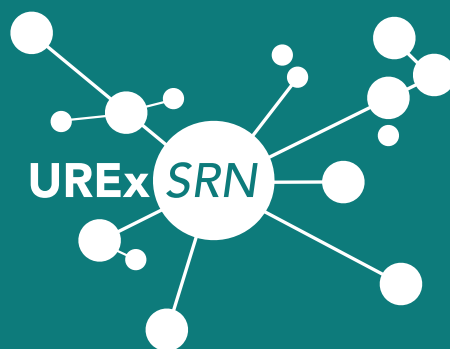# Envisioning Future Urban Resilience to Climate Change in the Greater Miami Area

WORKSHOP REPORT | April 12, 2019

UREx SRN

Urban Resilience to
Extremes Sustainability
Research Network

www.URExSRN.net

Workshop Summary

In the face of global climate change, city governments need to anticipate and guide infrastructure decisions to respond to a variety of extreme events, including flooding, heat waves, and storms. With the goal of addressing this challenge, a workshop on future visions for sustainability and resilience to climate change and extreme climate events was held in Miami on April 12, 2019. The initiative is part of an international effort that includes researchers and practitioners from ten cities in the United States and Latin America participating in the Urban Resilience to Extremes Sustainability Research Network (UREx SRN). The UREx Network is sponsored by the National Science Foundation (NSF) to support urban planning and development by generating future scenarios through a participatory and anticipatory process.

During the workshop, approximately 40 practitioners, administrators, decision makers, civic and community organization leaders, designers, professors, and students from across the Miami area, including the City of Miami, City of Miami-Beach, and other surrounding municipalities and unincorporated Miami-Dade County, gathered at the Miami River Commission. Together, participants developed scenarios to adapt to future extreme events and transformative scenarios that aspire to radically change the Miami area infrastructure and ability to respond to extreme events. Participants worked in small groups to jointly develop five visions for the future of the

Miami area in 2080. These future scenarios envisioned a more resilient Miami to compound flooding and extreme heat; economic prosperity and justice; a smart and connected city; and an eco-city relying on sustainable food and energy systems. Topics were developed in response to practitioner and citizen concerns, and the cities' and counties' sustainability, environmental management and climate action plans. Through various activities, the participants defined goals and strategies for each scenario. At the end of the workshop the participants presented their visions for the Miami area in 2080 with narratives and visual illustrations.

Next Steps

The UREx SRN team will synthesize the visions defined in the workshop and develop quantitative and qualitative outputs to visualize the future of the greater Miami area in 2080. The synthetic outputs include 1) land use change models to explore and evaluate different outcomes of different strategies and visions, and 2) a qualitative assessment of resilience, equity, sustainability and the potential for transformative change. Intended to inspire and promote future sustainability and resilience, the visions serve as a platform for further collaborations and resilience planning and are being integrated into the "Miami Forever Climate Ready" strategy, and the Miami-Dade County "Sea Level Rise" strategy.

About the Urban Resilience to Extremes Sustainability Research Network (UREx SRN)

The goal of the UREx SRN project is to improve the resilience of urban social, ecological, and technological systems in the face of the growing challenges that climate change poses to cities. The UREx SRN network includes ten cities affected by floods, heat waves, and/or droughts. The network has a wide range of researchers from universities in North and South America, as well as municipal practitioners, members of the civil society, and residents.

