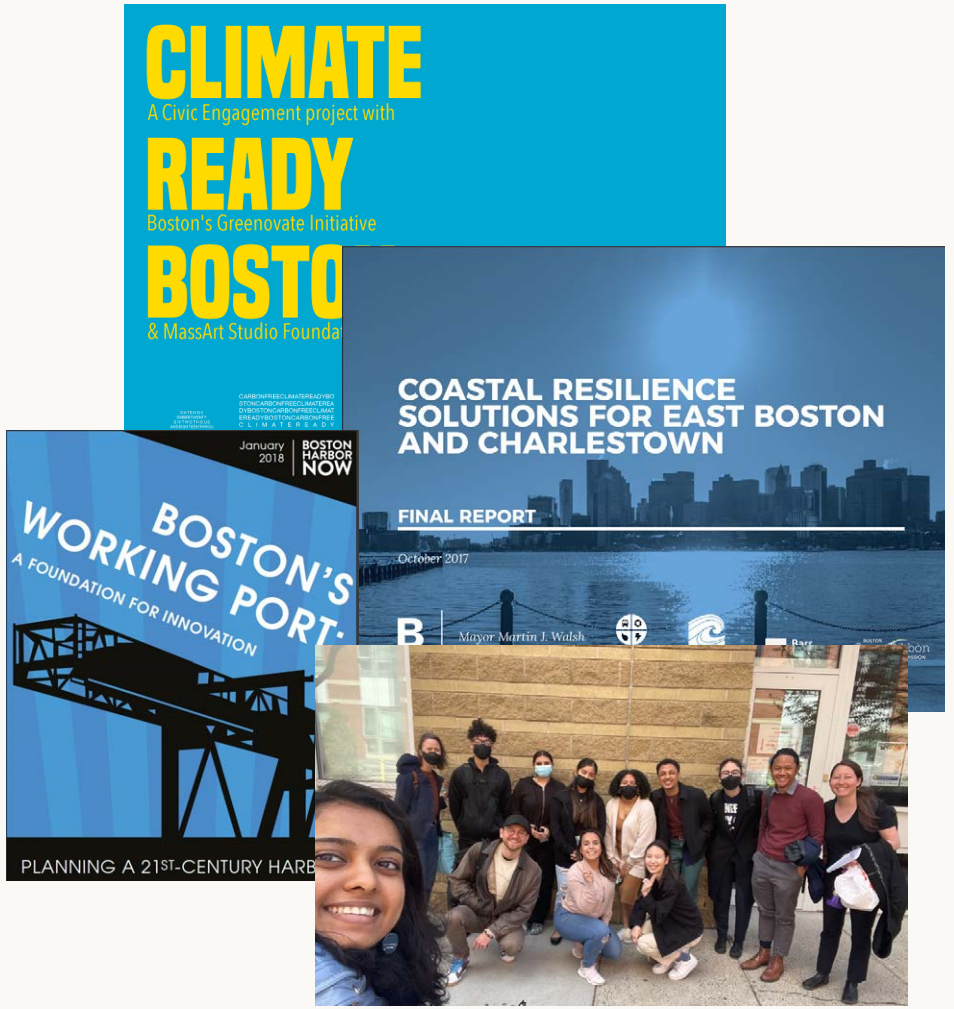
# Where the Land Meets the Water

A Kit to Teach Students about Flooding in East Boston

# How I got here

- Shorelines and waterfront areas are critical areas for flood mitigation and adaptation
- Multiple interests exist in Condor Street, and East Boston's shoreline in general
- Future flood events are going to affect youth communities in East Boston

- They need to have a medium in which their aspirations can be voiced



## Who is this for?

This toolkit is made specifically for

**Noah Youth Organizer!**

## What can you do with this kit?

You can play while learning about flooding and future green jobs. You can also design shorelines that you want to see in East Boston and use them as your advocation tool! Take a photo of your design and upload them to Instagram.

Also, don't forget to have fun!


fb: @N-YO

# Meet Maria!

She is a youth community organizer from East Boston!

She's going to take us to a journey to understand flooding in East Boston!

# Why do I need to understand flooding?

The biggest threat of flooding in East Boston is because sea-level rise is imminent,

Boston's sea levels will probably rise by at least

- 9 inches by 2030,
- 21 inches by as soon as 2050,
- and 36 inches by as soon as 2070.

**The risk of future flood events is going to impact East Boston's future generation.**

Therefore, it is important that young generations understand the threat of flooding!

# 36inch? It's only the height of a desk! Should I be concerned?



## A 9-inch flood will affect:

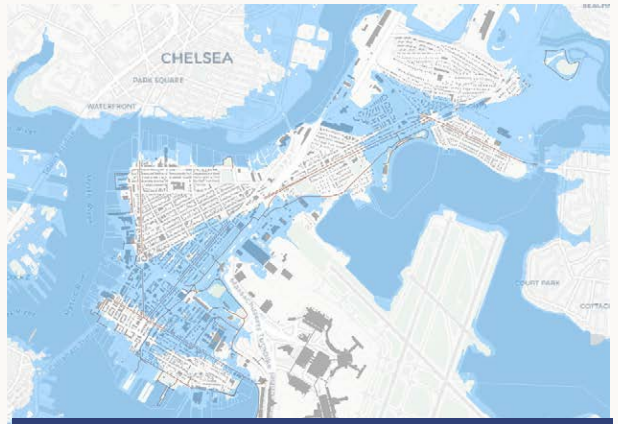
**1,098 buildings**
(14% of all buildings)

