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William Butler  Tisha Holmes  Zechariah Lange 

ABSTRACT

Problem, research strategy, and findings: Florida's 2015 Peril of Flood Act requires that coastal localities incorporate sea level rise (SLR) planning policies into their comprehensive plans. We surveyed planners and reviewed more than 150 plans to determine how communities responded to the state mandate along three domains: planning intelligence, SLR responses, and collaboration. We learned that the mandate spurred SLR planning, but that local SLR planning responses varied widely, ranging from complacent compliance to progressive planning responses. Further research is needed to clarify underlying motivators for these varied responses, as well as connections between policy adoption and implementation.

Takeaway for practice: Flexible mandates allow for discretion in how localities respond to complex, ever-changing, long-term, and uncertain phenomena like climate change and SLR. Commitment to addressing these challenges can be bolstered by state mandates that provide political cover and an impetus to move adaptation planning forward. Such flexibility can lead to inconsistent and vague policies. Thus, mandates can spur local policy adoption but cannot ensure substantive responses to climate change. Meaningful responses to climate change adaptation still depend heavily on local commitment, capacity, and competence of planners.

Keywords: adaptation planning, climate change, local comprehensive planning, sea level rise, state mandate

Climate change is the central challenge to human civilization this century. Sea level rise (SLR) is one of the most immediate and understandable climate change effects as well as one of the most consequential given the number of coastal human settlements that face permanent inundation (Nicholls & Cazenave, 2010). Recent estimates predict the displacement of more than 600 million people by 2100 (Kulp & Strauss, 2019), and there is growing concern about the destabilizing outcomes that nonlinear migration can have on destination communities (Burrows & Kinney, 2016; McLeman, 2018).

In the United States, SLR will significantly disrupt life along the Atlantic and Gulf coasts and presents an existential crisis to the state of Florida. Hauer et al. (2016) project that around half of the 13.1 million people in the United States who will be displaced by SLR-related flooding by 2100 live in Florida. Hallegatte et al. (2013) place Miami and Tampa metropolitan regions among the world's top 10 most vulnerable regions to climate change-enhanced hazards. Coastal erosion and sunny-day flooding presage Florida's flooded future as SLR projections become increasingly dire with each

update (Kulp & Strauss, 2019; Southeast Florida Regional Climate Change Compact, 2020).

Despite the looming crisis, by early 2015, only 20% of Florida's coastal communities were incrementally planning for accelerating SLR (Butler et al., 2016). Limited state policy guidance, local capacity, and political will stymied adaptation planning efforts in many communities. However, the Peril of Flood Act (PoFA, 2015), passed in May 2015, requires local governments to consider SLR flood risk in comprehensive plans. Planning scholars indicate that mandates generally improve plan quality and can influence strategy adoption across a range of issues, although results are uneven (Dalton & Burby, 1994; Hoch, 2007; Nelson & French, 2002; Norton, 2005). There is less literature exploring how state-level mandates can influence adaptation planning for climate change impacts with long time horizons and high uncertainties.

In this study, we ask to what extent state mandates encourage meaningful SLR adaptation planning. We begin with an overview of state planning mandate literature followed by research on local adaptation planning and SLR planning frameworks. Next, we

contextualize SLR planning in Florida and summarize our methods. Through an analysis of coastal comprehensive plans, we identify a range of responses and characterize how the mandate supports adaptation efforts in Florida's coastal communities. We further identify how planners can turn to SLR planning frameworks, with or without a mandate, to undertake more meaningful adaptation action.

Literature

Shaping Local Planning Through State Mandates

For several decades, scholars have evaluated the effects of state mandates on local comprehensive planning. Researchers studied the impact of such mandates on local plan quality (Berke, 1996; Berke & French, 1994; Burby et al., 1993; Dalton & Burby, 1994; Norton, 2005), development management and hazard mitigation (Berke, 1996, 1998; Berke & Godschalk, 2009; Berke et al., 2014; Dalton & Burby, 1994; Nelson & French, 2002), and factors related to local planner commitment and action (Adler, 1990; Burby et al., 1993; Dalton & Burby, 1994; Hoch, 2007).

Planning mandates often influence plan quality when measured by the factual basis of information in the plan (planning intelligence), coverage and content of goals, and completeness and consistency of policies, strategies, or recommendations shaping land development (e.g., Dalton & Burby, 1994). However, mandates yield uneven results. Dalton and Burby (1994) determine that plan quality generally improved with a mandate but development programs were more robust in communities where planners were already committed to state policies. Norton (2005) finds that many coastal communities responding to a mandate in North Carolina developed plans with weak information bases and policy recommendations to protect coastal resources. Berke and Godschalk (2009) conducted a meta-analysis of plan quality in natural hazard mitigation and find that mandates tended to spur stronger goal adoption and fact bases than nonmandatory plans. However, the quality and coverage of policies, implementation, and monitoring remained weak. In their study of 175 coastal plans in six states, Lyles et al. (2014) calculated high scores in plan quality related to implementation but low plan quality scores overall, suggesting an uneven contribution of state mandates.

