



Southeast  
Climate Consortium

# Coastal Resilience Research at the SECC

Jessica Bolson  
Postdoctoral Fellow  
UM/SECC

Wharton Risk Management and Decision Processes Center

## SECC Coastal Areas



- 11,387 miles of coastline
- Diverse concerns across region's coastal areas
  - Different economic risks
  - Different institutions and capacity to respond
  - Differing levels of engagement
- Extreme vulnerability to sea level rise and coastal hazards in region
- **Many decisions to be made!**

## Ongoing SECC Coastal Research

Ongoing research  
(SECC research team):

Florida Water Climate Alliance  
FWCA (Bolson, Bartels, Misra,  
Martinez, Graham)

Southeast Florida Climate Change  
Compact SFCCC (Bolson, Letson)

South Florida Water Sustainability and  
Climate Project SFWSC (Bolson,  
Martinez, Letson, Broad)

Miami Beach SLR Initiative (Bolson)

SeaGrant Projects (Jones et al)

# Ongoing SECC Coastal Research + Objectives

Ongoing research  
and objectives  
(SECC team):

FWCA (Bolson, Bartels,  
Misra, Martinez,  
Graham)

Build network for knowledge exchange and coproduction of climate information, develop deeper understanding of decision context, build adaptive capacity among water managers

SFCCC (Bolson)

Learn about decision context, participate in climate adaptation planning, identify avenues for collaboration and information needs, build stakeholder network

SFWSC (Bolson,  
Martinez, Letson, Broad)

Understand behavioral response to flood risk, model different water allocations and evaluate associated values using new information, scenario simulations with stakeholders

Miami Beach SLR  
Initiative (Bolson)

Develop research partnership, understand information needs of local coastal community, learn about policy and decision context, develop joint proposals

SeaGrant Projects

Building communities of practices, organizing networks, assessing needs of coastal communities



...to increase the regional relevance and usability of climate and sea level rise models for water suppliers and resources managers in Florida



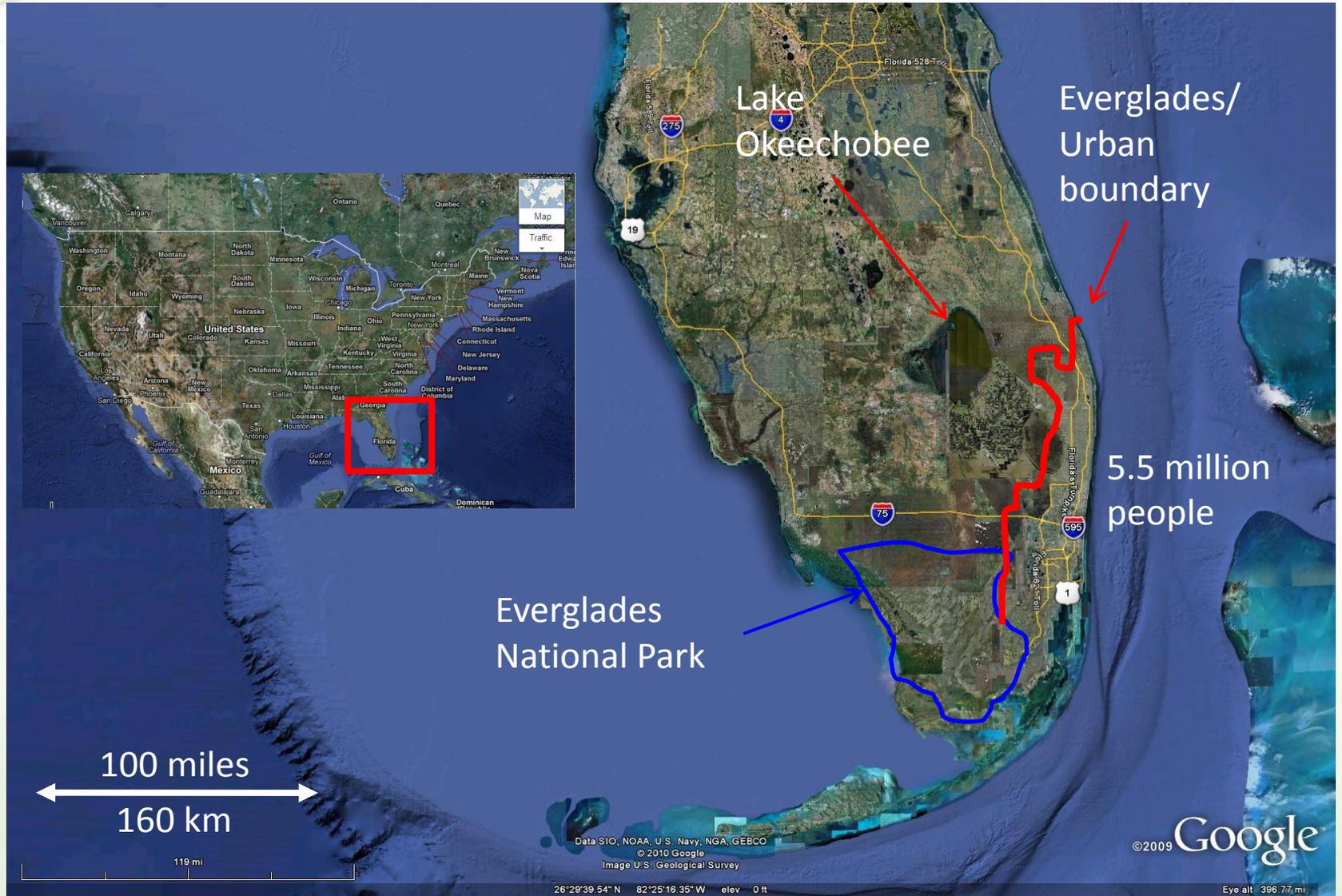
# Southeast Florida Climate Change Compact