**445 households**
(18% of all households)

**2 MBTA stations**

**3 Bus stations**

**32 parks**
(48% of all parks)




## A 21-inch flood will affect:

**2,648 buildings**
(32% of all buildings)

**1,245 households**
(50% of all households)

**2 MBTA stations**

**20 Bus stations**

**41 parks**
(63% of all parks)


## A 36-inch flood will affect:

**3,232 buildings**
(42% of all buildings)

**1,434 households**
(57% of all households)

**5 MBTA stations**

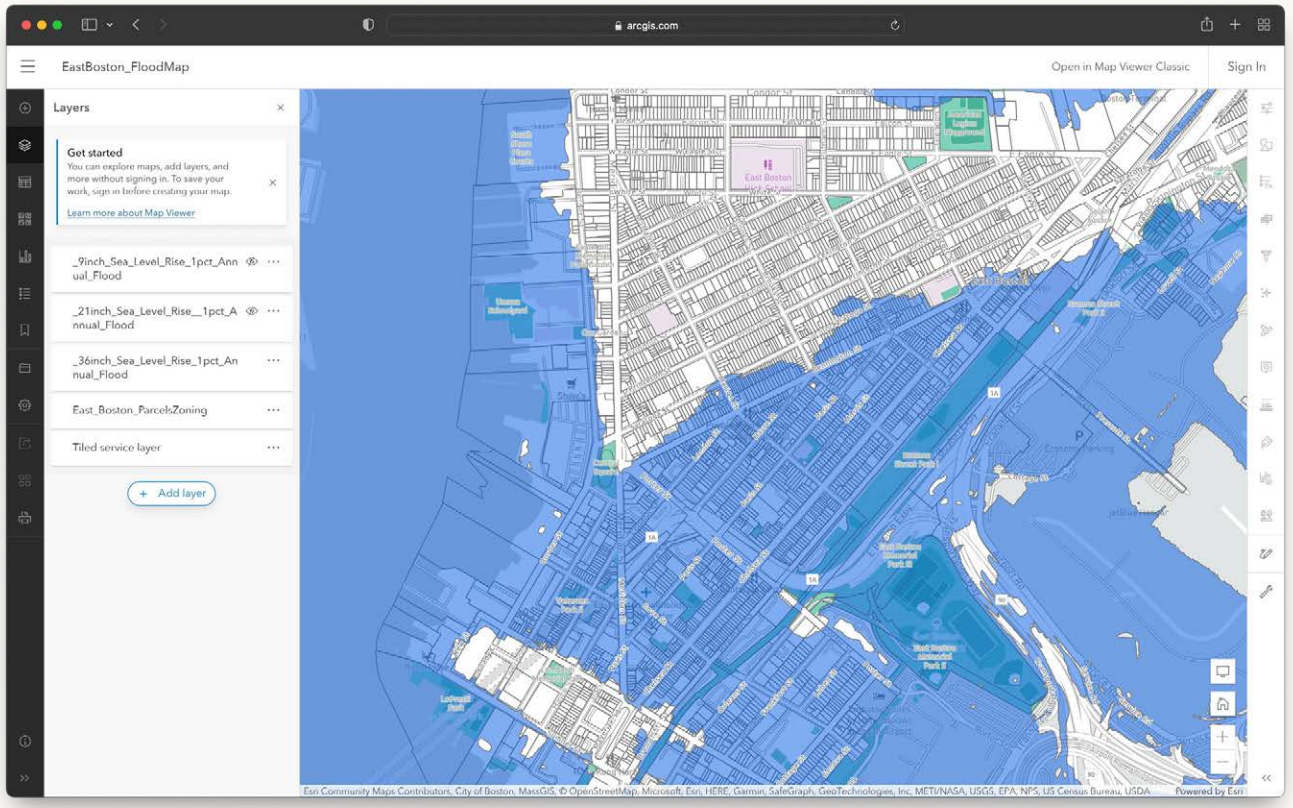
**31 Bus stations**

**48 parks**
(73% of all parks)

# Could my house get flooded?

Check the possibility of flood in your area by clicking on this link:

bit.ly/EB_flood



# What actually causes flooding?

## Wave Surge

Wind waves result from the wind blowing over a fluid surface, where the contact distance in the direction of the wind is known as the fetch. In certain random times, the waves get to a certain height that overtopes existing structures and can cause flooding.

## Erosion

Coastal erosion is the loss or displacement of land, or the long-term removal of sediment and rocks along the coastline due to the action of waves, currents, tides, wind-driven water, waterborne ice, or other impacts of storms.

## Storm Surge

Storm surge is the abnormal rise in seawater level during a storm, measured as the height of the water above the normal predicted astronomical tide. The surge is caused primarily by a storm's winds pushing water onshore.

## Sea-Level Rise

# Oh no! What can we do about this?

One of the ways that we can combat this is by creating special treatments

## Where the land meets the water!

# Many people are working on this!

- Community Organizers
- City Planners
- Local Government
- Civil Engineers
- Landscape Architects
- Emergency Responses
- Climate Scientists
- Local community committees
- And many others!

# Today, we will step into the role of a landscape architect and a civil engineer

**Maria**
Youth Organizer

**Mike**
Landscape Architect

**Mel**
Civil Engineer

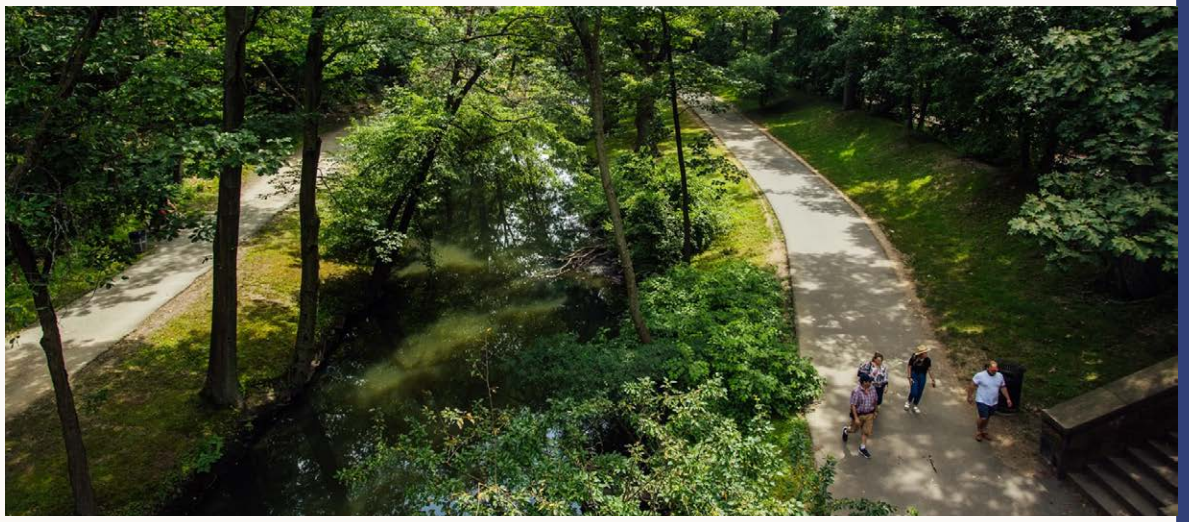
We can engage with landscape architects and civil engineers on **collaboratively designing our coastline** in **mitigating floods in East Boston**!


*Soft Edge Approach*

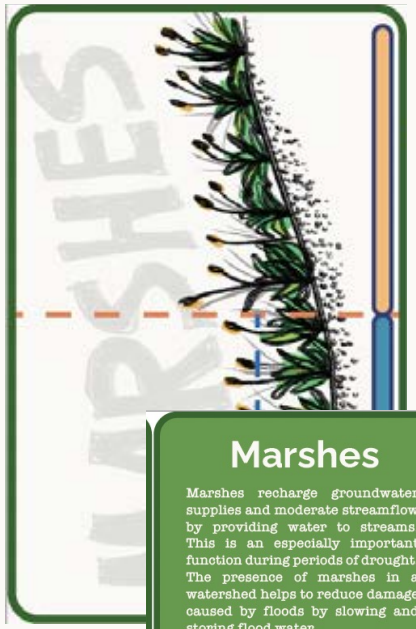

*Hard Edge Approach*

Landscape architects work with **plants, trees, and other natural features** to design outdoor spaces that are **sustainable, functional,** and **contributes to the biodiversity**

Series of parks called **"The Emerald Necklace"** in Boston utilized trees and rivers to enrich biodiversity



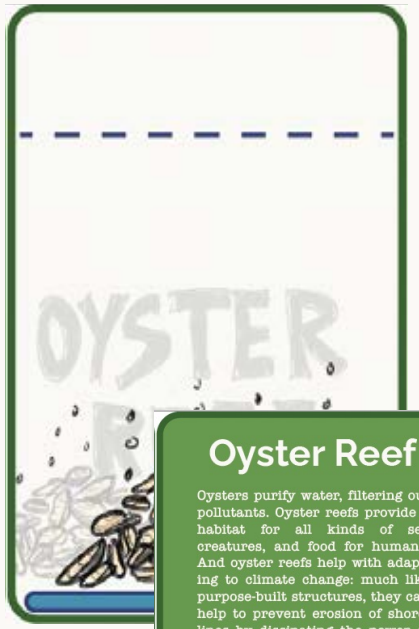
# Examples of Soft Edge Strategies




## Marshes

Marshes recharge groundwater supplies and moderate streamflow by providing water to streams. This is an especially important function during periods of drought. The presence of marshes in a watershed helps to reduce damage caused by floods by slowing and storing flood water.

