Planning for Community Resilience in Satellite Beach: Stormwater Infrastructure and LDRs

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His accomplishments recognized with the John M. DeGrove Eminent Scholar Chair in Growth Management and Development at Florida Atlantic University

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The PowerPoint is available at www.1000friendsofflorida.org
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- 1.5 AICP CM Credits for planners (#9138851)
- 1 CEC for Certified Floodplain Managers
- 2 CLE for Florida attorneys (1708851N - Intermediate)
- .125 CEUs for Florida Environmental Health Professionals.

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Upcoming Dr. John M. DeGrove Webinars

Spring 2017 DeGrove Webinar

Approved for professional certification credits for Planners (AICP CM), Certified Floodplain Managers, Florida attorneys (CLE) and Florida Environmental Health Professionals.

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- March 21, 2018, Noon to 1:30 p.m. -- 2018 Florida Legislative Wrap Up

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- Please keep your questions succinct!
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Check out our Legislative Webpage!

Available at:
www.1000friendsofflorida.org/2018-florida-legislative-session-custom/

This site is:
- Updated weekly (or more often as needed)
- Includes Growth Management, Transportation and Conservation Legislation
- Includes links to the bills
Presenters
Courtney H. Barker, AICP

- City Manager for Satellite Beach since April 2013 and longtime resident
- Master of Science in Planning from Florida State University and Bachelor of Arts in Anthropology from University of Florida
- Active member on the boards of Capital Outlay Committee for Brevard County School District, the Beach Committee for Tourism and Development Council, Technical Advisory Committee, Space Coast League of Cities, Space Coast Public Managers Association, and Florida Redevelopment Association.
- Member of many professional associations such as the American Planning Association, American Institute of Certified Planners, National Trust for Historic Preservation, Leadership Brevard, and the Florida Redevelopment Association.
- Volunteered for the Planning & Zoning Board for the City of Satellite Beach, the Florida Redevelopment Association Board, and as Treasurer for the Atlantic Coast Section of Florida American Planning Association.
Jason M. Evans, Ph.D.

- Assistant Professor of Environmental Science and Studies at Stetson University.
- Interdisciplinary systems and landscape ecologist broadly interested in the emergent geospatial interfaces between human and natural systems.
- Current research projects involve collaborations with several regional Sea Grant programs to assist local governments along the southeastern U.S. coast with sea level rise adaptation.
- Working with Monroe County and the Village of Islamorada, Florida; St. Marys and Tybee Island, Georgia; and Hyde County, North Carolina.
- Other recent research has focused on land cover change, wildlife habitat and life cycle assessments for various bioenergy systems (including ethanol, biogas, and wood pellets) across the U.S.
- Also extensive experience and very strong ongoing interest in the ecology, management and restoration of Florida springs ecosystems.
In her 39 year career, Rochelle W. Lawandales, AICP, has garnered a reputation as a change agent, public involvement specialist, and expert in redevelopment planning in the State of Florida. She spent 10 years in public service before opening Lawandales Planning Affiliates in 1989, which helped many Cities or Counties create, expand, or implement CRA’s. She also helped private sector clients bring quality development to fruition. After failing retirement in 2011, she became a sole proprietor, once again serving local clients.

She got her Master’s of City and Regional Planning (MCRP) from Clemson University in 1979, after obtaining a BA in Sociology/Psychology there in 1977. She became AICP in 1983.

Rochelle served as a Board member, Officer, and as a former President of the Florida Redevelopment Association. She is former chair of the APA’s Atlantic Coast Section, APA FL Division Chair, and long term Legislative Committee member of APAFL. She tries to give back to her community by serving on local boards, such as 211 and the Brevard County Planning Board; as well as being past chair of the Satellite Beach Planning and Zoning Board and Community Redevelopment Agency, Melbourne Architectural Review Board; among others.

She has developed design and form based codes using smart growth ideals and performance incentives; and, has written land development codes and Redevelopment or Comprehensive plans for communities across the state, integrating best practices.

Known as a forward thinker, she strives to create a more sustainable future via a marriage of planning and redevelopment practices, as a strategy to implement good growth management and sustainability measures.
City of Satellite Beach: Rising to Resilience!
Courtney Barker, AICP
City Manager

Rochelle W. Lawandaales, AICP
Planning Consultant

City of Satellite Beach

RISING TO RESILIENCE!
COURTNEY H. BARKER, AICP
CITY MANAGER
PREPARING for RESILIENCY
Situated on an barrier island between the Banana River and the Atlantic Ocean

15 miles south of Cape Canaveral Air Force Station and NASA

Patrick Air Force Base is adjacent to our City

Population is 10,300

3.8 square miles, with 617 acres of navigable canal system and Banana River
LOCAL GOVERNMENT AT CENTER OF CLIMATE CHANGE. WHY?

- PROTECTION OF PUBLICLY OWNED LANDS, BUILDINGS AND INFRASTRUCTURE
- PROTECTION OF PRIVATE PROPERTIES
- RESPONSIBILITY AND AUTHORITY OVER REGULATORY DECISIONS
- OBLIGATION TO THE PUBLIC TRUST TO PROTECT SOCIAL, ENVIRONMENTAL, AND ECONOMIC RESOURCES.

