

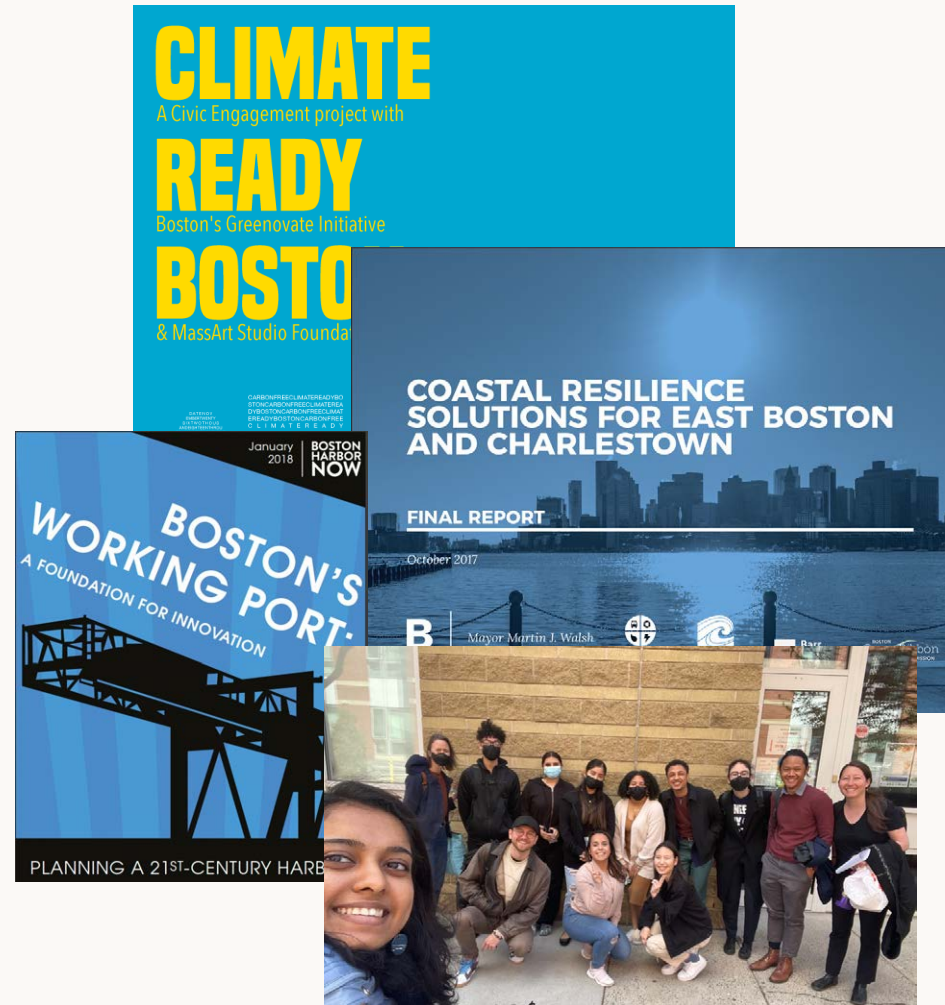


Where the Land Meets the Water

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 advocacy 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:

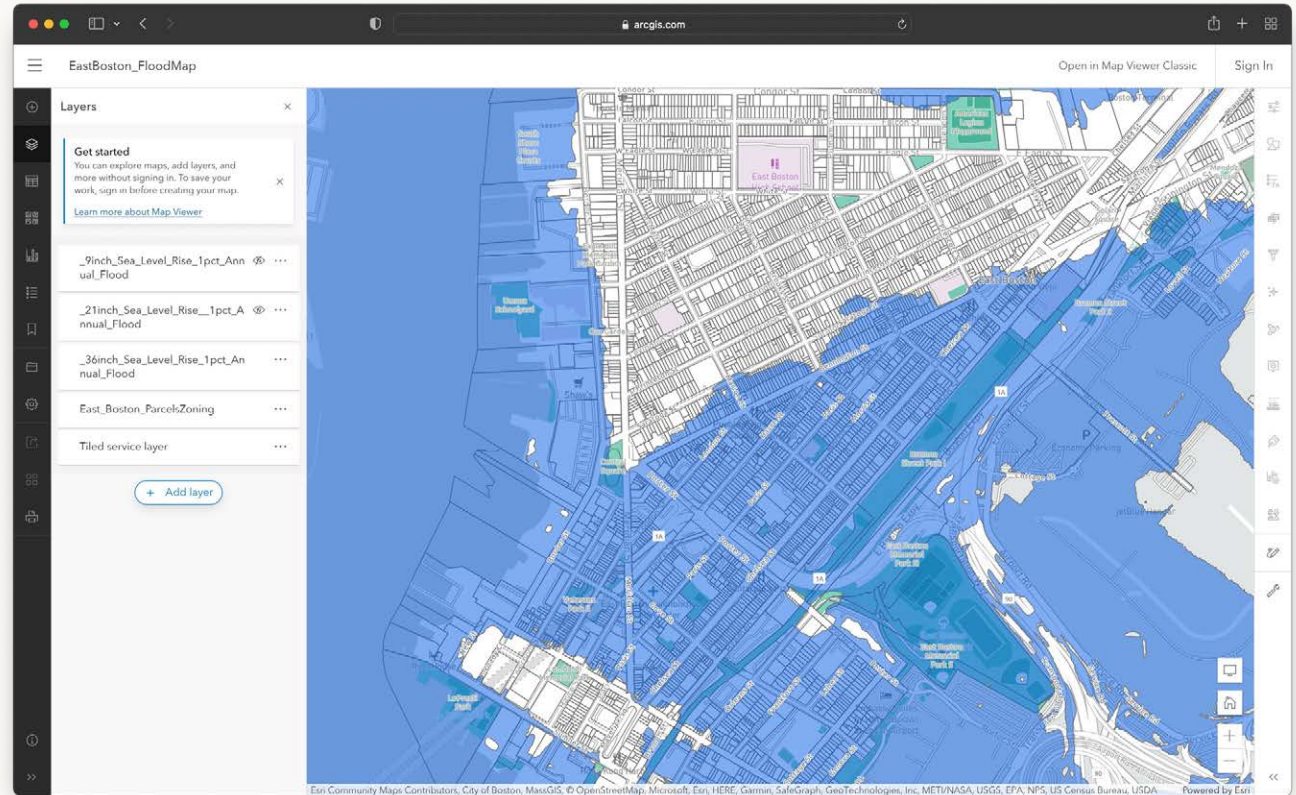
- 3,232 buildings**
(42% of all buildings)
- 1,434 households**
(57% of all households)
- 5 MBTA stations**
- 31 Bus stations**
- 48 parks**
(73% of all parks)



