hi,tide

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Hi! We are Andrea, Karina and Marlyn.Social Designers investigating sea level rise in Rockaway, NY.

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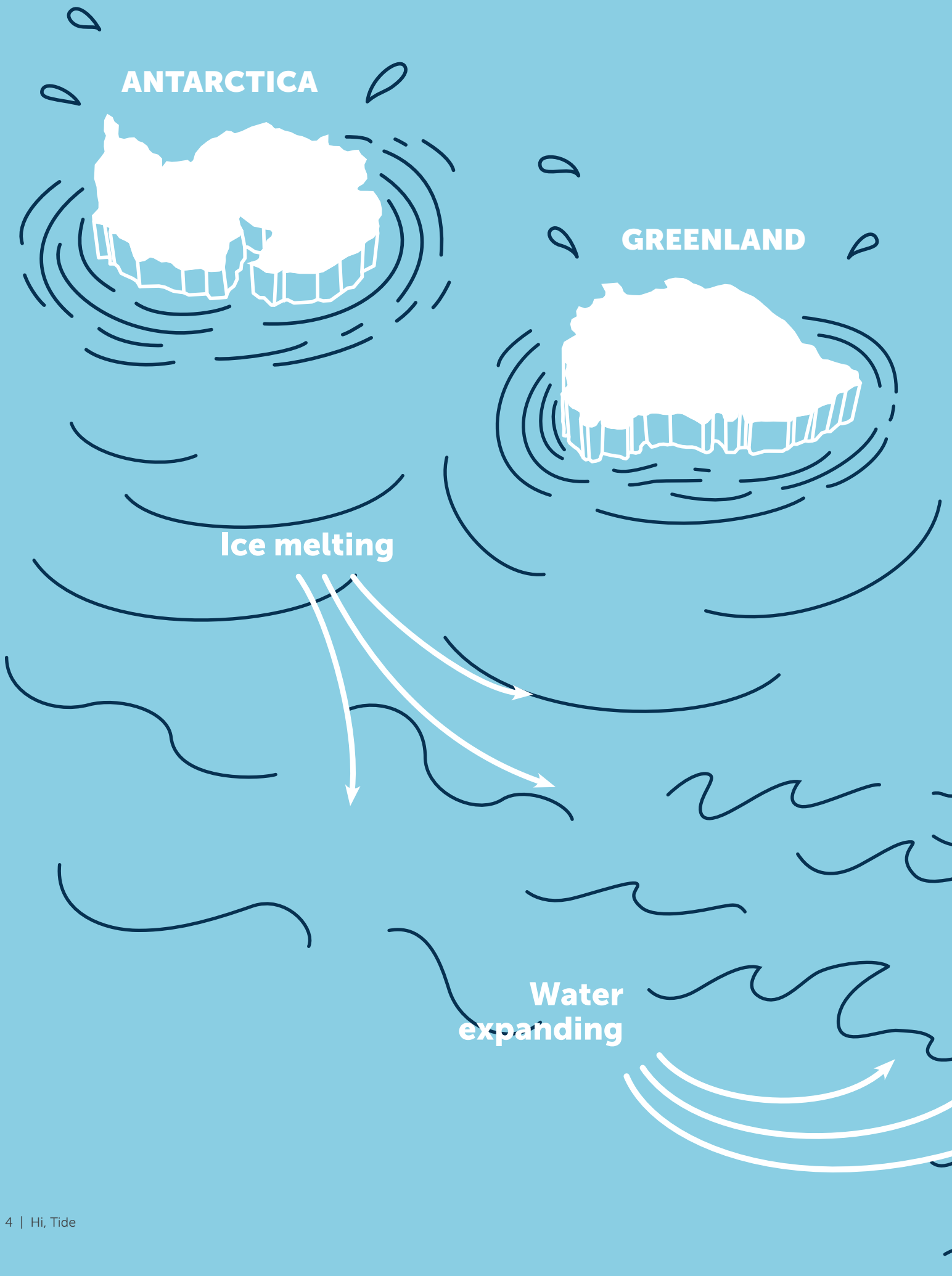
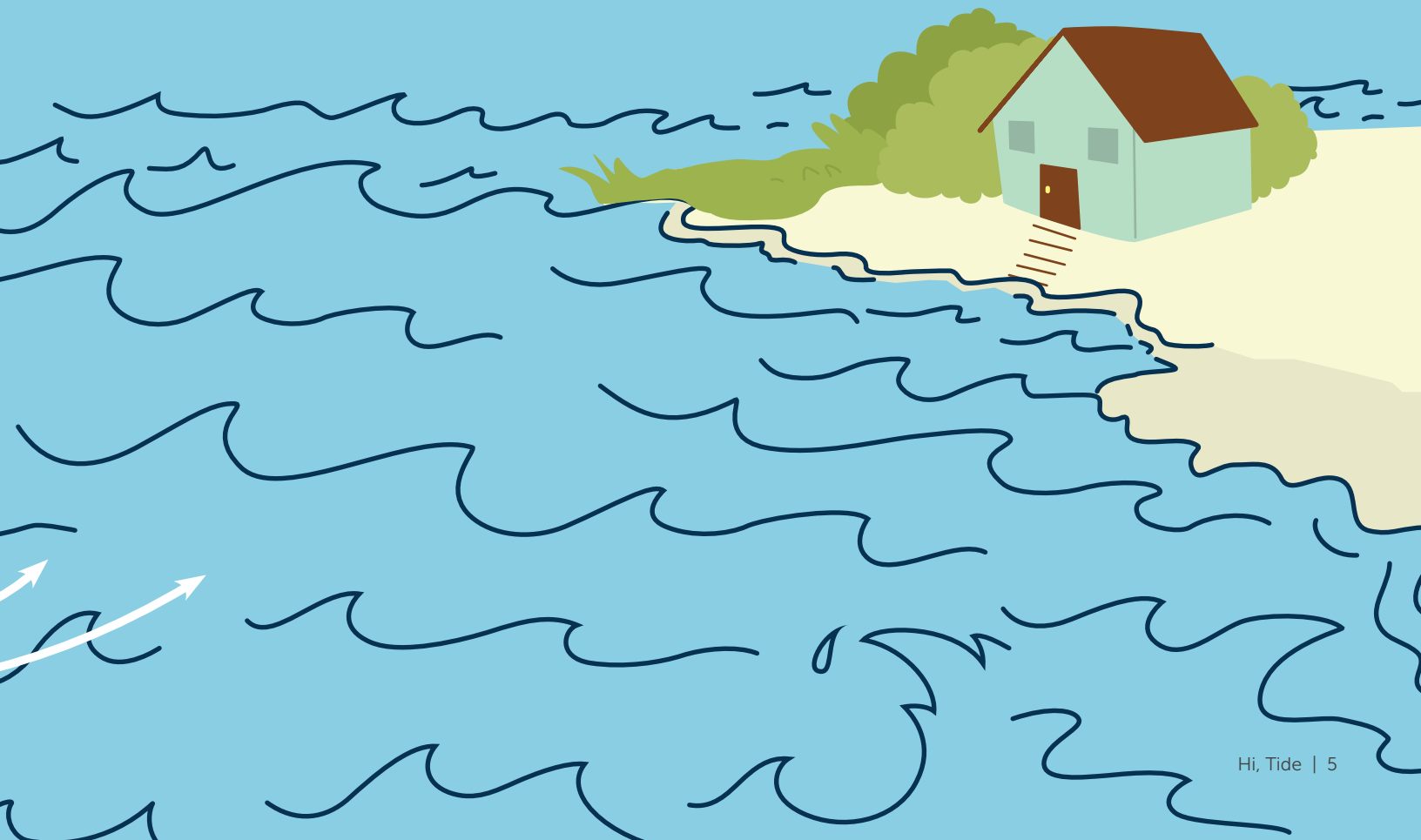

ANTARCTICA
GREENLAND
Ice melting
Water expanding

INTRODUCTION

OCEANS ARE RISING.