“A resilient city is prepared to absorb and recover from any shock or stress while maintaining its essential functions, structures, and identity, as well as adapting and thriving in the face of continual change,” (ICLEI, 2015)
Vulnerability Assessment

- **Impacts of**
  - Sea Level Rise
  - Storm Surge
  - Flood (FEMA Flood Plain)
  - Coastal Erosion

- **On:**
  - Financial Exposure
  - Land Use and Building Exposure
  - Critical Facility Exposure
  - Environmental/Ecological Exposure
TAKING ACTION

DATA GATHERING AND PUBLIC INVOLVEMENT

2014-2016
• 6 well attended open houses, community events, workshops

2017-2018
• Created a Climate Ambassador ‘think tank’ to help with programs and projects
• Booths at major community events
• Ocean Reef Festival
• Inaugural Local Surf festival

This rain event happened before one of the workshops. A sign from above!
Atlantic Coast
Mean High Water (NAVD88)
USACE Low, Intermediate and High Projection Rate Curves
Planning Horizon: 2040, 2070, 2100

Lagoon Side
Mean Annual High Water (NAVD88)
USACE Low, Intermediate and High Projection Rate Curves
Planning Horizon: 2040, 2070, 2100
High USACE Projection Rate Curve 2040

- **2040:**
  - 46 inch inundation using MHHW (Atlantic),
  - 19 inch inundation using MAHW (Lagoon)

- **2070:**
  - 66 inch inundation using MHHW (Atlantic),
  - 39 inch inundation using MAHW (Lagoon)

- **2100:**
  - 93 inch inundation using MHHW (Atlantic),
  - 66 inch inundation using MAHW (Lagoon)

City Hall, Fire Station, Police Station, Recreation HQ, Library, Elementary School
Florida Sea Grant (2016-2018)
Why Stormwater?

Figure 1: Stages of Stormwater Infrastructure Failure due to Sea Level Rise

- Fully Operating System
- Stage 1: Salt Water Plug
- Stage 2: Fresh Water Flooding After Precipitation
- Stage 3: Salt Water Flooding

Legend:
- Ground
- Sky
- Fresh Water
- Salt Water
- Stormwater Drainage Infrastructure

Figure by Emily Niederman
Sea Grants, Rising Tides and Other Water Bodies

Dr. Jason M. Evans
Associate Professor of Environmental Science
Stetson University
My Past Few Years

Researcher Helps Florida Cities Adapt to Sea-Level Rise

August 11, 2016

Satellite Beach, FL Public Works

(From left to right) Emily Niederman, Jason Evans, Ph.D., and Adam Carr are mapping out the vulnerable areas of Satellite Beach, Fla. Photo by Rhiannon Boyer
Yes, the sea is rising...

Trend of approximately 8 inches over 100 years
Yes, the sea is rising...

Trend of approximately 1 foot over 100 years
News release on July 28, 2014

NOAA: 'Nuisance flooding' an increasing problem as coastal sea levels rise

Study looks at more than 60 years of coastal water level and local elevation data changes

July 28, 2014

Eight of the top 10 U.S. cities that have seen an increase in so-called 'nuisance flooding'—which causes such public inconveniences as frequent road closures, overwhelmed storm drains and compromised infrastructure—are on the East Coast, according to a new NOAA technical report.

This nuisance flooding, caused by rising sea levels, has increased on all three U.S. coasts, between 300 and 925 percent since the 1960s.

The report, Sea Level Rise and Nuisance Flood Frequency Changes around the United States, also finds Annapolis and Baltimore, Maryland, lead the list with an increase in number of flood days of more than 920 percent since 1960. Port Isabel, Texas, along the Gulf coast, showed an increase of 547 percent, and nuisance flood days in San Francisco, California increased 364 percent.

"Achieving resilience requires understanding environmental threats and vulnerabilities to combat issues like sea level rise," says Holly Barmforth, Ph.D., NOAA assistant administrator of the National Ocean Service. "The nuisance flood study provides the kind of actionable environmental intelligence that can guide coastal resilience efforts."

"As relative sea level increases, it no longer takes a strong storm or a hurricane to cause flooding," said William Sweet, Ph.D., oceanographer at NOAA's Center for Operational Oceanographic Products and Services (CO-OPS) and the report's lead author. "Flooding now occurs with high tides in many locations due to climate-related sea level rise, land subsidence and the loss of natural barriers. The effects of rising sea levels along most of the continental U.S. coastline are only going to become more noticeable and much more severe in the coming decades, probably more so than any other climate-change related factor."

The study was conducted by scientists at CO-OPS, who looked at data from 45 NOAA water level gauges with long data records around the country and compared that to reports of number of days of nuisance floods.
Miami Beach, April 2013

Big Pine Key, FL

September 29, 2015

Photo credit: Greg Corning, provided by Monroe County staff
Nuisance Flooding Threshold for Monroe County is 1.08 ft above MHHW, as defined by Sweet et al. (2014).

Fifth highest tide on record (since 1935) for this gauge (10.43’ above Mean Lower Low Water, MLLW)

Only exceeded by tropical storm surges
Nuisance Floods by Year at Tybee Island, GA
(Ft. Pulaski Tide Gauge)

NOAA nuisance flood threshold for Fort Pulaski:
9.2 feet above MLLW

Data Source: https://tidesandcurrents.noaa.gov/stationhome.html?id=8670870
Stormwater drainage issues

Saltwater infiltration into underground wastewater systems

Saltwater flooding of yards and roads

Flooding of ancillary structures such as pavilions, sheds, etc.