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!**



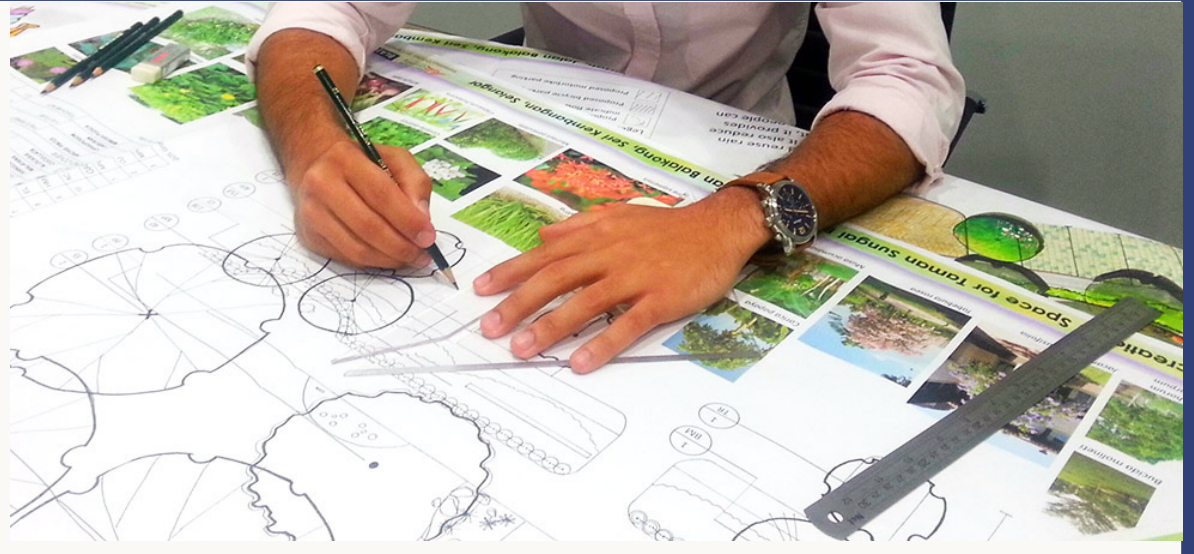
Soft Edge Approach



Hard Edge Approach



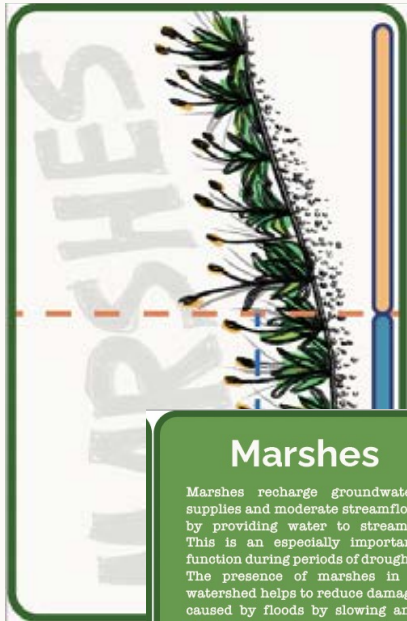
Landscape architects work with **plants, trees, and other natural features** to design outdoor spaces that are **sustainable, functional, and contributes to the biodiversity**



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



Examples of Soft Edge Strategies



Marshes

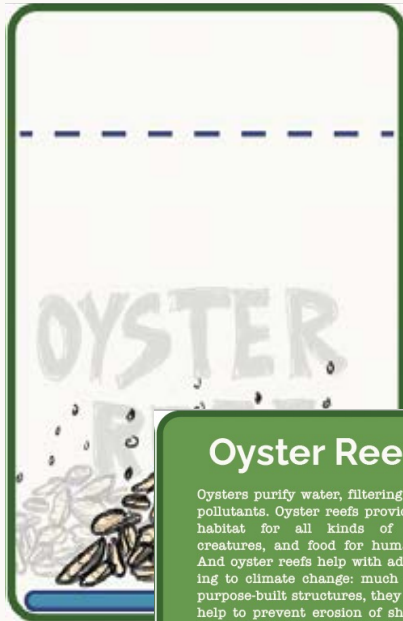
Marshes recharge groundwater supplies and moderate streamflow by providing water to streams. This is an especially important function during periods of drought. The presence of marshes in a watershed helps to reduce damage caused by floods by slowing and storing flood water.