Southeast Florida Regional Climate Change Compact Counties



# South Florida Water Sustainability and Climate Project





## SFWSC Decision/ Behavioral Research Focus: the natural hazard communication challenge

- People tend to under-invest in protection against natural hazards because of a universal tendency to be present-biased; it is hard to channel resources away from immediate needs to lower the risk of highly uncertain future losses
- Question: how best to persuade (or nudge) people to make investments in protection when the threat may be years (or even decades) in the future?



## Example: planning for the effects of sea-level rise in South Florida

- Over the next century S FL is expected to gradually see worsening effects of SLR. The effects: more frequent nuisance flooding, greater storm impacts, and salt water intrusion in the Biscayne Aquifer.
- LT engineering solutions exist, but will be expensive, and implementation will depend on a series of factors that are difficult to forecast, such as:
  - Realized rate of SLR and its observed impacts;
  - How threats and impacts are communicated via varying media
  - Social norms; and
  - Health of the real-estate tax base (which may collapse if SLR causes out-migration)

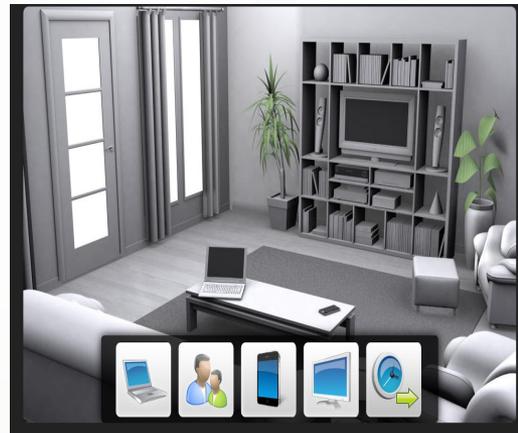
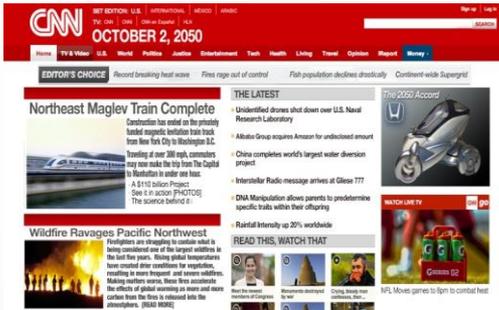
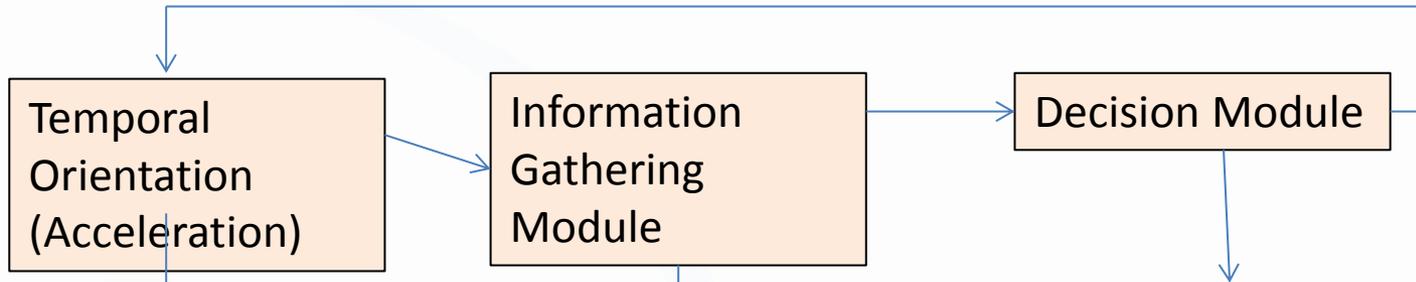
How can we predict how this process might unfold?

## One solution: Information Acceleration: HAZSIM (2014)

- A programming platform that allows rapid development and deployment of IA experiments