- Storm Surge Damage
- Wave Damage
- Erosion Damage
- Biodiversity




## Oyster Reef

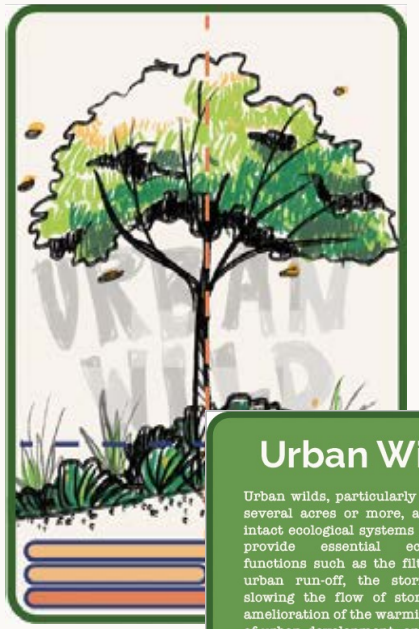
Oysters purify water, filtering out pollutants. Oyster reefs provide a habitat for all kinds of sea creatures, and food for humans. And oyster reefs help with adapting to climate change: much like purpose-built structures, they can help to prevent erosion of shorelines by dissipating the power of waves.

- Storm Surge Damage
- Wave Damage
- Biodiversity


## Floating Wetland

Floating treatment wetlands (FTWs) are a useful tool used to increase water quality of ponds and lakes. Adding FTWs to a pond can also increase the biodiversity by providing additional wildlife refuge. The shelter provided by the floating mat also allows sediment and elements to settle by reducing turbulence and mixing by wind and waves.

- Storm Surge Damage
- Wave Damage
- Biodiversity

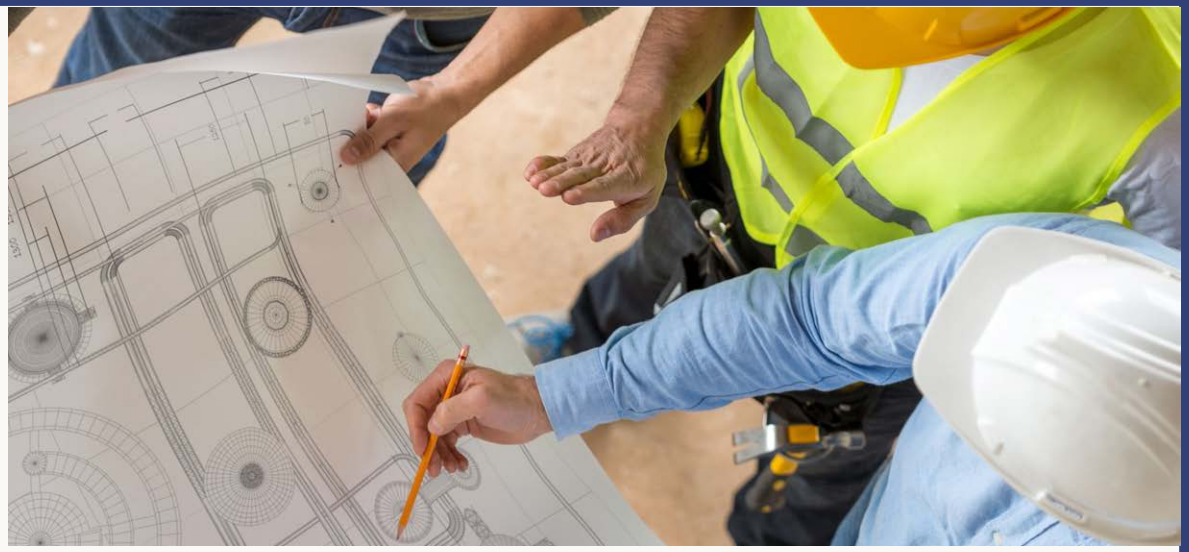


## Urban Wild

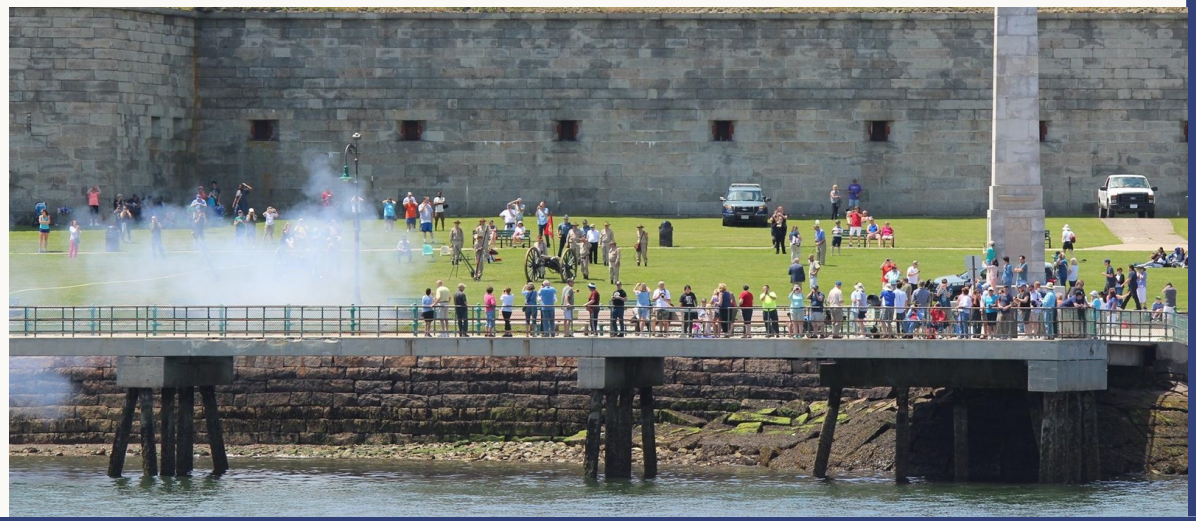
Urban wilds, particularly those of several acres or more, are often intact ecological systems that can provide essential ecosystem functions such as the filtering of urban run-off, the storing and slowing the flow of stormwater, amelioration of the warming effect of urban development, and generally benefiting local air quality

- Storm Surge Damage
- Wave Damage
- Erosion Damage
- Biodiversity

Civil engineers work with **infrastructures such as walls, bridges, and flood barriers** to make neighborhoods **resilient against water surges and flooding**



**Castle Island** utilized sea walls to **protect heritage buildings** from erosion and floods

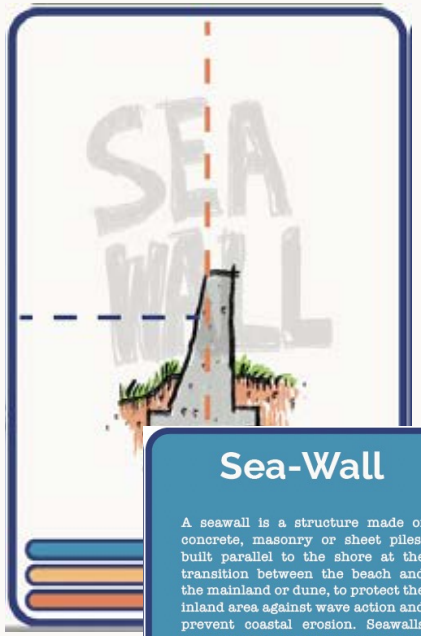


# Examples of Hard-Edge Strategies


## Dikes

The primary function of sea dikes is to protect low-lying, coastal areas from inundation by the sea under extreme conditions. These structures have a high volume which helps to resist water pressure, sloping sides to reduce wave loadings and crest heights sufficient to prevent overtopping by flood waters. They may also be referred to as dykes, embankments, levees, floodbanks and stopbanks.

- Sea-level rise Damage
- Storm Surge Damage
- Wave Damage




## Sea-Wall

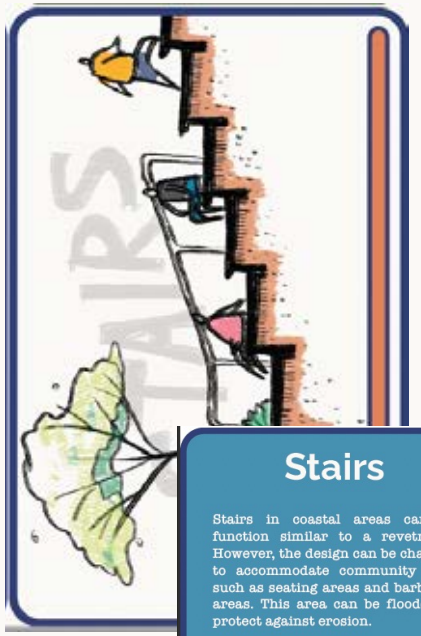
A seawall is a structure made of concrete, masonry or sheet piles, built parallel to the shore at the transition between the beach and the mainland or dune, to protect the inland area against wave action and prevent coastal erosion. Seawalls are usually massive structures designed to resist storm surges.