Storm Surge Damage 😊

Wave Damage 😊

Erosion Damage 😊

Biodiversity 😊



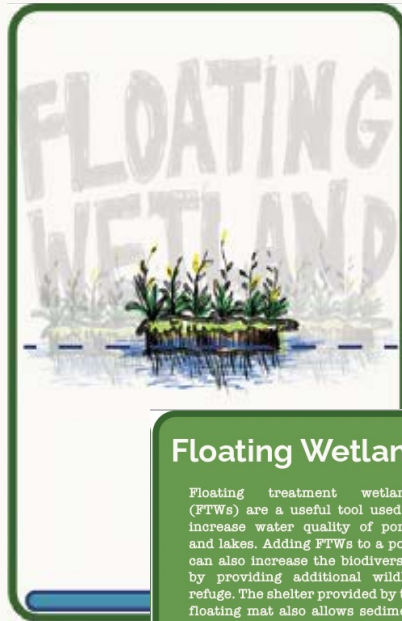
Oyster Reef

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 😊



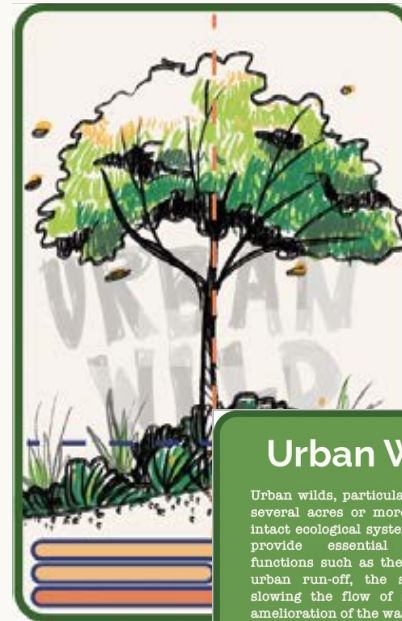
Floating Wetland

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



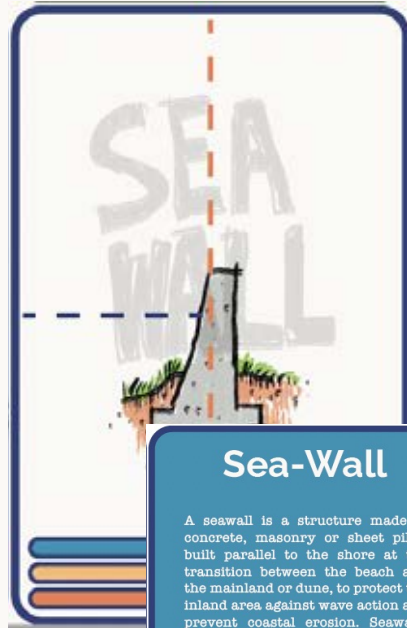
Examples of Hard-Edge Strategies



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.

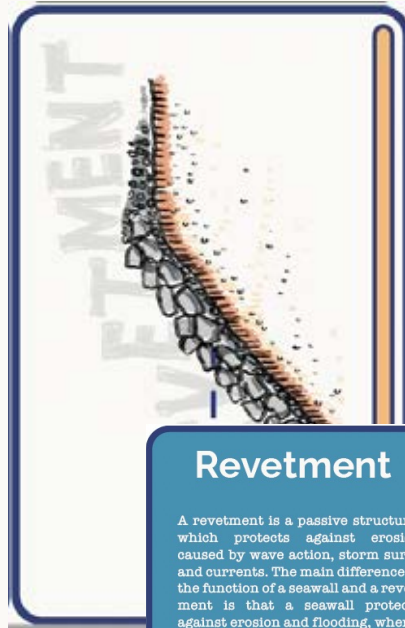
- Sea-level rise Damage 😊
- Storm Surge Damage 😊
- Wave Damage 😊



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.