Sea level rise is caused primarily by two factors related to global warming: added water from melting land ice and the expansion of seawater as it warms.



According to a March 2016 study by the Proceedings of National Academy of Sciences of the USA, sea levels have risen faster in the 20th Century than in any of the previous 27 centuries.[8] However, there has been a lot of discussion between scientists as to which predictions to follow. Although scientists agree that sea levels will rise, they have different estimates. In 2012, The National Oceanic and Atmospheric Administration (NOAA) reported that the greatest uncertainty surrounding estimates of future global sea level rise is the rate and magnitude of ice sheet loss, primarily from Greenland and West Antarctica.[9] Climate Central, an organization leading communication on sea levels, and NOAA present four global sea level rise scenarios (Table 1.1).

Table 1.1 Global Sea Level Rise (SLR) Scenarios

Scenario	SLR by 2100 (m)*	SLR by 2100 (ft)*
Highest	2.0	6.6
Intermediate-High	1.2	3.9
Intermediate-Low	0.5	1.6
Lowest	0.2	0.7

*Using mean sea level in 1992 as a starting point

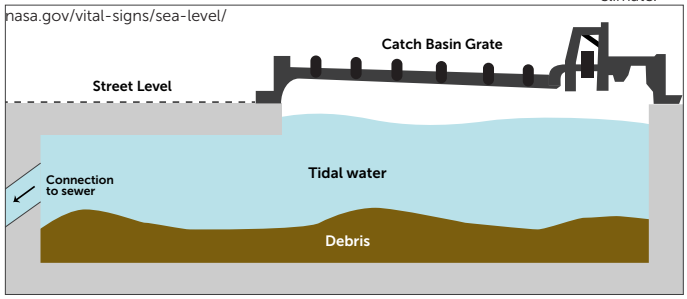
These scenarios are meant to represent the levels of sea level rise globally by 2100.[10]

Today, many cities on the U.S. East Coast are already dealing with the effects of sea level rise in the form of tidal flooding, also known as sunny day flooding or nuisance flooding.[11] Tidal flooding happens when high tide comes up and water comes through the storm drains (Figure 1.1). In order to adapt to this and other effects, cities are planning and building infrastructure to protect themselves. Although necessary, they are very costly and may not be sustainable in the long term. Seas are going to continue to rise, and as they do, tidal flooding will get worse, especially during storms.[12]

8 Bumming, Vivien. This is how far seas could rise. bbc.com, April 2016

Figure 1.1 Tidal flooding coming up the sewer

9 NASA, https://climate.nasa.gov/vital-signs/sea-level/



10 https://scenarios.globalchange.gov/sites/default/files/NOAA_SLR_r3_0.pdf
11 Corum, Jonathan. A Sharp Increase In 'Sunny Day' Flooding. nytimes.com, September 2016
12 Phillips, Laura. Consumerism and Climate Change: How the Choices You Make Can Help Mitigate the Effects of Climate Change. un.org, March 2016

We wanted to investigate what additional actions coastal communities can take on an individual level to adapt to their changing environments and create a sustainable future for themselves.

PROCESS

Sea level rise and coastal cities

We began by researching and interviewing people in Miami, FL—a coastal city already changing due to sea level rise and one of the areas in the US that has the most to lose economically. We were looking to see what they currently know about sea level rise and what they think can be done to adapt. In June 2016, we took a trip down to Miami to assist The Miami Foundation facilitate workshops about sea level rise. The workshops were meant to bring together stakeholders from several parts of the community, plan communication strategies around the topic of sea level rise and how to best disseminate it to their community.

During these workshops, we learned some residents were aware of sea level rise, but tired of the doom and gloom stories. Participants expressed their desire to take action and keep enjoying their community, but they didn't feel like there a was a specific tangible problem they could solve. It was much easier to speak to them about something that affected them immediately, like frequent flooding. We noticed that once sea level rise was reduced to something like flooding affecting their morning commute or rusting their cars, it became personal. They were then able to say, 'Okay, this is a tangible problem. How can we fix this now?'.

Rockaway

Along with learning about what the Miami community was doing, we also wanted to explore how New York City's residents were talking about the issue and preparing for sea level rise. In 2012, when Hurricane Sandy hit New York City and the surrounding areas, it was a turning point in understanding how sea level rise and climate change could really affect the New York region. To get a sense of how New Yorkers were thinking, we participated in a walking tour of Lower Manhattan called The Future Sea Level in Lower Manhattan. It focused on informing the public about how sea level rise is threatening lower parts of the city. During our tour, many speakers feared that Miami's current reality of frequent flooding could be the reality for many coastal areas of New York City in the future.

Rockaway, which is situated in the southern portion of Queens, is one of the most at-risk communities in New York City for sea level rise.

> In 1983, only 24% of Rockaway Park and Rockaway Beach's buildings were in the 100-year flood zone compared to 89% now.

It is floodable by two areas—Jamaica Bay and the Atlantic Ocean—making the communities in this area the city's frontlines to sea level rise.

Like Miami, Rockaway also deals with tidal flooding. In communities like Queens, tidal flooding is becoming more and more common. Rockaway residents say they deal with tidal flooding about once or twice a month. When speaking to residents in the area about what they do during these floods, they said they "just deal with it." In Rockaway, tidal flooding has been normalized and a part of everyday life.

Environmental organizations in the area, such as The Rockaway Waterfront Alliance (RWA) and The Nature Conservancy, are developing interventions that are trying to utilize natural resources to their advantage. These natural resources not only benefit Rockaway residents, but can also benefit other residents in the city. After speaking to Jeanne DuPont, Executive Director of the RWA, we found that her organization is creating initiatives to use more green infrastructure to combat the impact of tidal flooding such as an initiative to collect rainwater (illegally) and redirect it for seeding gardens. Although they are receiving some pushback from the city and other agencies, they are still able to continue their initiatives. However, Jeanne believes more initiatives are needed.

As we continued researching the community, we also learned that tidal flooding was only one problem among the many others in the community. Rockaway suffers from other overarching social and health ailments. These existing problems have an effect on how some residents, such as the New York City Housing Authority (NYCHA) residents, view and act toward climate change/sea level rise. Their overarching problems are more of a priority. According to Jeanne,

> "People don't connect green infrastructure and storm-water to those things [overarching problems]...it's [flooding] seen as an inconvenience."