Local situational factors or institutional dynamics explain some of the variance (Adler, 1990; Dalton & Burby, 1994; Deyle & Smith, 1998; May & Burby, 1996). Mandates are part of the equation, but enforcement, through either coercion or incentives, not only ensures compliance but fosters commitment (Burby & May,

1998; Burby et al., 1999; Dalton & Burby, 1994; May & Burby, 1996). In their study of coastal storm planning in Florida, Deyle and Smith (1998) observe that state mandates have weak explanatory power of plan quality and compliance remains dependent on other factors such as agency oversight. Pendall (2001) studied Maine's 1992 shift from mandated comprehensive planning to a voluntary program that provided incentives, technical assistance, and review. He discovered that incentives led to higher plan adoption rates and stronger alignment with state goals. Hoch (2007) studied an affordable housing mandate in Illinois and observes that it stimulated planning and put affordable housing on community agendas. However, local officials, nonprofits, or others committed to affordable housing prior to policy requirements filled the gap in the face of limited state support. Many planning mandates provide planners discretion, which they can use if motivated to do so and supported by other levels of government (Adler, 1990).

This literature suggests that state mandates can prompt quality planning, but local conditions and capacities may drive effective implementation. However, state policies, when paired with local incentives, might lay the foundation for more substantive commitments. This suggests that mandates have a role to play, but they must be tailored to community-level contexts and issues to spur meaningful planning responses.

Planning for Climate Adaptation and Sea Level Rise

Like other hazard planning processes, planning for SLR involves gathering planning intelligence, setting goals, and developing risk reduction strategies (Butler et al., 2016; Godschalk et al., 1998). Planning intelligence involves integrating the latest SLR projections, assessing vulnerability, and monitoring coastal assets and risks (Butler et al., 2016). Rapidly changing science leads to uncertainty, making up-to-date information gathering essential (Quay, 2010; Woodruff, 2016). Conventional responses include protection (keeping water out), accommodation (allowing water in but maintaining current uses), avoidance (not developing in at-risk areas), and retreat or relocation (removing development from areas at risk; Butler et al., 2016). These responses might be enacted through engineering modifications, land use policies, site design techniques, and building code standards (Butler et al., 2016; Dalton & Burby, 1994; Godschalk et al., 1998).

Many observers note that although climate change is a global phenomenon, people feel impacts such as SLR at local and regional scales. As a result, scholars emphasize the need for local planning for climate change adaptation (Bierbaum et al., 2013; Shi et al.,

2015; Woodruff & Stults, 2016). However, climate adaptation planning at the local level falls short in the United States. Woodruff and Stults clarify that climate adaptation plans in the United States underemphasized implementation (Woodruff & Stults, 2016); tended to support changes in practices and behaviors, updating plans, and altering land use (Stults & Woodruff, 2017); and revealed only minimal attention to uncertainty (Woodruff, 2016). In terms of determining what motivated adaptation planning, Shi et al. (2015) find that state-level policies were not statistically significant among 156 U.S. cities participating in the ICLEI network for local sustainability. Local-level political support and leadership primarily determined local-level engagement, funding, and resource procurement for climate adaptation planning. Butler et al. (2016) explore SLR planning in Florida before the PoFA and find that credible and relevant information (e.g., vulnerability assessments) and hazard salience (e.g., recent impacts attributable to climate change) were key determinants of SLR planning progress. However, only a small percentage of coastal municipal plans even mentioned SLR. This research suggests that scholars remain uncertain about whether state mandates play an important role in climate adaptation planning and the extent to which adaptation planning is substantive and meaningful in the face of climate risks.

Sea Level Rise Planning in Florida

The Local Government Comprehensive Planning Act of 1975, Chapter 163 of the Florida statutes, laid the foundation for statewide planning and was strengthened in 1985 with the Growth Management Act (Pelham, 2007). However, in the last decade, the scope of Florida's statewide planning framework was methodically deconstructed. A 2011 bill (HB 7207; Growth Management Act, 2011) undermined many of the Act's strongest provisions (including concurrency), repealed the rule implementing the Act, and folded planning oversight and technical support into the Department of Economic Opportunity (DEO).

Despite this dismantling of state oversight, and even while climate denialism dominated Florida politics (Vella et al., 2016), state legislators supported policies to address SLR. The 2011 bill undermining key state planning provisions included an amendment that authorized local governments to apply policies and develop projects in "Adaptation Action Areas" at risk of SLR impacts. The Peril of Flood Act (SB 1094), signed into law on May 21, 2015, required planners in coastal communities to consider sources of coastal flood risk, including SLR, in their comprehensive plans. The PoFA sits within a larger complex of comprehensive planning mandates. Local governments are still required to

comply with this state planning framework despite weakened enforcement. Comprehensive plans undergo evaluation and appraisal reviews every 7 years. Local governments propose amendments to address local concerns and come into compliance with changes to state rules. Since 2015, PoFA has emerged as a central focus of coastal comprehensive plan reviews.