Ground floor flooding of houses and commercial buildings

Flooding of high value critical infrastructure such as wastewater facilities and electrical substations

Planning Usually Begins Here
Fifth highest tide on record (since 1935) for this gauge (10.43’ above Mean Lower Low Water, MLLW)

Only exceeded by tropical storm surges
Yes, sea-level rise is likely accelerating.
“Scientists have very high confidence that global mean sea level will rise at least 8 inches and no more than 6.6 feet by 2100.”

NOAA REPORT, DEC. 2012
What to do????

Or maybe this?

Plan for this?
“Risk–based” scenario planning for sea–level rise and climate change–induced flood risk...
Satellite Beach: A Regional Leader in Climate Adaptation Planning
Stormwater drainage issues

Saltwater infiltration into underground wastewater systems

Saltwater flooding of yards and roads

Flooding of ancillary structures (pavilions, sheds, etc.)

Ground floor flooding of houses and commercial buildings

Flooding of high value critical infrastructure such as wastewater facilities and electrical substations

Satellite Beach is Here
What to do????

NOAA 2012
Predictions for Global Sea-Level Rise

Or maybe this?

Plan for this?
Policy 1.1.6 – The City shall utilize a **2070 planning horizon** and **the USACE high curve for sea level rise**, where applicable to the life span of the infrastructure and decision process. 2070 year projections shall be utilized for new infrastructure with life spans over 50 years and anticipated to be built by 2025. These ranges and projection curve model shall be updated based upon the newest data projection curves, when available, but at least every 5 years.
### Army Corps High Projection?

<table>
<thead>
<tr>
<th>Year</th>
<th>Relative Sea Level (Ft)</th>
<th>Relative Sea Level (In)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>-0.37’</td>
<td>-4.4”</td>
</tr>
<tr>
<td>2015</td>
<td>0.00’</td>
<td>0.0”</td>
</tr>
<tr>
<td>2040</td>
<td>0.85’</td>
<td>10.2”</td>
</tr>
<tr>
<td>2070</td>
<td>2.48’</td>
<td>29.8”</td>
</tr>
</tbody>
</table>

![Estimated Relative Sea Level Change Projections - Gauge: 8721120, Daytona Beach Shores, FL](http://www.corpsclimate.us/ccaceslcurves.cfm)
General Timeline of Sea Level Rise Impacts on the Built Environment

- Stormwater drainage issues
- Saltwater infiltration into underground wastewater systems
- Saltwater flooding of yards and roads
- Flooding of ancillary structures (pavilions, sheds, etc.)
- Ground floor flooding of houses and commercial buildings
- Flooding of high value critical infrastructure such as wastewater facilities and electrical substations

Satellite Beach is Here
To be clear: Sea-level rise is not the primary culprit for these breaks (but it doesn’t help)

Broken Main Discharged 1 Million Gallons Of Raw Sewage In Florida

By Peak Johnson

More than 1 million gallons of raw sewage went into a canal that leads to Central Florida’s Banana River, after an old sewer pipe broke last week near the border of Satellite Beach and Indian Harbour Beach.

"It’s 20-year-old pipe," Doc Walker, spokesman for Brevard County told Florida Today. "It's kind of a problem we've got all over the county."

The county had asked residents to curtail their water use in the hours following the leak to reduce impacts to the sewers. To prevent sewage backups at homes and businesses, the county diverted 668,000 gallons of raw sewage into a pond near Sea Park Elementary School and 1.05 million gallons of raw sewage into Anchor Drive Canal, which connects with the Banana River.

A similar spill happened in the same area of South Patrick Drive in November 2012. The county leaked sewage into the same canal when a pipe failed. A pipe discharged 60,000 gallons of sewage for several hours, until the pipe could be sealed.

The Florida Department of Environmental Protection at the time found no wrongdoing, so it did not fine the county.

Repairing the leaking sewer force main was complicated by excessive inflow of groundwater in the excavation area, county officials said, because it was so close to a canal. The pipe was 9 feet underground.

Utility staff and two contractors worked around the clock for 38 hours, reported Florida Today.

"After the first 24 hours, the ability to store and/or haul sewage was exhausted, so the decision was made to divert sewage to a nearby canal to prevent backups into streets, homes or businesses," County Manager Stockton Whitten said. "Additional staff and equipment was brought in to complete the repair."
October 1, 2017
(after Irma was long past)

More than 10 inches of rain fell on Palm Bay, Indialantic; flooding could continue

Tyler Vazquez, FLORIDA TODAY  Published 12:11 p.m. ET Oct. 2, 2017 | Updated 6:45 p.m. ET Oct. 2, 2017

VIDEOS: RECORD RAINS IN BREVARD
Scenes of flooding in Merritt Island | 2:33

Monday in the aftermath of heavy rains from Sunday. Video by Tim and Riley Shortt. Posted 10/2/17.
Florida Sea Grant (2016-2018)

Objective 1: Work with the City to develop and update geographic information system (GIS) files to include high precision elevation data for stormwater, critical facilities, and vulnerable buildings

July 2016
There are over 2000 stormwater outfalls in the entirety of the Indian River Lagoon. Each stormwater outfall is a potential future flood risk because of sea level rise.
Objective 2: Use improved infrastructure datasets to develop enhanced storm surge flood assessments using FEMA’s HAZUS Multi-Hazard Assessment Tool
Benefits

HAZUS–MH allows the user to:

- **IDENTIFY** vulnerable areas that may require planning considerations
- **ASSESS** level of readiness and preparedness to deal with a disaster before it occurs
- **ESTIMATE** potential losses from specific hazard events (before or after a disaster hits)
- **DECIDE** how to allocate resources for most effective and efficient response and recovery
- **PRIORITIZE** mitigation measures that need to be implemented to reduce future losses