Partnership and workshops

In order to find out more about specific problems that people dealt with everyday, we partnered with the Rockaway Waterfront Alliance. The RWA has after school programs for teenagers who were interested in climate change and sea level rise.

We conducted workshops with the teens to teach them about our thesis project. During the workshops we asked them if they could identify problems related to sea level rise. Many of them stated environmental problem that were mostly coastal, but we wanted to know how it affected them in their daily lives, away from the coast. We conducted mapping sessions where they could plot specific problems they had observed in their neighborhoods related to tidal flooding. These issues they plotted included:

Smells
Mold
Accessibility to certain areas
Garbage and sewage accumulation
Swarms of mosquitoes
Absence to school
Heavy traffic

Apart from our in class mapping session, we also asked them to use CUSP.org to map during their commute around the peninsula and pinpoint where certain problems existed. [CUSP map] In doing this, we were able to see which issues were most prevalent and in which areas they were most frequent.

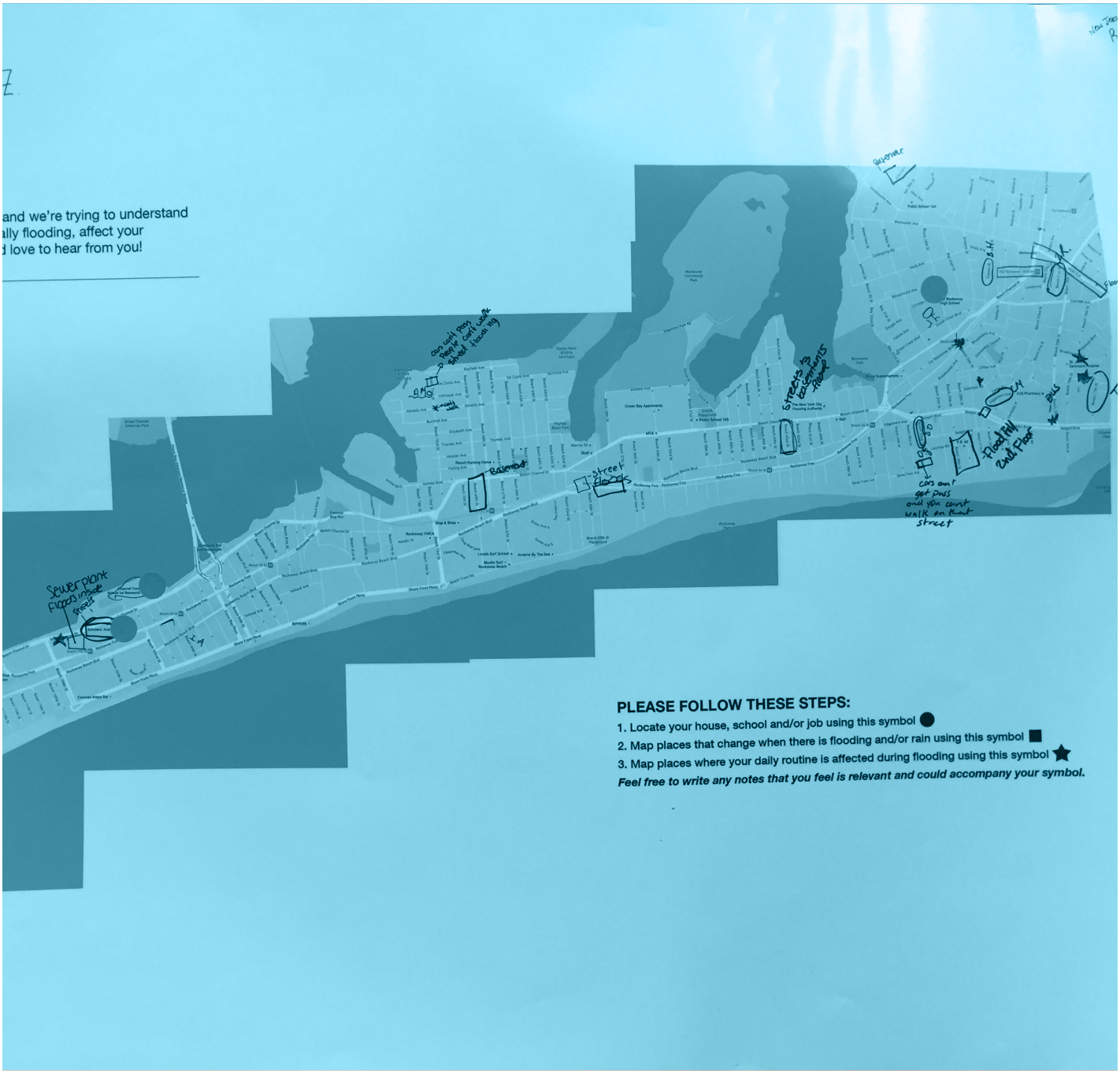
What we learned through the workshops was that specific problems they and their community dealt with everyday were not obvious as stemming from sea level rise, and some were seen as mutually independent from sea level rise. When we initially asked them about sea level rise, it was easier to get problems relating to things close to the coast. However, it's important to note and remember that although tidal flooding could happen on the coast, it is something that happens inland as well, inundating low-lying areas.

So, when breaking the topic down to just flooding, something that happens inland, and asking what problems arose from it in their neighborhoods, the answers became things that they related to a lot more.

