

Sea Level Rise, Saltmarsh Expansion, and Environmental Choices in Bridgeport, CT

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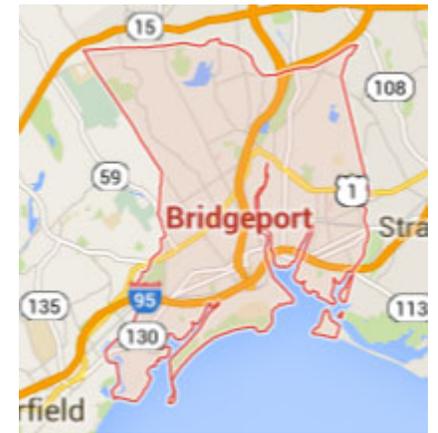
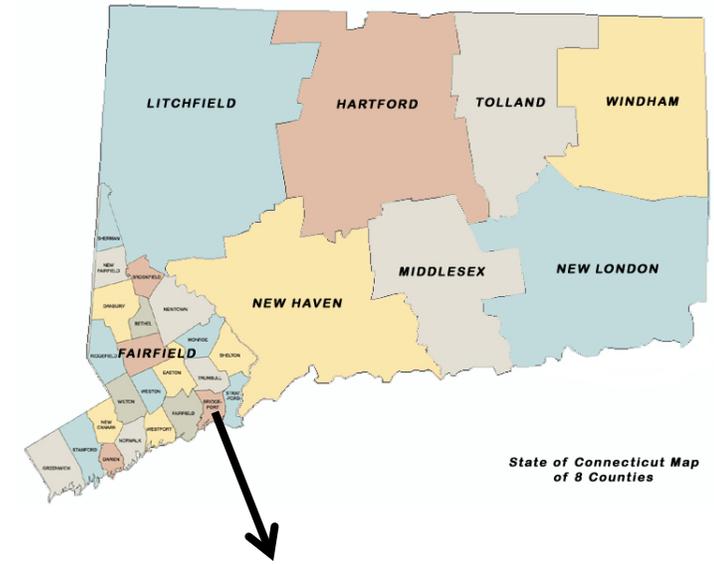
The Ecuadorian Secretary of
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Technology

Bridgeport - CT

- Largest, most populous and diverse city in CT
 - African – American
 - Hispanic
 - Other (European

- 18% of households live below poverty line
- The majority of adult population has not graduated from high -school

- Highly vulnerable to natural hazards.
- Almost all wetlands have been impacted since 1950