- Sea-level rise Damage
- Storm Surge Damage
- Wave Damage

## Revetment

A revetment is a passive structure, which protects against erosion caused by wave action, storm surge and currents. The main difference in the function of a seawall and a revetment is that a seawall protects against erosion and flooding, whereas a revetment only protects against erosion.

- Storm Surge Damage
- Wave Damage
- Erosion Damage

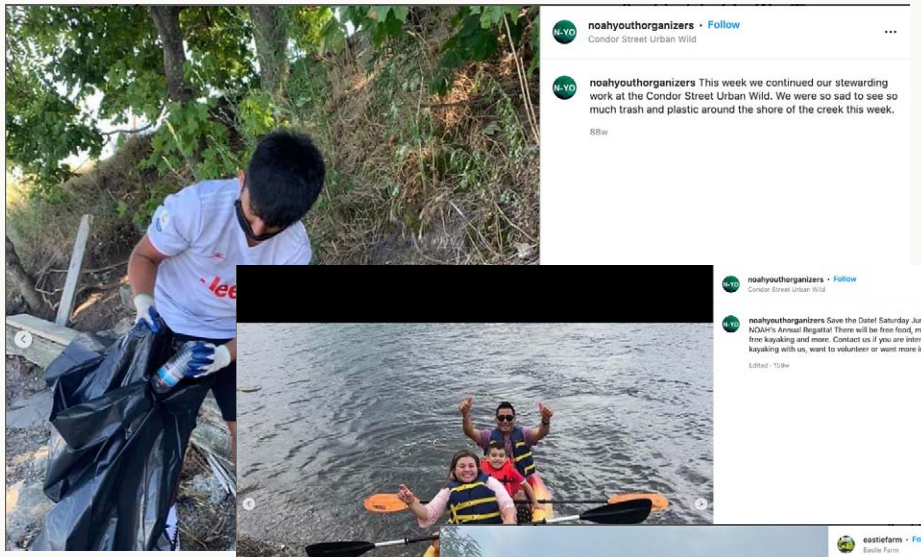


## Stairs

Stairs in coastal areas can be function similar to a revetment. However, the design can be changed to accommodate community uses such as seating areas and barbeque areas. This area can be flooded to protect against erosion.

- Storm Surge Damage
- Erosion Damage
- Community Uses

However, coastlines can and should be utilized by the community as well. Combining flood protection measures with **public activities** makes a coastline **active, maintained, and enjoyable!**




ig: @N-YO

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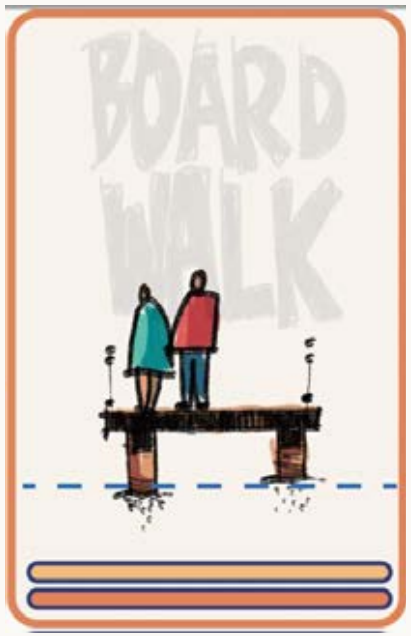
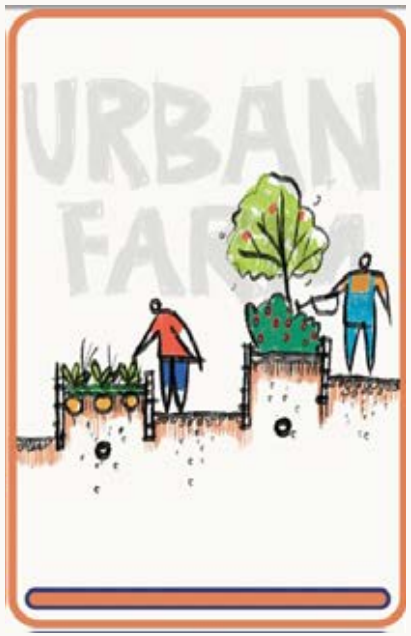
We are happy to be **engaged in activating and maintaining our shoreline!**

Do you recognize any of this community?

