUM to LOW, depending on context

EXAMPLES

Maryland Living Shorelines Act stipulates use of living shorelines rather than hard armoring when feasible (MD Code Ann. Envir. §16-201)

NOTES

Many states now have policies that encourage living shorelines over hard armoring largely because of the environmental benefits of living shorelines rather than hard armoring.

RESOURCES

Implementation:

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

San Francisco Bay Conservation & Development Commission, Staff Report Living with a Rising Bay: Vulnerability and Adapation in San Francisco Bay and on its Shoreline. 2011. http://www.bcdc.ca.gov/BPA/LivingWithRisingBay.pdf

REGULATORY ACTION

ACCOMODATION: EXISTING DEVELOPMENT

ALTERED ZONING TO CREATE NON-CONFORMITIES

LEGAL ASPECTS

Responsible Authority:

Basis of Authority:

Likelihood of Legal Challenges:

MOST APPROPRIATE LAND USE

FEASIBILITY

Political Feasibility:

Technical Feasibility:

Economic Feasibility:

EFFICACY

Short-term:

Long-term:

EXAMPLES

Sarasota County ordinances

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

Thomas Rupert, Esq.

REGULATORY ACTION

ACCOMODATION: EXISTING DEVELOPMENT

HIGHER REBUILD REQUIREMENTS; EXTEND FLOODPLAIN REGULATIONS TO 500 YEARS

LEGAL ASPECTS

Responsible Authority: local government

Basis of Authority: permitting authority

Likelihood of Legal Challenges: MEDIUM to LOW- if these requirements are included as flood-plain regulation or building code changes, the likelihood of successful legal challenges is low

MOST APPROPRIATE LAND USE

FEASIBILITY

Political Feasibility: MEDIUM

Technical Feasibility: HIGH- these areas are already usually mapped in FEMA flood maps as "B" zones or "X" zones (shaded)

Economic Feasibility: HIGH- cost to local government to implement is low. While increased elevation adds a small percentage to construction costs, the cost savings are great if the property is subsequently rezoned into the 100-year floodplain

EFFICACY

Short-term: HIGH

Long-term: MEDIUM to HIGH

EXAMPLES

NOTES

Higher elevation requirements in 100- and 500-year floodplains can save significant sums of money for property owners during disasters and due to changing flood maps

RESOURCES

Implementation:

Coastal No Adverse Impact

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

REGULATORY ACTION

ACCOMODATION: EXISTING DEVELOPMENT

INCREASED FLOODPLAIN MANAGEMENT STANDARDS (FREEBOARD, BUILDING DESIGN, OPEN SPACE/PRESERVATION)

LEGAL ASPECTS

Responsible Authority: local government

Basis of Authority: building permit authority; floodplain management responsibility

Likelihood of Legal Challenges: VERY LOW for freeboard and building design requirements; MEDIUM for open space/preservation depending on details of implementation

MOST APPROPRIATE LAND USE

All land use types

FEASIBILITY

Political Feasibility: MEDIUM to HIGH- most flood plain management tools are already widely used and accepted. Changes to the National Flood Insurance Program create a unique opportunity for increased implementation

Technical Feasibility:

Economic Feasibility: HIGH

EFFICACY

Short-term: HIGH

Long-term: MEDIUM- creating greater resistance to flooding will help, but large amounts of SLR could offset the benefit eventually (except for open space/preservation)

EXAMPLES

NOTES

RESOURCES

Implementation:

Existing floodplain management framework at local level

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

REGULATORY ACTION

ACCOMODATION: EXISTING DEVELOPMENT

ELEVATE BUILDINGS

LEGAL ASPECTS

Responsible Authority: local government, FEMA

Basis of Authority: Floodplain management and local permitting authority

Likelihood of Legal Challenges: LOW when only applied to existing buildings that are substantially damaged or substantially improved as these are minimums required by the NFIP

MOST APPROPRIATE LAND USE

Urban, suburban, rural

FEASIBILITY

Political Feasibility: MEDIUM to HIGH especially with recent changes to the NFIP making increased elevation more economically rewarding for the property owner

Technical Feasibility: HIGH- increasingly companies are raising even slab-on-grade buildings by either raising the entire slab (more costly) or raising the building off the slab and building a new floor (more economical)

Economic Feasibility: LOW to HIGH depending on value of the structure to be elevated, the land value, and the amount to be saved in flood insurance, if required

EFFICACY

Short-term: HIGH

Long-term:

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

Deyle, R.E. & Butler, W.H. Resilience Planning in the Face of Uncertainty: Adapting to Climate Change Effects on Coastal Hazards, in "Disaster Resiliency: Interdisciplinary Perspectives" pp. 178-206. 2013.

REGULATORY ACTION

ACCOMODATION: EXISTING DEVELOPMENT

INCREASE ALLOWABLE DENSITY IN NON-HAZARDOUS AREAS

LEGAL ASPECTS

Responsible Authority:

Basis of Authority:

Likelihood of Legal Challenges: LOW

MOST APPROPRIATE LAND USE

FEASIBILITY

Political Feasibility:

Technical Feasibility:

Economic Feasibility:

EFFICACY

Short-term:

Long-term:

EXAMPLES

NOTES

Could be independent of or form part of a transfer of development rights program. If this approach were to be used, it should contain the most stringent hazard mitigation building practices possible, likely making it less appropriate for historical areas.

RESOURCES

Implementation:

Consulted/ Reviewed:

NOAA & EPA. Achieving Hazard-Resilient Coastal & Waterfront Smart Growth. Undated.

REGULATORY ACTION

ACCOMODATION: NEW DEVELOPMENT

CLUSTERED DEVELOPMENT

LEGAL ASPECTS

Responsible Authority: local government

Basis of Authority:

Likelihood of Legal Challenges:

MOST APPROPRIATE LAND USE

FEASIBILITY

Political Feasibility:

Technical Feasibility:

Economic Feasibility:

EFFICACY

Short-term: MEDIUM- Not very effective at dealing with long-term flooding changes, but may decrease amount of land area that would require protection

Long-term: LOW

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

San Francisco Bay Conservation & Development Commission, Staff Report. Living with a Rising Bay: Vulnerability and Adapation in San Francisco Bay and on its Shoreline. 2011. http://www.bcdc.ca.gov/BPA/LivingWithRisingBay.pdf

REGULATORY ACTION

ACCOMODATION: NEW DEVELOPMENT

INCREASED FLOODPLAIN MANAGEMENT STANDARDS (FREEBOARD, BUILDING DESIGN, OPEN SPACE/PRESERVATION)

LEGAL ASPECTS

Responsible Authority: local government

Basis of Authority: building permit authority; floodplain management responsibility

Likelihood of Legal Challenges: VERY LOW for freeboard and building design requirements; MEDIUM for open space/preservation depending on details of implementation

MOST APPROPRIATE LAND USE

All land use types

FEASIBILITY

Political Feasibility: MEDIUM to HIGH- most flood plain management tools are already widely used and accepted. Changes to the National Flood Insurance Program create a unique opportunity for increased implementation

Technical Feasibility:

Economic Feasibility: HIGH

EFFICACY

Short-term: HIGH

Long-term: MEDIUM- creating greater resistance to flooding will help, but large amounts of SLR could offset the benefit eventually (except for open space/preservation)

EXAMPLES

Many local governments in Florida's Escambia County require 3 ft. of "freeboard" above the base flood elevation for buildings in flood zones

NOTES

As National Flood Insurance Program premiums increase, higher floodplain management standards could contribute to better Community Rating System discounts for NFIP policy holders, making this a very politically and economically attractive option.