PoFA specifies that Section 163.3178 of the Florida Statutes under Section 2, Paragraph f, is amended as follows:

Each coastal management element required by s. 163.3177(6)(g) shall be based on studies, surveys, and data; be consistent with coastal resource plans prepared and adopted pursuant to general or special law; and contain: ... (f) A redevelopment component which outlines the principles which shall be used to eliminate inappropriate and unsafe development in the coastal areas when opportunities arise. The component must: 1. Include development and redevelopment principles, strategies, and engineering solutions that reduce the flood risk in coastal areas which results from high-tide events, storm surge, flash floods, stormwater runoff, and the *related impacts of sea-level rise*. (SB 1094, 2015, chapter 2015-69; emphasis added)

Local jurisdictions including or contiguous to state waters dominated by marine species of vegetation must complete a coastal zone protection element in the comprehensive plan. According to the Department of Environmental Protection, Florida has 211 local governments (35 counties, 176 cities) under this designation. With the passage of PoFA, the coastal element of the comprehensive plan must consider the effects of SLR.

Official DEO guidance notes that plans must adhere to the law but does not specify how to reach compliance (Lenczewski, 2019). Communications we reviewed between DEO and local governments reiterated language from the PoFA and emphasized that plans must include flood risk mitigation strategies and best practices, including alignment with the Florida Building Code and participation in the National Flood Insurance Program Community Rating System. According to DEO staff, existing hazard mitigation efforts account for planning for coastal flooding from high tide, storm surge, flash floods, and stormwater. However, SLR was a new addition that required using future projections rather than retrospective data to address flood risk (Lenczewski, 2019).

Methods

We undertook a two-tiered approach to discover to what extent a state mandate encourages meaningful

SLR adaptation planning. First, we conducted a state-wide survey of coastal planners and managers to determine whether PoFA prompted integration of SLR policies in comprehensive plans. Second, we completed an analysis of comprehensive plan language to assess alignment with the SLR planning framework we presented in the literature review. Our work also builds on analysis conducted prior to PoFA (Butler et al., 2016), allowing for pre- and post-PoFA comparisons.

We conducted the survey of coastal planners and managers in summer 2019 as part of a larger project. The state planning oversight agency, DEO, provided a list of contacts from Florida's 211 coastal municipalities. We disseminated the survey and requested a response from staff members whose responsibilities included coastal flooding, SLR adaptation, and/or coastal resilience. We obtained unique and useable responses from 178 individuals representing 96 coastal municipalities, or 45% of our target population.¹¹

Simultaneously, we reviewed comprehensive plans in 152 of the 211 Florida coastal counties and municipalities using search terms related to sea level. We drew our sample from DEO's internal database of municipalities compliant with the PoFA and our survey respondents. We reviewed all plans along the Gulf Coast to ensure that DEO's list did not overlook or undercount plans that included SLR language. We reviewed the most recent evaluation and appraisal review reports and DEO and regional planning council response letters providing guidance to local governments on comprehensive plan amendments. Through our review process, we identified 88 comprehensive plans that, at a minimum, mentioned SLR.

We undertook an iterative coding process to characterize SLR policies. We were interested in substantive commitments more than procedural compliance. We categorized the language in the plans based on an SLR planning framework rather than assessing plan quality through a scoring system (Lyles & Stevens, 2014). We used broad categories of planning intelligence and response strategies based on our literature review. Through our coding, we added a separate category on collaboration because numerous plans referred to working with partners at multiple levels and for a range of purposes. Under each of these categories, we developed subcodes based on the plans and extant literature. Four reviewers coded all policy language in a spreadsheet and then reviewed the assigned codes to determine the level of intercoder agreement. We negotiated the few disagreements until we reached consensus. Table 1 displays example language for each code. Our findings characterize SLR policy language within this framework.

Results

Our results reveal that a) PoFA spurred SLR planning activity and b) localities pursued a range of planning intelligence, SLR response, and collaboration strategies. In the sections below, we first clarify, based on our survey, that a significant number of Florida coastal communities engaged in SLR planning activity in direct response to PoFA, and we observed a fourfold increase in SLR planning since its passage. Second, we describe planning intelligence strategies that relied heavily on vulnerability assessments, response strategies that were general and vague while emphasizing protection and accommodation measures, and collaboration strategies that emphasized interlocal and regional entities to improve information and capacity.

Survey

In our survey, we asked coastal planners and managers whether SLR language was in municipal comprehensive plans, whether the language was included prior to PoFA, or whether it was added in response to PoFA. Of the 96 responding municipalities, 73% (70) stated that they had SLR language either in their comprehensive plan (50%) or in process of being developed (23%). Twenty-one percent (20) responded that SLR language was included in their plans prior to PoFA. However, 37.5% (36) responded that they developed new language pertaining to SLR in their comprehensive plans since the passage of PoFA, and another 17% (18) responded that they were in process of developing such language. Thus, of the 70 municipalities with SLR language either in their plans or under development, 77% (54) developed or were in the process of developing that language in response to PoFA. From these results, coastal planners and managers clearly identify the mandate as an important motivating factor spurring SLR planning in Florida.