Source: Federal Emergency Management Agency (www.fema.gov/hazus)
But running HAZUS near Satellite Beach gave us some unexpected results...
HAZUS Coastal Flood Risk Zones (also a FEMA tool)
FEMA Flood Zones in Satellite Beach
HAZUS Coastal Flood Risk Zones (also a FEMA tool)

Current conditions (i.e., no sea level rise)
Big takeaway lesson #1:

Flood risk characterization tools for flood insurance (property) are quite different than the flood risk characterization for evacuations and critical facility (human life).
Objective 3: Integrate new datasets with previous vulnerability assessments and policy frameworks to develop specific recommendations for increasing Satellite Beach’s resilience to sea-level rise and future flood risks.
Stormwater Inventory Base

City of Satellite Beach, Florida
Stormwater Tidewater Inflow Assessment

2015 Water Levels

**Mean Water Level** = Tidewater in pipe at least ½ of the year

**Seasonal High Water** = Tidewater in pipe for ~ 1 month

**Annual High Water** = Tidewater in pipe for ~ 1 day
Stormwater Tidewater Inflow Assessment

2040 Water Levels

Mean Water Level = Tidewater in pipe at least ½ of the year

Seasonal High Water = Tidewater in pipe for ~ 1 month

Annual High Water = Tidewater in pipe for ~ 1 day
Stormwater Tidewater Inflow Assessment

2070 Water Levels

Mean Water Level = Tidewater in pipe at least ½ of the year

Seasonal High Water = Tidewater in pipe for ~ 1 month

Annual High Water = Tidewater in pipe for ~ 1 day
Small drainage basins that to date have not experienced flooding problems.

To date, not surveyed for invert elevation data.
Big takeaway #2

FEMA flood zones in the coastal zone are almost exclusively for storm surge... and DO NOT account for local stormwater drainage.
Yes, this is one of the lowest lying areas in the City of Satellite Beach
Delivered to City Council on September 6, 2017

Site Flood Vulnerability Assessment for the Satellite Beach Fire Department
(1390 South Patrick Drive, Satellite Beach, FL)

Report for the City of Satellite Beach
August 28, 2017

Dr. Jason M. Evans – Department of Environmental Science and Studies, Stetson University
Adam Carr, Crystal Goodison, and Dr. Paul Zwick – GeoPlan Center, University of Florida

Assessment conducted through funding and project support provided
by the Florida Sea Grant College Program
September 6, 2017

Note: The cone contains the probable path of the storm center but does not show the size of the storm. Hazardous conditions can occur outside of the cone.

Hurricane Irma
Wednesday September 06, 2017
11 AM AST Advisory 30
NWS National Hurricane Center

Current information: x
Center location 18.2 N 64.0 W
Maximum sustained wind 185 mph
Movement WNW at 16 mph

Forecast positions:
- Tropical Cyclone
- Post/Potential TC
Sustained winds:
D < 39 mph
S 39-73 mph
H 74-110 mph
M > 110 mph

Potential track area:

Day 1-3
Day 4-5

Watches:

- Hurricane
- Trop Stm

Warnings:

- Hurricane
- Trop Stm

Current wind extent:

- Hurricane
- Trop Stm
Nothing pictured is currently in a flood zone
LIDAR Elevations with survey control points and OPUS GPS

HAZUS results (current sea level)

~ 4 feet of water above first floor elevation at 100-year coastal flood (Hazus)

Satellite Beach Fire Station

~ 6 feet of water in driveway and South Patrick Drive at 100-year coastal flood (Hazus)
HAZUS Coastal Flood Risk Zones (also a FEMA tool)

Current conditions (i.e., no sea level rise)
Between initial request and September 6...

Hurricane Harvey
Alternative fire station site...
Alternative fire station site...
Satellite Beach’s new firehouse will be higher and drier

Written by: George White  November 09 2017

Satellite Beach Fire Department officials, surrounded by recent flood waters at their current location at 1390 South Patrick Dr., now know their new home will be located on a two-acre site that was formerly the parking lot of the U.S. Post Office at 210 Jackson Ave.

But it wasn’t just Hurricane Irma or the followup Oct. 1 no-name storm that has city officials ready to move the facility built in 1971.

“The building did not flood but all the roads around it did. It’s definitely getting worse,” said City Manager Courtney Barker.

The city is planning for the eventual expected impact from sea level rise, not coming over the dunes from the Atlantic Ocean, but coming up from the west and rising waters in the Banana River and Indian River Lagoon. The current fire station is shown in recent flood maps to be near the areas to be first impacted by rising waters, areas near canals and low-lying roadways, she said.

Finding an alternative location for the fire station actually involved several different criteria, she said.

“We spent a lot of time looking at different properties at different locations and that (the Jackson Avenue parcel) was definitely the best. It’s got the best timing because it’s centrally located throughout the city, it’s near State Road A1A at a high elevation and it’s on a street with a stoplight (at Jackson Avenue and SR A1A and South Patrick Drive). It’s definitely the best location,” Barker said.

“We’re looking more down the road. We’re just securing the property now because you know property prices are not going down.”

The $730,000 contract for the property contemplates the note being repaid with revenues from a utility tax.

The old fire station will be considered for other city purposes or offered for sale, she said.

It wasn’t current or future flooding that prompted the discussions for a new fire station, it was the crowded conditions that originally started the conversation,” Barker said.