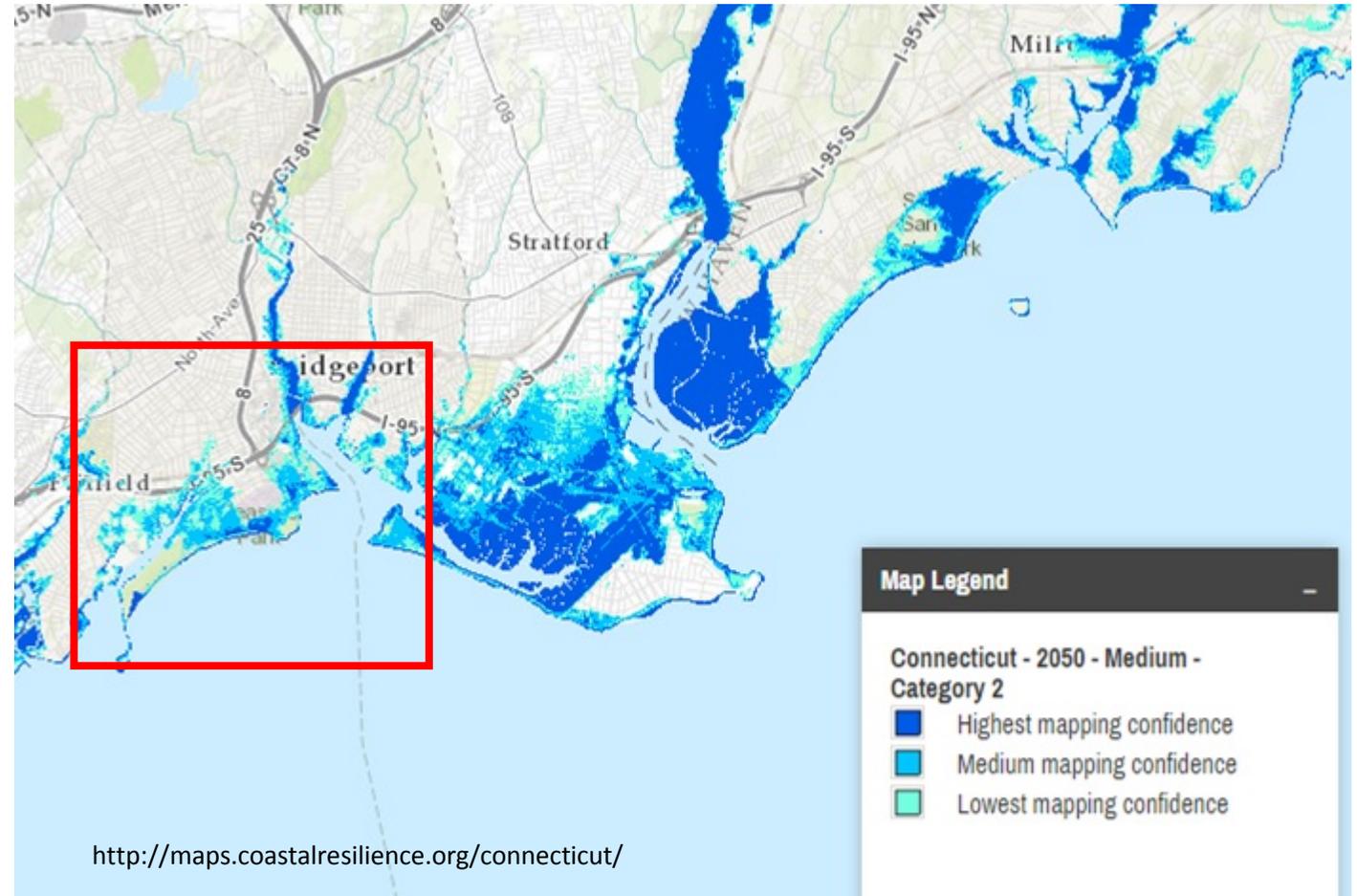


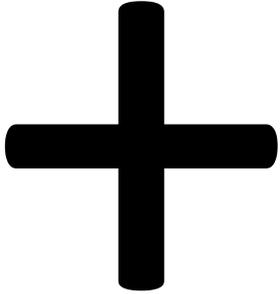
Bridgeport City Hall, Master Plan 2010

By 2050

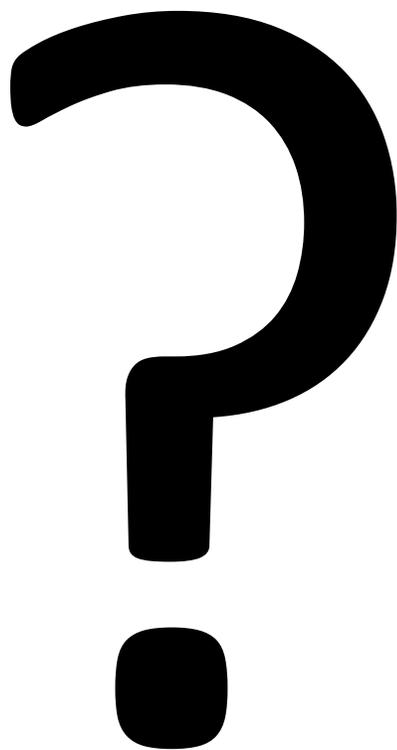
Forecast (2050)

- Sea Level Rise: 0.7 ft
 - SLR + height mild flood: 3.1ft
- (Climate Central, Surging Areas)





Bridgeport - CT



Research questions

1. Are (low-income) residents from Bridgeport, CT willing to support adaptation actions that involve conservation of endangered species, in the face of sea level rise?
2. How do socio-demographic characteristics affect individuals' tendency to choose (or not) a pro-environmental project?