Plan Analysis

To respond to the latter part of our question, whether SLR planning was *meaningful*, we conducted a plan analysis of the state's coastal comprehensive plans, building on research completed just prior to the passage of PoFA. In their analysis of SLR planning activities conducted through spring 2015, Butler et al. (2016) find that 21 comprehensive plans (10% of coastal municipalities) addressed SLR in Florida. Policies were somewhat equivocal and vague but at least mentioned the need to develop information or consider a range of potential strategies to address SLR. Eight of the plans mentioned some level of commitment to Adaptation Action Areas, the SLR tool enabled in 2011. Butler et al. (2016) characterize the approach as a low-regrets incremental response to SLR. Planners hesitated to take a proactive

Table 1. Comprehensive plan coding and plan language examples.

Category	Code(s)	Plan language example
Intelligence	Vulnerability assessment	Jupiter (2019)—Policy 2.6.10: The Town shall utilize the 1-Foot, 2-Foot, and 3-Foot Sea Level Rise in Palm Beach County–Jupiter Area maps identified in the Vulnerability Analysis prepared by the South Florida Regional Climate Change Compact when determining the risks of coastal flooding due to sea level rise.
	Current and credible	Holmes Beach (2018)—Policy 5.1.1: Based on rising seas data as they evolve and associated vulnerabilities, to allow for flexible adjustments, preserve future strategic adaptation implementation options to maintain maximum resiliency in response to new risks and vulnerabilities; the City will take advantage of new emerging data and technological opportunities. The City's basis for measuring sea level rise shall be as per the Recommended Projection of Sea Level Rise in the Tampa Bay Region, as may be revised from time-to-time by the Tampa Bay Climate Science Advisory Panel
	Monitoring	Gulfport (2018)—Policy 4.4.2: The City shall participate in efforts to monitor the effects of sea level rise on Clam Bayou and other local waterbodies and develop supportive strategies as determined appropriate. Gulfport (2018)—Policy 4.4.5: The City shall monitor public utility infrastructure that may be impacted by sea level rise, and work to floodproof or relocate components as need is determined.
Responses	Generalized response	Anna Maria (2017)—Objective 2.5: Development and redevelopment within the City shall proceed in a manner that lessens risk to public investments and private property by utilizing policies, techniques and practices that reduce negative impacts of flooding and sea level rise.
	Policy revision, protection, accommodation, avoidance	Satellite Beach (2016)—Policy 1.14.18: adaptation strategies supported within the EAAA include but (are) not limited to: Public infrastructure planning, siting, construction, replacement, operation and maintenance; Increase of Set Back Line for Coastal Properties; Increase of Base Flood Elevations; Natural Dune Restoration; Vernacular Plant Placement; Building Codes; Land Development Regulations; Comprehensive Planning; Water Flow Diversion Strategies; Grass Pavers (Parking Lots); Rain Garden Building Buffers.
	Protection, accommodation, avoidance	Panama City Beach (2018)—C1 Policy 19.1: The City will continue to use the following strategies to mitigate flooding from all sources including sea level rise: setbacks and buffers, building codes and design, floodplain regulations, zoning and overlay zones, hard and soft-armoring permits, rebuilding restrictions, stormwater assessments, impact fees and other strategies or regulations as may be needed.
	Accommodation	Seminole (2017)—Policy 1.2.14: Strategies for preparing for sea-level rise, such as increasing road surface subsurface stabilization, stormwater management and drainage, and adjustment of bridge heights to allow for navigation, should be collectively assessed and implemented where appropriate.
	Avoidance	Titusville (2018)—Policy CME 2.1.2: The City shall prohibit the location of new hospitals, nursing homes, and assisted living facilities in the CHHA and the area inundated by a category 2 hurricane as depicted by the SLOSH model, as reflected in the Sea Level Rise Vulnerability Assessment prepared by the East Central Florida Regional Planning Council.
	Managed retreat/relocation, protection	Bellair (2015)—Policy 2.5.2: Redevelopment plans for such improvements will take alternative locations outside of the Coastal High Hazard Area into consideration. Where relocation of infrastructure and critical facilities is deemed unfeasible, structurally defensive measures to mitigate the impacts of rising seas in order to decrease vulnerability should be pursued.
Collaboration	Partner (local, regional, and state); purpose (capacity building)	Clearwater (2016)—Policy E.2.5.3: Work with local, state and regional partners to identify funding sources to support adaptation projects located within Adaptation Action Areas.
	Partner (local, regional, state, federal agencies; nongovernmental organizations); purpose (information, strategy development)	Cutler Bay (2016)—Objective CC-7: Coordinate with local, County, regional, State and federal agencies and other non-governmental entities and academic institutions in the ongoing assessment of climate change and sea level rise, and continue to collaborate in the identification and implementation of appropriate mitigation, protection, accommodation and adaptation strategies.

EAAA = Environmental Adaptation Action Area; CHHA = Coastal High Hazard Area; SLOSH = Sea, Lake, and Overland Surges from Hurricanes model.

stance against the uncertainties posed by SLR. Most focused on gathering planning intelligence, and those with progressive policies usually had experienced direct impacts attributable to SLR.

Since the passage of PoFA, consideration of SLR in Florida's coastal comprehensive plans increased dramatically. We identified 88 comprehensive plans (42% of total coastal municipalities) that addressed SLR as of the

summer of 2019, a fourfold increase from the pre-PoFA analysis. Here we elaborate on the language coded in three main categories: planning intelligence, responses to SLR impacts, and collaboration.