RESOURCES

Implementation:

Existing floodplain management framework at local level

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

REGULATORY ACTION

ACCOMODATION: NEW DEVELOPMENT

RESILIENT DESIGN REQUIREMENTS (INCREASED ELEVATION, FLOODPROOFING, STRONGER BUILDING REQUIREMENTS, ETC.)

LEGAL ASPECTS

Responsible Authority: local governments

Basis of Authority: state or local building codes

Likelihood of Legal Challenges: LOW

MOST APPROPRIATE LAND USE

Urban, suburban, rural, undeveloped

FEASIBILITY

Political Feasibility: MEDIUM TO HIGH- often the building industry is the biggest obstacle to increasing building code stringency

Technical Feasibility: HIGH

Economic Feasibility: MEDIUM to HIGH

EFFICACY

Short-term: HIGH

Long-term: LOW to HIGH- depends on vulnerability of location of specific development

EXAMPLES

NOTES

Increased elevation requirements can increase a jurisdiction's Community Rating System score in the NFIP, thus saving policy holders money

RESOURCES

Implementation:

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

REGULATORY ACTION

ACCOMODATION: NEW DEVELOPMENT

IMPACT FEES

LEGAL ASPECTS

Responsible Authority: local government

Basis of Authority: planning & permitting authority; ability to address development impacts

Likelihood of Legal Challenges: MEDIUM to HIGH- the likelihood of legal challenge could be increased by a recent U.S. Supreme Court case that expressly subjects all exactions, such as impact fees, to stricter judicial scrutiny

MOST APPROPRIATE LAND USE

Urban, suburban, rural, undeveloped

FEASIBILITY

Political Feasibility: MEDIUM- impact fees are a common and accepted tool. They have become less popular as the economic crisis hurt the development industry

Technical Feasibility: MEDIUM- proper administrative justification and tracking of impact fees is critical to withstand legal challenges

Economic Feasibility: MEDIUM to HIGH- the administrative costs will be harder for small local governments to bear

EFFICACY

Short-term: Varies according to the purpose and amount of the fee

Long-term:

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

REGULATORY ACTION

ACCOMODATION: NEW DEVELOPMENT

SETBACKS

LEGAL ASPECTS

Responsible Authority: state government, local government, or other permitting authority

Basis of Authority: authorization to require a permit for new development

Likelihood of Legal Challenges: MEDIUM- likelihood of a successful challenge will often hinge on the specifics of the case and especially on whether the setback renders parcels unbuildable. May be possible that there could be legal challenges to the scientific processes underlying determination of the setback line if the line represents an erosion rate or storm-impact area

MOST APPROPRIATE LAND USE

Undeveloped, environmentally sensitive

FEASIBILITY

Political Feasibility:

Technical Feasibility:

Economic Feasibility:

EFFICACY

Short-term:

Long-term:

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

REGULATORY ACTION

ACCOMODATION: NEW DEVELOPMENT

LOW-IMPACT DEVELOPMENT STORMWATER MANAGEMENT

LEGAL ASPECTS

Responsible Authority: local government, water management districts, state Department of Environmental protection

Basis of Authority: local permitting and zoning; stormwater permitting

Likelihood of Legal Challenges: LOW

MOST APPROPRIATE LAND USE

Urban, suburban

FEASIBILITY

Political Feasibility: HIGH

Technical Feasibility: LOW- the most vulnerable coastal areas are so low lying that they are already close to the water table, meaning that existing infiltration capacity may be low and future capacity may be non-existent due to higher water tables

Economic Feasibility: MEDIUM

EFFICACY

Short-term: MEDIUM

Long-term: LOW

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

ACCOMODATION: NEW DEVELOPMENT

DEVELOPMENT EXACTIONS

LEGAL ASPECTS

Responsible Authority: permitting authority

Basis of Authority: based upon permitting authority

Likelihood of Legal Challenges: HIGH- a recent U.S. Supreme Court case (Koontz, 2013) indicates that all exactions, whether or not a permit is issued or not and whether the exaction is property or money, are subject to stricter judicial review

MOST APPROPRIATE LAND USE

All land use types

FEASIBILITY

Political Feasibility: MEDIUM to LOW- current conceptions of property tend to favor short-term private interests in development and use over longer-term public interests in ecosystems and avoided costs

Technical Feasibility: MEDIUM to LOW- if the exactions are on a case-by-case, negotiated basis, this increases dramatically the time and energy investment by both the applicant and the permitting authority. Case-by-case negotiation can also increase the likelihood of a legal challenge. For set exactions for a conditional use, say allowing construction in an area that otherwise would not be allowed on condition of agreeing to a restriction on armoring, it is unclear how a court would view this under its stricter scrutiny for "essential nexus" and "proportionality" tests

Economic Feasibility: MEDIUM- higher if done across-the-board by a rule for conditional use but lower negotiated on a case-by-case basis

EFFICACY

Short-term: HIGH- can be used to maximize current land use while assuring some future protection

Long-term: MEDIUM to HIGH- longer-term, restrictions based on exactions might be subject to legal challenges; while well-designed exactions might survive legally, enough impact might create political pressure to alter laws to negate the adaptive impacts

EXAMPLES

California requires some coastal permit applicants to accept, as a condition of a permit, a deed restriction that prohibits future coastal armoring on the property.

NOTES

Some legal commentators believe that exactions might fail challenges based on the idea that any current cost of the restriction cannot be balanced because the benefit it conveys (or harm it prevents) may be far into the future or too speculative. An alternative analysis, specifically for an exacted restriction on armoring, argues that the current cost is virtually zero, and the only time a cost would accrue to the property owner is when a harm to be prevented (stopping the shoreline from migrating naturally) means that the exaction could pass constitutional challenge.