# Examples of Community Uses

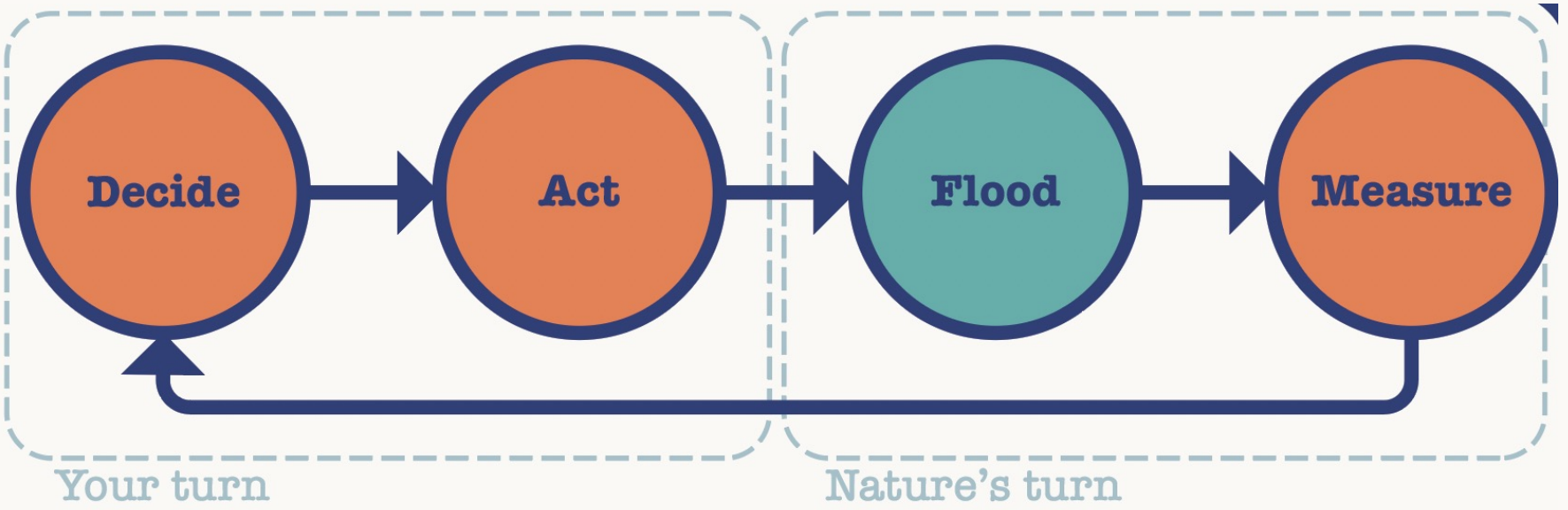




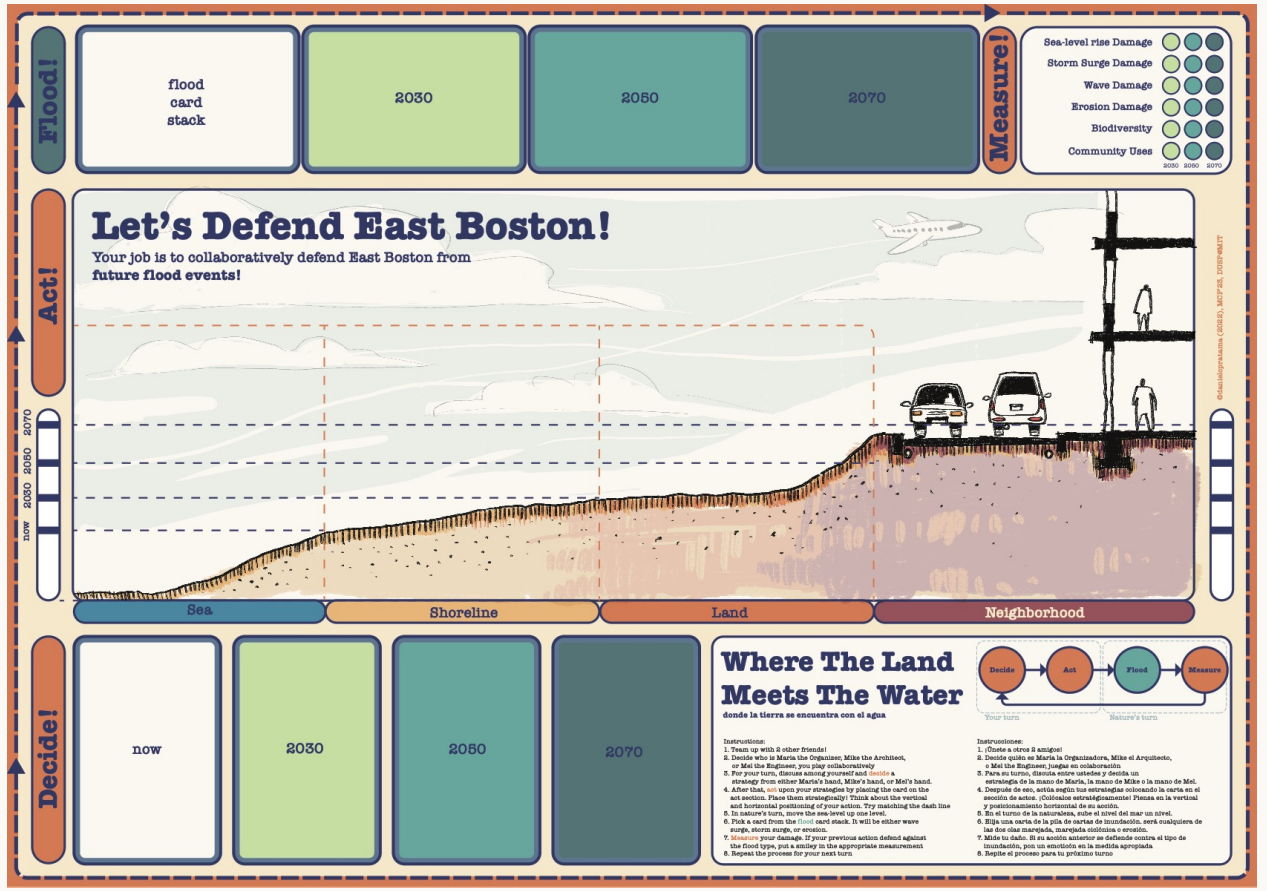



# LET'S PLAY!

# Your job is to collaboratively defend East Boston from future flood events!

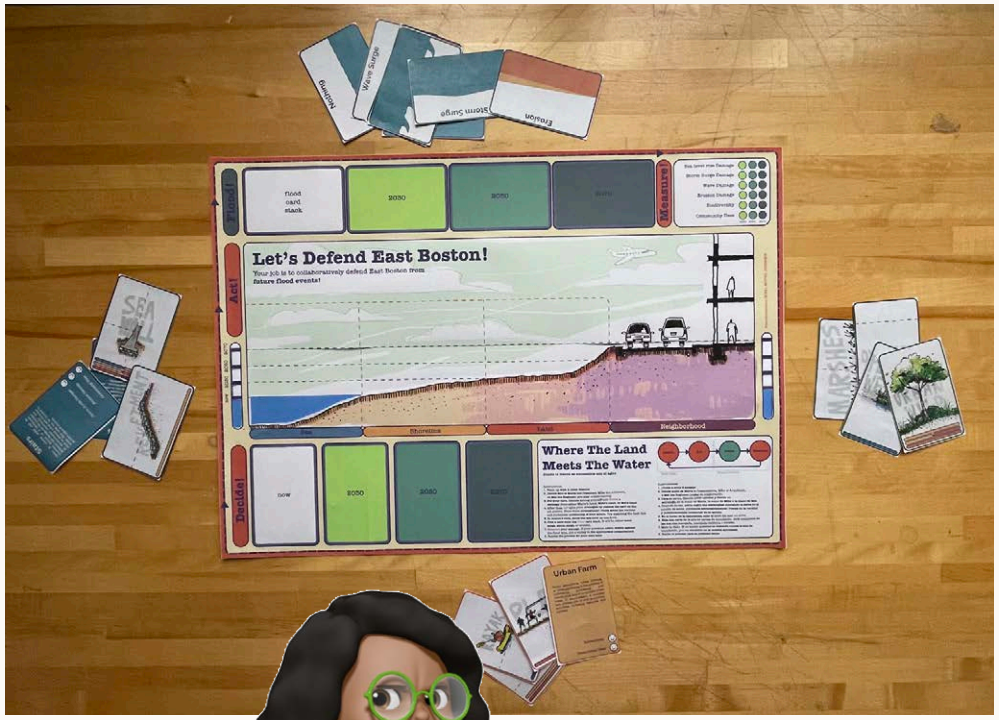


# Let's Collaboratively Defend East Boston From Flooding!



# Set up the table like this

The nature plays flood cards (grey cards)

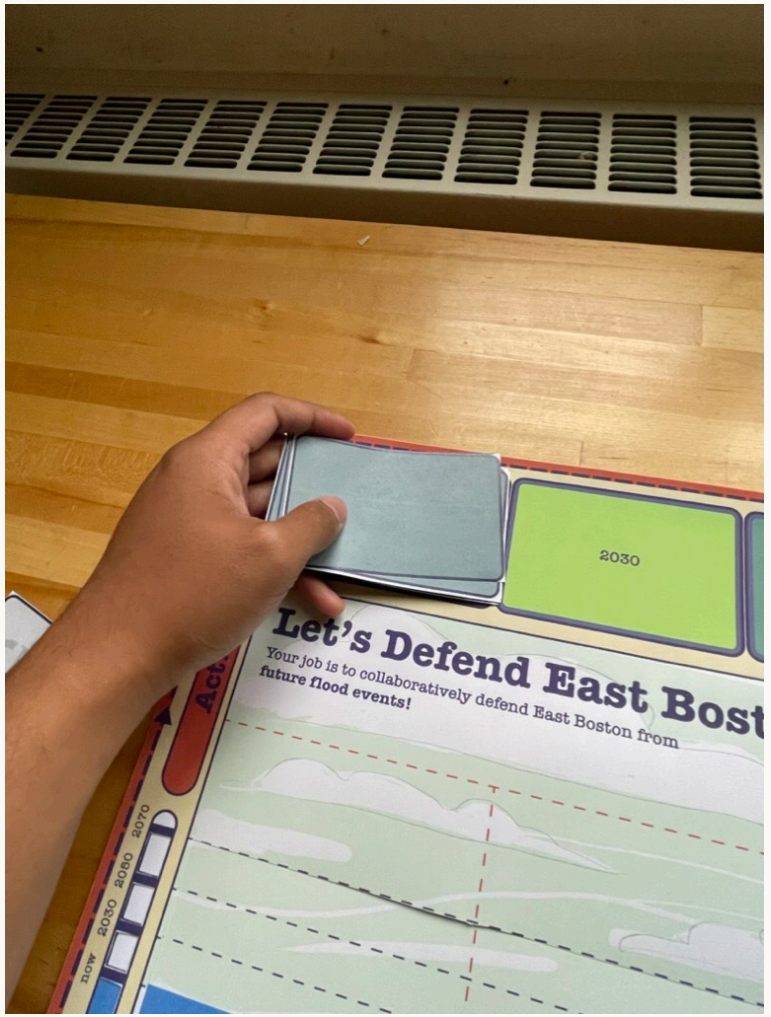


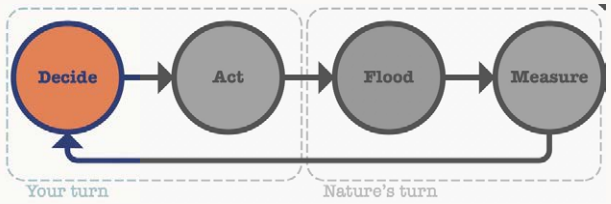

Mel plays the hard-strategies (blue cards)

