

JOURNAL OF COASTAL AND RIVERINE FLOOD RISK

Review and rebuttal of the paper

Adaptation to Flooding in St. Augustine, USA

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Editor handling the paper: Jeremy Bricker

The reviewers remain anonymous.

Round 2

Just a request from reviewer A to update the formatting. Please revise your paper considering the few comments. Additionally, a list that includes each reviewer's remark and your reply indicating how you have considered the comment is needed in an extra file. It should be given per reviewer, and in the same order as the remarks were given. Additionally, please provide a second copy of the paper where the changes are clearly indicated (e.g. 'track changes' in Word).

Please aim to resubmit the paper within a couple of weeks. If you need extra time, please provide a tentative timeline of when you are planning to resubmit.

Reviewer A:

I have reviewed the revised manuscript and the authors' responses to my comments. Their revisions adequately addressed my concerns and the paper is, to my way of thinking, sufficiently improved to warrant publication. I appreciate the authors efforts.

I do have one issue with the figures of the various flood control features. Could the authors insert the letters (a - g) that identify the various figures and insert them on one of the more detailed maps? That would give the reader a sense of where they are in the study area. This is not essential, but would be helpful.

Recommendation: Accept Submission

Reviewer B:

I am satisfied with the responses received and would like to commend the authors for addressing all comments and revising the paper accordingly. I do not have any further comments.

Recommendation: Accept Submission

Round 1

Reviewer A:

 Comments on Adaptation to Flooding in St. Augustine
 2/23/23

The author makes a useful contribution by seeking to employ an qualitative approach to gauging “eco-anxiety.” This could be strengthened by (1) making a stronger case as the outset for a qualitative approach - what can this approach do that a quantitative approach not do and (2) retaining a sharper focus on the eco-anxiety throughout. The author seems to wander afield on occasion.

The authors are very grateful for the annotated version of the manuscript that the reviewer returned to them. The authors have implemented all the modifications made by the reviewer. Also, the manuscript was further modified to make a stronger case at the outset for a qualitative approach. This included, for example, adding the paragraph below, and sharpening the text throughout:

“The factors which increase, decrease, or alter the impact of experience, and the context in which different emotions arise is still not understood well enough for quantification. Additionally, work dealing with emotions and qualitative work is well suited to describing the nuance and socio cultural circumstances. For many of the residents, their experiences are best captured through stories which allows them to express their emotions rather than a survey or other more quantitative tool which may put their ideas and responses in a more clinical mindset.”

The authors would like to thank the reviewer for the time taken to review this manuscript and the constructive criticisms provided. The authors have thoroughly revised the manuscript in the light of the comments provided, as per the replies below.

While not original, the blending of ideas from psychology and hazards is a clearly interdisciplinary.

The authors agree that the approach is not entirely original, but are glad the reviewer appreciates that this is clearly interdisciplinary and that it contributes to further the understanding of the topic they are being applied to (adaptation to SLR).

The author obviously assembles new data/information. The interviews provide insights not available from demographic or economic data. A stronger statement about selecting the initial interview subjects would help.

The authors would like to thank the reviewer for this comment. The following clarification was added to the text: *“who were identified by a contact within the city government, a member of a local church and two business owners known to the lead author of the study”*

The basic issue of blue sky flooding in coastal communities is a pressing issue and by contrasting two very different types of neighborhoods is a valid approach. Some acknowledgement of the environmental justice aspects of these different settings would have strengthened the work. This could open the door to a wider spectrum of eco-anxiety issues tied up in EJ and marginalized communities.

There are many ways in which this work is affected by the issues of environmental justice and investigation of these sites with this as a specific focus could yield fruitful results. Even without this as a focus, the issue was very prevalent in the stories of residents. The St. Augustine neighborhoods particularly have much connection. In previous work and the interviews of the current paper, many people spoke of the problems of insurance with both home owners of lower economic status and renters. Renters spoke of not being fully covered by insurances and losing significant value due to storms. Some home owners within the Davis Shores described situations in which others were more inclined or felt forced by circumstances to sell properties because receiving the full reimbursement for the work to rebuild took longer than they could afford. This is a clear disservice the disadvantaged and in some ways may have helped jump start gentrification and home price increases in the area. Unfortunately, this work has missed those voices by dint of being done after many have already left. Similarly, within the Lincolnville, the neighborhood has already mostly gone through a gentrification which has replaced the historically located black population. One resident who is a remnant of that population spoke of this as both a purposefully acted out plan and as a systemic problem. There are many ways in which these two aspects have played out within these neighborhoods and future work focusing solely on such ideas would be very interesting.

