

Flood Watch Social Impacts Research Brief

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Background

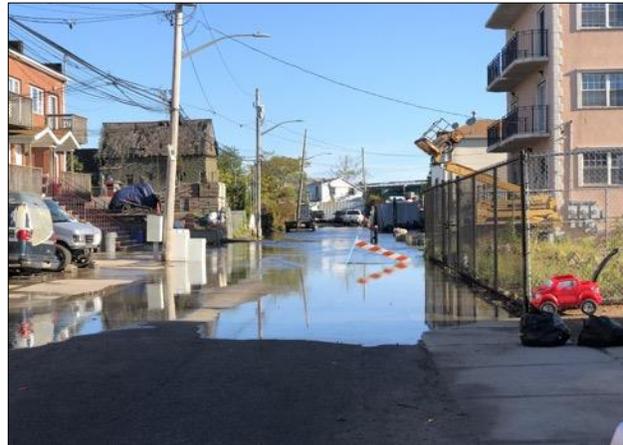
New York City's coastal communities face challenges in understanding, preparing for, and recovering from extreme weather events including floods. The impacts of large-scale disasters, such as Superstorm Sandy, are well-documented. But, in analyzing tide gauges managed by federal agencies, chronic stressors, such as monthly spring tides and heavy rainfall, are increasingly causing flooding in low-lying waterfront neighborhoods. According to a technical report released by National Ocean Service (NOS), locations across the U.S. Northeast are expected to see a 140% increase in flooding caused by high tides in this decade than was typical in the year 2000, and these events are happening during times of sunny, blue-sky days as well during times with storms.

Sea level rise will continue to exacerbate this hazard; the New York City Panel on Climate Change (NPCC), projects that seas could rise by as much as 30 inches by the 2050s (Horton et al. 2015). In their 2019 report, "Advancing Tools and Methods for Flexible Adaptation Pathways and Science Policy Integration," the NPCC developed and mapped a novel dataset of Mean Monthly High Water, an average of the highest projected monthly tides for the 2020s, 2050s, 2080s and 2100s (Patrick et al. 2019). These future risk models, taken together with existing anecdotal evidence, speak to the need for a baseline dataset of observed current high tide driven flooding. This dataset could then be considered alongside local social and economic impacts caused by flooding to inform planning and decision-making.

The Community Flood Watch Project (Flood Watch), coordinated by the Science and Resilience Institute at Jamaica Bay (SRIJB) and New York Sea Grant (NYSG) in partnership with NYC Emergency Management and the NYC Mayor's Office of Resiliency (MOR), uses civic science contributions to collect photographs of tidal flood events, including date, time, depth, duration, and flooding source. Using photographs and reports collected by trained community members can help researchers and City officials track current conditions and validate models. At the time of the study, Flood Watch was active in Hamilton Beach/Howard Beach and the Eastern side of the Rockaways (including Rockaway Beach, Arverne, Edgemere, and Bayswater), Queens, New York.



First Street in Hamilton Beach, Queens NY 11414
Photo credit: Community Flood Watch Project NYSG and SRIJB



Beach 84th Street in Rockaway Queens, NY 11693
Photo credit: Community Flood Watch Project NYSG and SRIJB

Research Aims

MOR, SRIJB, and NYSG partnered with social science researchers at the USDA Forest Service to understand the scope of social impacts of tidal flooding on the communities and delivery of city services in high-flood-risk neighborhoods. The purpose of this pilot research was to develop and test a methodology for gathering qualitative accounts of the impacts of tidal flooding and the ways in which communities have adapted to living with water, while gaining insights into the experiences of Flood Watch participants in select communities to inform further program development in other coastal New York City communities.

Our research questions were:

1. What are the social impacts of living with semi-regular flooding?
2. How can these impacts be documented?
3. How do residents share information and take action on flooding?
4. What adaptation strategies can the City and community use to limit these impacts?