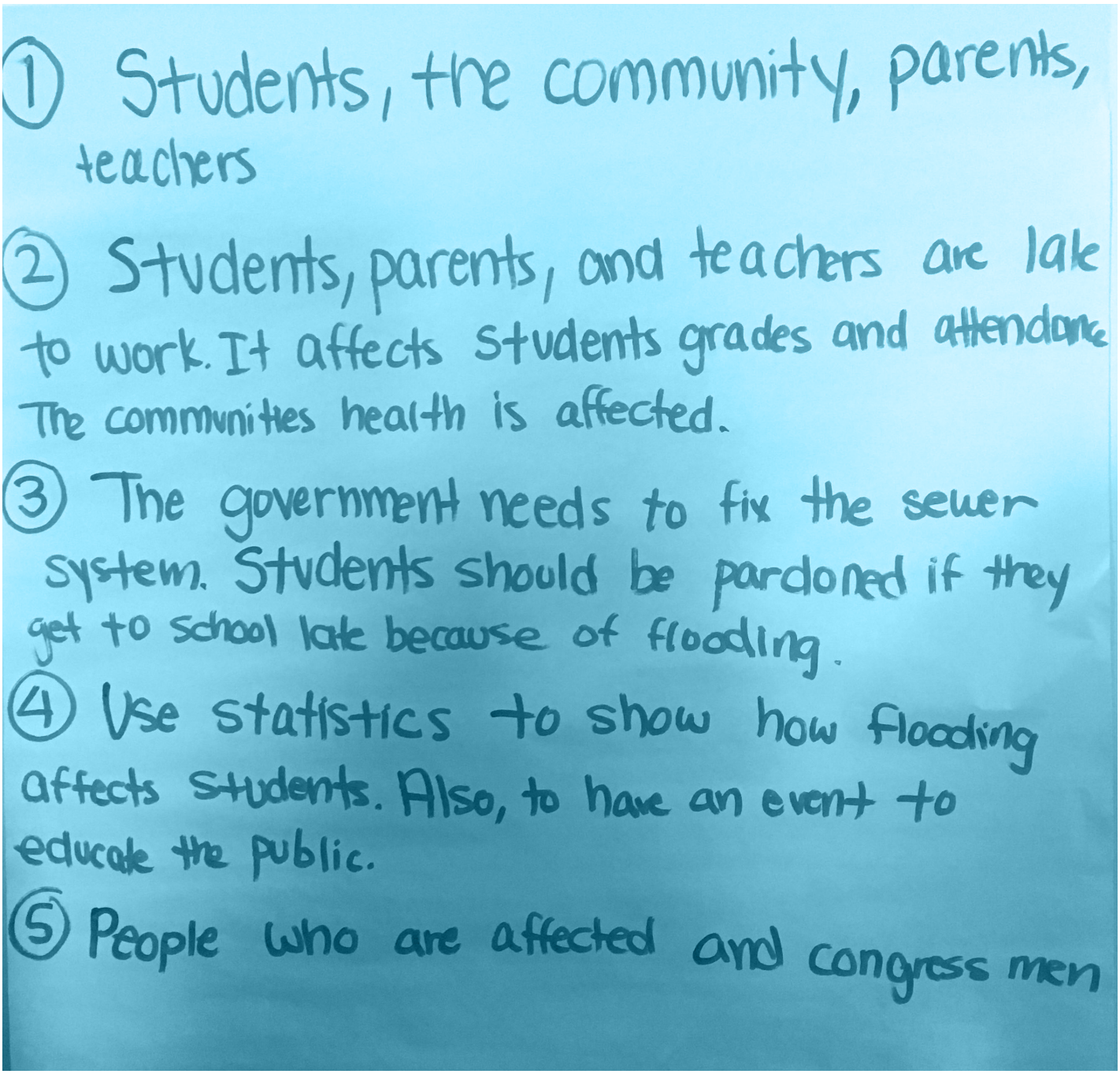
If we think back to the Miami workshops, many of the participants did not know what actions they could take about sea level rise or tidal flooding. But, they had many problems that they dealt with everyday that they could relate to that were affected by tidal flooding. This was very similar to what we were hearing in the Rockaway.

This led us to our hypothesis.

We believed that if we could identify existing daily problems that residents could relate to, and were exacerbated by tidal flooding, they can make a personal connection to sea level rise and identify actions they can take in regard to flooding in their neighborhood.



Rockaway Map Shows areas where students see flooding and sea level rise related issues.



Brainstorming Session. Students came up with ideas on how to better deal with flooding and sea level rise.

Trash

After our workshops, we researched more about the problems the teenagers mapped. Trash was one of the problems we found to be the most prevalent in Rockaway. Apart from trash being very present on the peninsula, we also found that it was clogging a lot of the catch basins. This resulted in standing water after tidal flooding, or rain. Because of this we realized it also worsen a lot of the other problems teenagers pointed out before: smells, tardiness to school and work and swarms of mosquitos.

In 2012, Nearly 29 million pounds of debris and sediment were removed from Queens waterways where 23% of sewer backups correspond to debris. That's enough to fill nearly three Olympic-sized swimming pool.

29M pounds of debris = **23%** sewer backups related to debris

This map of 311 complaints (Figure 1.2) related to catch basins confirms this is an issue. However, Jeanne DuPont, Director of RWA, told us that people don't report to 311 as often as they need to.

She believes that if more people reported issues, then it would bring attention to the area by local government. A previous community intervention she created focused on reporting potholes in local roads suggesting this is an effective way to get the government to act. And, we think it would help flood waters go down faster.

Figure 1.2 Map of 311 complaints in Rockaway


East Pond
st Pond
CEDAR
INWOOD
LAWRE
BAYSWATER
FAR ROCKAWAY
BROAD
CHANNEL
SOMERVILLE
WAVE CREST
ROY REUTHER
HOUSES
ARVERNE
ARVERNE BY
THE SEA
HAMMELS
ROCKAWAY
BEACH
ATLA
BEA
AY

Point of intervention

The sense of community in Rockaway is obvious. And residents agree: "we are a community here in Rockaway, we know each other very well because at one side you have the beach and 3 blocks to the other side there is the Bay. That's it." However, we found that not all of them are aware of the flooding problems residents a couple of blocks away experience and if they do, they don't see them as their own. Trash, for example, can be thrown in one part of the neighborhood and because of water and wind could end up being a problem in another.

Early in our research we learned that for communities dealing with climate change is important to have a strong community network that allows citizens to stay informed about issues in the neighborhood and know what to do about it. We found that RWA teenagers and those who already call 311 often have a level of awareness that needs to be amplified through their community so others take environmental actions too. We concluded that by creating a communication network more people in the community would report and learn about sea level rise.

If more people in Rockaway call 311 to complain about clogged catch basins, there would be fewer clogged catch basins and when flooding happened the water could go down faster and there would be less standing water exacerbating secondary problems.

Prototyping

To help Rockaway residents report sea level rise related issues to 311, stay informed about said issues, and learn more about the environmental issues threatening their neighborhood we tested 4 different prototypes. Attendees to a flood risk and insurance conference held at the RWA were our first group of testers. They were all homeowners approximately 50 years old or older.

We wanted to learn what formats were easier for them to use, how our intervention can be accessible to a bigger population, what mechanics users prefer and what incentives would get them to take part of this intervention for the long run.