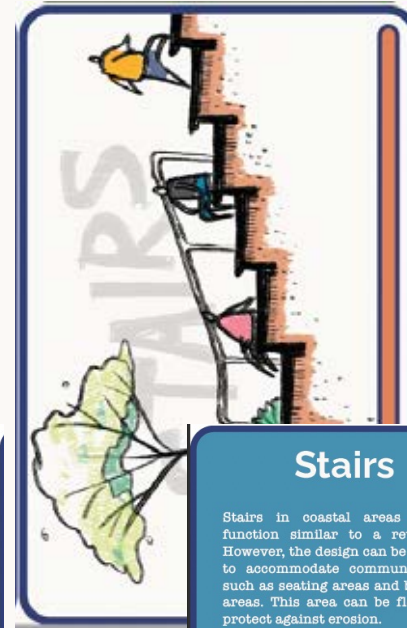
- Sea-level rise Damage 😊
- Storm Surge Damage 😊
- Wave Damage 😊



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 barbecue 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!**

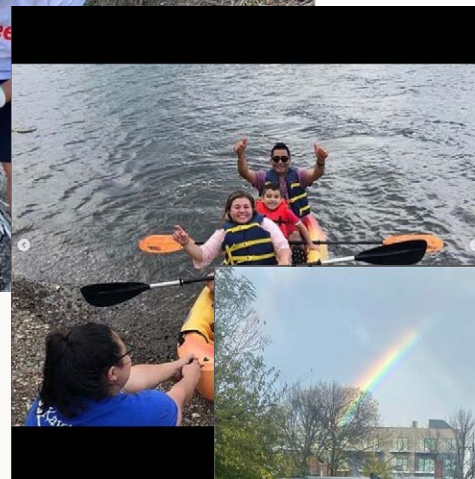


We are happy to be engaged in activating and maintaining our shoreline!

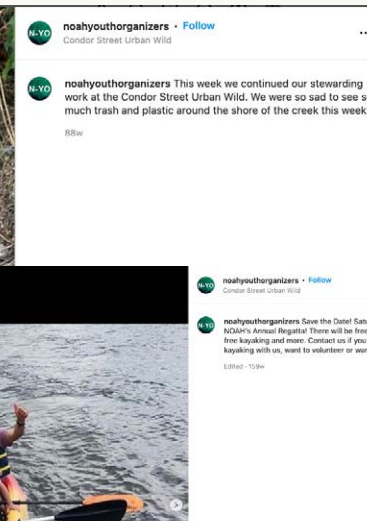
Do you recognize any of this community?



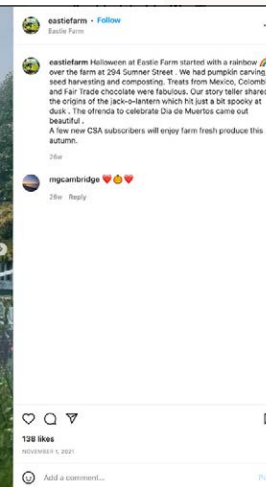
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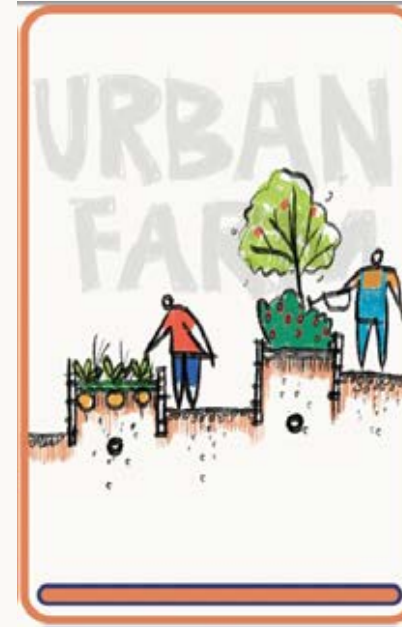
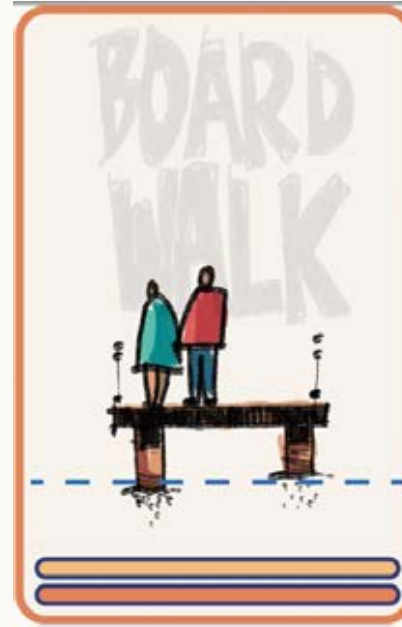
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ig: @eastie_farms