- Users access via a virtual living room computer, television, radio, cell phone, and “leave” the room to talk to individuals
- Users provide content which is cloud stored (e.g., Dropbox), and data is directed to Wharton servers
- Data includes all click sequences, durations, and survey responses



# HazSim Structure



6 SOUTH FLORIDA  
NEWSLETTERS | SEND PICS | TIPS  
84°  
HOME NEWS WEATHER INVESTIGATIONS ENTERTAINMENT TRAFFIC CONTACT US CONTESTS  
LOCAL U.S. & WORLD SPORTS HEALTH TECH WEIRD WEATHER ANIMALS NBC 6 PRIDE  
LIVE VIDEO WATCH: NBC 6 News OCTOBER 13, 2016  
Florida Unemployment Falls to 5.6%  
Polls Show Close Race; Rand Gaining on Hillary  
Bermuda Taken Direct Hit from Hurricane Terence  
135 Wrecks Destroyed in Drone Strike

USA TODAY  
OCTOBER 28, 2025  
SUBSCRIBE NOW 3 MONTHS FOR THE PRICE of 1  
NEWS SPORTS LIFE MONEY TECH TRAVEL OPINION 58° CROSSWORDS YOUR TAKE INVESTIGATIONS VIDEO MORE  
Mayor Regalado discusses evacuation protocol for Watch the Interview. Plus: What to Pack in a Hurricane

Florida Panthers moving to Las Vegas after 2025 season

Google's self-driving bus makes NYC debut

Caribbean coral reef on the verge of being wiped out; oceanic acidification, changes in water temperature cited as primary factors

Decade fund

USA TODAY  
OCTOBER 11, 2030  
SUBSCRIBE NOW 3 MONTHS FOR THE PRICE of 1  
NEWS SPORTS LIFE MONEY TECH TRAVEL OPINION 58° CROSSWORDS YOUR TAKE INVESTIGATIONS VIDEO MORE  
TOP STORIES  
India vs. China: The battle for global manufacturing  
Global Population reaches "Crisis Point"