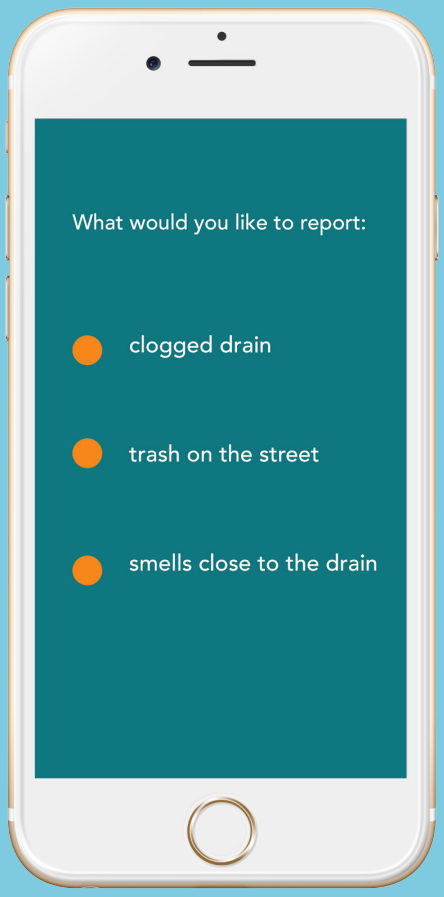
PROTOTYPE

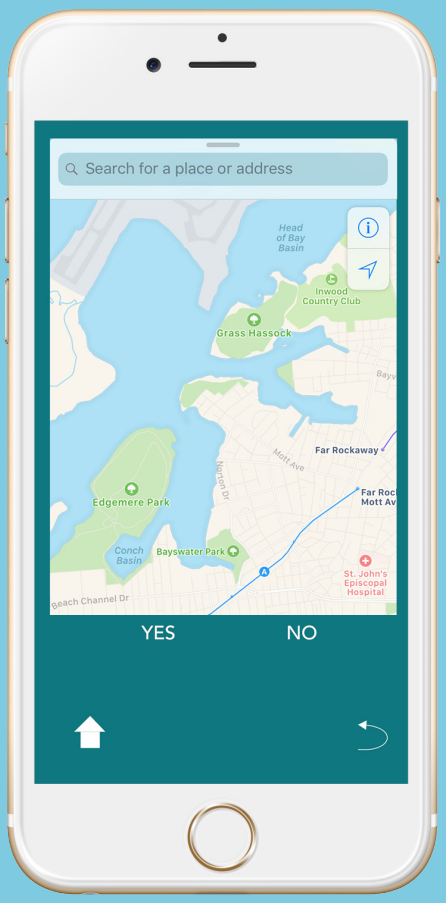
1

The App

Participants tested a simple mobile application that helped them report problems with the simple touch of a button. Users answered a series of questions including the issue, its location, if they would like to stay informed and if they would like to share the report on social media. An option to win points and rewards for reporting issues was also included. Residents reacted positively to this feature, but they agree it comes with the risk of some people just reporting problems for self-benefit.

All users reported liking this prototype because of how simple it is to use. They just need to open the app and choose an issue. It took all users less than 1 minute. However, in order to use this tool people need to have a smartphone and download the app which limited our audiences and prevented us from creating a product that is accessible to most people.



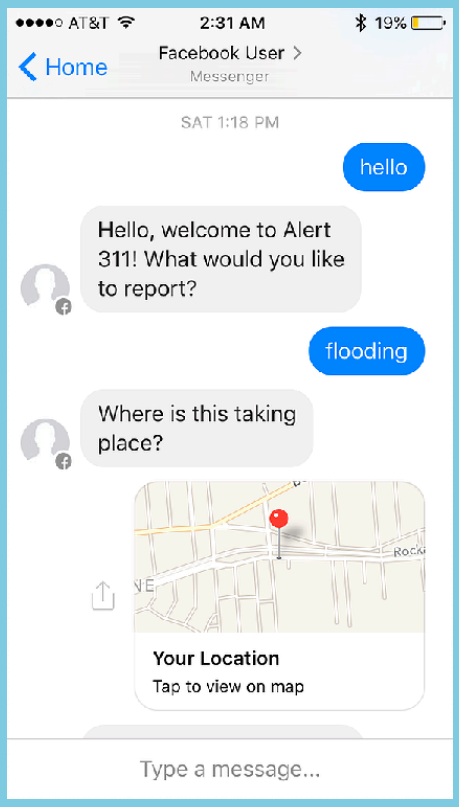


PROTOTYPE 2

Text

We prototyped text messaging system. It is almost like texting one of your friends. It works with automatic responses previously written by our team. This prototype worked very well because, similar to the app, it is simple and easy to use. The added benefit is that no app download is required as text messaging is already a feature in all cell phones. Most testers already use some sort of text messaging system.

On the other hand, some residents found the text messaging to be intimidating because it was not clear who they were texting to and they did not know exactly how it works. Once we explained them and they tried it, they reacted positively about how simple and accessible it was to use.



PROTOTYPE

3

Game

Some of the recommendations received from teenagers at the RWA were around gamifying the intervention and including incentives so that people continue reporting and participating in the network. One of the examples discussed was Earthmiles[8], an app that gives its users discounts for walking helping them increase their physical activity. With this in mind, we prototyped a location-based augmented reality game. We used Taleblazer, a game creation platform developed in MIT. [9]To participate, the Taleblazer app must be downloaded to a mobile device and our game located. It shows a map of the area with icons and locations users must visit in real life. Once there, stories of residents dealing with sea level rise issues or prompts will appear on the screen. Some of the prompts require users to report conditions such as trash, flooding, clogged sewer, or smells in specific areas for the chance to receive coupons or prizes from local shops.

User testers found great that it gives businesses owners the opportunity to promote their businesses and become part of the efforts to educate and adapt to climate change. The opportunity to win coupons or prizes was a clear incentive. On the other hand, all testers thought the game was much more complex to learn and required more usage time which would cause the target audience to be reduced. Additionally most users agree in that seeing the results of their efforts should be incentive enough to use some of this tools.

8 https://earthmiles.co.uk/our_world/
9 http://taleblazer.org/

PROTOTYPE

4

Twitter

The Friends of Rockaway Beach is one very active Facebook group that has over 8,000 members. This suggested us that many Rockaway residents are already engaged in social media and led us to create a prototype that allows users to report issues and share pictures using twitter.

Although users liked that twitter is an existing platform that many already know how to use there was a concern that reporting publicly might cause an overload of negative messages and images to show in people's twitter feed. Some testers also pointed out that even if twitter is an existing platform, not the majority of people know how to use it.

Iterations (successes + failures)

Once different ideas were tested, the RWA students helped us put the pieces together. Through more workshops and prototyping we got to the conclusion that although for Rockaway teenagers social media is the easiest way to reach and inform people, most residents still prefered the automated text message because it is a familiar and simple to use platform that requires little usage time. Text messaging allows for a more inclusive tool to members of the community.

With more people testing our tool, we were able to prove some assumptions of what was needed in a communication network that we knew are not part of the 311 experience. Communication received must be relevant and specific to the local community and, once they file complaints, they want to see the results of their effort and follow up in the easiest way possible.

For most users, seeing improvements in their neighborhood should be incentive enough to take any actions that would benefit or help the larger community. They saw that prizes, coupons and other monetary incentives could result in users abusing this tool.

> "People shouldn't ask for an incentive, they have to do it because they are part of a community."

So we concluded that the best incentive will be the realization that their neighborhood is now cleaner because of the actions they took. The more residents report their environmental problems, the better off their neighborhood will be. It is important to mention that we are not trying to increase the complaints that 311 receives, our aim is for people to take action to reduce trash on the street and adapt to the effects of flooding in the neighborhood.

INTERVENTION

HI, TIDE

So with all of this in mind, we created a communication network, Hi, Tide, which oriented to help the Rockaway community understand the problem, take a specific action and start preparing to take other actions that will help them deal with further climate change.

Hi, Tide allows Rockaway residents to easily 1. report issues, 2. visualize the positive impact of their collective and individual efforts, and 3. better understand the connection between sea level rise and other issues in their neighborhood.