Mike plays the soft-strategies (green cards)

Maria plays the community uses (orange cards)

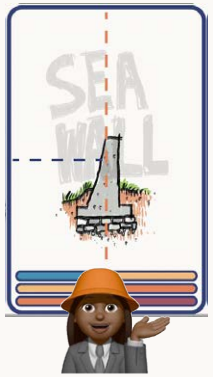
**Before starting the game, shuffle the flood cards and put them (facing down) on the upper-left corner**

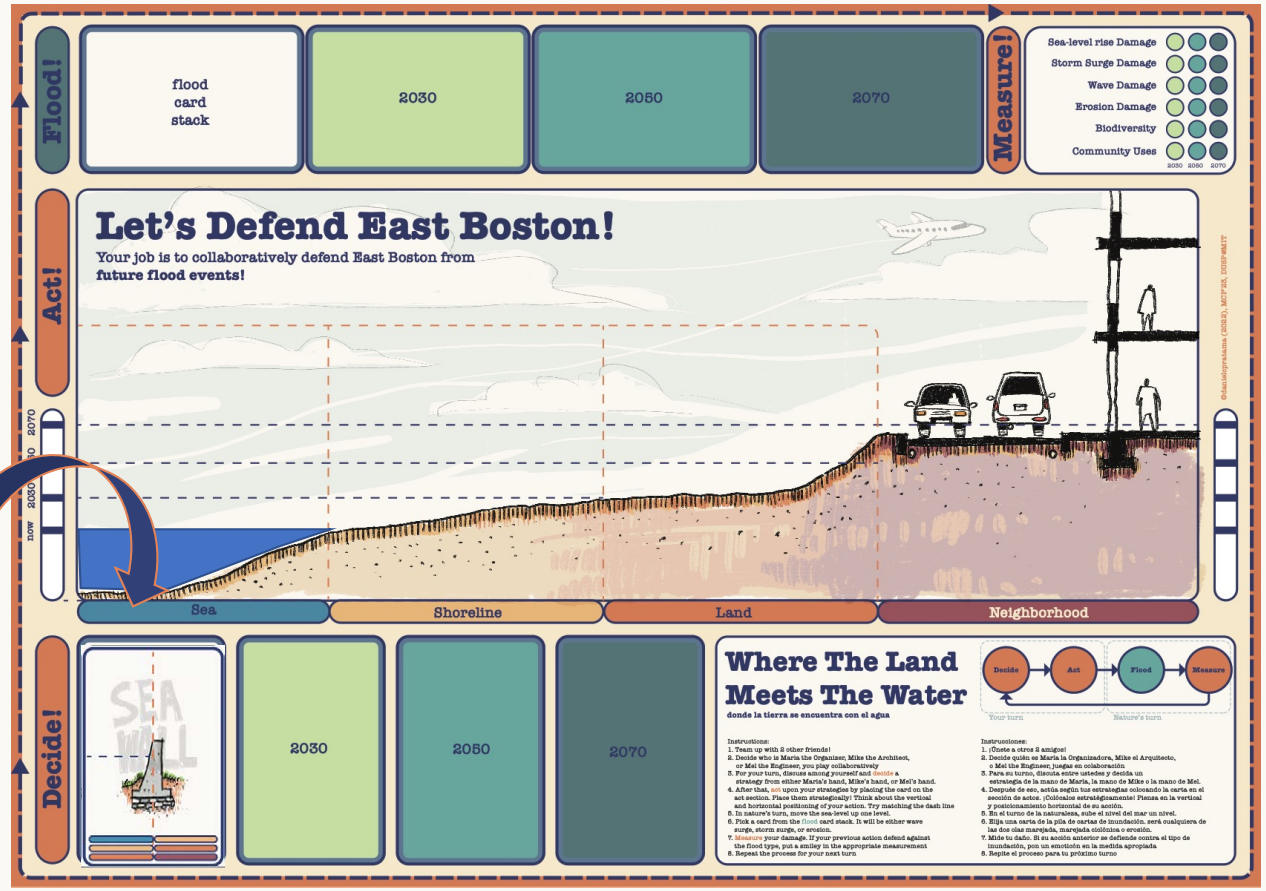


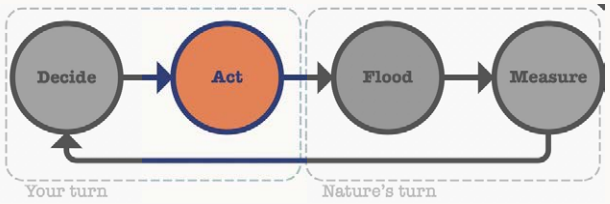



# Decide!

- Each of you must propose one strategy that you think better for the future.
- Then, out of the three options, collectively discuss and decide only one strategy to be played this turn.
- Place your decision in the strategy box