CNN  
OCTOBER 2, 2050  
Home TV & Video U.S. World Politics Justice Entertainment Tech Health Living Travel Opinion iReport Money

Scientists use 3D printed electronic membranes to prevent heart attacks

EDITOR'S CHOICE Record breaking heat wave Fires rage out of control Fish population declines drastically Continent-wide Supergrid

THE LATEST  
Unidentified drones shot down over U.S. Naval Research Laboratory  
Alibaba Group acquires Amazon for undisclosed amount  
China completes world's largest water diversion project  
Interstellar Radio message arrives at Gliese 777  
DNA Manipulation allows parents to predetermine specific traits within their offspring  
Rainfall Intensity up 20% worldwide

Northeast Maglev Train Complete  
Construction has ended on the privately funded magnetic levitation train track from New York City to Washington D.C.  
Traveling at over 300 mph, commuters may now make the trip from The Capitol to Manhattan in under one hour.  
A \$110 billion Project  
See it in action [PHOTOS]  
The science behind it

Wildfire Ravages Pacific Northwest  
Firefighters are struggling to contain what is being considered one of the largest wildfires in the last five years. Rising global temperatures have created drier conditions for vegetation, resulting in more frequent and severe wildfires. Making matters worse, these fires accelerate the effects of global warming as more and more carbon from the fires is released into the atmosphere. (READ MORE)

WATCH LIVE TV  
NFL Moves games to 6pm to combat heat

Temporal Orientation (Acceleration)



## Flooding and Sea Level Rise in South Florida: Preparation for critical levels

**Introduction:** Over the past decade, attention on the east coast of the United States has been focused on increased insurance flooding that causes road closures, business interruptions, home property loss, and damage to public infrastructure. The economic costs have been in the billions and are expected to increase unless dramatic action is taken. Sea level rise is now being felt in South Florida. Sea level rise is now being felt in South Florida. Sea level rise is now being felt in South Florida.

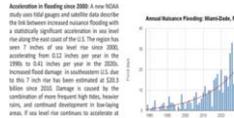
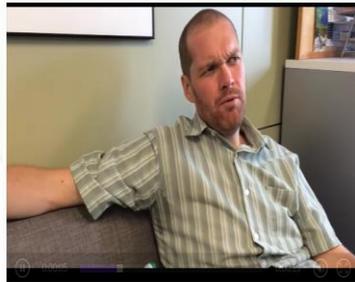


Fig. 2. Annual Return Period Flooding for Miami-Dade County. It is assumed that the sea level rise will be 1.8 meters by 2050.

A seawall and existing flood control infrastructure, as well as the so-called Miami-Dade County and 4 towns, are being purchased in Big Pine Key due to sea level rise. In each Florida large coastal area which can no longer open at high sea level rise would make them obsolete.



### FOX NEWS

#### County begs voters for flood proofing

Published October 17, 2010  
By Carol O'Leary

Voters in Miami-Dade County will consider a \$1 billion proposal to flood-proof county buildings and create a walkway along Biscayne Bay. Commissioners said it is on the table but are divided on whether this is the best solution and business losses are not as great.



During 11 commissioner Julio Suarez spoke at the county courthouse yesterday. "We may have experienced increased flooding in some areas, but so we really need to make our county buildings safe against." Citing the risk, he said the county project seems to combine the best of all 11 commissioners voted to show the measure on the ballot.

Along at one FEMA (Federal Emergency Management Agency) study, the County recently changed building codes to that construction must meet a flood plain plan 4 feet greater in water level. "So, existing buildings are exempt." The reason why existing county buildings must be upgraded has not been fully explained.

Local homeowners who will bear the brunt of the cost are not excited. Isabelle Horton of Coral Gables, where she lives, said she doesn't think that.

Here is the past three or four years for the future. "Within a year, we're going to see a lot of changes in the way we do things."