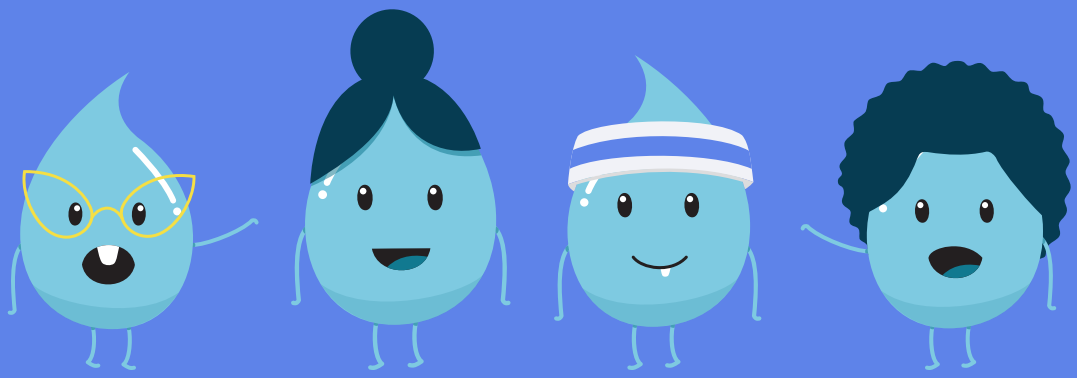
1. To help them report—and empower them to take action—we created a simple messaging system, They can access it through text message, facebook's messenger or facebook. Rockaway residents with access to a cell phone or computer, can select an issue to report and the location. They can also decide if they want to stay informed about that specific complaint or would like to receive further notifications.

2. Users can see the impact of their actions through weekly recaps on social media and follow-up text messages.

3. And, to help them connect, we will put forward information and visualizations on our web page and social media accounts so they can learn about trash and how sea level rise affects it and other issues. This is also a place where we can share local stories of how sea level rise has affected them.

hi, i'm tide

All this is presented using the Hi, Tide icon. Tide, a character that makes this product more approachable while connecting the tool back to the water. Our goal is for Tide to look like a friend's contact in a cell phone or facebook account. We presented Tide during a workshop with RWA students, they loved the icon and thought it goes along well with the goal of the tool.



STEP BY STEP

1

Text Hi, Tide at
917-725-6413.
or, find it on
Facebook Messenger

2

Tell tide what you
want to report.

3

Tell tide where
the issue is.

Sea levels are rising! That's why some Rockaway areas get flooded often. Do you ever wonder what can you do?

I'm glad you ask. I'm Tide and I'll help you and your neighbors report issues related to sea level rise. The more you speak up, the better the chances the government will take action.

Text "1" to start. Or text "2" for options and to learn more about sea level rise and about our network.

1

Let's get this started. What would you like to report?

1 - flood
2 - trash
3 - smells
4 - drain
5 - other

2

Sorry to hear this is going on. But remember, the more you and your neighbors speak up, the better the chances it will be solved quickly.

Where is this taking place? i.e. 225 Parkside Ave., Brooklyn.

233 Beach 65th, Arverne, Rockaway, NY

Got it. We will alert 311 ASAP.

Would you like to know when further action had taken place?

yes

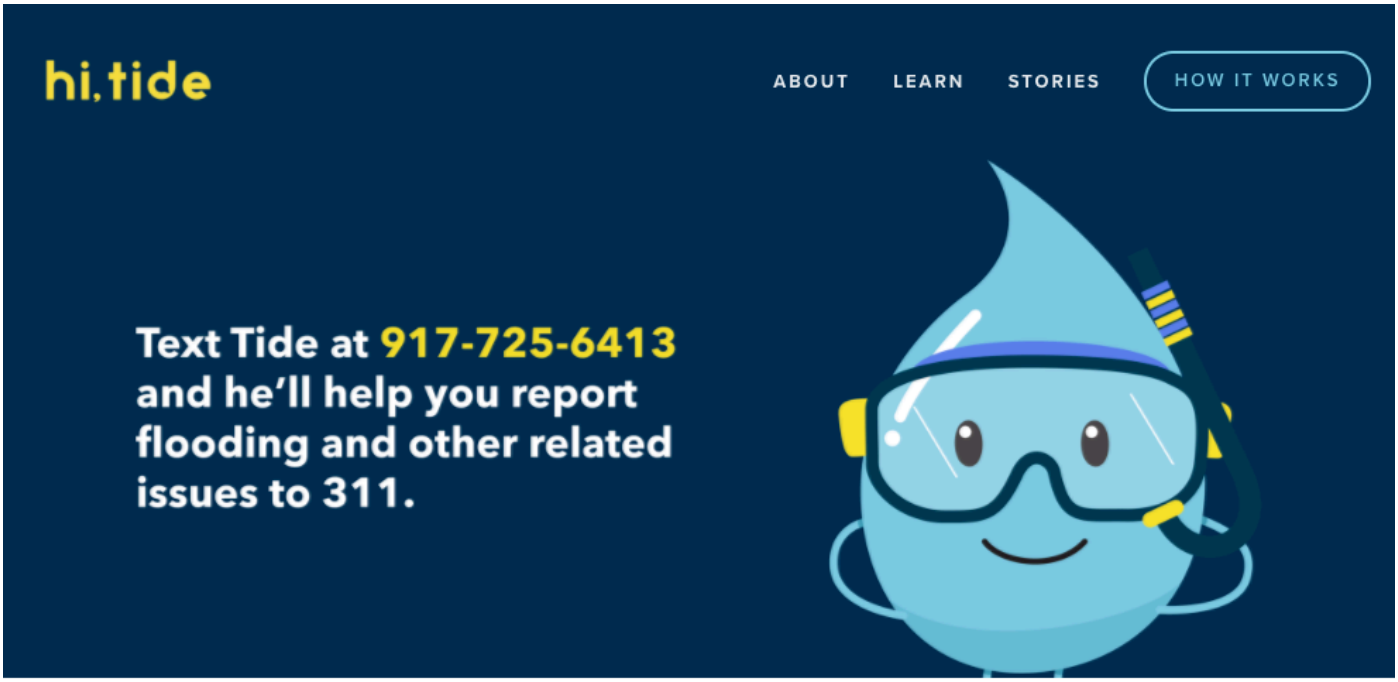
I'll keep that in mind. I can also keep you updated about other issues reported in your location. Would you like that? I promise, I'm not a spammer.

yes

I hear ya! Thanks again and have a superb day.

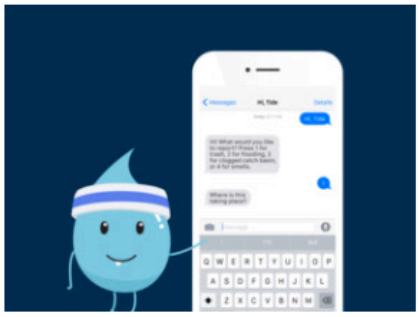
And remember, you can always contact me back by texting Hi, Tide!

Type a message...



ADAPTATION STARTS WITH YOU.

Hi, Tide allows Rockaway residents to easily report issues, visualize the positive impact of their collective and individual efforts, and better understand the connection between sea level rise and other issues in their neighborhood.