“We were looking at expanding by adding a floor to the fire station, because they are so cramped in there now, but then we realized, do we really want to invest in a building that will be sitting in a foot of water? We started looking at the elevations and getting the data and deciding whether we wanted to do it,” she said.

The city tries to build for 100 years or more, she said.
COURTNEY H. BARKER, AICP
CITY MANAGER
PLANNING for RESILIENCY
and
SUSTAINABILITY
DATA GATHERING/PUBLIC INVOLVEMENT
- Getting the best facts we can - DONE

ADOPTED SUSTAINABILITY PLAN AND GREEN ACHIEVEMENT TARGETS
- Many ongoing Sustainability projects

DEFINING COMMUNITY RESILIENCE
- Planning - Sustainability Action Plan and Comprehensive Plan
- Implementing Resiliency techniques through the Planning and Regulatory Process

https://www.facebook.com/GoGreenSB
SUSTAINABILITY PLANNING

- **Sustainability Board** established in 2015
- R&D of SAP began in 2016
- Started with a **Sustainability Assessment Report**: SAR was used to guide the direction of the SAP
- Identified specific indicators, **121 in total**, which were broken down into five categories...
- **Recommendations** made for each category based on indicators formed the basis for the SAP
- **Joint effort between City officials, the Sustainability Board, and Florida Institute of Technology students**

- **121 INDICATORS**
- **88 were listed as near term high priority**, with action steps for each principle
- **88 broken into group of 20**
- These **20 became the GREEN ACHIEVEMENT TARGETS (GATS)**

The basic goal: To create a user friendly *Sustainability Action Plan* that could set meaningful and attainable targets for the city to follow so as to lead by example well into the 21st century.
City Council adopted the Plan in March, 2017, to lead by example in the next five years.
‘GATS’
Green Achievement Targets

- Community Garden
- Desoto Stormwater Park
- Bat Houses
- Shade House
- Irrigation Restriction
- Lagoon Friendly Lawns
- SolSmart
- PACE: Property Assessed Clean Energy

“Open for solar business!”
PROJECT IMPLEMENTATION

BAT HOUSES (VIDEO)
https://www.facebook.com/GoGreenSB/videos/1425065237575310/

Florida's bat population is in alarming decline because of habitat disturbance and the widespread use of pesticides. Bats are critical to both habitat health and human health; they are the primary predator of night-flying insects, with many species consuming nearly their own weight in bugs each night.

City Hall Goes Solar
PROJECT
IMPLEMENTATION

TOGETHER WE'RE CHALLENGING THE STATUS QUO

everyday in Canada & the US
we needle-fry one hair dye down the drain and throw recyclables into landfills

hair clippings 63,180 lbs
hair color 42,122 lbs
tubs & color tubes 109,512 lbs
papers & plastics 206,392 lbs

TOTAL DAILY WASTE = 421,206 lbs

stand up and be counted!

Love Our Lagoon

Supported by the Citizens of Satellite Beach
Initiated the first **SUSTAINABILITY SUMMIT**, with surrounding Cities, County, lay-people, with Orlando’s Chris Castro, Sustainability Guru, as the headliner.

Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it's the only thing that ever has.

Margaret Mead
Next steps

- Working with our Climate Ambassador Committee on
- Potential Code and Charter Changes and taking those into
- Public Workshops
- Charter Changes
ROCHELLE W. LAWANDALES, AICP
IMPLEMENTATION
SUSTAINABILITY + RESILIENCY = THE FUTURE
**ENVIRONMENTAL ISSUES**

- 90% built out
- Mostly reuse/redevelopment
- Older parcels contribute heavily to **environmental problems**
  - lack of stormwater,
  - Little green space,
  - No landscape,
  - Over parking on vast impervious surfaces
- New regulations create **usability problem** on small platted lots:
  - Existing lot coverage,
  - Impervious %,
  - Stormwater regulations,
  - Breezeways,
  - Height and density requirements generally LIMIT OR ELIMINATE project feasibility
Lack of development has led to **economic decline and environmental degradation** and **Increased Residential tax burden**...

So, to **protect the environment**: fix aging infrastructure, protect our public investments, make it easier and more financially feasible to develop aging sites to get retention/detention/treatment of stormwater, promote green building, low impact development, etc.;

And, to **create a sustainable economy**: create better development patterns, offer incentives, take some of the risk off development, add value to make development feasible.

Can’t do this now...
RESULT:

Increase tax revenue to finance improved public infrastructure, protect public facilities, replace aging utilities, so that we have... better environment and healthy economic future!

- Correct environmental degradation occurring from old development patterns!
- Create Economic Sustainability
- Promote Social Equity and Quality of Life
- Human and animal safety (priceless)
PHILOSOPHY/PREMISE

4 KEY URBAN DESIGN SUSTAINABILITY PRINCIPLES

- Promote density and mixed use
- Create spaces of value
- Connect places
- Invite pedestrians

GOAL: PROTECT OUR CITY’S ASSETS AND OUR PRIVATE INVESTMENTS. MAINTAIN SENSE OF PLACE, FOSTER (RESTORE) ENVIRONMENTAL INTEGRITY AND DIVERSIFY ECONOMY
Adaptation Action Areas
Redevelopment Areas
Coastal land use and sea level rise (Line in the Sand literally - CCCL)
Creating a new Sustainability Element
Community Health and Wellness, and local food source initiatives