PLANNING INTELLIGENCE

Planning for SLR requires using scientific information about SLR rates, timing, and location to anticipate impacts. Fifty-eight (66%) plans included language addressing the need for or sources of planning intelligence. Table 2 provides a summary of the types of language used.

Vulnerability assessments and current and credible data dominated, with a small percentage specifying the use of ongoing monitoring to inform plans and policies. In some cases, plans referred to developing new vulnerability assessments, whereas others aimed to improve or update existing assessments. Along with or instead of vulnerability assessments, nearly half of the plans committed to using “current and credible” SLR information. Often, the language was relatively vague, simply stating that the community would use current and credible data to address SLR, whereas some plans specified sources of information. The unified projections of the South East Florida Climate Change Compact and the Tampa Bay Climate Science Advisory Panel were frequently cited sources of current and credible data in those respective regions. Otherwise, plans mentioned inundation mapping and projections by the National Oceanic and Atmospheric Administration most frequently.

Although locally scaled SLR data are elusive, only 13 (15%) communities adopted policies to monitor SLR impacts on key facilities or adjust planning responses

based on changing conditions. These monitoring activities were tiered to either implied or explicit actions such as elevating structures depending on evaluation of the data. This was a significant gap in how communities were gathering information to respond to future changes. Ongoing monitoring can measure changes at fine-grained temporal and spatial scales. None of the plans specified a schedule for monitoring or a trigger event to determine timing or type of response.

RESPONSES TO POTENTIAL IMPACTS

Seventy-seven (87.5%) plans responded to a key provision of PoFA by identifying either a general or specific set of responses to SLR. Table 3 enumerates types of responses in the plans we assessed.

Generalized responses and policy revisions.

Forty-nine (56%) plans had general language vaguely referencing risk reduction strategies. Many of the policies mirrored language in PoFA “to reduce the flood risk in coastal areas that result from high tide events, storm surge, flash floods, stormwater runoff, and the related impacts of sea level rise” (2015). For example, Collier County (2017) simply stated, “development and redevelopment proposals shall consider the implications of a rise in sea level” (Policy 10.4.13). These policies provided limited guidance on implementation.

Forty (45%) plans specified policy revisions such as changes in building codes, land development codes, or other plans and ordinances. Boynton Beach (2016), for example, adopted a policy to update land development and building codes to reduce flood risk associated with SLR and other coastal hazards and required “vulnerability reduction measures for all new construction, redevelopment, and infrastructure ...” (Policy 7.6.11). Often, policy revisions were linked to planning intelligence. St. Lucie County (2010) proposed updating their Land Development Code and to “consider the most current and credible sea level rise data when planning long-term infrastructure and capital improvement expenditures and land use amendments in areas less than 10 feet in elevation” to reduce vulnerability and provide for recovery (Policy 5.2.1.6). These types of

Table 2. Planning intelligence.

Planning intelligence mentioned	No. of plans	% of 88
Vulnerability assessments	41	47
Current and credible data	42	48
Ongoing monitoring	13	15
Total plans addressing intelligence needs	58	66

Table 3. Response strategies adopted in comprehensive plans in Florida.

Response strategy	No. of plans	% of 88
Generalized response (e.g., redevelopment principles)	49	56
Policy revisions (e.g., changes to land development code)	40	45
Protection (e.g., shoreline armoring, beach nourishment)	41	47
Accommodation (e.g., elevate or flood-proof structures)	37	42
Avoidance (e.g., buffers, setbacks, conservation)	19	22
Retreat (e.g., relocation of infrastructure)	19	22
Total plans addressing response strategies	77	87.5

responses take SLR into account on an ongoing basis to address emergent threats and refer to a range of generalized or contingent policy changes. Although the generalized response could meet baseline standards, policy revisions helped clarify how meeting those standards would be implemented.

Protection, accommodation, avoidance, retreat. Many of the plans listed a range of response options across the spectrum of protection, accommodation, avoidance, and retreat. We counted the plans that listed each of the four types as if they mentioned each of them separately. In some cases, we observed that the language was more like a laundry list tacked onto the end of a general policy statement, keeping options on the table rather than articulating a set of location-specific implementable strategies. Miami Beach (2018), for example, listed protection (including shoreline armoring and beach renourishment) as preferred when location-dependent areas “cannot be significantly altered or relocated,” accommodation (including elevation or stormwater improvements) to reduce risks rather than prevent flooding, “management strategies” (including removal of development and possible relocation), and “avoidance” to ensure “development does not take place in areas subject to ... sea level rise” impacts (Policy 4.1). Some plans left all options open but applied them in specific areas such as Adaptation Action Areas or Coastal High Hazard Areas.

Among the 41 (47%) plans that mentioned *protection* strategies, many listed seawalls, flood-proofing, and other means of structural hardening. However, protection measures were rarely specifically prioritized. In some cases, hard structures were explicitly *deprioritized*. Broward County (2014), for example, will consider “hard structures, such as sea walls, only when alternative options are unavailable” (Broward County Climate Change Element 19.3.11 d). Instead, the county prioritized dune stabilization, beach renourishment, and other nature-based strategies for protection purposes.