This is now acknowledged in the text, in the following paragraph:

“Insurance was frequently cited by respondents as something that could either increase or alleviate anxiety, depending on a few factors. The perception of it not being consistently applied was expressed as a source of anxiety, and this made it hard to know whether the respondent it adequately preparing for future disasters. A lack of transparency was viewed in much the same way. Certain kinds of insurance associated with storms not being mandatory was seen as a problem, particularly as new residents may suffer as a result. Some expressed anxiety over the fact that possessions that might be damaged would not be covered by insurance, causing an undue burden on lower income residents. Renters spoke of not being fully covered by insurances and losing significant value due to storms. Some home owners within the Davis Shores described situations in which others were more inclined or felt forced by circumstances to sell properties because receiving the full reimbursement for the work to rebuild took longer than they could afford. This is a clear disservice the disadvantaged and in some ways may have helped jump start gentrification and home price increases in the area.”

Section 5. Conclusions. Overall I find this a useful analysis of attitudes toward climate change. The one really important insight, that is not developed is the question about denial as adaptation or maladaptation – but not for the reason stated – it gets at the really critical issue of at what scale is denialism important – the individual or the community?

The authors would like to thank the reviewer for this question. Indeed, the interviews provide some insights into this, which resulted in a new paragraph introduced to the discussion.

The interviews hint that there is a connection between social infrastructure and social safety nets and how an individual reacts to triggers for Eco-anxiety. More support from these systems may be the cause of less negative reactions in individuals experiencing eco-anxiety. Because of this, government programs or policies which increase the social safety net or, maybe more importantly in small towns because of their smaller resource pools compared to cities, encourage the formation

and strengthening of social infrastructure may reduce the negative effects of Eco-anxiety increasing the resilience to sea level rise exacerbated flooding.

Recommendation: Revisions Required

 Reviewer D:

Manuscript: **Adaptation to Flooding in St. Augustine, USA**

In general, this paper addresses an important topic related to climate anxiety, also known as 'eco-anxiety' according to the authors. I believe it makes a valuable contribution, particularly as many quantitative studies often overlook the nuances that drive people's adaptation. However, I have some concerns about whether the paper fully delivers on its claims.

The authors would like to thank the reviewer for the time taken to review this manuscript and the constructive criticisms provided. The authors have thoroughly revised the manuscript in the light of the comments provided, as per the replies below.

The description of interview themes does not clearly connect people's attitudes, tolerance for risk, or their views about communities and their roles in adapting to anxiety. I suggest that the authors revise the manuscript and place more emphasis on how the references about specific eco-anxiety levels of individuals were made from the answers they have provided on different questions.

The authors would like to thank the reviewer for this comment. A number of specific references are now made to how the individuals expressed their emotions. These are detailed below:

“When I see it (hurricane warnings), it causes traumatic stress disorder. When I see flooding scenes of flooding in other areas, no matter where it is, yeah. I just get this, I don't know, makes my heart race. It makes me anxious. And all I can think about is those poor people, all I can think about is you've lost.”

"I don't mess around when it comes to hurricanes anymore, not after Matthew. I learned the hard way. So when a real hurricane like Irma was coming, I made sure to bring all my belongings up at least three feet high. I have PTSD from the experience because I always worry about what if it's worse than before. I also get lots of sandbags and tape and calk the outside of my door.”

“No one from this community is going to check on me if I get into trouble with a storm.... So I've been dealing with that for the last few years. It's gotten worse because you got people who are Airbnb and I've fought, you know, I've called code enforcement. I called police. They don't care because they don't live here. And then the police say, well, there's nothing we can do. We gotta catch 'em. So I started taking pictures so I can just, you know, I don't go out because as a black woman, I feel, believe it or not, and I know this is gonna sound weird. I feel in danger... . Because my community is gone”

The authors state the following: "Some studies have suggested that climate anxiety can be either adaptive or maladaptive, depending on the surrounding factors (Taylor 2020)." Could you please

elaborate on how climate anxiety can be either adaptive or maladaptive? This is an important aspect that the paper builds upon but is not sufficiently explained upfront.

Indeed, this was not well explained in the original text. The authors have thus provided additional explanations on how anxiety can lead to either maladaptive or adaptive responses, depending on the surrounding factors. The following sentences were added to the text:

“Maladaptation in physical responses has been noted in literature on climate change adaptation. For instance, Jamero et al. (2018) report how as a consequence to higher water levels residents of small islands in the Philippines initially responded by elevating the level of the floor in their houses using coral stones, a maladaptive approach that could hurt their livelihoods as fishermen, and which subsequently changed to a better adaptation response when the municipal authorities started supplying them from stones from the mountains nearby. This has important implications for how cities, communities, and individuals adapt now and in the future to climate change. Extending this idea to eco-emotion and the responses it might cause we can imagine eco-anger at the perception that the local government is not helping enough or is engaged in corruption exacerbating the problem as experienced by residence either leading to more personal and community based activities if they have enough personal resources or if their community has enough infrastructure which could be viewed as adaptive or manifesting as a distrust in government causing them to ignore storm warning and evacuation orders which could be perceived as maladaptive.”