Methods

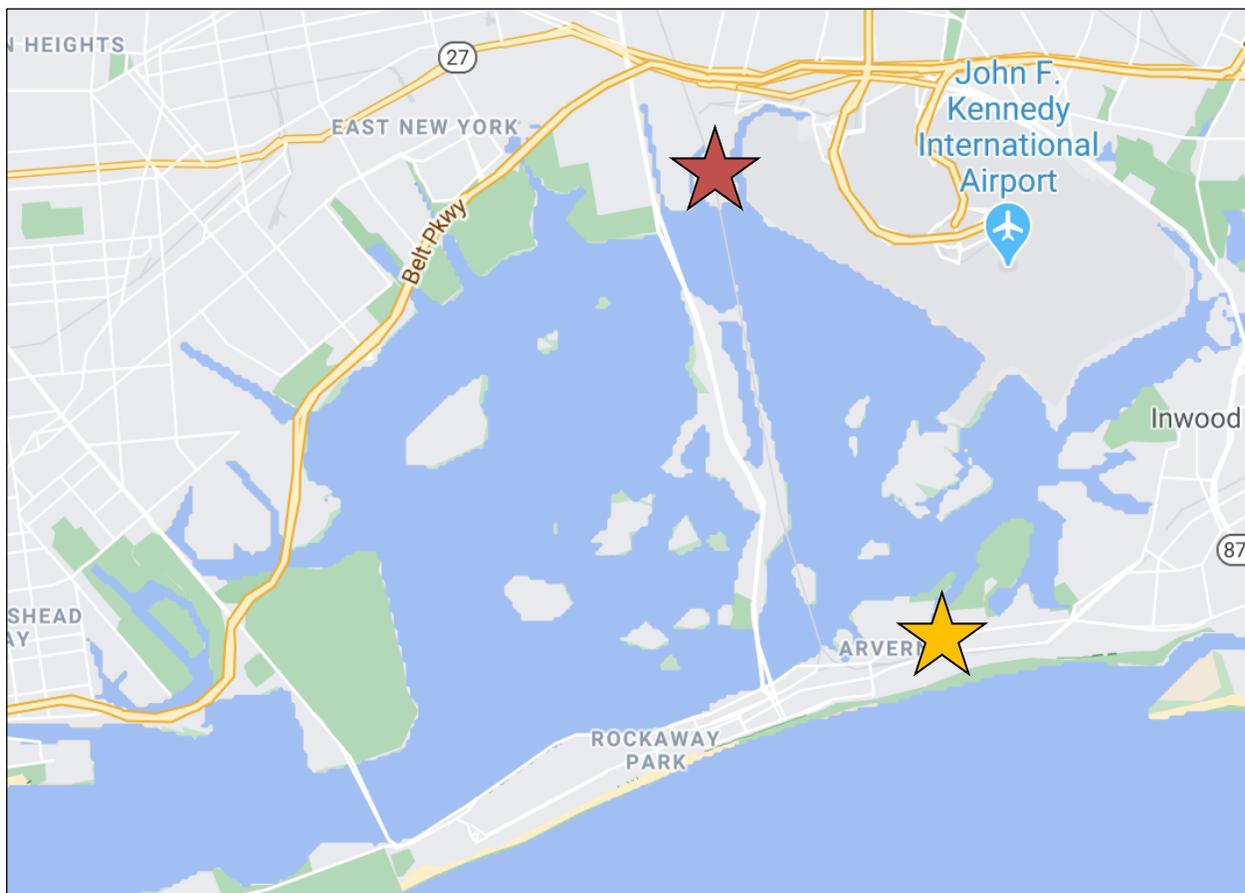
We conducted a series of semi-structured interviews with adult Flood Watch participants. Recruitment announcements were sent out to existing Flood Watch participants (n=12), who also made referrals to other program participants (n=7). From this pool of 19 recruits, there were 9 interviews conducted, 7 nonresponses, 3 unable to find a suitable scheduling time, and zero refusals.

Interview lasted approximately 1-1.5 hours. All interviews were voluntary and confidential (Cornell IRB # 1910009143). All participants were eligible to enter into a raffle for a solar lantern following their interview. Upon completing the interview, participants submitted a demographic

questionnaire. Interviews were conducted by two members of the research team then followed by a debrief to discuss key themes, patterns, and incongruities in the data. Full team debriefs were also conducted at the completion of the interviews. All interviews were recorded, transcribed, and coded for themes using NVivo11. The researchers had intended to conduct focus groups with community residents unaffiliated with Flood Watch; however, this research phase was postponed due to the COVID-19 pandemic.