Examples of Community Uses

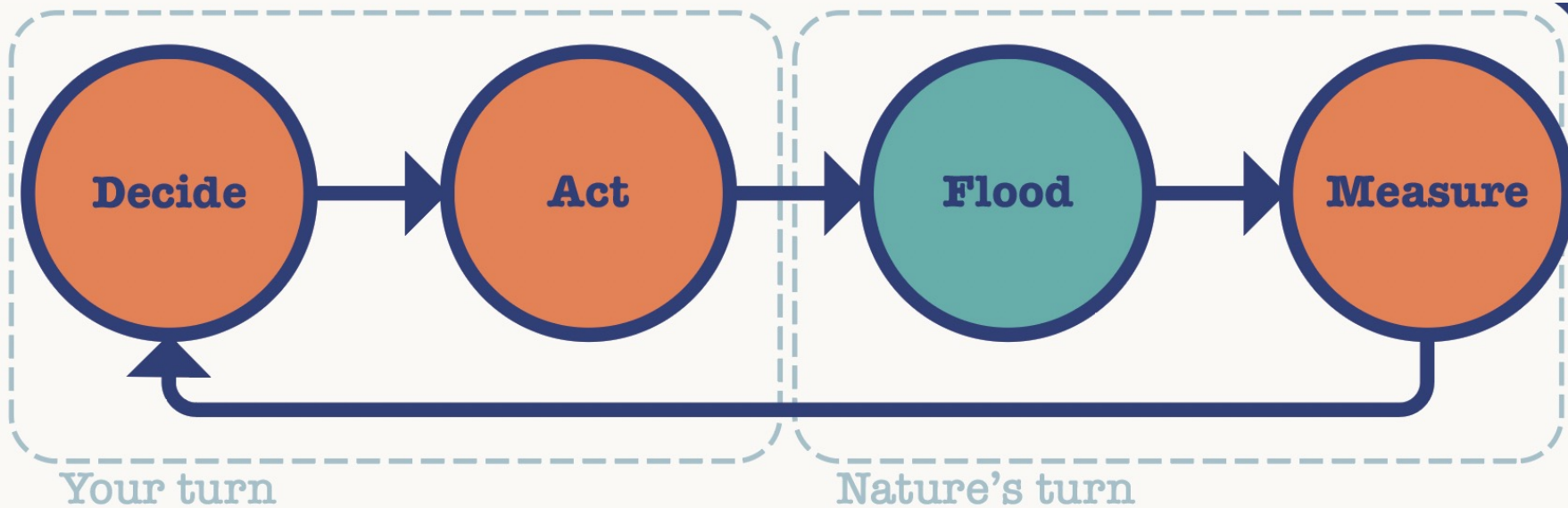




LET'S PLAY!



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



Let's Collaboratively Defend East Boston From Flooding!



Flood!

flood card stack

2030

2050

2070

Measure!

Act!

Let's Defend East Boston!

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

Measure!

Decide!

now

2030

2050

2070

Measure!

Where The Land Meets The Water

donde la tierra se encuentra con el agua

Instructions:

1. Team up with 3 other friends!
2. Decide who is Maria the Organizer, Mike the Architect, or Mel the Engineer, you play collaboratively
3. For your turn, discuss what you need and decide a strategy from either Maria's hand, Mike's hand, or Mel's hand.
4. After that, lay upon your strategy by placing the card on the act section. Please think strategically! Think about the vertical and horizontal positioning of your action. Try matching the death line
5. In nature's turn, move the sea-level up one level.
6. Pick a card from the "Flood" card stack. It will be either wave surge, storm surge, or erosion.
7. Simulate your damage. If your previous action helped against the flood type, put a smiley in the appropriate measurement
8. Repeat the process for your next turn.

Your turn Nature's turn

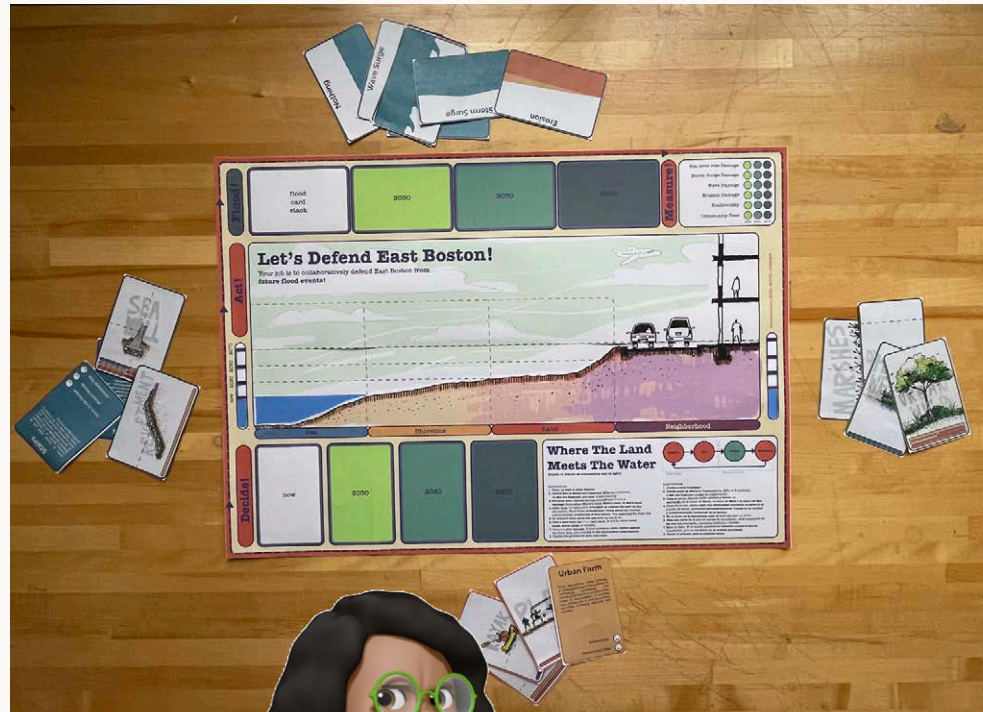
Instructions:

1. (Osteo a otro 3 amigos)
2. Decida quién es María la Organizadora, Mike el Arquitecto, o Mel the Engineer, juegan colaborativamente
3. Para su turno, discutan qué necesitan y decidan un estrategia de la mano de María, la mano de Mike o la mano de Mel.
4. Después de eso, colóca según las estrategias colocando la carta en el sección de acción. ¡Piensen estratégicamente! Piensen en la vertical y posicionamiento horizontal de su acción.
5. En el turno de la naturaleza, mueve el nivel del mar un nivel.
6. Elige una carta de la pila de cartas de inundación: será tsunamis de las olas marejada, marejada ciclónica o erosión.
7. Mida su daño. Si su acción anterior se defendió contra el tipo de inundación, pon un smiley en la medida apropiada.
8. Repite el proceso para tu próximo turno

Set up the table like this



Mel plays the hard-strategies (blue cards)



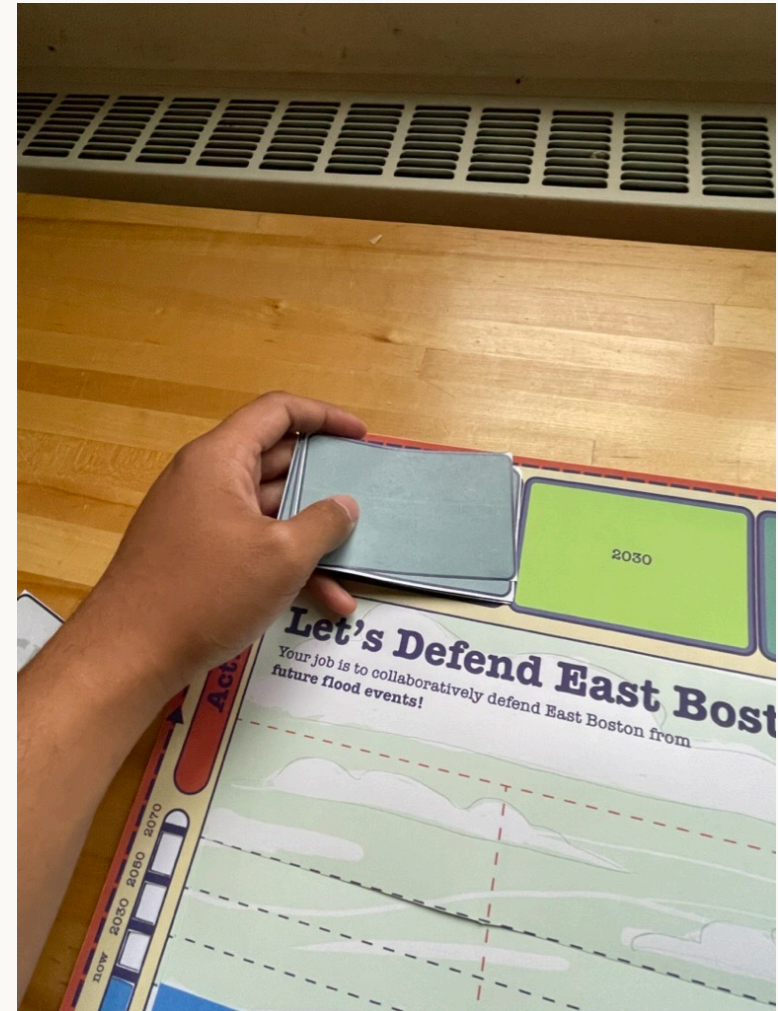
Maria plays the community uses (orange cards)

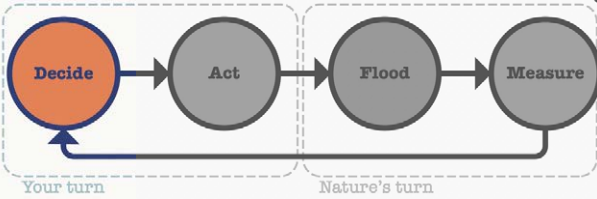
The nature plays flood cards (grey cards)



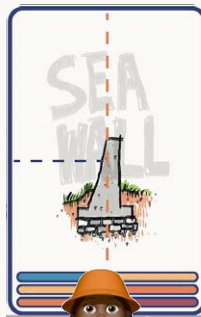
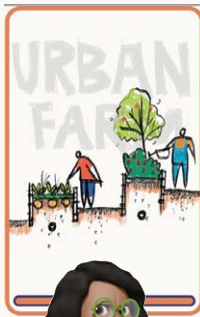
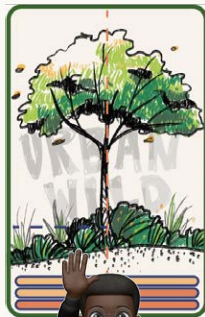
Mike plays the soft-strategies (green cards)

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





- 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



Decide!

Flood!

flood card stack

2030

2050

2070

Measure!

Let's Defend East Boston!

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

Act!

SEA WALL

2030

2050

2070

Decide!