Through the co-development of scenarios in participatory workshops - such as those described in this document – we research possible transition paths to help transform cities for a more sustainable future.
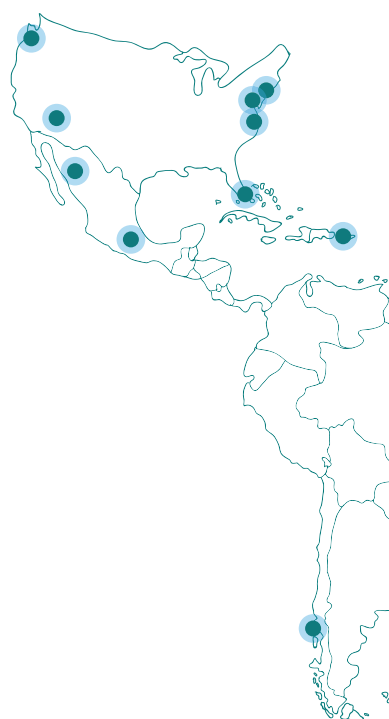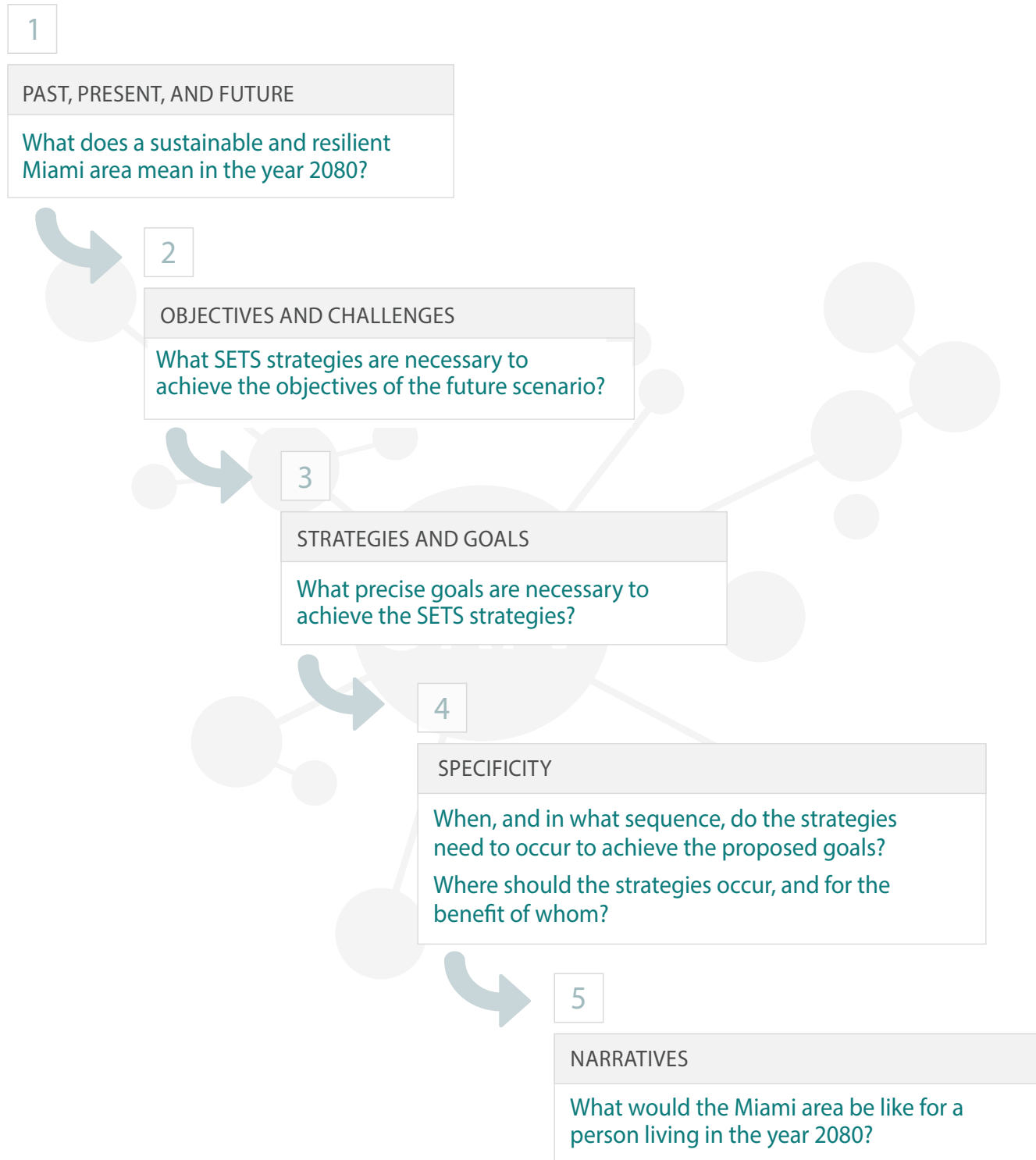

UREx SRN CITIES:

Baltimore, Maryland

Hermosillo, México

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Miami, Florida

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Phoenix, Arizona

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Scenario Development Process

Workshop participants began by establishing and deliberating the main goals for a 2080 Miami area around different environmental conditions. Several social, ecological and technological strategies were presented and imagined that have been implemented in adaptation and resilience interventions in similar cities.