Study Area

Our study site locations were two initial communities participating in Flood Watch: Old Howard Beach/Hamilton Beach, Queens, New York and the Eastern side of the Rockaways (including Rockaway Beach, Arverne, Edgemere, and Bayswater), Queens, New York (see Map 1, below).



Map 1: Google map of two study site locations, where the red star indicates Old Howard Beach/ Hamilton Beach, Queens, NY, and the yellow star indicates Eastern Rockaway, Queens, NY

The population of Old Howard Beach/Hamilton Beach is approximately 115,000 as of the 2010 census. The Howard Beach community is generally Hispanic (25.8%), followed by Asian (23.7%), and White (21.5%). The percentage of the population that is 65 and over is 14.1%. In this

community, there are 20,065 persons per square mile. The population that lives in the 1% annual chance flood is 11.9K (NYC Department of City Planning Community Profiles based on 2010 Census data). The population of the Eastern Rockaways is approximately 122,400 as of the 2010 census. The population is Black (35.8%), White (34.2%), and Hispanic (23.9%). The percentage of the population that is 65 and over is 14.1%. In this community, there are 16,425 persons per square mile. The population that lives in the 1% annual chance flood (based on FEMA’s 2015 Preliminary Flood Insurance Rate Maps (PFIRM) and the FEMA 2007 Flood Insurance Rate Maps (FIRM) is 75.3K.