We aimed to examine the trade-offs that residents from Bridgeport might prefer between environmental and other attributes of actions for adaptation to sea level rise.

Methodology

Choice-experiment survey with discrete choice questions to model preferences according to the Random Utility Model

The survey

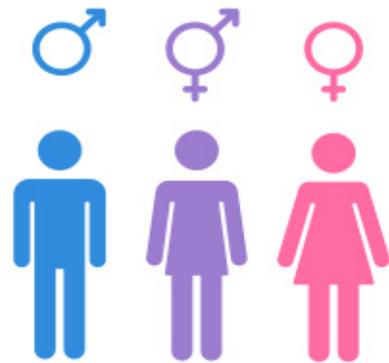
1. Design
2. Pretest
3. Implementation

Data collation

Econometric Model

$$u(X^i, C^i, Z) = DN + \sum_j \beta_j X_j^i + \beta_c C^i + \sum_k \alpha_k DNZ_k$$

Who responded our survey? 421 completed surveys, 370 useable



57.03% 1.04% 41.93%



African-American: 26.91%
Caucasian: 29.76%
Hispanic: 21.53%
Other: 7.08%
Missing ethn: 14.72%



- Part or all middle-school: 1.09%
- Part or all high-school: 27.17%
- Some college: 30.71%
- 4 years of college: 16.58%
- Some graduate school: 13.87%
- Missing education: 10.58%



< \$20,000 :16.85%
\$20,000 – \$35,000 : 20.65%
\$35,000 – \$60,000: 19.02%
\$60,000 – \$100,000: 13.32%
>\$100,000: 10.6%
Missing income: 19.55%

Question 1: If this was a referendum, how would you vote? Would you vote for "No action", for "Plan A", or for "Plan B"?

3 levels of...

	"No Action" What will happen in Bridgeport over 35 years with no action	"Plan A" What will happen over 10-35 years by actions under Plan A	"Plan B" What will happen over 10-35 years by actions under Plan B
Saltmarsh Habitat 	The sea will create 20 new acres of saltmarsh place of currently dry land. Likely that most sensitive species become endangered.	The sea creates 288 new acres of saltmarsh 32 (10%) acres remain dry land High quality habitat Helps most of wildlife species survive	The sea creates 160 new acres of saltmarsh 160 (50%) acres remain dry land Low quality habitat Helps a few wildlife species survive
Homes vulnerable to flooding 	1,000 residential sites vulnerable to flooding, replaced by open water or saltmarsh (above)	Protects 800 homes 200 homes still vulnerable	Protects 400 homes 600 homes still vulnerable
Beach and sports fields 	80 acres of beaches and 20 sports fields Transformed to open water or saltmarsh (above)	Protects 60 acres of beaches and 5 sports fields	Protects 20 acres of beaches and 12 sports fields
Old industrial land (with hazardous waste) 	360 acres washed out	Cleans-up and restores 180 acres That create 75 new jobs and provide some park space	Cleans-up and restores 180 acres That create 75 new jobs and provide some park space
Please vote for <u>one</u> option			
	"No Action" Plan <input type="checkbox"/>	Action "Plan A" <input type="checkbox"/>	Action "Plan B" <input type="checkbox"/>

acreaage associated with habitat quality for local endagered species

homes to be protected

acreaage of beaches and fields to be protected

acreaage of brownfields/old industrial sites to be cleaned



Preliminary findings

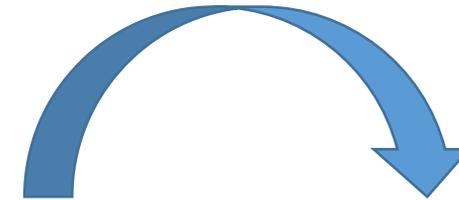
When cost is not part of the choices

More of attribute means
(in terms of utility)

Saltmarsh	-
Low habitat	+
High habitat	+*
Homes	+***
Beach and fields	+
Brownfields	+***

Forego protection of...