RESOURCES

Implementation:

Modified zoning and permitting processes

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

REGULATORY ACTION

AVOIDANCE & RELOCATION: NEW DEVELOPMENT

ELEVATION THROUGH LAND-FILLING

LEGAL ASPECTS

Responsible Authority: local government

Basis of Authority: local government permitting authority

Likelihood of Legal Challenges: LOW- depending on situation. For local governments participating in the National Flood Insurance Program, local flood plain ordinances likely prohibit or severely limit the use of fill in floodways and floodplains

MOST APPROPRIATE LAND USE

Suburban, rural, and sensitive lands

FEASIBILITY

Political Feasibility: MEDIUM- adds cost to development, but may be politically acceptable if the requirements allow otherwise-prohibited development

Technical Feasibility: HIGH

Economic Feasibility: MEDIUM- depending on scale of fill required, it may be costly

EFFICACY

Short-term: MEDIUM to HIGH

Long-term: MEDIUM to LOW- even if elevation through fill protects a parcel during construction, eventual levels of SLR could decrease the effectiveness of fill. Also, elevating a parcel or building through fill may not address access and infrastructure issues.

EXAMPLES

NOTES

Adding fill to raise land elevations may lead to legal problems if the addition of fill causes flooding on other parcels of land.

RESOURCES

Implementation:

Private funds

Consulted/ Reviewed:

Australian Department of Climate Change. Climate Change Risks to Australia's Coast. 2009. http://www.climatechange.gov.au/climate-change/adapting-climate-change/australias-coasts-and-climate-change/coastal-risks-0/climate

Deyle, R.E. & Butler, W.H. Resilience Planning in the Face of Uncertainty: Adapting to Climate Change Effects on Coastal Hazards, in "Disaster Resiliency: Interdisciplinary Perspectives" pp. 178-206. 2013

REGULATORY ACTION

AVOIDANCE AND RELOCATION: NEW DEVELOPMENT

MORE STRINGENT STORMWATER REQUIREMENTS

LEGAL ASPECTS

Responsible Authority: local government

Basis of Authority: home rule authority

Likelihood of Legal Challenges: LOW to MEDIUM

MOST APPROPRIATE LAND USE

All land use types

FEASIBILITY

Political Feasibility: MEDIUM

Technical Feasibility: MEDIUM to HIGH

Economic Feasibility: MEDIUM- improved stormwater standards can become costly in some instances, especially when applied to individual parcels

EFFICACY

Short-term: MEDIUM

Long-term: LOW

EXAMPLES

NOTES

For a local stormwater permitting system to be useful, it would have to go beyond the requirements of the existing water management district requirements. This may present unrealistic administrative and engineering demands on the staff of small local governments.

RESOURCES

Implementation:

Existing or new local stormwater permitting program

Consulted/ Reviewed:

REGULATORY ACTION

AVOIDANCE AND RELOCATION

LIMITATIONS ON STATE-SUBSIDIZED WIND INSURANCE

LEGAL ASPECTS

Responsible Authority: state government

Basis of Authority: Citizens Property Insurance Statute

Likelihood of Legal Challenges: NONE

MOST APPROPRIATE LAND USE

All land use types

FEASIBILITY

Political Feasibility: HIGH- already enacted for new development or substantial improvement seaward of the Coastal Construction Control Line (FL Stat. sec. 627.351(6)(a)5.b (2013). Could be expanded

Technical Feasibility: HIGH

Economic Feasibility: HIGH

EFFICACY

Short-term: MEDIUM

Long-term: MEDIUM

EXAMPLES

In counties where sufficient insurance competition exists, current FL Statutes ratchet down the value of condominiums eligible to seek or maintain coverage under Citizens Property Insurance to $700,000 in dwelling unit and contents replacement cost. FL Stat. sec. 627.351(6)(a)3 (2013).

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

REGULATORY ACTION

AVOIDANCE AND RELOCATION: NEW DEVELOPMENT

TRANSFER OF DEVELOPMENT RIGHTS

LEGAL ASPECTS

Responsible Authority: local government

Basis of Authority: home rule authority, planning/zoning authority

Likelihood of Legal Challenges: MEDIUM- current U.S. Supreme Court precedent not clear on whether a TDR is a remaining value of a property or if it is a type of compensation for a taking

MOST APPROPRIATE LAND USE

Undeveloped, environmentally sensitive lands

FEASIBILITY

Political Feasibility: MEDIUM- may be viewed as too heavy-handed an action by property owners

Technical Feasibility: MEDIUM to LOW- complex to design and administer effectively. While many programs have been created across the country, most have very little or no activity. Difficult to ensure that credits have sufficient value due to demand for the credits

Economic Feasibility: HIGH to MEDIUM- while administrative costs may be high, they are easier for a larger local government to assume and are also less than having to spend public money to limit development in hazardous coastal areas

EFFICACY

Short-term: LOW if the program is poorly designed and not obligatory; HIGH if program is well designed and obligatory (i.e.--no development can occur on the SLR-threatened land)

Long-term: HIGH if properly implemented so that denser receiving areas are sufficiently removed from coastal hazards such as flooding, surge, and erosion

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

San Francisco Bay Conservation & Development Commission, Staff Report. Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on its Shoreline. 2011. http://www.bcdc.ca.gov/BPA/LivingWithRisingBay.pdf

REGULATORY ACTION

AVOIDANCE AND RELOCATION: NEW DEVELOPMENT

MANDATORY PURCHASE OF DEVELOPMENT RIGHTS

LEGAL ASPECTS

Responsible Authority: any governmental body at federal, state, or local level with eminent domain power

Basis of Authority: Home rule authority, planning/zoning authority

Likelihood of Legal Challenges: MEDIUM

MOST APPROPRIATE LAND USE

FEASIBILITY

Political Feasibility: MEDIUM

Technical Feasibility:

Economic Feasibility:

EFFICACY

Short-term:

Long-term:

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

REGULATORY ACTION

AVOIDANCE AND RELOCATION: NEW DEVELOPMENT

REMOVAL/RELOCATION REQUIREMENTS

LEGAL ASPECTS

Responsible Authority: most likely the local government permitting authority

Basis of Authority: most likely implemented through zoning requirements and special conditions/exactions

Likelihood of Legal Challenges: HIGH- a recent U.S. Supreme Court case (Koontz, 2013) indicates that all exactions are subject to stricter judicial review

MOST APPROPRIATE LAND USE

Suburban, rural, undeveloped

FEASIBILITY

Political Feasibility: LOW

Technical Feasibility: MEDIUM

Economic Feasibility: MEDIUM- part of the condition could be posting of a performance bond; these systems are already in place for other types of permitting conditions that may require substantial expenditures to fulfill, such as stormwater management

EFFICACY

Short-term: HIGH although removal should not be necessary in the short term

Long-term: HIGH provided the legal assurances underlying the requirement are sound

EXAMPLES

NOTES

This could also be included under "Financial Tools" due to its impact on financing and development costs

