# Visualizing Sea Level Rise in West Palm Beach

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## PURPOSE

Using a multiplatform interactive virtual reality (VR) experience within an Educate-Plan-Act framework, the community engages with the impacts of sea-level rise (SLR) and potential mitigation strategies in West Palm Beach's public parks.

Citizens and decision makers learn about potential planning and engineering strategies to mitigate impacts on infrastructure and public places in their area, thereby increasing propensity to act toward SLR mitigation solutions, enhancing plans that will benefit the community at large. The community can rank potential solutions.

In addition, the research team measures the impact of the VR experience on the population's knowledge, attitude and behavior toward the sea level rise issue.

*Study area: Osprey Park, West Palm Beach, FL*
*Image still from the Sea Level Rise Explorer Virtual Reality Experience*

## THE CLIMATE CRISIS

With more than 1 billion people expected to be living in low-elevation coastal areas by 2060 (Neumann et al., 2015), these areas are particularly vulnerable to sea level rise (SLR) caused by global warming. In the U.S. coastline, sea levels are expected to increase 10 to 12 inches in the next 30 years (NOAA, 2022), leading to permanent inundation, submergence of coastal areas under high tides, resulting in permanent loss of settled areas, migration and community relocation (Hauer et al., 2021).

*Study area flooded: Osprey Park, West Palm Beach, FL*
*Image still of from the Sea Level Rise Explorer Virtual Reality Experience*

## VIRTUAL REALITY AS AN ENGAGEMENT TOOL

Recent research has shown that behavioral interventions in climate change had short-term and small effects (Nisa et al., 2019), indicating the need for new forms of intervention (Nielsen et al., 2021). The increased adoption of virtual reality (VR) in the last decade (de Regt et al., 2020), its ability to immerse and trigger emotions (Bailenson, 2018), and its encouraging effects concerning engagement with climate change (Queiroz et al., 2018) indicate the potential of this technology for the development of interventions focusing on the development of adaptation behavior.

Calil and colleagues (2021) developed three interactive VR experiences depicting the impacts of SLR on local communities in the U.S and applied them to public engagements. They showed that the local engagement events and the process of developing the VR experience in collaboration with governmental and non-governmental agencies enhanced the communication between coastal management organizations, stakeholders, and the public. Renne et al. (2021) observed that VR significantly increased participant comprehension versus 2D maps, and 80.3% of participants reported that the experience motivated them to become more engaged on the the topic of SLR.

## PROPOSED STRATEGIES

*Study area with proposed adaption: Osprey Park, West Palm Beach, FL*
*Image still from the Sea Level Rise Explorer Virtual Reality Experience*

After several iterations with experts in urban planning, sea level rise and public infrastructure, we identified context-sensitive strategies to be presented for consideration by the community, which may be implemented in phases:

- No intervention
- Changes in land-use practices
- Standardize and raise existing seawalls to an 8- or 9-foot height across study area
- Integrate an accessible, living shoreline approach (see figure above)

The image above depicts a solution that addresses higher water levels related to sea level rise, King Tide, and storms, while increasing recreational opportunities, access to water, and biodiversity.

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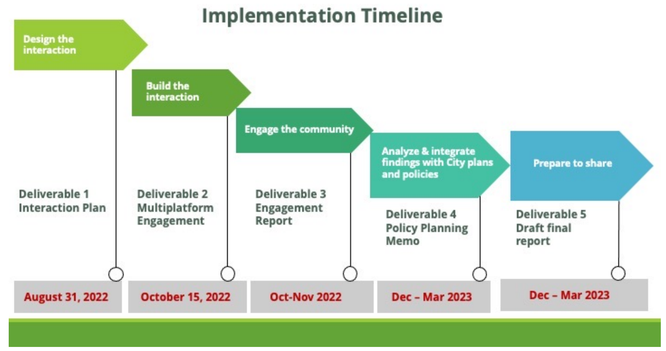
## PROJECT STRATEGY

Participants experience a 10-minute virtual reality engagement that demonstrates flooding impacts in three public parks (Gettler, Osprey, and Chapell Parks) in West Palm Beach. Participants see adaptation strategies to mitigate flooding impacts while hearing a narrated message about climate change and adaptation. Participants can interact with the technology by raising and lowering water levels and triggering pre-recorded messages.

After the VR engagement, participants are invited to complete a survey. The survey data will consist of opinions about potential sea level rise impacts and infrastructure adaptation options. We also ask questions about the VR experience. Finally, we collect non-identifiable demographic information including a scale of political orientation.

*Advertisement depicting a young woman participating in the West Palm Beach Sea Level Rise Virtual Reality Experience*

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