Like protection measures, most of the 37 (42%) plans that identified *accommodation* measures did so among a list of other responses. The few that referred to specific accommodation strategies focused on increasing base floor elevation standards or heights of structures such as bridges. For example, the City of Bradenton (2016) aimed to establish a new freeboard level at 1 ft. above existing standards for new construction, redevelopment, and major modifications with ongoing review and consideration of raising the levels up to 2 ft. Gulfport (2018) proposed elevating docks and bridges based on SLR projections and ongoing monitoring to reduce flooding coastal infrastructure.

Accommodation presented a particular challenge unacknowledged in the plans we reviewed. Some accommodation strategies (i.e., raising bridge heights or base floor elevation) alter development to stay in place while reducing flood risk. Elevating structures can protect buildings without impeding flow or storage capacity of floodwaters. However, in the context of SLR, the waters will not recede, making such strategies ineffective over the long term.

Nineteen (22%) plans referred to *avoidance* strategies. Most adopted relatively generic language, mentioning setbacks and buffers in a list of other strategies to be considered. Cedar Key (2017), for example, included multiple potential responses: “additional shoreline hardening, elevated grade surface, elevated structures, floodable development, buffers and setbacks, higher flood elevations and incorporation of natural infrastructure for increased resilience” (Policy 4.15.5). Among this list were avoidance strategies of increasing buffers and setbacks and higher flood elevations along with protection and accommodation strategies. More specifically, Fort Lauderdale (2019) encouraged new development in higher elevation areas (FLU Policy 2.2.2). The City of Titusville (2018) did not exclude development in at-risk areas but prohibited “new hospitals, nursing homes, and assisted living facilities” in areas at higher risk of flooding from storm surge and SLR based on a vulnerability assessment conducted by the regional planning council. These avoidance strategies were designed to limit new development in at-risk areas. Few eliminated risk by prohibiting development in inundation zones; instead, they prohibited certain types of development and/or encouraged development elsewhere in the municipality.

Nineteen (22%) plans also recognized that coastal inundation in this century will necessitate relocation or retreat responses. Retreat strategies tended to be one option in a long list and were rarely given more than a mention. In a few cases, the plans used a euphemism, “management strategies,” which they described as including removal of development from at-risk locations. Some plans, however, prioritized relocation over protection for infrastructure and critical facilities. The City of Seminole provides an example:

Policy 1.2.13: The City will identify infrastructure and critical facilities at risk for ... sea-level rise. Redevelopment plans ... will take alternative locations ... into consideration. Where relocation of infrastructure and critical facilities is deemed unfeasible, structurally defensive measures to mitigate the impact of rising seas in order to decrease vulnerability should be pursued. (City of Seminole, 2017)

Plans focused on public facilities and infrastructure while largely ignoring relocating private development.

Table 4. Prevalence and purpose of language pertaining to collaboration.

	No. of plans	% of 88
Who?		
County (internal or neighboring)	26	30
Municipalities or other local governments	14	16
Regional (general)	10	11
Regional planning councils	10	11
South East Florida Climate Change Compact	12	14
State agencies (specific or general)	26	30
Federal agencies (specific or general)	21	24
Citizens, property owners, businesses	15	17
Nongovernmental organizations	5	6
Academic institutions	5	6
Why?		
Information source, development, technical expertise	30	34
Coordination for project or plan implementation	21	24
Strategy development	19	22
Capacity building	17	19
Total plans identifying collaboration needs	43	49

However, this recognition of the need for retreat and prioritization of relocation above protection strategies is a significant development in Florida. Prior to PoFA, only 3 out of 21 comprehensive plans referred to retreat strategies, using vague language and framing it as a last resort (Butler et al., 2016). In our analysis, although still a minority of plans mentioned retreat, seven times more plans mentioned it than prior to PoFA. And, instead of a last resort, some plans even prioritized relocation strategies.

Collaboration. Collaboration emerged as an unexpectedly frequent theme during the coding process. All of Florida's plans must include an intergovernmental coordination section. However, we coded plans that recognized the importance of collaboration and coordination specifically to address SLR. SLR impacts are cross-jurisdictional and multiscalar, and local governments do not have the authority to undertake all adaptation actions. Affected facilities, land, and services are often managed by public entities from state or federal levels, creating interdependence between jurisdictions and across levels. Moreover, adaptation policies in one community can be undermined by strategies in a neighboring jurisdiction. Working locally with agencies, nonprofits, businesses, or local community members can help build legitimacy and support. Numerous plans included language to coordinate or collaborate with various partners for a variety of purposes (Table 4).

Nearly half (43 of 88) of the plans referenced working with other agencies across jurisdictions and levels of government. Thirty-four (79%) of those plans identified working with local and regional partners, whereas more than half mentioned state agencies and around 40% mentioned working with federal agencies. Clearly, local governments depend on interlocal, regional, and state partners to help address information needs and conduct vulnerability assessments. A substantial number of localities also turned to local and regional partners to coordinate projects and develop more robust strategies, whereas a smaller number looked to partners to help build capacity. These findings affirm the importance of collaborating across jurisdictions and levels of government to attend to climate change adaptation planning needs.