RESOURCES

Implementation:

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

REGULATORY ACTION

AVOIDANCE AND RELOCATION: EXISTING DEVELOPMENT

SETBACKS

LEGAL ASPECTS

Responsible Authority: State government, local government, or other permitting authority

Basis of Authority: Authorization to require a permit for rebuilding, repair, redevelopment

Likelihood of Legal Challenges: MEDIUM- likelihood of a successful challenge will often hinge on the specifics of the case and especially on whether the setback renders parcels unbuildable. May be possible that there could be legal challenges to the scientific processes underlying determination of the setback line if the line represents an erosion rate or storm-impact area

MOST APPROPRIATE LAND USE

Undeveloped; environmentally sensitive

FEASIBILITY

Political Feasibility: MEDIUM to LOW- property owners as well as real estate and developer interests often unite to strenuously oppose any increase in setbacks

Technical Feasibility: HIGH

Economic Feasibility: MEDIUM- setbacks can be very simple and economical, or they can be more complex and relatively expensive to develop if based on erosion rates or the landward extent of coastal hazard impacts

EFFICACY

Short-term: VERY HIGH in the short to medium term if the setbacks are significant relative to likely erosion and flooding

Long-term: MEDIUM to LOW- long-term prospects are often not as good as typically the setbacks are not large enough to offer long-term protection for human development or ecosystem migration

EXAMPLES

Maine's coastal dune rule (FN 201 in Grannis' document); Hawaii setback rules (FN 163 of Grannis' doc; N.C. setback rules (FN 161 of Grannis' doc); Florida's Coastal Construction Control Line program has a "30-year erosion projection line," but it is subject to serious flaws in design and execution (see, Thomas Ruppert, Eroding Long-Term prospects for Dynamic Beach Habitat in Florida: A Coastal Resiliency Conundrum, 1 Sea Grant Law & Pol'y J. 65 (2008)).

NOTES

Many setbacks are based on historic erosion rates. These rates could underestimate future erosion due to increased erosion from SLR

RESOURCES

Implementation:

Consulted/ Reviewed:

Deyle, R.E. & Butler, W.H. Resilience Planning in the Face of Uncertainty: Adapting to Climate Change Effects on Coastal Hazards, in "Disaster Resiliency: Interdisciplinary Perspectives" pp. 178-206. 2013

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

San Francisco Bay Conservation & Development Commission, Staff Report. Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on its Shoreline. 2011. http://www.bcdc.ca.gov/BPA/LivingWithRisingBay.pdf

REGULATORY ACTION

AVOIDANCE AND RELOCATION: EXISTING DEVELOPMENT

PROHIBITIONS ON ARMORING

LEGAL ASPECTS

Responsible Authority:

Basis of Authority:

Likelihood of Legal Challenges:

MOST APPROPRIATE LAND USE

FEASIBILITY

Political Feasibility:

Technical Feasibility:

Economic Feasibility:

EFFICACY

Short-term:

Long-term:

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

REGULATORY ACTION

AVOIDANCE AND RELOCATION: EXISTING DEVELOPMENT

LIMITATIONS ON REBUILDING

LEGAL ASPECTS

Responsible Authority: Usually local government, but may include other permitting authorities

Basis of Authority: Based on permitting authority of any permitting entity

Likelihood of Legal Challenges: LOW to VERY HIGH - the inability to rebuild at all is very likely to lead to a takings claim. If the limitation is only on size, configuration, location, the likelihood of a successful claim may be quite low

MOST APPROPRIATE LAND USE

Most appropriate for rural, undeveloped, and environmentally sensitive lands. Some application may be possible for low-density suburban. Extremely difficult to apply to urban settings.

FEASIBILITY

Political Feasibility: LOW- Florida has not been able to institute significant limitations on rebuilding (i.e.--beyond limiting to previous footprint or use) in over 40 years of discussions about rebuilding limitations; even mentioning further rebuild limitations often provokes virulent political pushback

Technical Feasibility: MEDIUM to HIGH- Detailed information on erosion rates, flooding, and surge provide an excellent basis for making policy on when a parcel should potentially be subject to rebuilding limitations

Economic Feasibility: LOW to MEDIUM- local governments will seldom support such moves or, at most, in very limited circumstances as the local governments will see that this will reduce their taxable property base. Maybe only way to justify economically from their perspective is if the parcels are costing the local government more than they are contributing in tax base

EFFICACY

Short-term: MEDIUM- buildings are only "removed" if they fail or are destroyed

Long-term: MEDIUM to HIGH- eventually, if not allowed to armor, buildings interfering with coastal movement will usually experience great difficulty with maintenance of access and services, leading to abandonment

EXAMPLES

NOTES

This is a highly polarizing issue politically that is very difficult to approach. More feasible if used to impose certain restrictions on rebuilding such as increased elevation, stronger construction, or greater setbacks rather than complete prohibition.

RESOURCES

Implementation:

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

Thomas Ruppert, Esq.

REGULATORY ACTION

AVOIDANCE AND RELOCATION: EXISTING DEVELOPMENT

LAND VALUE INSURANCE

LEGAL ASPECTS

Responsible Authority: Private entity or local government

Basis of Authority: Free market or local government home rule authority

Likelihood of Legal Challenges:

MOST APPROPRIATE LAND USE

All land use types

FEASIBILITY

Political Feasibility:

Technical Feasibility:

Economic Feasibility:

EFFICACY

Short-term:

Long-term:

EXAMPLES

Proposed for use in Australia by insurance companies. Insurance Australia Group 2008, submission to House of Representatives. Inquiry into Climate Change and Environmental Impacts on Coastal Communities, viewed on 12 October 2009, <http://www.aph.gov.au/house/committee/ccwea/coastalzone/subs/sub012.pdf>. [LINK NOT FUNCTIONING] In theory, such a tool would allow landowners to pay into a fund and then receive a payout if their land was lost.

NOTES

While the free market could try to develop such a product, it is unclear what role the Florida Office of Insurance Regulation and state statutes might have. In addition, it is not clear whether local governments would be free to develop such programs under existing law and whether such programs, if developed, would be subject to FOIR regulation.

RESOURCES

Implementation:

Consulted/ Reviewed:

Australian Department of Climate Change Climate Change Risks to Australia's Coast. 2009. http://www.climatechange.gov.au/climate-change/adapting-climate-change/australias-coasts-and-climate-change/coastal-risks-0/climate

FINANCIAL TOOLS

EMINENT DOMAIN

LEGAL ASPECTS

Responsible Authority: Federal, state, or local government

Basis of Authority: Authority to engage in eminent domain to protect the health, safety, and welfare of the public

Likelihood of Legal Challenges: MEDIUM- government entities have clear authority to engage in eminent domain for public purposes. However, this authority is limited by the need to pay just compensation and to use the land for public purposes

MOST APPROPRIATE LAND USE

Most applicable to suburban, rural, undeveloped, and environmentally sensitive lands in large part because the cost of acquiring high-value urban land is prohibitive.