Where The Land Meets The Water

donde la tierra se encuentra con el agua

Instructions:

1. Team up with 2 other friends!
2. Decide who is Maria the Organizer, Mike the Architect, or Mel the Engineer; you play collaboratively.
3. For your turn, discuss among yourself and decide a strategy from either Maria's hand, Mike's hand, or Mel's hand.
4. After that, use your strategies by placing the card on the act section. Place them strategically! Think about the vertical and horizontal positioning of your action. Try matching the dash line.
5. In nature's turn, move the sea level up our level.
6. Pick a card from the Flood card stack. It will be either wave surge, storm surge, or erosion.
7. Measure your damage. If your previous action defend against the flood type, put a marker in the appropriate measurement.
8. Repeat the process for your next turn.

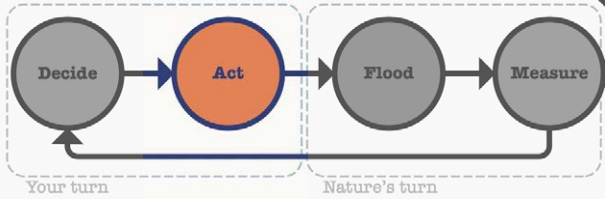
Instructions:

1. ¡Cíete a otros 2 amigos!
2. Decide quién es María la Organizadora, Mike el Arquitecto, o Mel the Ingeniero; jugar en colaboración.
3. Para su turno, discutir entre ustedes y decida un estrategia de la mano de María, la mano de Mike o la mano de Mel.
4. Después de eso, usen sus estrategias colocando la carta en el sección de acción. ¡Colócalas estratégicamente! Piensen en la vertical y posicionamiento horizontal de su acción.
5. En el turno de la naturaleza, subir el nivel del mar un nivel.
6. Elija una carta de la pila de tarjetas de inundación; será cualquier de las dos olas marejada, marejada ciclónica o erosión.
7. Mida su daño. Si en acción anterior se defendió contra el tipo de inundación, poner un marcador en la medida apropiada.
8. Repite el proceso para su próximo turno.

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- 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

Act!

Flood!

flood card stack

2030

2050

2070

Measure!

Let's Defend East Boston!

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

Act!

Decide!

Decide!

SEA WALL

2030

2050

2070

Decide!

Where The Land Meets The Water

donde la tierra se encuentra con el agua

Your turn

Measure's turn

Instructions:

1. Team up with 2 other friends!
2. Decide who is Maria the Organizer, Mike the Architect, or Mel the Engineer, you play collaboratively
3. For your turn, discuss among yourself and decide a strategy from either Maria's hand, Mike's hand, or Mel's hand.
4. After that, on your strategy by placing the card on the act section. Place them strategically! Think about the vertical and horizontal positioning of your action. Try matching the dash line
5. In Nature's turn, move the sea level up our level.
6. Pick a card from the Flood card stack. It will be either wave surge, storm surge, or erosion.
7. Measure your damage. If your previous action deflected against the flood type, put a marker in the appropriate measurement
8. Repeat the process for your next turn.

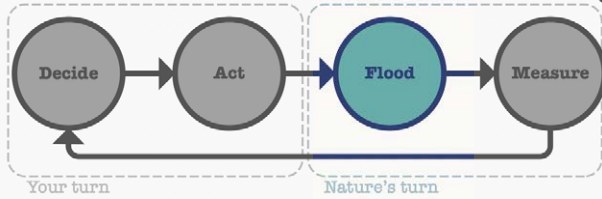
Instrucciones:

1. (Date a otros 2 amigos)
2. Decida quién es María la Organizadora, Mike el Arquitecto, o Mel el Ingeniero, juegan de colaborativo
3. Para su turno, discuta entre ustedes y decida un estrategia de la mano de María, la mano de Mike o la mano de Mel.
4. Después de eso, actúe según sus estrategias colocando la carta en el sección de acción. (Colócala estratégicamente) Piense en la vertical y posicionamiento horizontal de su acción.
5. En el turno de la naturaleza, sube el nivel del mar un nivel
6. Elija una carta de la pila de tarjetas de inundación, será cualquiera de las dos tipos marcadas, marejada ciclónica o erosión.
7. Mida su daño. Si su acción anterior se deflende contra el tipo de inundación, pon un marcador en la medida apropiada
8. Repite el proceso para tu próximo turno

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- 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

Flood!

Wave Surge

Flood!

Measure!

Sea-level rise Damage ●●●●●

Storm Surge Damage ●●●●●

Wave Damage ●●●●●

Erosion Damage ●●●●●

Biodiversity ●●●●●

Community Uses ●●●●●

Let's Defend East Boston!
Your job is to collaboratively defend East Boston from future flood events!

Act!

Decide!

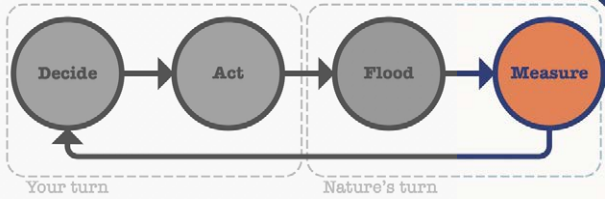
Where The Land Meets The Water
donde la tierra se encuentra con el agua

Instructions:

1. Team up with 2 other friends!
2. Decide who is Maria the Organizer, Mica the Architect, or Mel the Engineer, you play collaboratively.
3. For your turn, discuss among yourself and decide a strategy from either Maria's hand, Mica's hand, or Mel's hand.
4. After that, on your strategy by placing the card on the act section. Place them strategically! Think about the vertical and horizontal positioning of your action. Try matching the dashed line.
5. In nature's turn, move the sea level up one level.
6. Pick a card from the Flood card stack. It will be either wave surge, storm surge, or erosion.
7. Measure your damage. If your previous action defend against the flood type, put a marker in the appropriate measurement.
8. Repeat the process for your next turn.