REPORT

Report local issues to 311. Our simple SMS service doesn't require a smartphone. And, if you have Facebook messenger, you can report through there, too!

Learn more →

SHARE YOUR STORY

Do you have a story about how sea level rise has affected you? Share your story with us and the rest of the community. And, read about your neighbors experience.

Share →

LEARN AND SEE THE IMPACT

Learn how sea level rise affects problems locals face everyday, and see how you are making an impact when you use our SMS service.

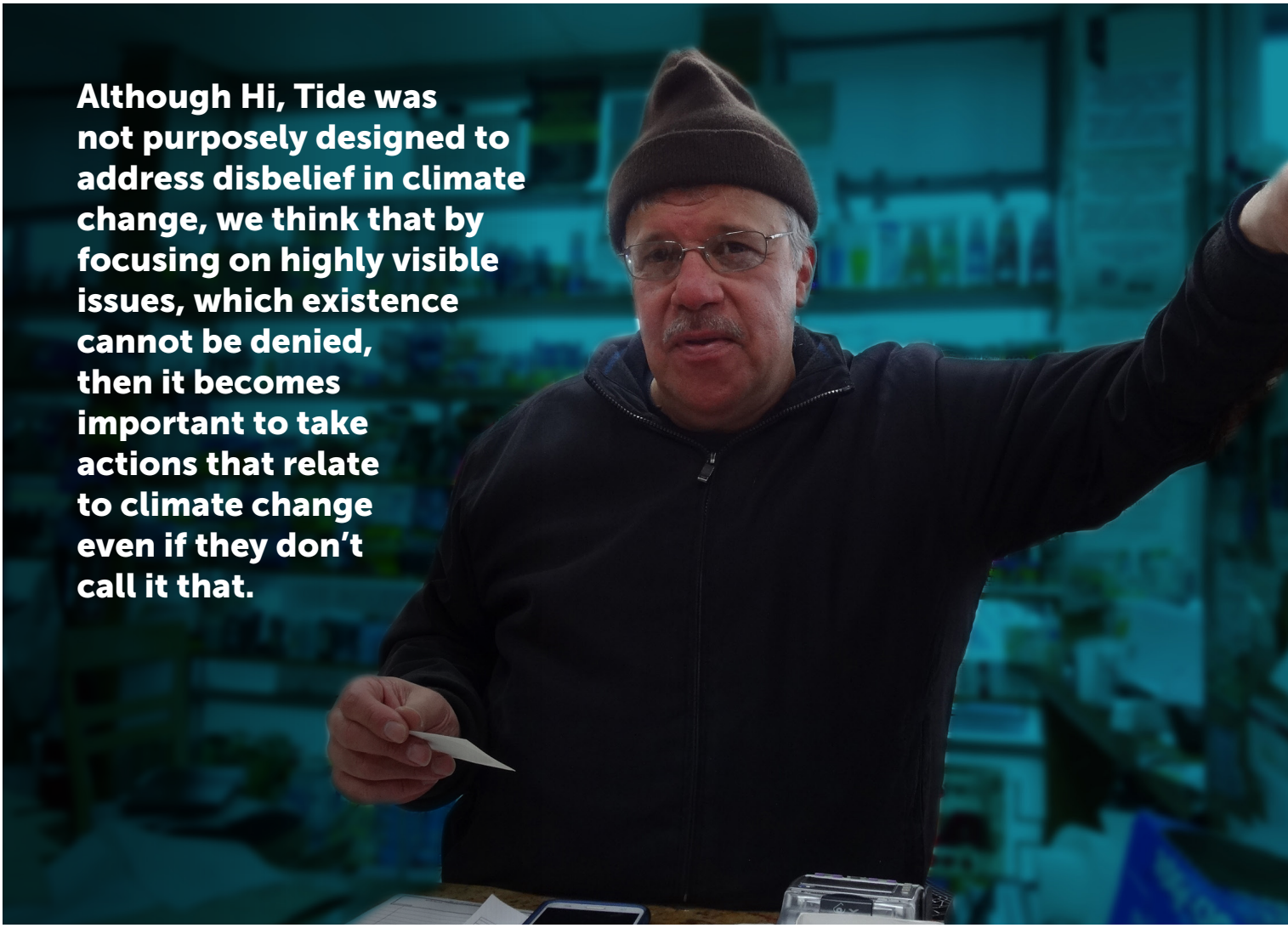
Learn more →

User testing and user feedback

Initially we tested Hi, Tide with teenagers at the RWA and the latest version was tested with business owners and their employees. We chose this group because they tend to pay more attention to outdoor areas when they tidy up their storefronts.

We also approached people walking on the boardwalk and on commercial streets. Their reactions varied. Some were enthusiastic, gave us thanks for developing this project, and offered words of encouragement. A few of them recognized the political views of Rockaway residents and stated that being a mostly republican town, a disbelief in climate change exists even if Sandy affected so many of them.

One user tester who owns a deli told us he and business owners in his street get together to call 311 and report flooding. He says 311 usually comes in less than a week with big equipment to clean the sewers. Although Hi, Tide will make it easier for them to report he gets frustrated because the same thing usually happens again after a month and whenever there is high tide. Along those lines, a lady who works at a local gift shop asked us if Hi, Tide will solve high tide. That gave us an insight on how they see the situation and its cause. It was also an opportunity for us to talk about how high tide is not solvable and sea levels will continue to rise, but trash, which makes flooding in their town worse, is.



While testing this tool we realized that, in terms of tidal flooding, different areas of Rockaway have very different experiences. One block may be totally flooded while the other is not. This was obvious during one of our visits after it had been pouring for hours.

People were clearly struggling finding their way around the street and commercial area. Puddles were everywhere and we could hear their complaints.

Two days after and a few blocks away from this area it was a different story. The sun was out and people were walking, shopping and doing sports, some of those who we approached said flooding is not a problem for them or they reported it as "normal". A general feedback from people who tried it, was that they will use Hi, Tide when they had a problem like that. One lady said "this will be a great tool for people who live there" referring to the blocks where we saw people struggle. For us this meant that there is a right time and right place to introduce Hi, Tide, but also a need to connect people from these different pockets in Rockaway. Although it is obvious for them where a problem ends and it starts by looking it from outside in reality the sewer system does not have clear boundaries. With the help of the wind and water trash thrown in one area may end up being a problem few blocks over.

Our goal was for the messaging system to be easy to use and simple, and this was achieved. All users found the language used was clear, the messages concise and the time required to use the tool short.

"My mom would love it! She doesn't like waiting on the phone."

A librarian at the local library believes Hi, Tide could get younger users that are not comfortable talking over the phone to report issues in their community. Most users were happy to know that it removes the need to wait in line and talk to a person over the phone. One senior citizen we approached thinks the text message system would not be of use for her as calling over the phone is her prefered method for contacting 311. Taking into consideration that some people do prefer a conversational solution, we think a future opportunity could be to offer an automated phone message system as part of Hi, Tide.