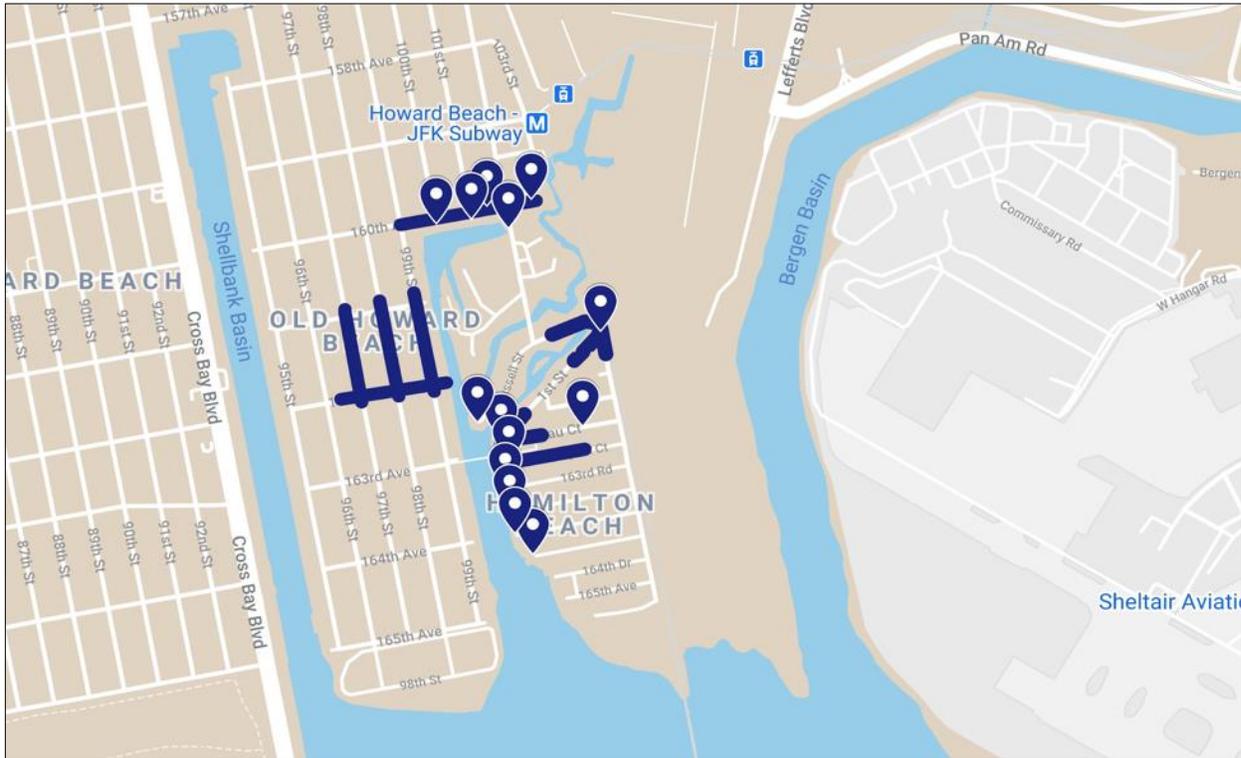
Participant Demographics

The participants in Flood Watch are predominantly residents of New York City coastal communities. Outreach is conducted through community and civic leaders and participation is open to all. While the sample size of interviews is too small to conduct statistical analyses, we collected background demographic data to understand the composition of our interview respondent pool. We did not interview youth under age 18, but participants ranged in age from 29 to 64. The racial and ethnic composition of interviewees was: White (6), Black (2), and Hispanic (1). Long-term residents had lived in their neighborhood since the 1960s, but several more recent arrivals had moved in the last decade. Participants came from across a wide range of socio-economic statuses, including educational level (high school to graduate degree), income levels (\$0 to over \$120,000), home ownership and renters and employment status (students, fully employed, retirees).

Key Findings

Flooding Observations

Participants were asked to describe the locations within their community where they had personally observed flooding events. Information was collected in multiple forms - as street addresses, intersections, roadways and landmarks and locations were drawn on print maps as points, lines, polygons. All locations were digitized and the stacked responses from all interviews are displayed below by neighborhood (see Map 2 and Map 3). Going beyond this aggregate view, the interview transcripts contain rich details about the timing, sequence, intensity, and impacts of these flooding observations, reflecting the importance of gathering qualitative data about the lived experience of flooding. In contrast to time-bound, highly visible extreme events, sunny day flooding occurs gradually over time, creating persistent, but nonetheless harmful effects. Sunny day flooding is experienced unevenly, exacerbating pre-existing vulnerabilities, and reflecting variation in residents’ ability to respond or adapt.



Map 2: Howard Beach/ Hamilton Beach Flooding Observations



Map 3: Rockaway Flooding Observations

Flooding Impacts

One of the aims of this pilot study was to identify a “*roster of social impacts*” from tidal flooding. Presented here in rank order of number of references are the impacts mentioned by our respondents (Table 1). Frequency of mentions is included to give a sense of relative commonness, but should not be interpreted quantitatively due to the pilot nature of the study. Overall, impacts spanned several categories, including: emotional distress, property damage, infrastructure damage, and time lost.

Impacts	References
Emotional distress, frustration	15
Miss or late for work, school, appointment	14
Property damage	9
Flood insurance costs and challenges	6
Change travel routes or times	5
Dirt, debris, or contaminants in street to clean	4
Vegetation loss	3
Car stuck in flooding	2
Infrastructure damage	2
Lost tenants	2
Abandoned vehicles	1
Cancel events	1
Temporarily had to move	1

Table 1: Roster of social impacts of flooding mentioned by respondents

Many interview participants reported feeling distress or frustration when describing tidal flooding events. In addition to these emotional effects, other social and economic impacts include being late to or missing work, school, and appointments and sustaining property damages to home and cars. Sunny day tidal flooding was more often described as a nuisance that residents have to adapt to on a regular basis, in contrast to more extreme events such as nor’easters and hurricanes that caused more lasting damages to property and impacts to livelihoods. It was noted that the impacts of everyday or extreme flooding are not evenly experienced across communities, and that vulnerable populations such as seniors living alone or people with underlying health conditions are more at risk when travel is inhibited. Some participants lamented that city government does not adequately respond to the distinct needs of their communities, including addressing persistent flood-prone streets — particularly access points that can inhibit vehicular traffic flow into and out of neighborhoods. At the same time, interviewees were generally highly knowledgeable about existing flood insurance resources and flood mitigation mechanisms. A few illustrative quotations are shared below. Parentheses indicate the neighborhood and respondent number (e.g. Hamilton Beach is HB1 or Rockaway 2 is R2).