The UREx SRN team presented a vision of the city's infrastructure as a social, ecological and technological system (SETS) to help frame, in an integrated manner, the different dimensions of the city. Several activities were designed to facilitate scenario development based on the following questions:

1

PAST, PRESENT, AND FUTURE

What does a sustainable and resilient Miami area mean in the year 2080?

2

OBJECTIVES AND CHALLENGES

What SETS strategies are necessary to achieve the objectives of the future scenario?

3

STRATEGIES AND GOALS

What precise goals are necessary to achieve the SETS strategies?

4

SPECIFICITY

When, and in what sequence, do the strategies need to occur to achieve the proposed goals?

Where should the strategies occur, and for the benefit of whom?

5

NARRATIVES

What would the Miami area be like for a person living in the year 2080?

Social-Ecological-Technological Systems (SETS)

Many of the problems we face today, such as climate change, social inequality, or environmental health, cannot be solved by traditional planning approaches. These are complex problems and with high levels of uncertainty that require the integration of different perspectives, experiences, and knowledge. One of the problems that challenges the planning and governance of cities like Miami and its surrounds is how to create resilience to extreme external forces such as those posed by climate change that endangers lives, communities, and infrastructure in the urban system. When they are resilient, cities can persist, grow, and even transform, maintaining their functions and identity. The thinking of social-ecological-technological systems (SETS) integrates these three dimensions from a perspective of complex systems and is essential to promote resilience in cities and facilitate their transformation towards more sustainable futures.

Metropolitan areas, and the cities within them, are complex SETS, and so too are parts of cities such as neighborhoods, parks, and infrastructure. The social dimension includes both decision makers and the people affected by them. The ecological dimension includes elements of a non-human nature that are part of the fabric of cities, for example, trees, soils, and water. The technological dimension includes the built components of cities, for example, the road system, buildings, or public transport networks. But perhaps the most important feature of the SETS approach is that it is a systems approach. This means that the social, ecological and technological elements are not considered separately, but rather as a whole and paying special attention to the relationships and interactions between the three dimensions.
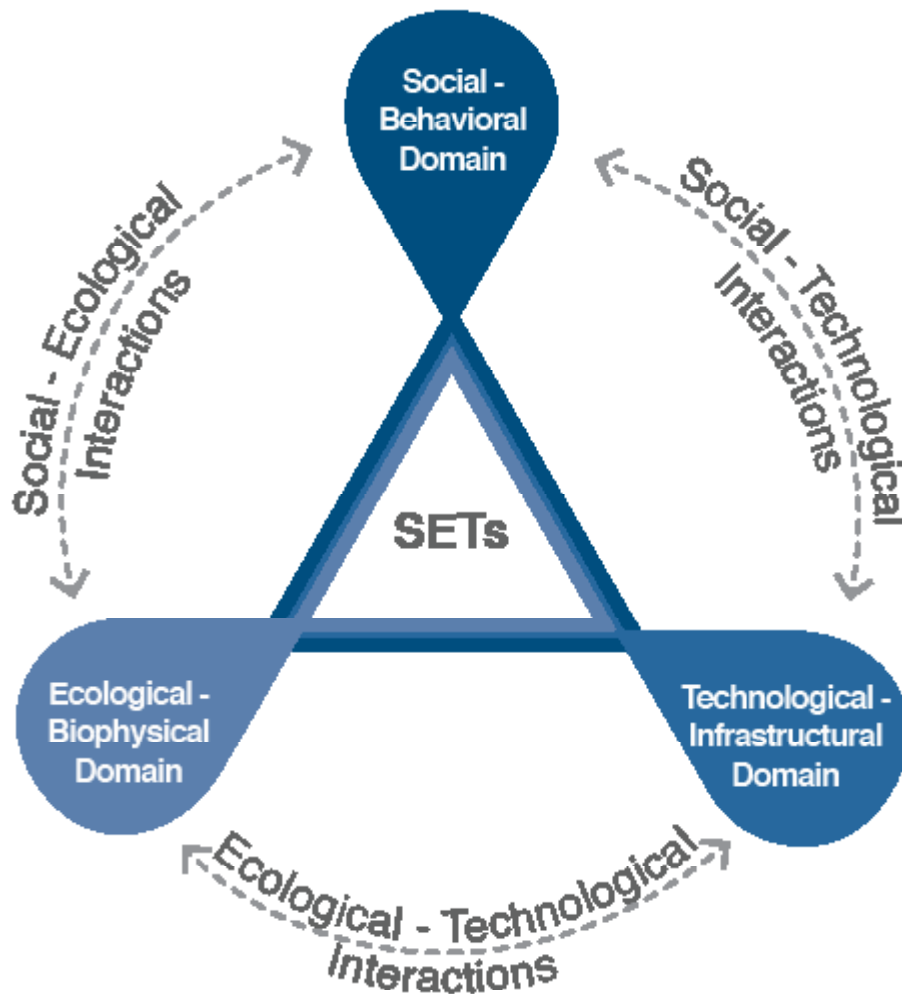
Miami Area 2080 Scenarios