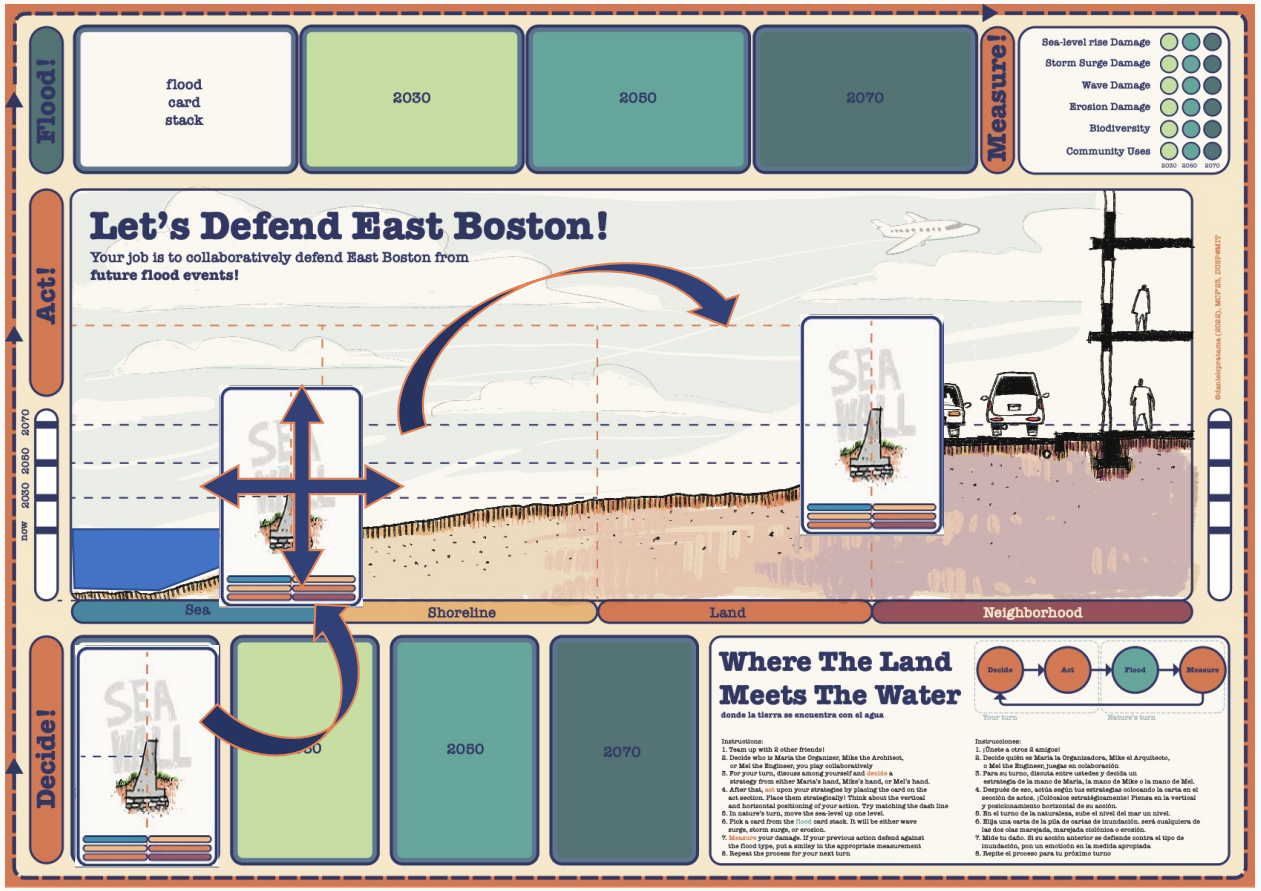



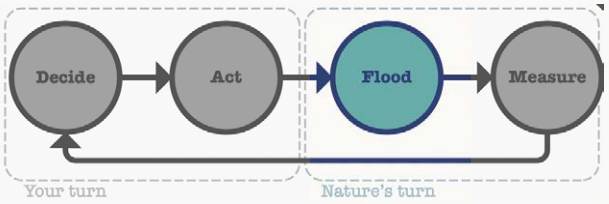





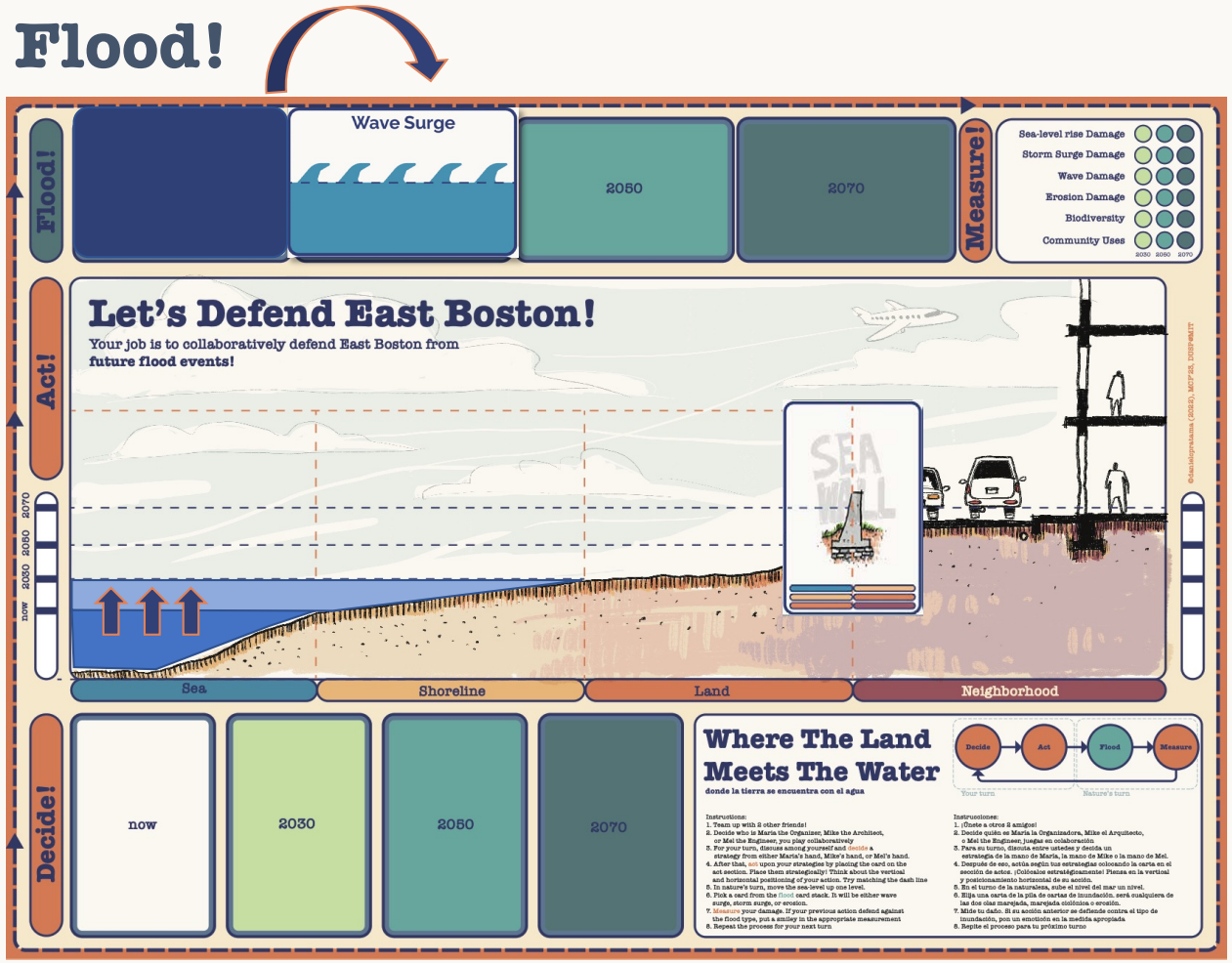

# Act!

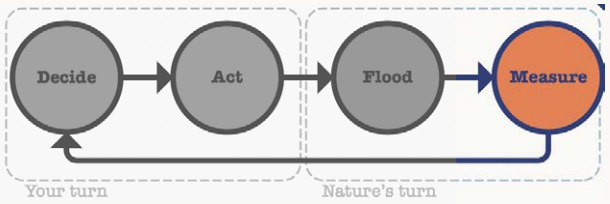
- Move your decision to the act board and place them strategically
- Notice the color on the bottom of the cards, they indicate where you can place them horizontally. You can place them on one of these segments: sea , shoreline, land, or the transition in between each. Maximum 2 cards per segment please!
- Notice the dash line on the cards, they indicate where you can place them vertically! Try matching the dash line