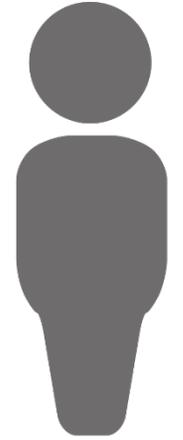
524* residential sites



To switch to plan

That allows saltmarsh to support high - quality habitat*

The typical respondent...



For example:

* The model is statistically significant

Question 6: If this was a referendum, how would you vote? Would you vote for "No action", for "Plan A", or for "Plan B"?

	"No Action" What will happen in Bridgeport over 35 years with no action	"Plan A" What will happen over 10-35 years by actions under Plan A	"Plan B" What will happen over 10-35 years by actions under Plan B
Saltmarsh Habitat 	The sea will create 320 new acres of saltmarsh in place of currently dry land. Likely that most sensitive species become endangered.	The sea creates 16 new acres of saltmarsh 304 (95%) acres remain dry land No longer helps wildlife species survive	The sea creates 288 new acres of saltmarsh 32 (10%) acres remain dry land High quality habitat Helps most of wildlife species survive
Homes vulnerable to flooding 	1,000 residential sites vulnerable to flooding, replaced by open water or saltmarsh (above)	Protects 400 homes 600 homes still vulnerable	Protects 200 homes 800 homes still vulnerable
Beach and sports fields 	80 acres of beaches and 20 sports fields Transformed to open water or saltmarsh (above)	Protects 20 acres of beaches and 8 sports fields	Protects 60 acres of beaches and 5 sports fields
Old industrial land (with hazardous waste) 	360 acres washed out	Cleans-up and restores 180 acres That create 75 new jobs and provide some park space	Cleans-up and restores 72 acres That create 30 new jobs and provide some park space
Cost to your household (State and business pay a share separately) \$	\$0	Your household's cost to cover local share \$216/ year (\$18/month) (taxes or rent increases)	Your household's cost to cover local share \$960/ year (\$80/month) (taxes or rent increases)



Please vote for one option

"No Action"
Plan

Action
"Plan A"

Action
"Plan B"

Preliminary findings

With cost

Forego protection of....

272* residential sites

to move from the
Status-Quo



That allows saltmarsh
to support high -quality
habitat*

The typical respondent...



The probability of choosing the **Status Quo option** (“take no action”) . . . increases if the respondent is low-income and African-American. . . .while it decreases if the participant is high - income and female

*The model is statistically significant

Preliminary findings

From Latent Class Analysis ...Who is less likely to vote for an environmental project?

All groups appear ready to support some adaptation actions under some conditions

Group 1

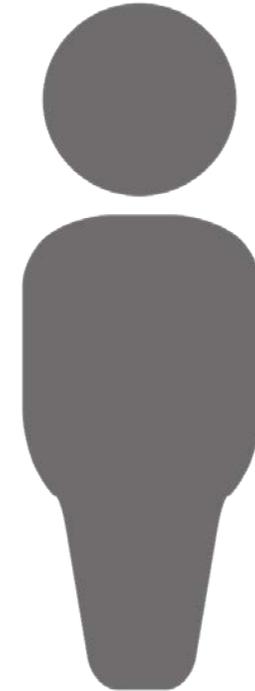
>78%
People who did not report income



Willing to forego protection of 45* residential sites to move from the Status-Quo

Group 2

<22%
Low education respondents who live in the East Side and the Enterprise Zone



appears not to consider choices and tradeoffs, and is driven mainly by cost

Willing to forego protection of 21* residential sites

to move from the Status-Quo

Both groups low – income, black and male respondents appear more likely to choose a no-action option

*The model is statistically significant

Preliminary findings

Who is more likely to make “repeated choices” ...

66 respondents always made the same choice 23% of the sample

If -Male
- low-income
- Hispanic or
-African ethnicity, more likely to make repeated choices

We interpret this as evidence that we face a significant challenge in developing choice scenarios that engage the entire population

who live in the
- East End
- East Side
(correlated with income)

Therefore, all results presented are indicative, not definitive

share separately)		\$216/ year (\$18/month) (taxes or rent increases)	\$960/ year (\$80/month) (taxes or rent increases)
\$	Please vote for <u>one</u> option		
	"No Action" Plan <input type="checkbox"/>	Action "Plan A" <input checked="" type="checkbox"/>	Action "Plan B" <input type="checkbox"/>
↕	Please vote for <u>one</u> option		
	"No Action" Plan <input type="checkbox"/>	Action "Plan A" <input checked="" type="checkbox"/>	Action "Plan B" <input type="checkbox"/>
\$	Please vote for <u>one</u> option		
	"No Action" Plan <input type="checkbox"/>	Action "Plan A" <input checked="" type="checkbox"/>	Action "Plan B" <input type="checkbox"/>

Implications

From
community
meetings,
we learned
that
residents...

Face

reduced air quality and pollution from
“junkyards” and old industrial sites

Show

a degree of concern for environmental
assets

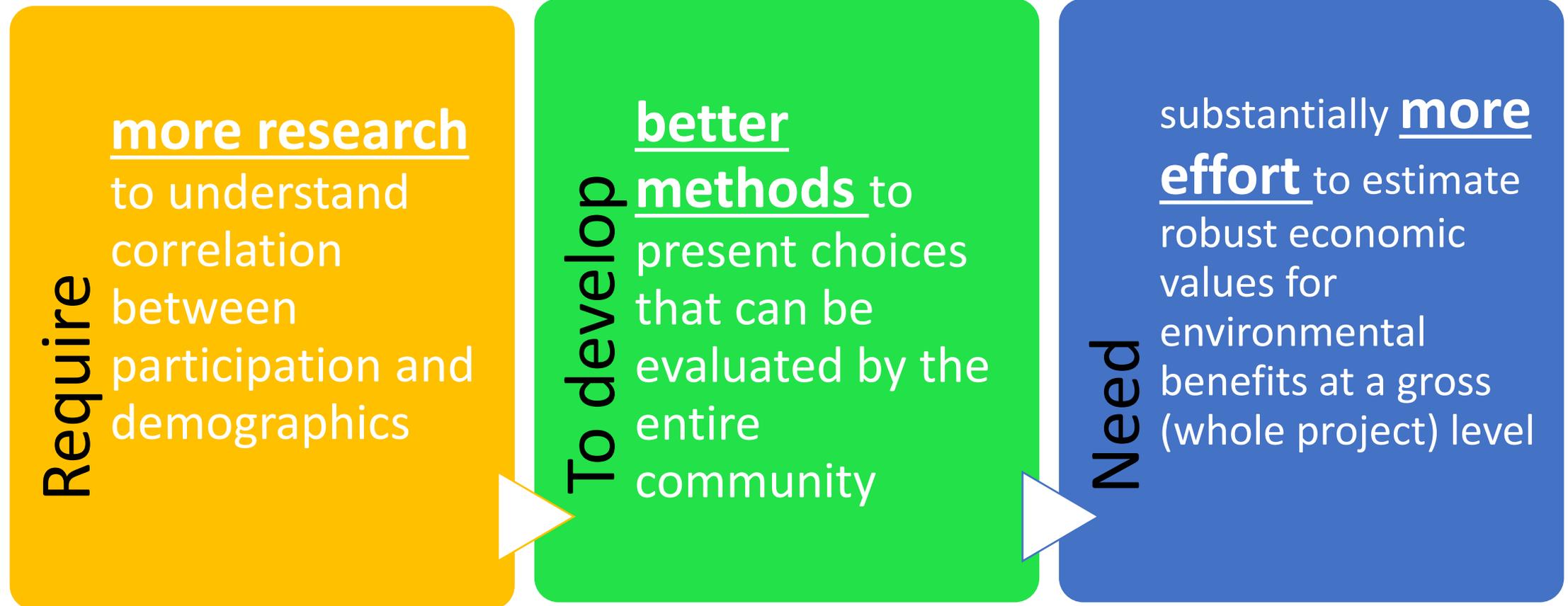
1. There is willingness to “take action”
2. Adaption actions are preferred over Status Quo

Need

environmental education to help understand
ecosystem services, and
institutional trust

Next steps

The repeated choices...



Thank you!

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