NLC: “Land Use is the most visible of the sustainability topics. Cities with sustainable land use create an obvious balance of environmental preservation, commerce, and livability. And of course, land use and transportation are intricately connected.”
The 5-sustainability categories within those 3:

- **Built Environment**
- **Land and Water Systems**
- **Energy and Transportation**
- Community Outreach
- Quality of Life
CODE CHANGES: BUILT ENVIRONMENT

BUILDING AND ZONING CODES

- **GREEN BUILDING STANDARDS-** LEED/USGBC, Energy Star, MANY OTHERS
- **Finish Floor Elevations/BFE/Crown of the road-** RAISING LIMITS to get out of the water
- **Solar Panels-** sitting, shade, orientation, (check your tree requirements may inhibit)
- **Do you allow stilting?**
- **Washout first floors?**
- **Does this count in your height regulations?**
CODE CHANGES: BUILT ENVIRONMENT

BUILDING AND ZONING:
- Are 2 car garages required?
- High Performance building techniques and systems?
- Heat island reduction?
- LED/Smart batteries
- Yikes, the list is exhaustive!
USES:
- Vertical and horizontal mixed use
- New Mixed Use District
- Adaptive Re-use/Redevelopment
- Density: is it enough to make a site feasible development or redevelopment?
- Transferring unused density from areas prone to flooding near the lagoon to west side of AIA-create developable properties-better for environment and economics

SITES:
- Require complete demolition of old parking lots and impervious surfaces
- Parking requirements-Do you have maximums? Change from minimums
- Connectivity for pedestrians and Linkage into the neighborhoods
- Upgrade to new environmental standards
- Upgrade with new sustainability and low impact design
**CODE CHANGES: LAND and WATER**

**Sites continued...**

- Fertilizer and Pest Control (reduce nitrogen other chemicals)
- Swales near the lagoon; collection systems for pre-treatment
- Rain Barrels, Rain Gardens
- Green Roofs, Blue Roofs
- Drainage—do you require Single Family to drain to the street? What happens to it?
- Do you allow or require Swales/bioswales?
- Landscaping—do you limit the amount of natives?
- Do you allow Low Impact Design methods?
- Lagoon Friendly?
- Grow FOOD not lawns! Fleet Farming?
Low-impact development (LID) can be a lucrative option for new development, urban retrofitting, and redevelopment projects wanting to invest in LID as a stormwater management tool.

**Basic principles**

- Water is a resource
- Reduce impervious surfaces to allow water to soak into the ground where it lands
- Use natural systems to promote infiltration of water
- Protect ecologically important areas of proposed developments

**Examples**

- Vegetated filter strips at the edges of paved surfaces
- Residential or commercial rain gardens designed to capture and soak in stormwater
- Porous pavers, porous concrete, and porous asphalt
- Narrower streets
- Rain barrels and cisterns
- Green roofs
Some examples

- **Engineered systems** that filter storm water from parking lots and impervious surfaces, such as bioretention cells, filter strips, and tree box filters;

- **Engineered systems** that retain (or store) storm water and slowly infiltrate water, such as sub-surface collection facilities under parking lots, bioretention cells, and infiltration trenches;

- **Modifications to infrastructure** to decrease the amount of impervious surfaces such as curbless, gutterless, and reduced width streets;

- **Low-tech vegetated areas** that filter, direct, and retain storm water such as rain gardens and bio-swales;

- **Innovative materials** that help break up (disconnect) impervious surfaces or are made of recycled material such as porous concrete, permeable pavers, or site furnishings made of recycled waste;

- **Water collection systems** such as subsurface collection facilities, cisterns, or rain barrels; and

- **Native or site-appropriate vegetation**.
Transportation services/connectivity (affects Vehicle Miles Travelled)
Install Energy-Efficient Traffic and Street Lights (TIME THEM CORRECTLY)
Electric Cars, bicycle friendly, golf carts
Complete Streets
Transit-SHELTERS?
Rent-a-bike for more urbanized areas
Interconnectivity/throughways between uses for internal capture; Reduce emissions
Reduce street (or lane sizes)
Street Edges: (new, redevelopment, public or private): Bioswales, Ribbon curb, No curb

Example: Sec. 30-425. - General requirements for off-street parking facilities.

- **Paved and unpaved area.** An area equal to 2/3 of the total required parking area must be paved and striped. The remaining 1/3, upon the recommendation of the planning and zoning advisory board and approval by city council based on proposed uses of the facility, may **MUST be unpaved and placed in grass available for future paving** either left in a grassy state or be stabilized with pervious materials and use parking stops.
For more examples of communities implementing green infrastructure practices, please check-out The Conservation Fund’s Green Infrastructure Leadership Program, which has assembled an online database of green infrastructure projects being planned and implemented across the country.

http://www.greeninfrastructure.net/content/projects

Seattle, Washington

Since the late 1990s, the Seattle Public Utilities (SPU) agency has undertaken a variety of green infrastructure pilot programs including the well-known Street Edge Alternative (SEA) project. This and similar programs aim to reduce and treat runoff impacting water quality and aquatic habitat in the Puget Sound watershed by managing stormwater more effectively at a localized level. With this and other pilot programs, Seattle has collected performance data and made the case for substituting green infrastructure practices for traditional grey infrastructure in urban and suburban areas. For example, SPU estimates that a local street converted to the SEASTreet design saves $100,000 per block (330 linear feet) compared to a traditional street design, while achieving the same level of porosity (35 percent impervious area). In addition to these avoided-cost savings, the program claims these designs have provided additional community benefits such as traffic calming, improved neighborhood aesthetic and bioremediation (SPU 2010).
Create a Performance based bonus system based on sustainable principles to keep us resilient...