LEARNINGS & CONCLUSIONS

Through our whole process we faced different challenges that came along with learnings about the community, the problem and our intervention, here are our main takeaways of this journey.

What we did well...

With Hi, Tide, we were able to focus users' attention in something that is easily recognizable as a problem in their neighborhood.

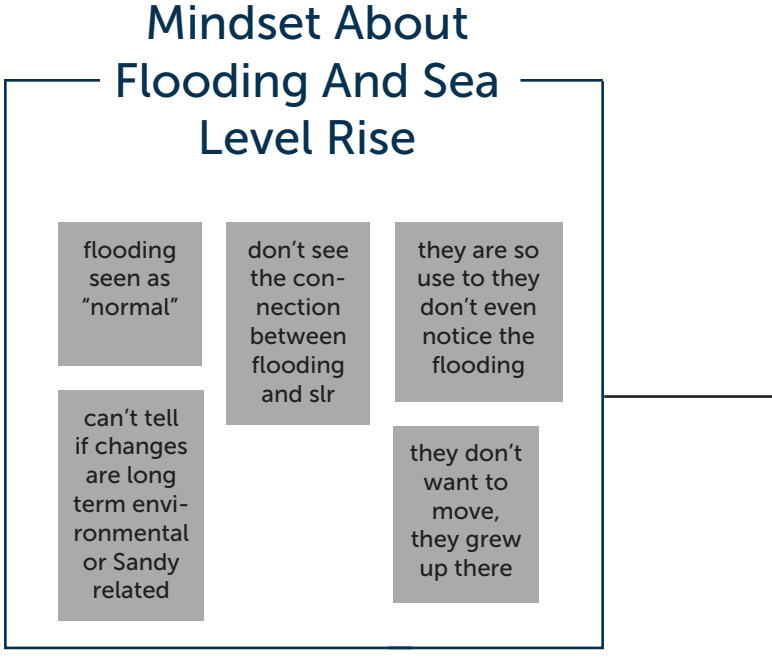
Scientifically speaking, human brains aren't wired to respond easily to large, slow-moving threats.[8] Climate change and sea level rise are two examples of threats that most people see happening very slowly. And because of the global proportions of the problem it is hard for individuals to identify ways to take actions that will make a difference. By focusing in a highly visible issue that people have agency on and that relates to sea level rise we get people to pass this barrier and start taking action. This could be true even if users in the area do not see climate change as a real problem.

We worked with the community and Hi, Tide was born from the ideas they shared with us during community workshops.

During workshops at the Rockaway Waterfront Alliance, students identified trash as a main issue in the community that makes flooding worse. They had also seen the importance of community organizing to report pressing local issues to 311. The combination of these two ideas resulted in Hi, Tide.

We created an opportunity to raise people's understanding of the problem.

When talking to some users the question about solving tide came up and it was a perfect opportunity to have the conversation about what is possible and what is not. High tide cannot be solved and sea levels will continue to increase, however, keeping trash away from the street and into the sewer can be.



8 Harman, Greg. Your brain on climate change: why the threat produces apathy, not action. theguardian.com, November 2014

Learnings. From community workshops, field research and interviews conducted in Miami and Rockaway.

But there is room for improvement...

Engage with a varied audience early on.

Working with teenagers at the Rockaway Waterfront Alliance was key in creating Hi, Tide. But given that this communication network is for any Rockaway resident with access to text messaging service to use, we could have benefited from developing strong relationships with a more diverse group of people in the area from early on.

The timing in which to present Hi, Tide to residents is essential.

We visited the area on a day when it was pouring. Big puddles on the street caused walking around town to be a struggle. We heard people complaining or making comments about the water covering the street. A couple of days after, when it was sunny again, we showed Hi, Tide to people on the street and they did not seem to be concerned for flooding.

Because flooding conditions in Rockaway varies from one block to the other, a better approach could have been to work with residents or business owners of a very specific and smaller geographical location.

Our approach in working with teenagers at the Rockaway Waterfront Alliance was mainly due to their awareness on environmental issues in their neighborhood and how active they are in their community. Although working with them helped us design a tool that we think can make a difference, their houses and schools are too spread out across the peninsula and they flooding affects them very differently depending on where they are.

We could had focused on a specific topic early on in the process.

Facilitating workshops with Miami residents was an opportunity for us to learn many of the ways in which sea level rise affects people. Cars breaking down, people with limited mobility navigating flooded zones, and people not being able to go to work or school are only a few of the problems we were told about. Then, during an early interview with Wellington Chen, Executive Director of the Chinatown Partnership and one of the people who led the emergency efforts in Chinatown during Hurricane Sandy, we learned about the importance for people to know what resources are available, to request support, to offer support, and to stay informed.

These were two instances in which we could have selected a topic, start converging and researching on a deeper level. Instead we continued diverging.

No one solution will solve climate change and the issues that come with it. The challenges that Miami residents told us about ranged from language to access to medicine and civic involvement.

"A lot of people don's speak English. The information needs to be in Spanish."

"People don't call their officials."

"We need better evacuation plans."

"Sea level rise doesn't mean anything for people, lack of access to medicine of jobs do."

And finally...

Even if working under uncertainty, decisions must be made to keep the process moving and to stay on schedule.


NO
STANDING
Q22
CVS/pharmacy

NEXT STEPS

Short term goals

Our short term goal is to implement the How to Guide in the community of Rockaway. We want to offer them the complete tool to Rockaway teenagers who are actively involved in their community, and anyone interested on the topic. So they can own the communication network, use it in the best way to climate change adaptation and to keep conversations about environmental issues in Rockaway going.

Most of the teenagers at the Waterfront Rockaway Alliance are involved with technology, and they already have knowledge on environmental issues. This is an opportunity for us to pass on the tool and leave it in the community so it can continue to be developed. For them it is an opportunity to learn about new and accessible tools they can use to implement other environmental projects.

This could be implemented in local science and technology curriculums or achieved by offering a series of workshops. A local teacher told us, they kids in his school are so technologically savvy that an online based workshop or curriculum can be created. With this guide they can learn how to create a communication tool or chatbot, how to use the data collected to generate maps and how to best help their community visualize this information so they help build their understanding of the local problems.

A community leader who works with NYCHA residents, one of the most socio-economically vulnerable groups, approached us and show interest in this workshops to be offered in her community.

Long term goals

Our long term goal. Hi, Tide can be implemented in coastal and inland communities beyond Rockaway that face climate change. Saudi Arabia is an example. Because of climate change they now experience persistent rainy days. They are facing a new challenge to which the city nor the sewer system are prepared to handle making flooding an issue. Just like in Rockaway, a communication network could be used to report and map the areas where the problem persist ultimately helping them to identify actions steps to adapt to new environmental conditions.

Increasing temperatures around the globe are a reality. Citizens must be part of the climate change conversations and must work together to implement action-oriented solutions to mitigate climate change. A larger community network can help improve their understanding of the problem so they can follow up with adaptation strategies to improve the quality of life and the changing environment.

hi, tide

WOULDN'T BE POSSIBLE WITHOUT THE HELP OF

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