FEASIBILITY

Political Feasibility: MEDIUM - despite possessing authority to condemn land, exercise of eminent domain often engenders strong opposition. This can be a significant deterrent at the local level but less at the federal level

Technical Feasibility: HIGH- identification of appropriate lands for acquisition and the legal processes for acquisition are well understood

Economic Feasibility: LOW - the higher-than-average value of much coastal land makes large-scale use of this tool unlikely. Funds available for acquisition via the Florida Communities Trust Fund and authorized under Florida Statutes section 295.105(17)(d) are almost exclusively used for voluntary buyouts, and a threat of eminent domain for acquisition of such lands "voluntarily" is not permitted. Furthermore, eminent domain removes property from the tax rolls and increases government costs for management of the property

EFFICACY

Short-term:

Long-term:

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

FINANCIAL TOOLS

CAPITAL IMPROVEMENTS PLAN

LEGAL ASPECTS

Responsible Authority: Federal, state, or local government, depending on taxing authority

Basis of Authority: Any organization with capital expenditures authority and planning

Likelihood of Legal Challenges: VERY LOW to VERY HIGH- Very low if a capital improvement plan simply prohibits first-time investment in hazardous areas. High to very high if the plan states that existing infrastructure will not be maintained or rebuilt; in many cases local governments may have specific responsibilities to maintain existing infrastructure

MOST APPROPRIATE LAND USE

FEASIBILITY

Political Feasibility: LOW to HIGH

Technical Feasibility: HIGH

Economic Feasibility: Varies widely depending on implementation. For prohibitions on first-time construction of new infrastructure: High. For discontinuing maintenance of existing roadways: Low, as the local government will be liable to property owners for a taking if this removes their sole public access to their property

EFFICACY

Short-term: LOW

Long-term: HIGH- potentially

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

FINANCIAL TOOLS

HAZARD-RESILIENT CAPITAL IMPROVEMENT PLAN

LEGAL ASPECTS

Responsible Authority: Local government

Basis of Authority: Planning and zoning authority; spending authority

Likelihood of Legal Challenges: MEDIUM to HIGH if plan calls for disinvestment in certain areas; low if plan only includes limitations or prohibitions in unserved areas

MOST APPROPRIATE LAND USE

Suburban, rural, undeveloped, environmentally sensitive

FEASIBILITY

Political Feasibility: MEDIUM- goes against historical focus in Florida on growth

Technical Feasibility: HIGH

Economic Feasibility: HIGH- infrastructure is costly, especially in hazardous areas where it is usually subject to higher maintenance/repair costs

EFFICACY

Short-term: HIGH

Long-term: HIGH

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

Beatley, Timothy. Planning for Coastal Resilience: Best Practices for Calamitous Times. 2009.

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

FINANCIAL TOOLS

TAX INCENTIVES

LEGAL ASPECTS

Responsible Authority: Federal, state, or local government, depending on taxing authority

Basis of Authority: Potentially any authority to levy taxes related to value of land

Likelihood of Legal Challenges: LOW

MOST APPROPRIATE LAND USE

All property types

FEASIBILITY

Political Feasibility: LOW- not very likely that this will occur at the federal level. For this to occur at the local level in Florida would require an amendment to the Florida Constitution altering how property may be assessed for tax purposes. Florida's existing tax breaks for conservation land may or may not be applicable. Such constitutional amendment might be opposed by local governments that depend on high property income from valuable coastal properties

Technical Feasibility: MEDIUM- assuming a legal change to allow differential property tax assessment at the state level, defying the terms that govern such differential assessment would require careful drafting

Economic Feasibility: LOW to MEDIUM- Constitutional amendment to allow property tax incentives might be opposed by local governments that depend on high property income from valuable coastal properties

EFFICACY

Short-term: MEDIUM

Long-term: MEDIUM

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

FINANCIAL TOOLS

VOLUNTARY ROLLING EASMENT

LEGAL ASPECTS

Responsible Authority:

Basis of Authority: Free market transactions

Likelihood of Legal Challenges: NONE to LOW

MOST APPROPRIATE LAND USE

FEASIBILITY

Political Feasibility:

Technical Feasibility: MEDIUM- drafting of rolling easements for effective implementation could be a time- and labor-intensive pursuit as the property owner must agree with the terms

Economic Feasibility: MEDIUM- due to the untested and innovative nature of voluntary rolling easements, their cost to obtain, monitor, and enforce are not clear. It is also not clear how much economic incentive, such as potential tax breaks, a voluntary rolling easement might convey to the grantee of the easement

EFFICACY

Short-term: HIGH

Long-term: HIGH

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

FINANCIAL TOOLS

VOLUNTARY CONSERVATION EASEMENT

LEGAL ASPECTS

Responsible Authority: Federal, state, or local government, or non-profits

Basis of Authority: Free market transactions

Likelihood of Legal Challenges: NONE to LOW

MOST APPROPRIATE LAND USE

Potentially useful in all property types; may be possible to allow some existing uses and contemplated uses, thus increasing the appeal of this option to property owners.

FEASIBILITY

Political Feasibility: HIGH- private property remains in private ownership and on the tax rolls

Technical Feasibility: MEDIUM- may be challenging to develop clear, effective easement language and this may be a long, complicated process in some cases

Economic Feasibility: MEDIUM to LOW- while these easements may be considerably less expensive than fee-simple acquisition of property, they may still cost a considerable amount of public or private funds. In addition, the holder of the easement bears the burden of monitoring and enforcing the terms of the conservation easement

EFFICACY

Short-term: HIGH

Long-term: MEDIUM to HIGH- while conservation easements are usually written as perpetual easements, as they are relatively recent legal creations, it remains to be seen whether they will be upheld in perpetuity by the legal system

EXAMPLES

NOTES

RESOURCES

Implementation:

Private non-governmental or public funds. Public funds include money from the Florida Forever Program

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

FINANCIAL TOOLS

VOLUNTARY BUYOUTS

LEGAL ASPECTS

Responsible Authority: Federal, state, or local government, non-profits, or private entities

Basis of Authority: Free market transactions

Likelihood of Legal Challenges: NONE to LOW

MOST APPROPRIATE LAND USE

Suburban, rural, undeveloped, and environmentally sensitive land

FEASIBILITY

Political Feasibility: HIGH

Technical Feasibility: HIGH

Economic Feasibility: LOW- the higher-than-average value of much coastal land makes large-scale use of this tool unlikely. Nonetheless, Florida Statutes section 295.105(17)(d) explicitly allow the use of "Florida Forever" funds for acquisition of land for adaptation to sea-level rise via the Florida Communities Trust Fund and authorized under Florida Statutes section 295.105(17)(d). Voluntary buyout removes property from the tax rolls and increases government costs for management of the property