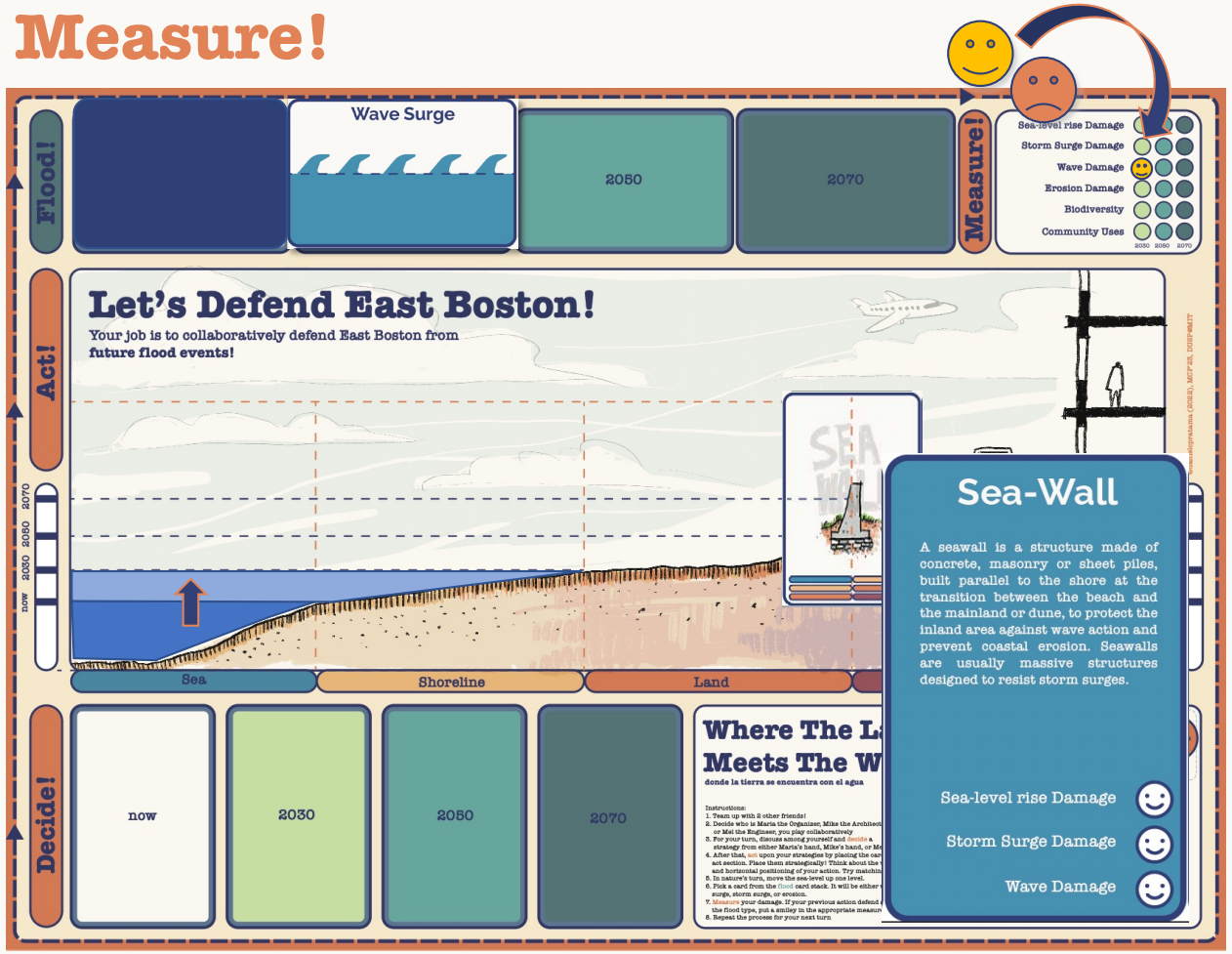

- Open one card from the flood stack and see what happens!
- Check if your previous strategy protects against this type of flooding
- In this turn, the sea level is going to rise one level by pulling the sea paper upward
- Check if your strategy placement is taller or lower than the sea-level rise

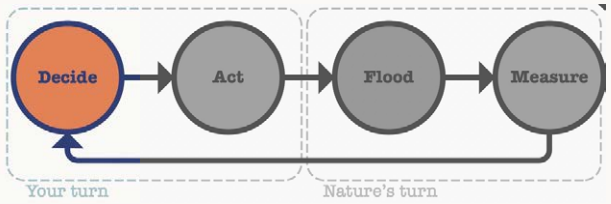





- Flip the card to see what a sea wall defend against.
- If you successfully defend the neighborhood from the flood events, draw a smiley face on the appropriate circle. If your strategy do not match the event, draw a sad face
- If your strategy placement is above the current sea level, draw a smiley face in the sea-level damage circle.

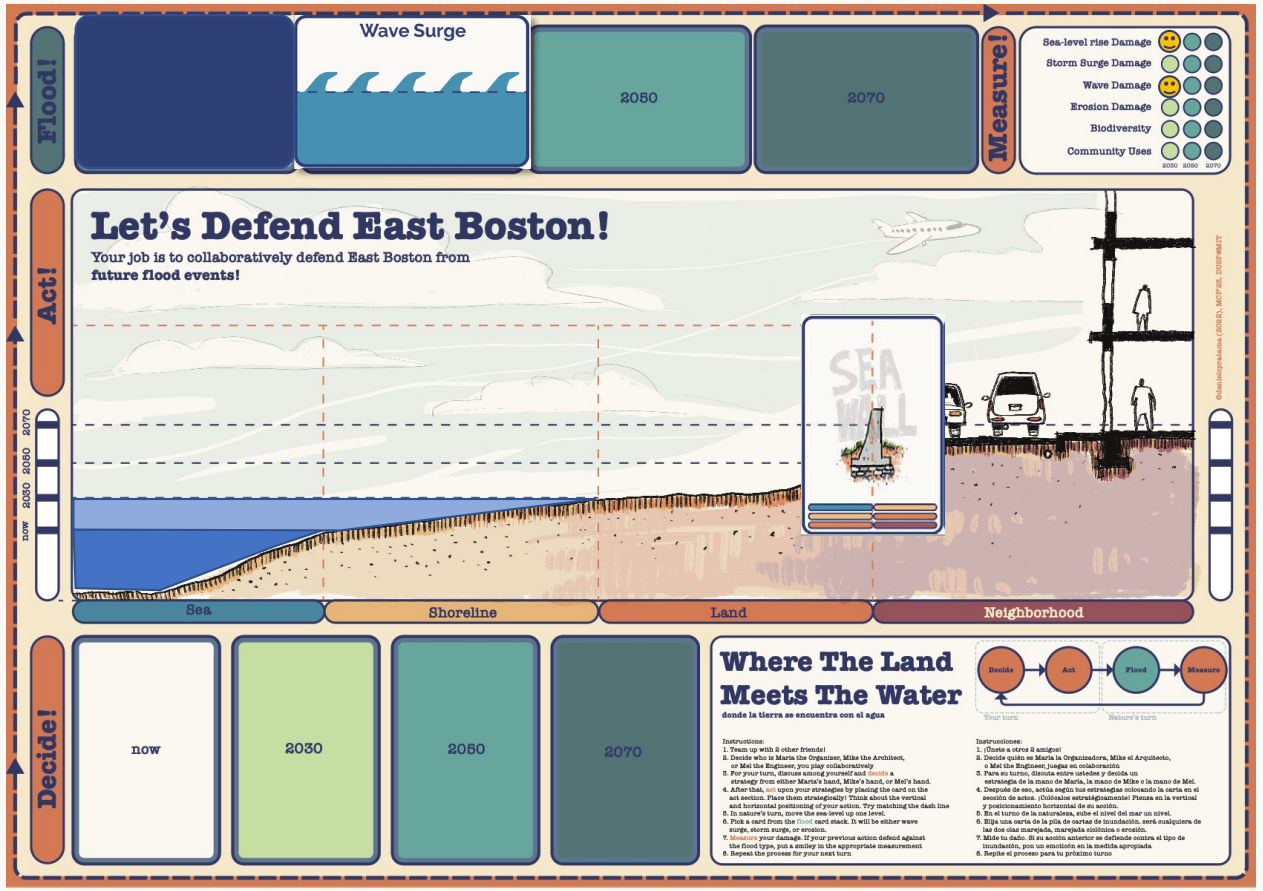
# Measure!






# Repeat!

- Repeat the game until 2070! (not the real 2070)
- Try to balance sea protection with biodiversity and community uses!

# Good job, you're done!
# Did you save East Boston?

Check again our design proposal:

- Does our design contribute to **biodiversity**?
- Does our design support **community use**?
- Does our design protect against **storm surges**?
- Does our design protect against **waves**?
- Does our design protect against **erosion**?

- Do you think you want to live next to this shoreline?

# What if ?

How would you design differently,

- If we know what is going to happen next?
- If we can have more than four strategies?
- If we are not limited by time constraints?
- If we can propose our own strategies?

# What do we learn by playing this game?

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