How do government actions to protect cities affect eco-anxiety? It can either reduce anxiety if people overly rely on the government to solve their problems or increase anxiety if government public projects aimed at risk mitigation are perceived as the response to increasing risk.

The authors would like to thank the reviewer for this question. Indeed, the interviews provide some insights into this, which resulted in a new paragraph introduced to the discussion.

The interviews hint that there is a connection between social infrastructure and social safety nets and how an individual reacts to triggers for Eco-anxiety. More support from these systems may be the cause of less negative reactions in individuals experiencing eco-anxiety. Because of this, government programs or policies which increase the social safety net or, maybe more importantly in small towns because of their smaller resource pools compared to cities, encourage the formation and strengthening of social infrastructure may reduce the negative effects of Eco-anxiety increasing the resilience to sea level rise exacerbated flooding.

It would be interesting to know the demographic backgrounds of the individuals who were interviewed and how these backgrounds may have influenced their responses. In multiple places, the authors mention, for example, engineers but do not mention the socioeconomic status or racial/ethnic backgrounds of the interviewees. Some background information may provide more clarity regarding how people responded.

The authors would like to thank the reviewer for this comment. As a result, a new table was added to the paper (Table 1), which provides some background information about the interviewees.

The authors claim that eco-anxiety could lead to inaction, passivity, or hopelessness, but it can also lead to proactive adaptation responses. It remains unclear whether eco-anxiety is inherently good or bad. Can an increase in community outreach for flood risk awareness lead to more or less anxiety and subsequently more or less adaptation responses? If there is no clear answer here, we may be treading a fine line when trying to engage or motivate individuals.

This is one of the main issues and there should be a call for more work in this area. The literature suggests that eco anxiety can lead to positive action, but many studies were done on eco-anxiety derived from individuals who experienced eco-anxiety through predictions, not lived experiences and measured through surveys. This study intends to show in part that there is still much to be understood about eco-anxiety including the depth and breadth of the emotions involved and the nuances of how those emotions interact with the social infrastructure of an area. In this work, the lived experience coming directly from storms and their perceived risk was an important factor. Unsurprisingly, within the group of individuals living in areas with the greater risk, the economic situation was also a factor. However, more than socio-economic level, the people with the least eco-anxiety also seemed to be the ones with the most self reported involvement with local communities and personal capabilities to enact adaptations to their personal property. This marks a level of complexity not covered in much work done on eco-anxiety.

Beyond anxiety, individuals' adaptation decisions are largely driven by their resource capacity. Resource-constrained individuals, even if anxious, are more likely to stay put until they are forcefully relocated, assisted with buyouts, or they do not retrofit much.

While there is some truth to this, it can be seen by an examination of other places (small islands in the Philippines, see Jamero et al. 2017, 2018, or Tangier and Smith Island in the USA) that adaptation will occur even in those who may be resource poor. Nevertheless, it is also true that the most resource constrained indeed also have nowhere to go, so that they tend to adapt as best as they can within their means.

“This has been shown also elsewhere, and for instance in the Philippines even impoverished communities in small islands have been able to adapt to frequent tidal flooding brought about by land subsidence (Jamero et al., 2017), highlighting how adaptation to slower SLR process is possible. Nevertheless, there is the risk that some practices may be maladaptive, in the sense that they may solve immediate problems but make future adaptation more difficult (Jamero et al., 2018).”

How can we distinguish eco-anxiety resulting from education, frequent experiences, and media exposure from a general increase in climate risk awareness?

The authors agree that this is indeed a very complicated problem. The authors added the following paragraph to section 2.2 Interviews:

“Also, it can be difficult to separate the eco-anxiety resulting from education, frequent experiences and media exposure from a general increase in climate risk and disaster awareness (and there is much evidence that risk awareness about natural hazards in general has been increasing in recent times, see Esteban et al., 2016, 2018, Valenzuela et al., 2020). While it is impossible for the authors to completely remove all such influence, during the interviews emphasis was added to attempt to

obtain answered based on the direct experiences of the interviewees related to flooding and adaptation.”

In all, I am bit confused, how the eco-anxiety aspect is captured in this study. Anything that better exposes that would strengthen the paper. Otherwise, the objective should be modified and instead of eco-anxiety focus, shifted towards understanding the drivers of climate adaptation.

The authors hope that the comments provided, and the new modifications to the text have helped to clarify this point. The authors remain open to further discussions and to improve the paper with any additional comments that the reviewer may have.

Recommendation: Revisions Required