EFFICACY

Short-term: HIGH

Long-term: HIGH

EXAMPLES

NOTES

RESOURCES

Implementation:

Public or private funds, including Florida Forever funds

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011.
http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

FINANCIAL TOOLS

VOLUNTARY PURCHASE OF DEVELOPMENT RIGHTS

LEGAL ASPECTS

Responsible Authority: Federal, state, or local government, or non-profits

Basis of Authority: Free market transactions

Likelihood of Legal Challenges: NONE to LOW

MOST APPROPRIATE LAND USE

FEASIBILITY

Political Feasibility:

Technical Feasibility:

Economic Feasibility:

EFFICACY

Short-term:

Long-term:

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

PLANNING TOOLS

COMPREHENSIVE PLANS: ACCOUNT FOR SEA LEVEL RISE

LEGAL ASPECTS

Responsible Authority: Local government

Basis of Authority: In Florida, statutory authority for comprehensive planning as well as home-rule authority. In states without broad home-rule authority, incorporating SLR into comp planning may or may not require a state grant of authority. Currently N.C. units of the state may only use linear projections of SLR

Likelihood of Legal Challenges: LOW- local governments have broad authority and discretion over their planning activities

MOST APPROPRIATE LAND USE

All land use types

FEASIBILITY

Political Feasibility: MEDIUM to HIGH- some controversy but not as controversial as actual implementation of concrete decisions or projects

Technical Feasibility: HIGH- many local governments have already incorporated SLR scenarios and information into their comp plans

Economic Feasibility: HIGH- the cost to local governments is primarily staff time or consultant time to create appropriate numbers or scenarios for SLR for the local area

EFFICACY

Short-term: LOW to HIGH- this broad range results from the fact that general language in a comp plan often does not translate immediately into changed action at the local level. However, this is an important and powerful first step

Long-term: LOW to HIGH - again, while this is an important step, it must be capitalized upon and turned into specific actions that manifest themselves in zoning, permitting, capital infrastructure planning, etc.

EXAMPLES

Satellite Beach [Coastal Management/Conservation Element, Objective 1.3, Policy 1.3.2, Obj. 1.4A, Policy 1.4A.1, Policy 1.4C.3, Obj. 1.12A, Policy 1.12A.1, Policy 1.12A.2], Broward County, Punta Gorda

NOTES

May incorporate SLR into a separate part of the comp plan or add SLR throughout the plan at appropriate points. The latter tends to be easier to pass politically and less likely to be challenged as it can be added as part of larger package of comp plan changes

RESOURCES

Implementation:

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

PLANNING TOOLS

CAPITAL IMPROVEMENT PLANS: ACCOUNTING FOR SEA LEVEL RISE IN EXPENDITURES

LEGAL ASPECTS

Responsible Authority: Local and state governments

Basis of Authority: Any spending authority or activity related to infrastructure and major capital expenditures

Likelihood of Legal Challenges: HIGH- while local governments have great legislative latitude in how they spend their capital improvement dollars, this discretion is not unbridled. It is very challenging for local governments to either remove or not maintain existing infrastructure

MOST APPROPRIATE LAND USE

All land use types

FEASIBILITY

Political Feasibility: MEDIUM- efforts to decrease capital outlays in the most hazardous areas will meet with strenuous resistance from property owners in such areas. Success would depend on strong general support from the local government; the best hope for generating this support is to educate the tax-paying public about the financial unsustainability of dedicating ever-larger amounts to protect the most hazard-prone areas

Technical Feasibility: HIGH- it is relatively easy to identify the most hazard-prone areas. More challenging to create hard economic numbers on likely costs and savings of such a provision

Economic Feasibility: MEDIUM- while a capital improvement plan that decreases investment in the most hazardous areas is a wise long-term financial move in many cases, it can cause short-term economic pain both to private property owners as well as to local government tax revenue as property values might decline. Crucial to point out that these will still result eventually, even if tax dollars are spent in the short term

EFFICACY

Short-term: MEDIUM

Long-term: HIGH - without long-term capital investment in infrastructure, property values in an area will tend to decline somewhat with services to the area. This will foster less private investment as well as facilitate purchases of property or easements on property

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

PLANNING TOOLS

HAZARD MITIGATION PLANS

LEGAL ASPECTS

Responsible Authority:

Basis of Authority:

Likelihood of Legal Challenges:

MOST APPROPRIATE LAND USE

FEASIBILITY

Political Feasibility:

Technical Feasibility:

Economic Feasibility:

EFFICACY

Short-term:

Long-term:

EXAMPLES

NOTES

RESOURCES

Implementation:

FEMA offers grants to state & local governments to help develop HMPs

Consulted/ Reviewed:

PLANNING TOOLS

COASTAL MANAGEMENT PLANS

LEGAL ASPECTS

Responsible Authority:

Basis of Authority:

Likelihood of Legal Challenges:

MOST APPROPRIATE LAND USE

FEASIBILITY

Political Feasibility:

Technical Feasibility:

Economic Feasibility:

EFFICACY

Short-term:

Long-term:

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

PLANNING TOOLS

INCREASED LENGTH OF PLANNING HORIZON

LEGAL ASPECTS

Responsible Authority: Local government

Basis of Authority: Planning authority

Likelihood of Legal Challenges: LOW

MOST APPROPRIATE LAND USE

All land use types

FEASIBILITY

Political Feasibility: MEDIUM

Technical Feasibility: HIGH- certainty of scientific information is not required to use information for planning purposes

Economic Feasibility: MEDIUM- longer planning horizons may result in some significant opportunity costs when it requires forgoing certain development or increases the costs of development/redevelopment. These costs should be recouped and more in future savings from having to protect, remove, or relocate imprudent development

EFFICACY

Short-term: HIGH

Long-term: MEDIUM to HIGH- overall efficacy will depend on the length of the planning horizon adopted and the corresponding choice of SLR for the planning scenario

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

EDUCATION AND OUTREACH TOOLS

ADVISORY INFORMATION: MODIFIED FLOOD MAPS THAT INCLUDE SEA LEVEL RISE

LEGAL ASPECTS

Responsible Authority:

Basis of Authority:

Likelihood of Legal Challenges:

MOST APPROPRIATE LAND USE

FEASIBILITY

Political Feasibility:

Technical Feasibility:

Economic Feasibility:

EFFICACY

Short-term:

Long-term:

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

San Francisco Bay Conservation & Development Commission, Staff Report: Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on its Shoreline. 2011.
http://www.bcdc.ca.gov/BPA/LivingWithRisingBay.pdf