Instrucciones:

1. ¡Júntate a otros 2 amigos!
2. Decide quién es María la Organizadora, Mica el Arquitecto, o Mel el Ingeniero, jugar en colaboración.
3. Para su turno, discuta entre ustedes y decida un estrategia de la mano de María, la mano de Mica o la mano de Mel.
4. Después de eso, sitúa según las estrategias colocando la carta en el sección de acción. ¡Colócala estratégicamente! Piense en la vertical y posicionamiento horizontal de su acción.
5. En el turno de la naturaleza, sube el nivel del mar un nivel.
6. Elige una carta de la pila de cartas de inundación, será cualquier de las dos olas marcadas, marejada súbita o erosión.
7. Mide tu daño. Si en acción anterior se defendió contra el tipo de inundación, pon un marcador en la medida apropiada.
8. Repite el proceso para tu próximo turno.



- 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!

Flood!

Wave Surge

2050

2070

Measure!

Let's Defend East Boston!

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

Act!

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.

Decide!

now

2030

2050

2070

Where The Land Meets The Water

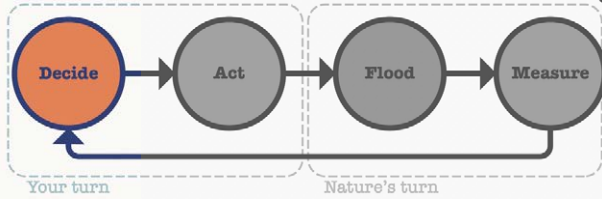
donde la tierra se encuentra con el agua

Instructions:
 1. Team up with 2 other friends!
 2. Decide who is Maria the Organizer, Mike the Architect or Mel the Engineer, you play collaboratively.
 3. For your turn, discuss among yourself and decide a strategy from either Maria's hand, Mike's hand, or Mel's hand.
 4. After that, on your strategy by placing the card and section. Place them strategically! Think about the sea horizontal positioning of your action. Try matching.
 5. In nature's turn, move the sea-level up our level.
 6. Pick a card from the Flood card stack. It will be either wave, storm surge, or erosion.
 7. Measure your damage. If our previous action defunct the flood type, put a smiley in the appropriate measure.
 8. Repeat the process for your next turn.

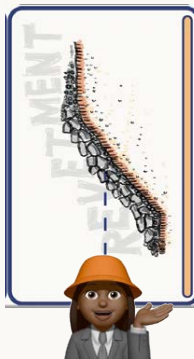
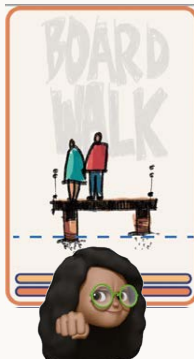
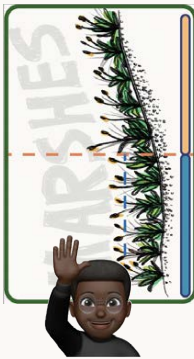
Sea-level rise Damage

Storm Surge Damage

Wave Damage



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



Repeat!

Flood!

Wave Surge

2050

2070

Measure!

Act!

Let's Defend East Boston!

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

Decide!

Decide!

now

2030

2050

2070

Measure!

Decide!

Where The Land Meets The Water

donde la tierra se encuentra con el agua

Measure!

Instructions:

1. Team up with 2 other friends!
2. Decide who is Maria the Organizer, Mike the Architect, or Mel the Engineer, you play collaboratively.
3. For your turn, discuss among yourself and decide a strategy from either Maria's hand, Mike's hand, or Mel's hand.
4. After that, on your strategy by placing the card on the act section. Place them strategically! Think about the vertical and horizontal positioning of your action. Try matching the dash line.
5. In nature's turn, move the sea level up our level.
6. Pick a card from the Flood card stack. It will be either wave surge, storm surge, or erosion.
7. Measure your damage. If your previous action defend against the flood type, put a marker in the appropriate measurement.
8. Repeat the process for your next turn.

Instructions:

1. ¡Cíete a otros 2 amigos!
2. Decidan quién es María la Organizadora, Mike el Arquitecto, o Mel the Ingeniero, jugar en colaboración.
3. Para su turno, discutan entre ustedes y decidan una estrategia de la mano de María, la mano de Mike o la mano de Mel.
4. Después de eso, según según sus estrategias colocando la carta en el sección de acción. ¡Colócalas estratégicamente! Piensen en la vertical y posicionamiento horizontal de su acción.
5. En el turno de la naturaleza, sube el nivel del mar un nivel.
6. Elige una carta de la pila de cartas de inundación, será cualquiera de las dos tipos marejada, marejada súbita o erosión.
7. Mide tu daño. Si en acción anterior se defendió contra el tipo de inundación, pon un marcador en la medida apropiada.
8. Repite el proceso para tu próximo turno.

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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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