The team co-developing resilient futures for the Miami area envisioned five scenarios: (1) a region more resilient to environmental hazards including compound flooding and (2) extreme heat, (3) an eco-city relying on sustainable solutions, (4) a city aspiring toward economic prosperity and justice, and (5) a smart and connected city. The five scenarios had several objectives in common including mobility, connectivity and equal access for all Miami area residents.

Some examples of transformative and adaptive strategies to achieve the objectives of the 2080 visions include: multi-modal seamless transit; public participation in planning; green economy driven by natural and cultural identity; community cohesion and inclusive decision-making; subsidies and incentives for flood retrofitting; decentralized energy systems; multi-purpose cooling centers to increase resilience to extreme heat; diversified economy; education and incentives for urban farming; restoration of living shorelines; coastal retreat; relocation of shorelines to increase ecological buffers to sea level rise, and many others.


COMPOUND FLOODING

Goals and Objectives:

Embracing and living with water in planning; Adaptive, multimodal, and efficient transportation systems; Equitable access to social and natural system services; Effective and efficient protection and utilization of natural resources.

Strategy Examples:

- 1) Designate wetlands and mangrove conservation areas for development of living shorelines; • 2) Solar powered water taxis with access points across Miami and other cities; • 3) Green lattice of greenways and bike paths connecting all neighborhoods including along Miami River; • 4) Incentivized coastal retreat, flood retrofitting and "amphibious" architecture; • 5) Universal basic income and affordable long-term flood insurance; • 6) Decentralized energy system with individual-scale solar power sources; • 7) New integrated water management institution to address flood and drought and govern urban waterways; • 8) Dissemination platforms to effectively and clearly communicate flood risks.

Zair Toloza, Sea Levels Solutions Center, FIU, MArch
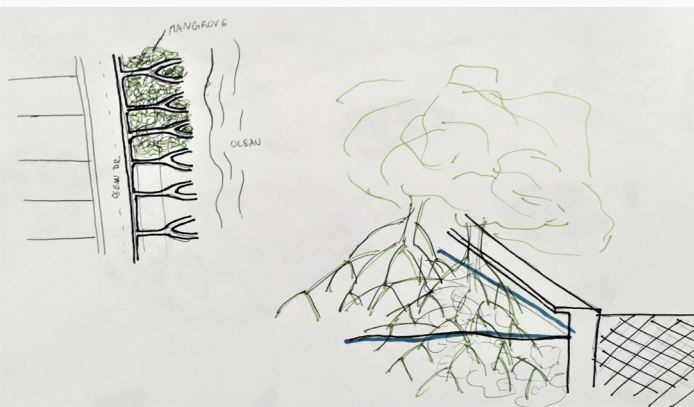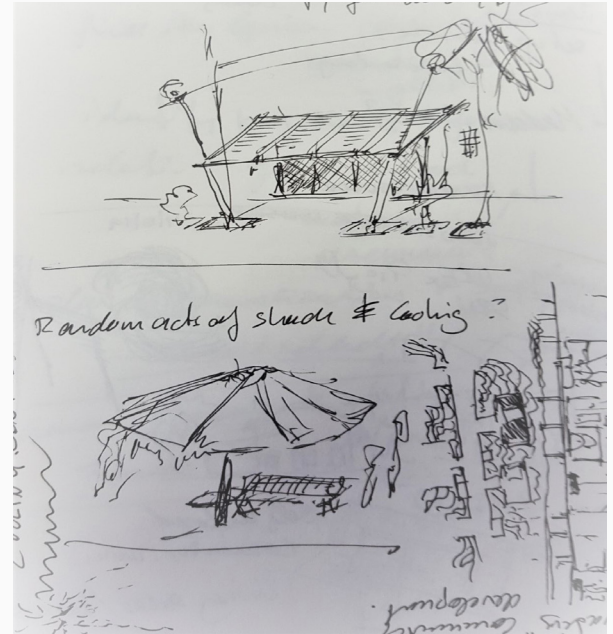
Miami Area 2080 Scenarios