EDUCATION AND OUTREACH TOOLS

MODIFIED STORM SURGE MAPS THAT INCLUDE SEA LEVEL RISE

LEGAL ASPECTS

Responsible Authority: No limitations

Basis of Authority: N/A

Likelihood of Legal Challenges: NONE

MOST APPROPRIATE LAND USE

FEASIBILITY

Political Feasibility: LOW- for public entities, this could be very problematic politically as typically development and property interests strongly resist these types of information as many property owners fear reductions in property value

Technical Feasibility: HIGH- Climate Central and scientists there have already developed peer-reviewed processes for this and have conducted coarse-scale analyses

Economic Feasibility:

EFFICACY

Short-term:

Long-term:

EXAMPLES

NOTES

RESOURCES

Implementation:

Climate Central Surging Seas Report

Consulted/ Reviewed:

EDUCATION AND OUTREACH TOOLS

PUBLICLY AVAILABLE RISK ASSESSMENTS

LEGAL ASPECTS

Responsible Authority:

Basis of Authority:

Likelihood of Legal Challenges:

MOST APPROPRIATE LAND USE

FEASIBILITY

Political Feasibility:

Technical Feasibility:

Economic Feasibility:

EFFICACY

Short-term:

Long-term:

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

San Francisco Bay Conservation & Development Commission, Staff Report: Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on its Shoreline. 2011.
http://www.bcdc.ca.gov/BPA/LivingWithRisingBay.pdf

EDUCATION AND OUTREACH TOOLS

COASTAL HAZARDS NOTICE/DISCLOSURE

LEGAL ASPECTS

Responsible Authority: State or local government

Basis of Authority: Property law authority for state and home-rule authority for local governments

Likelihood of Legal Challenges: LOW to NONE- disclosure of certain property hazards and attributes is a long-accepted practice in the real estate industry. Even if notice decreased property values, that is no basis for a "takings" claim as a taking requires a limitation on use of property that does not occur due to notice

MOST APPROPRIATE LAND USE

All property types

FEASIBILITY

Political Feasibility: MEDIUM- on one hand, this could appeal to some as a non-regulatory, consumer-friendly measure. Others might oppose on the basis of the lack of knowledge of exactly how far and fast sea levels will continue to rise

Technical Feasibility: MEDIUM- legally permissible to implement at the local level, but more effective if a uniform, statewide measure were enacted. Defying what notice is required, in what circumstances, and how this impacts property transactions requires significant consideration in develop policy, law, and ordinances

Economic Feasibility: HIGH- the costs to implement are relatively modest for the public sector

EFFICACY

Short-term: MEDIUM

Long-term: LOW to HIGH- depending on how courts do or don't use notice of future conditions to potentially color the "reasonable investment-backed expectations" inquiry in takings law

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

Australian Department of Climate Change. Climate Change Risks to Australia's Coast. 2009. http://www.climatechange.gov.au/climate-change/adapting-climate-change/australias-coasts-and-climate-change/coastal-risks-0/climate

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

Ruppert, T. Reasonable Investment-Backed Expectations: Should Notice of Rising Seas Lead to Falling Expectations? 2011.

EDUCATION AND OUTREACH TOOLS

ACQUISITION OF PROPERTY

LEGAL ASPECTS

Responsible Authority: Federal, state, or local government, NGOs, or private citizens

Basis of Authority: The Florida Forever acquisition program explicitly recognizes climate change and SLR adaptation as factors that may be considered in prioritization of land for purchase

Likelihood of Legal Challenges:

MOST APPROPRIATE LAND USE

FEASIBILITY

Political Feasibility:

Technical Feasibility:

Economic Feasibility:

EFFICACY

Short-term:

Long-term:

EXAMPLES

NOTES

Local government should plan for how to effectively utilize potential funds for relocation by setting priorities and developing a detailed plan. Any such process should include extensive public engagement.

RESOURCES

Implementation:

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

Lewis, David A. The Relocation of Development from Coastal Hazards Through Publicly Funded Acquisition Programs: Examples and Lessons from the Gulf Coast. 2012. Sea Grant Law & Policy Journal, Vol. 5, No. 1.

Macadangdang, K. (Conservation Clinic) Sea Level Rise Ready: Model Comprehensive Plan Goals, Objectives and Policies to Address Sea-Level Rise Impacts in Florida. 2010.

MISCELLANEOUS TOOLS

ZONING OVERLAYS: ALTERED ZONING/OVERLAY ZONES

LEGAL ASPECTS

Responsible Authority: Local government

Basis of Authority: Planning and permitting authority

Likelihood of Legal Challenges: LOW to HIGH- depending on type of policy tool being implemented

MOST APPROPRIATE LAND USE

All land use types

FEASIBILITY

Political Feasibility: LOW to MEDIUM- highly dependent on local situation; may encounter good as well as strident opposition

Technical Feasibility: HIGH- many potential criteria may be used to determine the extent of the overlay zoning, including status as coastal property, inclusion in a flood zone, seaward of the Coastal Construction Control Line, in a mapped Coastal High Hazard Area, etc.

Economic Feasibility: HIGH- primary cost could be new mapping activities, if needed, to establish the boundaries of the overlay zone

EFFICACY

Short-term: LOW to MEDIUM- the lower the immediate impact of an overlay, the more likely it is to not encounter extreme political opposition

Long-term: HIGH- used well, overlay zones can maximize current use of property while also creating realistic expectations of what the future holds

EXAMPLES

Satellite Beach, Policy 1.12A.2 – The City of Satellite Beach designates the Adaptation Action Area (AAA) as that area which includes the CHHA and other areas of the City as may be identified by the City Council in the future as being subject to coastal erosion, flooding, sea level rise, or damage to environmental systems. From Grannis' "Adaptation Tool Kit": "The Chesapeake Bay Critical Area law uses overlay zones to protect and restore water quality and habitat.