" We were supposed to have Christmas here one year at the old house. And all of a sudden, Christmas Eve, we get a high tide. It's a freak high tide. Nobody called it, nobody said anything, and I had just finished replacing the rug for the kids to come over to play downstairs, and the tide came in and hit the rug. So, you know, it's disappointing at that point. So, we had to cancel that day and we had to go to my sister-in-law's house for Christmas instead of coming here. So, you know, it bums you out. My wife was bummed out. She had started cooking 3 days before [Christmas]. You know, so it's those things."

(HB1)

" I just, I don't see it the same way anymore because of the constant flooding. I don't feel like a secured safeness that I can stay here, I don't feel it anymore. I just don't like that hanging over my head all the time. You know, life's tough enough without having something that is just like you're waiting for like a bomb to go off. When's the next one coming, you know?"

(HB2)

" There's a school bus stop right out front and on days when there's a high tide, the kids are getting off the bus into a pool of water. I've seen it., I have pictures actually of the kids walking across a plank to get into the school bus that we put up there, because how else are they going to get onto the bus without wading through the deep water?"

(R1)

Adaptations to Flood Events

We also identified a **"roster of adaptations"** that residents are taking on in response to tidal flooding, which spanned a few main categorical types, including: transportation/mobility; housing modifications; relocation; and use of personal gear (see Table 2). As above, frequency of mentions is included to give a sense of rank order, but should not be interpreted quantitatively due to the pilot nature of the study.

Adaptations	References
Change travel routes or times, cancel travel	20
Move car	11
Leave, sell, buyout homes	8
Sump pump, water pump	8
Carry boots	7
Buy specific type of car	5
Move items out of basement	3
Create and modify berms or walls	2
Live on houseboat	2
Would not buy home in area	2
Block street with tape	1
Building retrofits or reinforcements	1

Table 2: Roster of adaptations to flood events mentioned by respondents

Canoe in streets	1
Carry go bag in car	1
Change dress attire	1
Change event timing	1
Local FD send emergency notifications	1

For example, participants reported using measures such as consistently checking tidal charts, regularly moving cars, leaving early or staying out later to avoid flooded streets, keeping waterproof boots in their vehicles, and avoiding travel down streets that are prone to flooding. Other more resource-intensive adaptations include purchasing higher clearance vehicles, retrofitting homes, and building makeshift berms. At the community level, in Hamilton Beach, participants reported that the local Volunteer Fire Department has repurposed the use of their alarm system to signal high tides as a neighborhood warning system. A few illustrative quotations are shared below.

" Some people don't have the luxury of calling in late, you know. I know people down here who - one guy's a bus driver - so what does he have to do? High tide's at 7. He goes, "I'm leaving the house at 5", and he goes somewhere and sits in his car for two hours until he has to be at work. So, it's those things that nobody thinks about. You're somewhere in the middle of Brooklyn or the middle of Queens, you don't think about that."

(HB1)

" Now it seems to happen so much more frequently that the water will just be coming up, coming up, coming up and it's like you wait and you're watching, it's high tide, it's rising, it's rising, it's rising. You don't know how far it's going to come up the stoop. You've got to run and if you're lucky enough to be home and you have another vehicle, you have to move a car. You have to see people race around in the morning, running around like crazy to move their cars."

(HB2)

" One of the biggest issues, I think, is you have to check the tide table before you park your car even if you're parking today, it could be dry tonight and tomorrow morning you come outside and it's like ahh man, I need waders to get to my car..."

(R1)

Emergent Themes

In addition to our core aims of identifying flood impacts and adaptation, several other core themes emerged from our data.

Local Ecological Knowledge

Flood Watch participants have a finely honed local ecological knowledge that includes deep knowledge of exactly which streets and parcels are particularly flood-prone. Long-term residents of these coastal communities described Hurricane Sandy as the “wake-up call” for the general public on the realities of living with sea level rise and flooding — a reality that they had been experiencing over several decades. Other more recent residents of the area described their experience of becoming more attuned to daily and seasonal rhythms of tides through personal

observation and experience, reading tide charts, talking with peers, and participating in the community science program. Some participants take it upon themselves to notify their friends and neighbors when a high tide is coming and the need to move cars or ready basements, acting as a knowledge translator in interpreting complex forecasts.