EXTREME HEAT

Goals and Objectives:

Embracing nature-based solutions in a "green and wet" city; Transforming infrastructure by adapting to wind, water and humidity through the concept of "biomimicry"; Interconnected shade canopy that traverses the broader Miami area; Equal access to affordable, green housing and transit.

Strategy Examples:

• 1) Green roofs and hanging, vertical gardens to cool buildings and produce food; • 2) Infrastructure is elevated to enhance the use of surface water, wind, and evaporative cooling potential; • 3) Incentives and sustainability certification codes for vertical development to reduce land footprint and increase density; • 4) Multi-use cooling centers serve as resilience hubs and promote social cohesion; • 5) Decentralized solar network powers cooling stations and household AC units to reach 100% renewable energy by 2080; • 6) Connected mixed-transit corridors covered in shade canopy; • 7) Transit oriented development around river and green corridors with solar powered mass transit, water taxis, bikeways, and walkways.

Sebastian Eilert, City of Doral, Florida

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Miami Area 2080 Scenarios

ECO-CITY AND FOOD SYSTEMS

Goals and Objectives:

Economic equality with livable wages and affordable housing; Water conservation and reuse; Local and sustainable food production; 100% renewable energy by 2060; Mass public green transit; Land use planning with a focus on ecological restoration.

Strategy Examples:

- 1) Inclusive zoning requirements in developments over 6 ft elevation to ensure affordable housing and access to public transit; • 2) Nature-based solutions for stormwater management, water reuse, and conservation; • 3) Education and incentives for urban gardening, vertical food farms, green roofs, and drought-tolerant landscaping; • 4) Community gardens and cooling centers established in existing green spaces and schools; • 5) Solar powered desalination plant; • 6) Highway funds diverted to public electric light rail and shaded bikeways; • 7) Flood prone developments (<4 ft) relocated and repurposed as ecological buffers; • 8) Eco-tourism and green job creation; • 9) Enhance living shorelines with mangrove and wetland restoration.

SMART AND CONNECTED CITY

Goals and Objectives:

Efficient, publicly accessible, and integrated rapid transit system; Innovative human-centered design and mobility; Improved quality of life through social connectivity in culture, arts, and recreation; Communities value public transit and support goals to reduce carbon dependence.

Strategy Examples:

- 1) Culture of living and moving with water; • 2) Rapid, integrated, and energy efficient public transit including water transit with lock system that enables boat traffic and prevents saline intrusion; • 3) Cool, safe, service-orientated and covered transit corridors and bridges; • 4) Taxes and fees to discourage private car use, as well as designated car-free zones; • 5) Increased public participation in transit planning processes, including youth innovation competitions for smart transit; • 6) Digital platforms to increase equitable participation in governance and decision-making; • 7) Place-making and cultural investments; • 8) Elevate and flood proof critical infrastructure.

Miami Area 2080 Scenarios

ECONOMIC PROSPERITY AND JUSTICE

Goals and Objectives:

Equitable provision and access to basic needs, including clean air and water, green homes, and good health; Equitable and resilient infrastructure; Inclusive governance; Green economy driven by natural systems and cultural identity; Strong community cohesion and solidarity.