### Miami Herald

#### Voters will decide on \$500 million bond

October 19, 2010  
By Tom Ichniowski

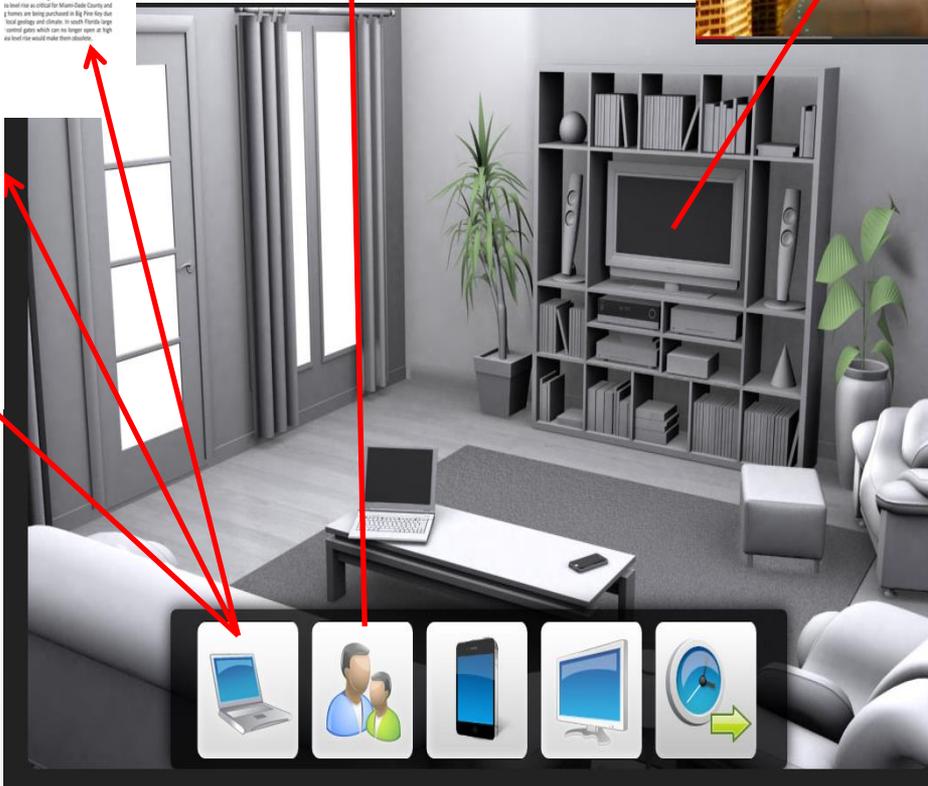
In November, Miami-Dade will vote on the County's proposed \$500 million Adaptation Bond. Bonds will be used over the next 3 years to build a series of water control pumps and other critical infrastructure. The project will address flooding from high tides and heavy rains in Collins Ave, North Miami, Surfside and around Mercy Hospital in Coconut Grove. It will also help to raise electrical controls above flood level across the county. A recent NOAA report found that sea-level rise continues to increase along the East Coast of the U.S. and that it has increased 60% in Miami since 1960 when sea level was about 3 inches lower.



Miami-Dade Water and Sewer Department (WSD) and Public Works Department will use the money to build sea levels that are expected to increase between 7 and 7 1/2 inches by 2030 and up to 18 inches by 2050. "The money for original, coastal improvements, the federal is paying. Because, Water passes right through and they will get the water of the coast," says WSD's chief engineer, Steve Deane.

Similar pumps successfully decreased flooding along Alton Road on Miami Beach, where real estate prices have continued to climb. The cost of each pump varies depending on the size, but Miami Beach has spent over \$100 million on about 40 pumps. Money from the bond will also be used to pay for the construction of critical infrastructure like electrical control panels built below current flood levels.

Locked in a tight re-election campaign against Francis Suarez, Mayor Carlos Giamberini supports the bond issue. "We must invest in the future now. Look at Miami Beach. They have brought back the tide and built with the tide. We will see sea level rise happening and businesses need to know we are serious." Other supporters include the Chamber of Commerce and the Director of Mercy Hospital. Opponents say the bond is too short-term and that the money could be spent better elsewhere.