“ I started to notice like every time that it is a full moon or a new moon, there’s water on 116th and 102nd Street.”

(HB3)

“ It’s an everyday thing. It’s just become that when the tide is high, especially if it’s higher than normal: expect flooding, dress accordingly, park accordingly, determine if I care if these shoes get wet, do I care if these clothes get wet? ... It’s always a surprising moment, like wait a minute, it didn’t rain today, why is all this water here?”

(R1)

Community Connectedness and Civic Engagement

The majority of interview participants reported sentiments of community connectedness, community pride, and civic engagement. Many Flood Watch participants are members or even leaders of local civic and environmental organizations and are heavily involved in awareness-raising and advocacy work around coastal resiliency. The majority of the participants maintained long-standing generational ties to their communities. Further, one-third of interviewees recounted their flooding experiences through a social justice-oriented obligation to serve their communities. In addition, the majority of respondents claimed they had no intention of leaving their communities in the future, despite the potential for worsening flood events.

“ Listen, I don't plan on going anywhere. I'm 57-years-old, I'm not going to retire for at least another ten years. But listen, I'm going to do the civic [association] as long as I can do the civic [association]...They say, right, the perfect job is something you'd do for free? Well, guess what? I've been doing this for free for almost eight years, coming up in February, and I'll continue

to do it as long as the residents want me to, you know? Everybody tells me - elected officials will say it - you know, you've done so much for this community. You get things done. And I say it all the time: you gotta take care of home and this is home."

(HB1)

" Yeah, because [respondent] educates the children in the neighborhood who are going to these programs to learn about the water here, so if they weren't doing that then they're not going to be able to talk to their parents about what's going on and so I find that he has a big responsibility to relay certain things to them that they would have normally never known about or considered so in that way I think [respondent] is very involved."

(R5)

Conclusions and Next Steps

This pilot study represents a first step in the creation of a baseline dataset to track current conditions in the City's lowest-lying neighborhoods and measure future changes due to sea level rise. Hyper-localized adaptation measures from participant interviews provide important data and context related to chronic flooding impacts and mitigation strategies for infrastructure agencies, emergency managers, city planners and policy-makers. For example, peer-to-peer methods for tidal flood alert communication, such as community-wide text message services and communication channels via neighbors, may better inform residents of impending flood events while bolstering social support for localized action. Since adaptations are hyper-local, we know localized communication on flood risk can assist residents in mitigating impacts.

In addition to this briefing paper and companion slide deck, the project team is preparing a manuscript for submission to a peer-reviewed, open-access journal to share insights and lessons learned more widely. The project team is also collaborating on a number of proposals to continue to build upon this pilot research as part of Flood Watch and its expansion to additional neighborhoods.

This work shows how important it is for municipal, state, and federal government, including policymakers, infrastructure agencies, emergency managers, regulatory agencies, and city planners, to consider the social, economic, and quality-of-life impacts of living with semi-regular tidal flooding when designing action or regulatory changes to mitigate flooding and/or flooding impacts. Flood Watch participants are knowledgeable about and engaged with the processes of tidal flooding. Due to the COVID-19 pandemic, planned focus groups could not proceed. Future research should further examine different populations in flood-prone communities, including but not limited to: business owners, renters, public housing residents, youth, seniors, schools, and particularly vulnerable populations to better understand the full breadth and diversity of flooding impacts in Jamaica Bay.

References

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Flood Watch Social Impacts Participating Organizations

NYC Mayor's Office of Resiliency: <https://www1.nyc.gov/site/orr/about/about.page>

New York Sea Grant: <http://www.nyseagrant.org/>

Science and Resilience Institute at Jamaica Bay: <https://www.srijb.org/>

USDA Forest Service, Northern Research Station - NYC Urban Field Station: <https://www.nrs.fs.fed.us/nyc/>