Strategy Examples:

• 1) Planning and policies to provide equal access to all basic needs; • 2) Circular food economy program; • 3) Multi-use parks, for growing food, education and social cohesion; • 4) Eco-enterprise Miami with green job development and training; • 5) Civic-public partnerships, incorporated throughout governance structures and that is civic-minded; • 6) All new governance structures are centered around high public engagement with neighborhood scale decision-making; • 7) Develop a charter for local level governance.

Acknowledgment to all workshop participants

We would like to thank all the workshop participants. Zair Toloza from the Sea Levels Solutions Center, FIU, contributed to the workshop and helped the Compound Flooding group conceptualize their scenario through drawings and visual schemes. Sebastian Eilert from City of Doral participated in the Extreme Heat scenario and contributed images to that group.
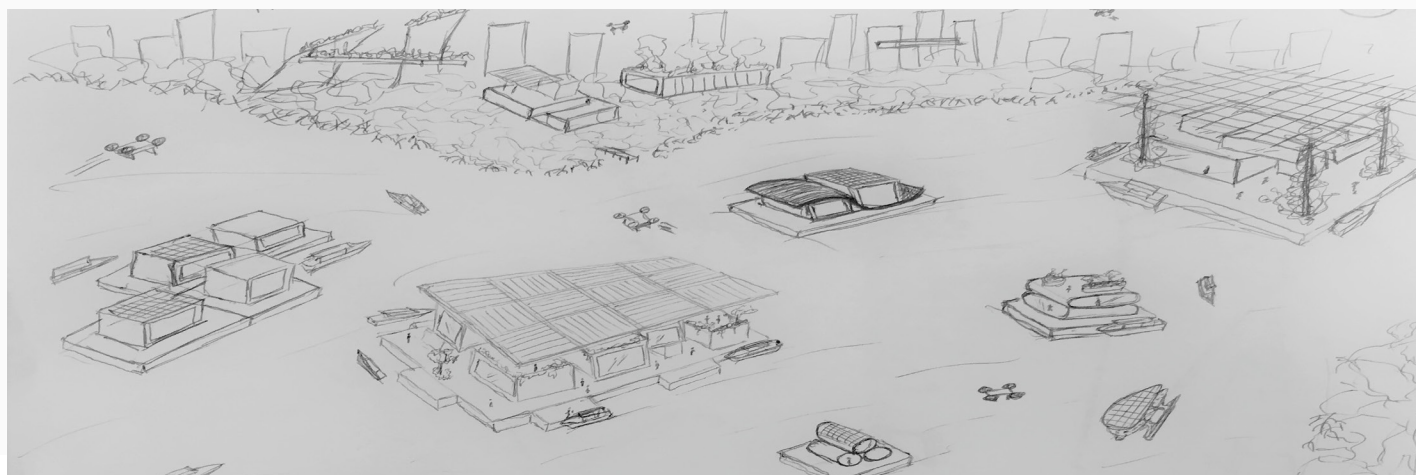
Zair Toloza, Sea Levels Solutions Center, FIU, MArch

Participating Institutions & Organizations

- AECOM
- Catalyst Miami
- CDM Smith Inc.
- City of Doral
- City of Miami Beach Emergency Management
- Curtis + Rogers Design Studio
- Eco-Logical Solutions
- Lanier Consulting, LLC
- Miami-Dade County District 5
- Miami-Dade County Regulatory & Economic Resources

- Miami-Dade County Millennial Board
- Miami-Dade South Florida Water Management District
- Miami-Dade State Attorney's Office
- Miami Waterkeeper
- The CLEO Institute
- The Nature Conservancy
- The New Florida Majority
- Tropical Audubon Society
- #SmartMiami

About UREx SRN

Our mission is to connect scientists and practitioners to create resilient infrastructure with information, models, images, maps, histories, and projects from 10 cities, accelerating the production of knowledge and the implementation of innovative and sustainable solutions in urban ecosystems.

CONTACT:

Tiffany Troxler
troxlert@fiu.edu

Elizabeth Cook
elizabeth.m.cook@gmail.com

Tischa Muñoz-Erickson
tmunozerickson@gmail.com

www.URExSRN.net | 🐦 @urexsrn | ✉ urexsrn@asu.edu