- **Using the broad categories of:**
  - Land
  - Buildings
  - Innovation
  - Transportation
  - Architectural Design, Site Amenities and Aesthetics

Reliable land use patterns to sustain the Communities’ tax base over time and over cycles
If you DO (X AMOUNT OF) this you will get X amount of additional stories or height in feet and X amount of additional units from the bowl

<table>
<thead>
<tr>
<th>LAND</th>
<th>BUILDING</th>
<th>INNOVATION</th>
<th>TRANSPORTATION</th>
<th>ARCHITECTURAL DESIGN, AMENITIES, AND AESTHETICS (SEC 30-422)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARKING ON GROUND FLOOR (DOESN'T COUNT TOWARD STORIES OR HEIGHT)</td>
<td>GO LEED V-4 (OR SILVER, PLATINUM), RIGHT OFF THE BAT, ______ FEET AND ______ UNITS (?)</td>
<td>TOTAL SITE REDEVELOPMENT (RIGHT OFF THE BAT GETS ______ FEET AND ______ UNITS)</td>
<td>PREFERRED PARKING FOR LOW-EMISSION, HYBRID, AND ELECTRIC VEHICLES/CHARGING STATIONS</td>
<td>FLORIDA VERNACULAR OR MEDITERRANEAN</td>
</tr>
<tr>
<td>PROVIDE'S CITY WITH 35% PUBLIC PARKING SPACES (ADDITIONAL TO REQUIRED PARKING)</td>
<td>RESIDENTIAL BUILDING ON STILTS/COMMERCIAL BUILDING ON PILINGS OVER PARKING AND STORMWATER AREAS</td>
<td>PARTIAL TEARDOWN</td>
<td>PROVIDES TRANSIT SHELTER AND ENCOURAGES USE OF TRANSIT AMONG OCCUPANTS</td>
<td>Canopies or porticos, integrated with the building massing and style;</td>
</tr>
<tr>
<td>PERVIOUS PARKING AREA FOR 50% OR MORE OF YOUR REQUIRED PARKING</td>
<td>SOLAR PANELS FOR ENERGY AND POWERED HOT WATER SYSTEM FOR APPLIANCES, FACILITIES, AND AMENITIES</td>
<td>FAÇADE AND MATERIALS OR SITE UPGRADE</td>
<td>BREE, PED, GOLF CART AND SOLAR PANEL CAR CHARGING STATION/ACCESS AND LOCATIONS ON SITE AND PROMOTION IN BUSINESS</td>
<td>Arcades, a minimum of six feet in width;</td>
</tr>
<tr>
<td>USE OF BIO SWALES AND/OR RAIN GARDEN STORMWATER SYSTEMS</td>
<td>PERFORMANCE BASED VIA TECHNOLOGY SYSTEMS</td>
<td>LAND ASSEMBLAGE FOR LARGER PROJECT</td>
<td>INTERCONNECTED DRIVEWAY/SIDEWALK/AND TRAIL NETWORK</td>
<td>Sculptural art work;</td>
</tr>
<tr>
<td>INTEGRATE LOW IMPACT DESIGN FOR LANDSCAPING AND USE MORE THAN 50% NATIVE PLANT MATERIALS; IRRIGATION IS FROM AN ONSITE CIRCULATION SYSTEM</td>
<td>WATER REDUCTION PIPE, TOILETS, SEWER, RAIN BARRELS, RECYCLATE</td>
<td>INTEGRATE A MIX OF USES</td>
<td>NO LAWN/ ALL XERISCAPE</td>
<td>Hvac/WATER SAVING TECHNOLOGY SYSTEMS</td>
</tr>
<tr>
<td>FIRST FLOOR UNHABITED OR PLACE HOUSE ON STILTS</td>
<td>HEAT ISLAND REDUCTION SYSTEMS APPROACH</td>
<td>ALL SIGNAGE LED BASED SYSTEM</td>
<td>SMART APPLIANCES IN RESIDENTIAL PORTIONS</td>
<td>PROGRAM FOR BUSINESSES TO USE GREEN CLEANING PRODUCTS, RECYCLEABLE/REUSABLE UTENSILS, BAG, OR TO-GO PRODUCTS; NO PLASTIC PRODUCTS INCLUDING STRAWS, BAG, PLATES, CUPS, ETC.</td>
</tr>
<tr>
<td>USE UNDERDRAINS</td>
<td>ALL LED LIGHTING</td>
<td>USE PASSIVE SOLAR DESIGN; ORIENT, SIZE, AND SPECIFY WINDOWS TO BALANCE DAYLIGHTING VERSUS HEAT LOSS; AND LOCATE LANDSCAPE ELEMENTS WITH SOLAR GEOMETRY AND BUILDING LOAD REQUIREMENTS IN MIND</td>
<td>USE HIGH PERFORMANCE BUILDING ENVELOPES; SELECT WALLS, ROOFS, AND OTHER ASSEMBLIES BASED ON LONG-TERM INSULATION, AIR BARRIER PERFORMANCE, AND DURABILITY REQUIREMENTS.</td>
<td>USE HIGH PERFORMANCE BUILDING ENVELOPES; SELECT WALLS, ROOFS, AND OTHER ASSEMBLIES BASED ON LONG-TERM INSULATION, AIR BARRIER PERFORMANCE, AND DURABILITY REQUIREMENTS.</td>
</tr>
</tbody>
</table>

Sample, not complete
INCENTIVE BASED CODE CHANGES

- **Proposals:** Removing unused density (units) from the ‘riverside’ portion of the City, to select locations along the west side of AIA, and creating a ‘jelly-bean’ bowl.