Discussion

Mandate Spurs Planning Action

Based on our findings, the PoFA has spurred many Florida coastal communities to consider SLR risks in their comprehensive plans. By 2019, the number of Florida's municipalities integrating SLR adaptation into their plans quadrupled since its inception in 2015, and nearly all are likely to do so when the mandatory 7-year plan review cycle is completed by 2023. Moreover, nearly 60% of coastal planners responding to our statewide

survey noted that they integrated SLR into their comprehensive plans in response to PoFA.

The Act, however, set a *minimum* bar, leaving much discretion to local governments to determine how to respond. PoFA reiterated the importance of strong planning intelligence using “studies, surveys, and data” (2015). Planning intelligence was a central element of most of the plans, either by developing new information (through monitoring or vulnerability assessments), gaining access to existing information from other entities (current and credible data), or maintaining and updating information. Vulnerability assessments were increasingly important to inform decision making. Many local communities relied on the support of regional actors to help obtain needed planning intelligence. The focus on monitoring was limited, which suggests that planners are relying on projections more than direct impacts to guide their policies.

Most of the plans offered generalized commitments to consider “most of the above” options when determining whether to protect coastal development, accommodate periodic flooding, remove some areas from future development, or relocate existing development. Many of the plans listed examples of each response under policies related to risk reduction. Protection and accommodation strategies dominated in terms of overall count. Although these strategies were frequently mentioned, there was a growing emphasis on more flexible adaptation strategies such as nature-based infrastructure.

Retreat or avoidance strategies were less prevalent but increasingly identified as a potential strategy. A growing number of plans recognized that protection and accommodation are simply buying time (Frank, 2020) and listed retreat, managed relocation, or the euphemism “management strategies” among policies local governments will consider. Some were more specific, reducing allowable densities or prohibiting facilities in Coastal High Hazard Areas, directing development to higher elevation neighborhoods, and specifying the kinds of facilities (usually public facilities and critical infrastructure) that should be relocated. In a few cases, plans prioritized relocation over protection. Although few plans codified a process to leave the coastline, an increasing number acknowledged the need to consider such strategies.

Our work also reveals broadly articulated reliance on collaboration with local, regional, state, and federal partners specifically to address SLR. Nearly half of the plans recognized the value of working across jurisdictions and levels of government as well as with other partners on planning intelligence, project coordination, and/or capacity building. Other local governments and regional entities were the most frequently mentioned partners for SLR adaptation. This finding aligns with the

increasing recognition of the importance of interlocal and regional collaboration in climate change adaptation (Shi, 2019; Shi et al., 2015; Vella et al., 2016). Few mentioned nongovernmental partners and citizens. Only two mentioned working with vulnerable and marginalized populations, which suggests that Florida’s coastal municipalities barely attend to even minimal procedural climate justice issues (Shi et al., 2016).

Complacent Compliance

Based on our analysis of the plans, we identified 19 (22%) localities engaged in what we call *complacent compliance*. A compliant plan had to include policy language that drew from PoFA or guidance from DEO, a derivative of “Development and redevelopment shall be planned and managed to reduce risk and losses due to flooding resulting from high-tide events, storm surge, flash floods, stormwater runoff, and the related impacts of sea level rise” (PoFA, 2015). A complacent plan included no further specification of responses to clarify the principles, practices, policies, and strategies used to accomplish this risk reduction. We coded 19 plans with both of these characteristics. A few plans had generalized responses and little else, but they did not include compliant language from the Act in their plan: These were perhaps complacent but not compliant.

Planning mandates are only as effective as the policies and strategies they inspire as well as the implementation of those policies in communities that adopt them. In our complacent compliance cases, plans contained vague language to use “development and redevelopment principles” to reduce risk, occasionally even copying guidance provided by oversight agencies. This type of language is all but guaranteed approval by DEO given that it aligns with suggested text. Further research will be necessary to assess whether mere compliance might still lead to changes in land development codes, permitting procedures, or other operational and plan implementation activities, or whether such compliance truly is complacent, signaling little or no meaningful adaptation response.

Beyond Compliance to Meaningful Adaptation

Most municipalities went beyond mere compliance and developed more specific language for response strategies to reduce SLR risks. The extent to which they did so varies greatly. We categorize the other end of the spectrum by assessing which plans covered a range of planning intelligence, response, and collaboration strategies to reduce SLR risks. We identified 17 (19%) plans that took on the most comprehensive approach, including drawing on planning intelligence from vulnerability

assessments; considering multiple responses across the spectrum of protection, accommodation, avoidance, and retreat; and articulating a need to collaborate with multiple partners for a range of purposes. Twelve of these municipalities sought to establish Adaptation Action Areas to help direct their policies and strategies to areas that are most at risk.

The characteristics of these localities are wide ranging. Some are large cities with high planning capacity (such as Tampa and Miami), and others are moderate-sized cities (such as Clearwater or North Miami). Others, such as Holmes Beach, are much smaller municipalities with small planning departments and limited staff capacity, yet their language was similarly progressive and comprehensive. Butler et al. (2016) find that hazard salience and planning intelligence were driving factors for more progressive SLR planning prior to PoFA. However, those drivers are insufficient explanations in our analysis: High-quality planning intelligence is widely available across most regions, but hazard salience varies dramatically across Florida and even within regions across municipalities. Yet, progressive planning activity is taking place in high-risk localities with recent storm events and flooding as well as localities with relatively low risk and hazard experience profiles. Moreover, planning capacity does not account for the most comprehensive and robust SLR adaptation language. Based on other research and observations at regional and state meetings, we suspect that technically adept, politically astute, and committed planners have an influence on the extent to which communities go beyond compliance requirements. Further research should specify motivating factors for progressive SLR adaptation.

Implications for Practice

Florida is a critical case study for understanding the complex considerations involved in SLR planning and offers translatable lessons for localities facing competing priorities, politics, and policies on planning for climate change. PoFA clarifies that planners must incorporate SLR in coastal comprehensive plans and use good planning intelligence to support decision making. However, it does not specify which kinds of planning intelligence to use, what projection curves or time horizons to plan for, or what kinds of responses to adopt. Based on our analysis of comprehensive plan responses, we find that planners can take advantage of the flexibility in a vague mandate to address complex issues like SLR or other climate change impacts. The mandate is a starting point. As Hoch (2007) concludes, a mandate “can focus attention and compliance” (p. 98). Although some planners may view the mandate as a procedural requirement and complacently comply, others take the opportunity to undertake more in-depth analysis, propose more

progressive policies, and partner with others to enhance both their own and regional efforts to address the problem of SLR. Flexibility in a planning mandate does not ensure progressive planning responses, but it does create a context conducive to pursuing such responses.

In our review of Florida’s comprehensive plans, about a fifth were complacently compliant. This group reminds us that mandates are unlikely to solve challenging problems like climate change on their own. Another approximately 60% went beyond compliance, building a foundation for more robust strategy development in future updates. However, they still have much room for deepening their planning commitments to develop robust intelligence; consider a range of responses, investments, and policy changes; and partner with actors across sectors and levels of government to support information, innovation, and inspiration. These planners reveal the challenge that many face in making short-term decisions that will have uncertain long-term implications. Rather than focus on getting it right, these planners operate incrementally to set the stage for action in the future.

Another fifth developed comprehensive and progressive responses to the challenges posed by SLR. These progressive planners remind us that mainstreaming technically sound and politically palatable planning practices into plans can be done in more progressive and robust ways, but that may be the exception rather than the norm. On the question of meaningful adaptation, the mandate lays the foundation, but planners have to build on that foundation to adopt substantive policy commitments. Planners can draw from our top municipalities for how to approach SLR adaptation, not only in Florida but around the world, by taking a comprehensive, specific, and in-depth approach whether a mandate is in place or not.

Conclusion

The planning literature is mixed on whether planning mandates work. Past studies suggest that mandates spur planning activity, yield relatively high-quality outputs that are compliant with the law, and, when paired with local commitment and inducements at the state level, can lead to effective implementation (Berke, 1996; Burby & May, 1998; Burby et al., 1993; Hoch, 2007; Norton, 2005). However, plans, whether mandated or not, remain highly variable in their content and quality, still have the potential to end up as downloadable but unused references on a website, and can be lacking in their persuasive and inspirational elements (Bunnell & Jepson, 2011; Burby & May, 1998; Deyle & Smith, 1998).

Based on our analysis, mandates ensure that local planning agencies take into account the bare minimum on concerns that are important across the state. Our findings suggest that planners in Florida are planning for SLR with renewed attention since the passage of

PoFA. Whether taking advantage of political cover, responding to a needed nudge, or begrudgingly meeting a new obligation, planners are incorporating language to consider, study, and respond to increasing coastal flood risks associated with SLR. Collectively, plans recognized the importance of strong planning intelligence, the need to update information on a regular basis, and the breadth of responses to consider, including, in an increasing number of cases, the possibility of avoidance and relocation. Moreover, plans emphasized the value of working across jurisdictions and levels of government to build capacity, coordinate actions, and increase the quality of planning intelligence. At the time of our analysis, around 20% of the coastal comprehensive plans that address SLR in Florida included all of the above.

These findings suggest that state planning mandates have an important role to play in promoting responsive and resilient planning practices, especially for long-term phenomena like climate change. With pressing priorities such as economic development, emergency response and recovery, waste management, housing affordability, and more, climate change could be deprioritized as less urgent, with impacts far in the future. Mandates can serve as a nudge to consider such phenomena in the near term. However, our work also reiterates the fundamental role that planners play in this context. Some coastal planners undertook SLR adaptation planning in response to the mandate but went beyond its requirements, in some cases quite substantially. Along with a mandate, relevant and credible planning intelligence, capacity building, and clear guidance from state and regional officials can provide needed resources to planners who seek to engage more effectively in local climate change adaptation and build community resilience to this existential coastal threat around the world.

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NOTE

1. For a more detailed explanation of the survey process and a complete review of results from the larger survey, see Butler et al. (2019).

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