Information Gathering Module





Back

Based on the information you have viewed, please answer a few questions:

How worried are you about the future effects of sea level rise?

Not at All Worried      Somewhat Worried      Extremely Worried

How likely are you to support the county bond issue to spend \$500 million on storm sewer improvements

Not at All Likely      Somewhat Likely      Extremely Likely

Decision Module

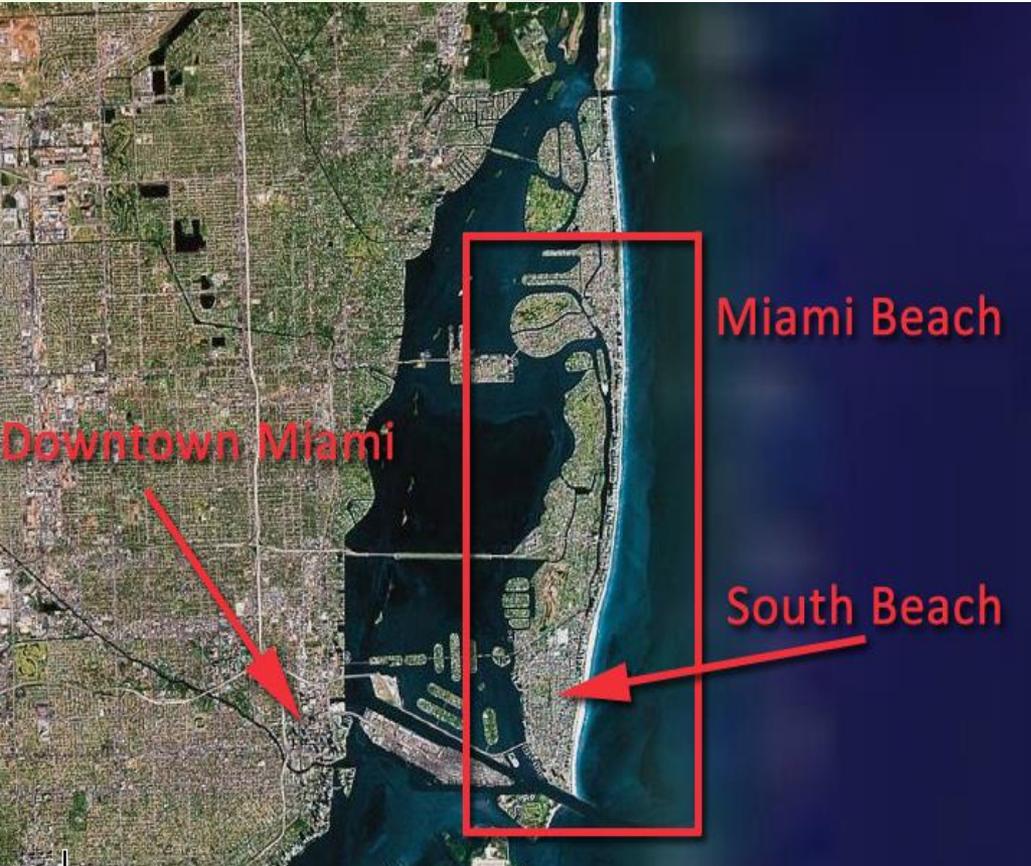


## Current application (in development): effects of SLR on residential real-estate decisions in S. Fla.

- Research question:
  - Sea-level rise is extremely slow and “noticed” now only when there are discrete disruptive flooding events (high lunar tides, storms). At what point do these experiences transition from being perceived as a “livable nuisance” to being an indicator of a serious threat to future life quality