The law creates overlay zones that regulate development adjacent to the bay based upon the status of development in three types of areas: (1) intensely developed areas—developed areas with little habitat that are the preferred location for new development, (2) limited development areas—lightly developed areas where any

new development must protect habitat, and (3) resources conservation areas—predominantly wetlands where only limited residential development is permitted"

NOTES

May be used for regulatory goals of Protection, Accommodation, or Avoidance & Relocation. Protection zones would prioritize activities such as armoring and improved drainage. For accommodation, buildings could be required to be more resilient to flooding and development somewhat limited

RESOURCES

Implementation:

Current zoning staff

Consulted/ Reviewed:

Australian Department of Climate Change. Climate Change Risks to Australia's Coast. 2009. http://www.climatechange.gov.au/climate-change/adapting-climate-change/australias-coasts-and-climate-change/coastal-risks-0/climate

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

MISCELLANEOUS TOOLS

DEVELOP A "COASTAL HAZARDS" ZONE (SUBSET OF ABOVE ALTERED ZONING TOOL)

LEGAL ASPECTS

Responsible Authority:

Basis of Authority:

Likelihood of Legal Challenges:

MOST APPROPRIATE LAND USE

FEASIBILITY

Political Feasibility:

Technical Feasibility:

Economic Feasibility:

EFFICACY

Short-term:

Long-term:

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

Ruppert, T. Dynamic Habitat Accommodation: The Policy Framework to Ensure Sea Turtle Nesting Beaches in Florida. 2007. http://www.law.ufl.edu/_pdf/academics/centers-clinics/clinics/conservation/resources/coastal_management_finalreport.pdf

MISCELLANEOUS TOOLS

ROLLING EASEMENT: STATUTORY

LEGAL ASPECTS

Responsible Authority: State government

Basis of Authority: Land use planning; coastal management; police power for environmental protection; state ownership of submerged lands; property law

Likelihood of Legal Challenges: VERY HIGH- creation of a statutory rolling easement in Florida would be challenged by property owners as a taking of property. In fact, based on U.S. Supreme Court statements in Stop the Beach Renourishment, Inc. v. Fla. Dep't of Envtl. Prot., 560 U.S. 702 (2010) indicate a willingness of the U.S. Supreme Court to find a judicial taking when a statute impugns on a "well-established" property right

MOST APPROPRIATE LAND USE

Suburban, rural, undeveloped, and environmentally sensitive lands

FEASIBILITY

Political Feasibility: LOW- both due to current conceptions of property as a static thing as well as the threat of a finding of a "judicial taking" if a court upholds the law. Experience in Texas demonstrates that even a clearly legal statutory "rolling easement" is difficult to enforce

Technical Feasibility: MEDIUM- other states with statutory rolling easements have been able to more or less successfully define the parameters of the easement

Economic Feasibility:

EFFICACY

Short-term: HIGH

Long-term: HIGH

EXAMPLES

NOTES

Because they operate on a large scale, the impact of statutory rolling easements is much higher than those that occur parcel by parcel.

RESOURCES

Implementation:

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

MISCELLANEOUS TOOLS

ROLLING EASEMENT: VOLUNTARY GRANT OF EASEMENT

LEGAL ASPECTS

Responsible Authority: State government

Basis of Authority: Land use planning; coastal management; police power for environmental protection; state ownership of submerged lands; property law

Likelihood of Legal Challenges: LOW-as long as the grant of easement is truly voluntary and not exacted as part of a quid pro quo

MOST APPROPRIATE LAND USE

Suburban, rural, undeveloped, and environmentally sensitive lands

FEASIBILITY

Political Feasibility: HIGH

Technical Feasibility:

Economic Feasibility:

EFFICACY

Short-term:

Long-term:

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

MISCELLANEOUS TOOLS

ROLLING EASEMENT: EXACTED GRANT OF EASEMENT

LEGAL ASPECTS

Responsible Authority: State government

Basis of Authority: Land use planning; coastal management; police power for environmental protection; state ownership of submerged lands; property law

Likelihood of Legal Challenges: MEDIUM to HIGH- see Titus, MD L. Rev. at 1313, 1342-1347 (analyzing the takings implications of a permit condition that exacts a rolling easement); Caldwell, 34 Ecology L.Q. at 564-66.

MOST APPROPRIATE LAND USE

Suburban, rural, undeveloped, and environmentally sensitive lands

FEASIBILITY

Political Feasibility: LOW to MEDIUM

Technical Feasibility:

Economic Feasibility:

EFFICACY

Short-term:

Long-term:

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

Grannis, J. Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use. 2011. http://www.georgetownclimate.org/resources/adaptation-tool-kit-sea-level-rise-and-coastal-land-use

MISCELLANEOUS TOOLS

DEVELOPMENT CONDITION: MOVABLE BUILDING DESIGN

LEGAL ASPECTS

Responsible Authority: State or local government

Basis of Authority: Coastal Construction Control Line permit at state level, local permitting authority for local government

Likelihood of Legal Challenges: LOW- building design requirements are an accepted part of permitting requirements

MOST APPROPRIATE LAND USE

Suburban, rural, and undeveloped lands

FEASIBILITY

Political Feasibility: MEDIUM

Technical Feasibility: MEDIUM

Economic Feasibility: MEDIUM- potentially "low" if no available parcel on which to reasonably place the building is available nearby

EFFICACY

Short-term: MEDIUM

Long-term: MEDIUM- just because a building is designed and constructed to able to be moved does not mean it will be moved when threatened. Requirements to move the building at a certain point would have to be added

EXAMPLES

NOTES

Could be combined with a requirement to own and maintain a parcel in a safer location to which the building could be moved, but this is a more problematic requirement.

RESOURCES

Implementation:

Consulted/ Reviewed:

Ruppert, T. Dynamic Habitat Accommodation: The Policy Framework to Ensure Sea Turtle Nesting Beaches in Florida. 2007. http://www.law.ufl.edu/_pdf/academics/centers-clinics/clinics/conservation/resources/coastal_management_finalreport.pdf

MISCELLANEOUS TOOLS

DOWNZONING

LEGAL ASPECTS

Responsible Authority: Local government

Basis of Authority: Zoning and planning authority

Likelihood of Legal Challenges: LOW to MEDIUM- downzoning has been allowed under Florida law and jurisprudence without incurring local government liability for a property "taking," especially if part of a Transferable Development Rights (TDR) program.

MOST APPROPRIATE LAND USE

All land use types

FEASIBILITY

Political Feasibility: LOW to MEDIUM- popular opinion often disfavors downzoning

Technical Feasibility: HIGH

Economic Feasibility: HIGH

EFFICACY

Short-term: MEDIUM

Long-term: MEDIUM- even reducing zoning will not completely eliminate threat to remaining or allowed development

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed:

Australian Department of Climate Change. Climate Change Risks to Australia's Coast. 2009. http://www.climatechange.gov.au/climate-change/adapting-climate-change/australias-coasts-and-climate-change/coastal-risks-0/climate

Ruppert, T. Dynamic Habitat Accommodation: The Policy Framework to Ensure Sea Turtle Nesting Beaches in Florida. 2007. http://www.law.ufl.edu/_pdf/academics/centers-clinics/clinics/conservation/resources/coastal_management_finalreport.pdf

MISCELLANEOUS TOOLS

NON-CONFORMING USE

LEGAL ASPECTS

Responsible Authority:

Basis of Authority:

Likelihood of Legal Challenges:

MOST APPROPRIATE LAND USE

FEASIBILITY

Political Feasibility:

Technical Feasibility:

Economic Feasibility:

EFFICACY

Short-term:

Long-term:

EXAMPLES

NOTES

RESOURCES

Implementation:

Consulted/ Reviewed: