UF IFAS Extension UNIVERSITY of FLORIDA

UF/IFAS PEER REVIEWED FE1084

Attitudes about Sea-Level Rise Adaptation: Comparison between Miami-Dade County and the Rest of Florida[1]

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Introduction

The topic of sea-level rise (SLR) and climate change has been an important issue in science, politics, and communities. The global sea level increased by 3.2 inches (81mm) above the 1993 average (Lindsey 2019). The rate of SLR has accelerated in the last 25 years, rising about 0.13 inches (3.2 cm) every year since 1993, more than double the twentieth century average (Lindsey 2019; Nunez 2019). Local or relative SLR is affected by global sea-level rise but varies due to local land elevation, tides, currents, and winds (Lindsey 2019). There are variations of local SLR projections pertaining to southeast Florida. To aid local planning, the Southeast Florida Regional Climate Change Compact, including Broward, Miami-Dade, Monroe, and Palm Beach Counties, unified projections on regional SLR based on consensus from the academic community, federal agencies, and the most recent peer-reviewed scientific literature, climate models, and data. According to its recent update, "sea level is projected to rise 10 to 17 inches by 2040 and 21 to 54 inches by 2070 above the 2000 mean sea level in Key West, Florida" (Compact 2020, p.4). The direct consequences of SLR include coastal flooding, shrinking shorelines, and saltwater intrusion (FDEP 2010). These impacts threaten all coastal regions but tend to have more significant economic impacts for those with fast-growing populations and booming tourism and real estate sectors (USGCRP 2020).

Nevertheless, constituents in Florida are shown to have different perceptions on climate-related coastal risks (Carlton and Jacobson 2013). A survey of Florida Keys experts found that decision makers are concerned about the impacts of climate change yet infrastructure and institutional barriers to effective adaptation strategies remain (Mozumder, Flugman, and Randir 2011). In Florida, there are no recent studies that describe the degree of concern about SLR, what constituents believe is truly happening, and what they think should be done in Florida.

The objective of this publication is to summarize findings from a survey sent to two samples: residents of Miami-Dade County and Floridians living in the rest of the state. This study compares the attitudes of Miami-Dade County residents (a highly populated, urban, coastal community) to other Floridians about their concerns regarding SLR, followed by preferences for different adaptation strategies. The findings from this research indicate that the two groups differ on the degree of concern about SLR, how to best adapt to SLR, and who needs to pay for adaptation. Both groups agree that there is not enough government spending focused on the problem of SLR in Florida.

1. This document is FE1084, one of a series of the Food and Resource Economics Department, UF/IFAS Extension. Original publication date June 2020. Visit the EDIS website at https://edis.ifas.ufl.edu for the currently supported version of this publication.

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Overview of the Survey

The online survey was distributed through a survey research company (Qualtrics) in two waves in 2017, first to Miami-Dade County homeowners (n = 520), then to homeowners in the rest of Florida (n = 514). The survey was developed in both English and Spanish, and invitations to participate were sent to a pre-recruited pool of consumers managed by Qualtrics. To participate in the survey, participants were required to be: (1) year-round residents in the two survey areas; (2) at least 18 years old; and (3) homeowners in the two survey areas.

Participants answered questions regarding their perceptions and knowledge about SLR. Next, participants were presented with information about the benefits and limitations of several common adaptation strategies (beach nourishment, seawall, elevation of streets and buildings, and installation of stormwater pumps), followed by questions on who should be paying for adaptations. The survey concluded with demographic questions, such as household income, race, gender, home values, and whether they purchased flood insurance in the past 12 months.

Results

The two samples were representative of the respective populations (Miami-Dade County and the rest of Florida) in terms of gender and race. Because we focus on homeowners, the age group distribution is concentrated in the ranges from 35 to 64 years old. The annual household income reported in the sample of Miami-Dade County is greater than the annual household income reported in the Florida population and the annual household income reported in the sample from the rest of Florida.

Using a 5-point Likert scale (strongly agree, somewhat agree, neither agree or disagree, somewhat disagree, and strongly disagree), we asked respondents about their level of agreement with the following two statements: 1) sea level is rising (Figure 1), and 2) the rate of sea-level rise is increasing (Figure 2). Most of the respondents in both samples agree with the two statements. Specifically, when asked about their level of agreement on the statement that "sea level is rising," about 43% of the respondents from Miami-Dade County strongly agree with the statement whereas 35% of the respondents from the rest of Florida strongly agree with that statement (Figure 1). This difference between the two samples is statistically significant at the 95% level of confidence.

Table 1. Respondent demographics.

	Rest of Florida N=513	Miami-Dade County N=521	Florida Census (2019)*
Age group			
18–24	5.3%	1.2%	8.7%
25–34	12.1%	6.0%	14.3%
35–44	29.2%	21.0%	13.8%
45–54	18.3%	19.8%	14.8%
55–64	16.9%	24.4%	12.0%
65–74	14.6%	22.3%	8.5%
75–84	3.3%	4.6%	5.1%
85 or older	0.4%	0.8%	2.3%
Gender			
Female	51.8%	50%	51.5%
Male	48.2%	50%	49.5%
Race			
Asian	1.0%	4.6%	2.7%
African American	16.1%	10.0%	16.1%
Hispanic	25.3%	23.7%	24.7%
White, Non-Hispanic	57.6%	61.7%	55.6%
Household income			
Less than $49,999	49.2%	21.9%	45.1%
$50,000 to $99,999	32.7%	37.9%	30.5%
Above $100,000	18.1%	40.2%	24.4%

Source: 2018 American Community Survey. census.gov/acs. (US Census Bureau 2019).

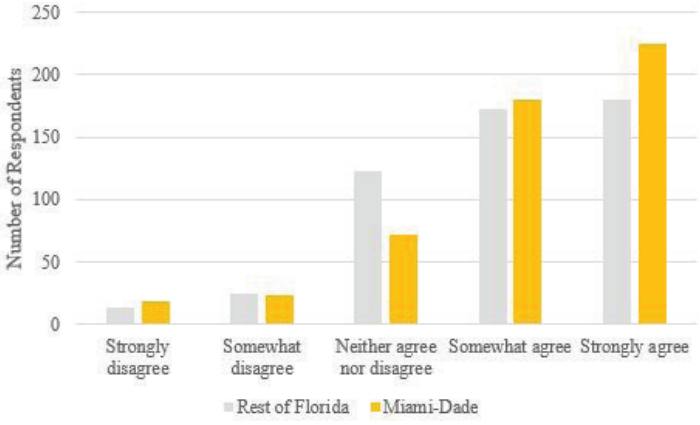

Figure 1. Survey response to the statement "Sea level is rising" for Miami-Dade County and residents of the rest of Florida.

When asked about the statement "the rate of sea-level rise is increasing," 38% of the respondents from Miami-Dade County strongly agree with the statement and only 27% of the respondents from the rest of Florida strongly agree with the statement (Figure 2). This difference between the two samples is also statistically significant.

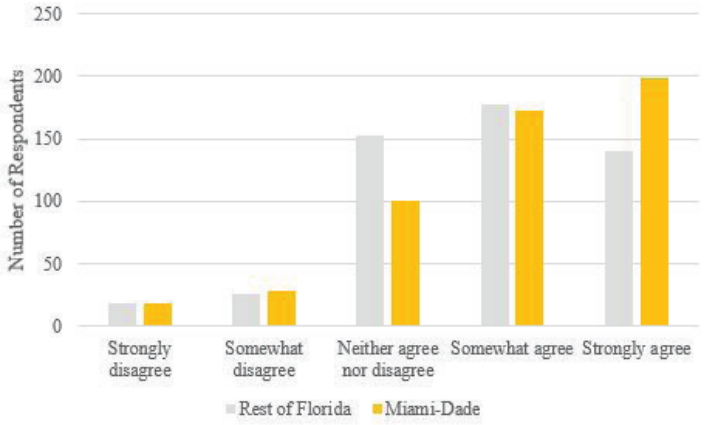

Figure 2. Survey response to the statement "The rate of sea-level rise is increasing" for Miami-Dade County and residents of the rest of Florida.

Respondents were asked about the severity of impacts of SLR on themselves and future generations. About one third of both samples believe that SLR will have a moderate impact on them personally, while 25% believe it will only affect them a little (Figure 3). However, about 22% of the respondents in Miami-Dade County believe that SLR will have a great impact on them personally, but only 16% of the respondents from the rest of Florida have such strong beliefs. This difference also indicates that residents in Miami-Dade County are more concerned about personal hardship resulting from SLR than are residents of the rest of Florida.

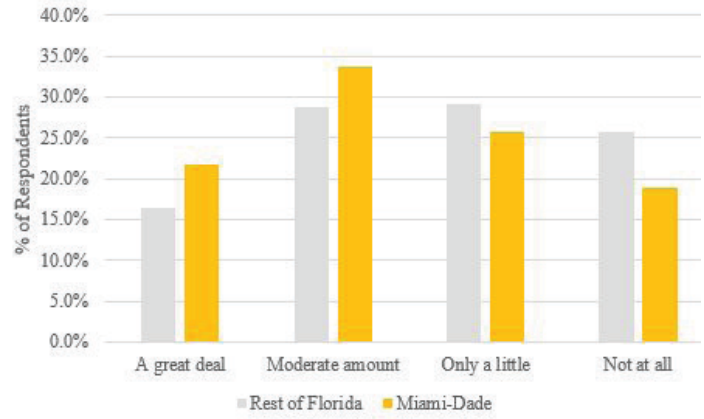

Figure 3. Survey response to the question "How much do you think SLR will affect you personally?" for Miami-Dade County and residents of the rest of Florida.

The area of most concern for both groups was future generations of Floridians (Figure 4). About 50% of the respondents in Miami-Dade County think the impact of SLR on future generations will be great, in contrast to 40% of the respondents from the rest of Florida. This difference is significant between the two samples at the 95% level of confidence.

Both groups are also concerned about the impact of SLR on coastal resources, especially coastal marshes and habitat (Figure 5). We do not find statistical difference between the two samples; about 50% of respondents from both samples believe that SLR's impacts on coastal resources will be great.

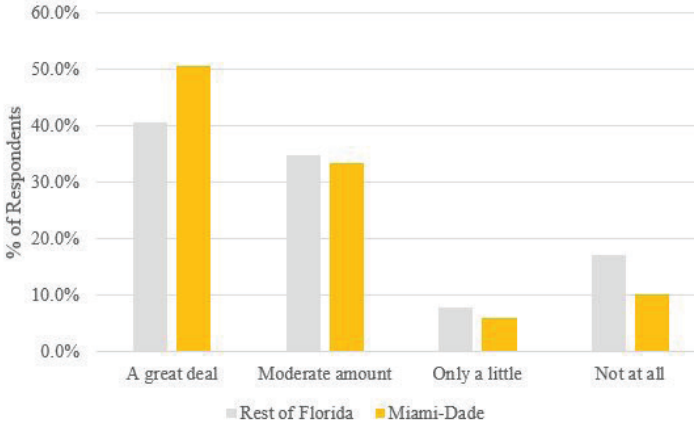

Figure 4. Survey response to the question "How much do you think SLR will affect future generations in your area?" for Miami-Dade County and residents of the rest of Florida.

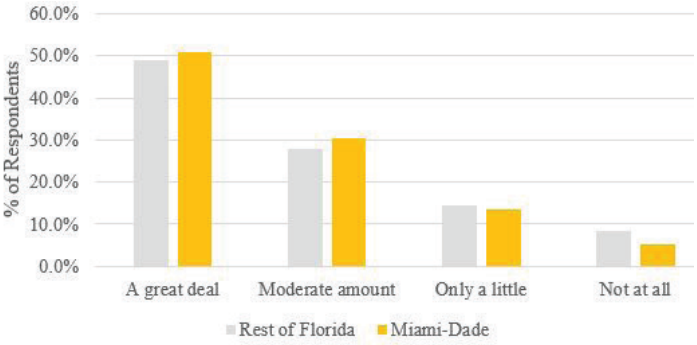

Figure 5. Survey response to the question "How much do you think SLR will affect coastal marshes and habitat?" for Miami-Dade County and residents of the rest of Florida.

We then asked about respondents' knowledge and preferences for four common protective adaptation strategies: building seawalls, replenishing beaches, installing stormwater pumps, and elevating buildings and streets. Prior to the question about respondents' preferences on these four strategies, we asked if respondents had heard, read, or seen these strategies before the survey. Respondents from Miami-Dade County are more knowledgeable than respondents from the rest of Florida about the four adaptations. Specifically, only 21% of respondents from Miami-Dade County were unfamiliar with stormwater pumps. In contrast, over one third (35%) of respondents from the rest of Florida were unfamiliar with stormwater pumps. About 23% of the respondents from the rest of Florida were unfamiliar with beach nourishment as compared to 18% of the respondents in Miami-Dade County, and 19% of the respondents from the rest of Florida were unfamiliar with seawalls as compared to only 12% of the respondents in Miami-Dade County. Respondents from the two samples have similar knowledge about elevation of buildings, as 12%

of the respondents in both samples were unfamiliar with that adaption. However, about 7% of the respondents in Miami-Dade County have personally witnessed elevation of buildings and streets in their neighborhoods, as compared to 4% of the respondents from the rest of Florida.

Next, respondents were asked their preference for the different strategies on a scale of 1 to 4 (1 being the most preferred, 4 being the least preferred). Results in Table 2 indicate that respondents in both samples prefer beach nourishment followed by building seawalls, installing stormwater pumps, and elevating buildings and streets. There were statistically significant differences between the two samples in their preference for elevating buildings and streets as well as installing stormwater pumps. Because residents in Miami-Dade are relatively more familiar with stormwater pumps, they may be more receptive to stormwater pump installation than respondents in the rest of Florida. However, Miami-Dade County respondents are less receptive to elevating buildings and streets than are the rest of Floridians, even though more respondents in Miami-Dade have personal experience with the adaptation. The results suggest that having prior knowledge or being familiar with an adaptation strategy does not always lead to favorable support. It is likely that experience with the implemented adaptation strategy also played a role in determining future support.

Table 2. Respondents' rating on preferred SLR adaptation strategy (most preferred = 1; least preferred = 4).

	Average rating from rest of Florida	Average rating from Miami-Dade County
Sea walls	2.43	2.37
Beach nourishment	2.19	2.24
Storm water pumping systems	2.64*	2.48
Elevate buildings and streets*	2.74*	2.91
The differences between the two samples are statistically significant from zero at the 5% significance level.		

On average, respondents from both samples think that over one third of the funding for SLR adaptation, particularly building sea walls and beach nourishment, should come from the state and federal governments (Figure 6). Interestingly, respondents expect a higher share of funding from property owners on stormwater pumps. Respondents in Miami-Dade County tend to have higher expectations for the percent of funding from local government with lower expectations from property owners. Miami-Dade County residents might have been more in favor of local funding because at the time of the survey (April and May 2017), there was discussion circulating regarding a vote for a Miami general obligation bond to fund local adaptations. The bond was ultimately passed in November 2017 (BallotPedia 2017).

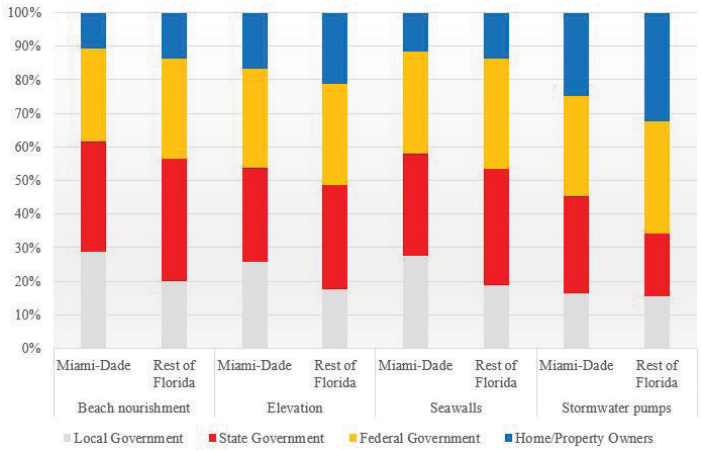

Figure 6. Preferences for funding sources on SLR adaptation.

Respondents in both groups indicate that Florida is not spending enough on SLR adaptation, regardless of funding source (Table 3). Interestingly, the majority of both samples did have an opinion about the level of spending on SLR adaptation with over 70% of both groups indicating that Florida was either spending too little or the right amount of funding. This implies that homeowners are largely in favor of committing Florida resources to SLR adaptation.

Table 3. Respondents' perception about Florida's spending on SLR adaptation.

	Percent in sample			
Sample	**Too Little**	**Right Amount**	**Not Sure**	**Too Much**
Rest of Florida	50.2%	22.1%	19.8%	7.7%
Miami-Dade County	49.0%	25.8%	16.3%	8.8%

Conclusion

Both Miami-Dade County residents and residents of the rest of Florida displayed a concern for sea-level rise and what is being done about it. Although they share similar beliefs, there are statistically significant differences regarding their attitudes about SLR and preferences for adaptation strategies. Residents in Miami-Dade County have stronger beliefs that SLR is happening and accelerating. They also tend to think it will cause greater harm to themselves, coastal habitats, and future generations. Residents in Miami-Dade County display a stronger preference for using local government funding for SLR adaptation, whereas residents from the rest of Florida display stronger preference for using state and federal funding for SLR adaptation. Both groups prefer sea walls and beach nourishment as adaptation strategies, while Miami-Date County residents

have a stronger aversion to storm water pumping systems and elevation of buildings and streets compared to the rest of Florida. However, both groups agree that not enough is being spent on SLR adaptation. The overarching conclusion shows that residents from Miami-Dade County and the rest of Florida agree that SLR is a problem that can potentially be quite harmful, and they would like Florida to commit more resources to SLR adaptation.

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