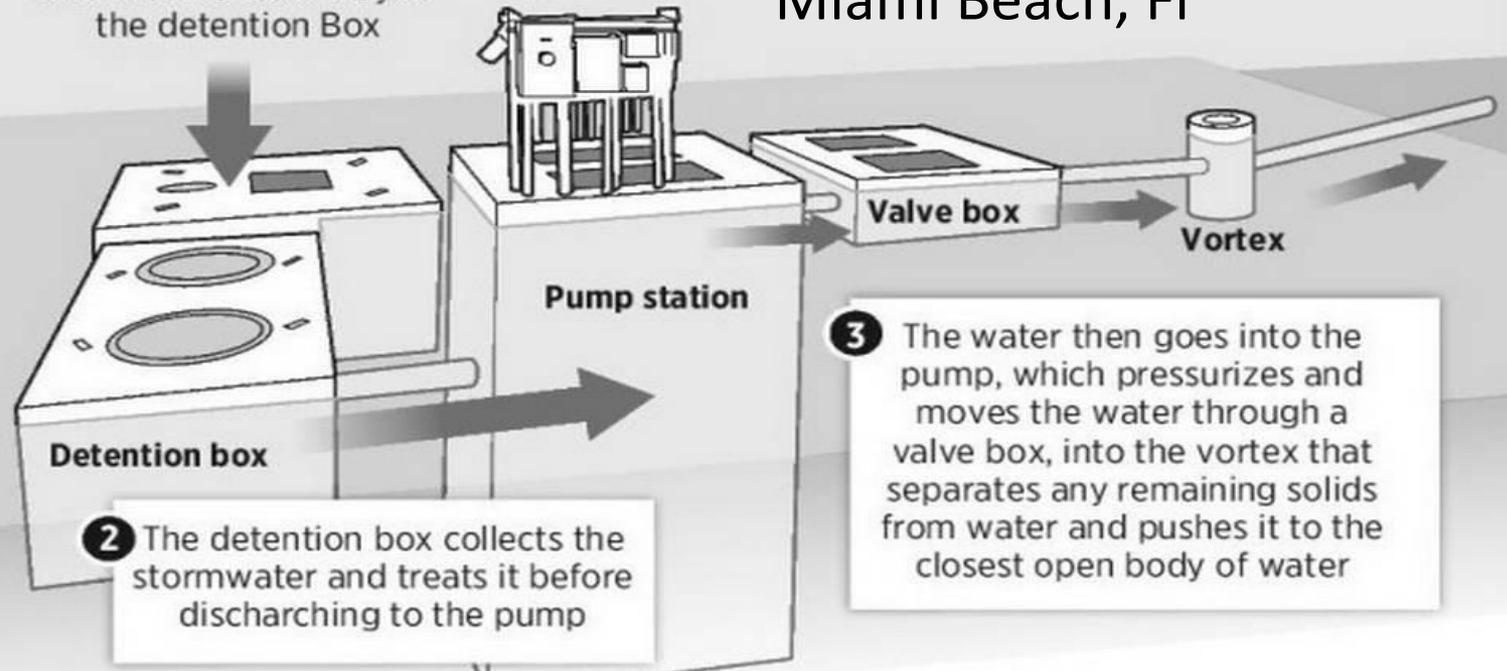


# Miami Beach SLR Initiative



# Decision example: flood control system in Miami Beach, FL

**1** Rainwater accumulates at the drainage structure and first makes its way to the detention Box





## Lessons learned

- Need to build network with local government stakeholders... where adaptation decisions are made
- Obstacles in the shift from planning to implementation (ex. Miami Beach Case Study and others)
  - Issues of jurisdiction challenge action (ex. Miami Beach road flooding)
  - Local govt. budgets for dealing with weather and climate are limited but critical
  - Leadership, staffing, and collaboration are central to action
- Role of stakeholders evolving



# Future research

- Apply research questions and methods to different areas
- Integrate lessons from multiple case studies across region
- Develop comprehensive regional assessments of coastal communities
- Better understand changing roles of stakeholders and scientists
- Expand behavioral research efforts using IA