- **Proposals:** Lowering the height from East of AIA (now 65’) to use on west side of AIA which is limited to 35’, in select locations.

- **“Minimum”** requirements for integrating sustainability and low impact design features.

- Creating a **sliding scale**. For example, if you do 3 ‘elements’, you will get ‘x’ amount of units and ‘x’ feet of height.

- Placing a **maximum cap on number of units and maximum height**; plus, other incentives (lot coverage, FAR, fee structures, etc).
FOR EXAMPLE...

- If you go full LEED-V4 (new maximum in LEED), you’ll get the max bonus/incentives allowed.
- If you do parking on ground floor, use LID standards, (underdrains or exfiltration), you’ll get bonuses.
- Complete ‘fold-up’ of old parking lots on re-do; and you may get a larger bonus of density or height to make it feasible.
- Must do minimum green building techniques, but the more you do, you’ll get bonuses of units or height or both depending on the use.
- Almost like a Chinese menu: One from Column A, Two from Column B

“Green’ means good stewardship of land, water, buildings, and environment. So, Satellite is going Sustainable and Green, by Design naturally.“RWL
We have an added problem! We need to change the City’s Charter to allow incentives of:

- Density (but we’re just moving it, not raising it)
  - Mix, Mass and Mesh for Economic Sustainability
- Height (reducing one side, adding to other side and the max is not yet determined)
- If it doesn’t pass, we’ll have find other ways of adding value like Density and Height. Not nearly as effective!
Low Hanging fruit:
- Enforce the CCCL (move forward)
- No Minimum Parking—create Max Parking and % non paved
- Increase lot coverage when use swales, bioswales
- Allow to build on stilts
- First floor non-habitable like low country
- Regional Stormwater (City $$$)
- Swale program (City $$$) and Swales on private lots (Rain Gardens, etc.)
- Encourage sustainable site redevelopment by adding value via codes

Major potential solution:
Increase project feasibility via density and height bonuses and new design standards requiring green development technologies and standards
CONCLUSION

Remember ‘Green’ takes ‘Green’, so you have to take off some risk and help add value and in the end, you get what you want...

A SUSTAINABLE and RESILIENT community.

Real change occurs from the bottom up; it occurs person to person, and it almost always occurs in small groups and locales and then bubbles up and aggregates to larger vectors of change.

Paul Hawken, Author, Drawdown

Read more at: https://www.brainyquote.com/authors/paul_hawken
FOR YOUR COMMUNITY....

- WHAT IS THE 1 THING THAT SHOULD BE REQUIRED FOR ALL PROJECTS (Public and Private) TO DO?
- WHAT ARE YOUR TOP 3 MOST IMPORTANT ITEMS YOU HAVE AVAILABLE TO USE AS INCENTIVES?
- RANK THE REST IN ORDER OF IMPORTANCE.
- ADD OTHER ITEMS AS NEW TECHNOLOGIES OR IDEAS COME ALONG.

Prepare, Plan, and Implement Sustainability and Resilience!
WHY?

...because the future matters

.... For them...
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A FEW TAKE AWAYS FOR YOU

- Check out National League of Cities Sustainable Cities Institute
  http://www.sustainablecitiesinstitute.org/topics/land-use-and-planning/land-use-and-planning-sustainability-principles
- Download Land Use Sustainability Principles: Action Checklist
  https://www.wbdg.org/resources/low-impact-development-technologies
- http://edis.ifas.ufl.edu/uw364
- www.cnt.org
- www.americanrivers.org
- https://www.asla.org/stormwatercasestudies.aspx
Green Infrastructure Benefits and Practices

This section, while not providing a comprehensive list of green infrastructure practices, describes the five Gi practices that are the focus of this guide and examines the breadth of benefits this type of infrastructure can offer. The following matrix is an illustrative summary of how these practices can produce different combinations of benefits. Please note that these benefits accrue at varying scales according to local factors such as climate and population.

| Practice                  | Reduces Stormwater Runoff | Improves Water Quality | Reduces Grey Infrastructure Needs | Reduces Flooding | Increases Available Water Supply | Increases Groundwater Recharge | Reduces Salt Use | Reduces Energy | Improves Air Quality | Reduces Atmospheric CO₂ | Reduces Urban Heat Island | Improves Community Livability | Improves Aesthetics | Improves Recreational Opportunity | Improves Noise Pollution | Improves Community Cohesion | Improves Agriculture | Improves Habitat | Cultivates Public Education Opportunities |
|---------------------------|---------------------------|------------------------|----------------------------------|-----------------|---------------------------------|-------------------------------|-----------------|---------------|---------------------|--------------------------|---------------------------|-------------------------------|----------------------|------------------------------------------------|---------------------|-------------------------------|------------------------------|---------------------|--------------------------------|---------------------|
| Green Roofs               | Yes                       | Yes                    | Yes                              | Yes             | Yes                             | Yes                           | Yes             | Yes           | Yes                 | Yes                      | Yes                       | Yes                           | Yes                  | Yes                                                          | Yes                 | Yes                           | Yes                           | Yes                 | Yes                          | Yes                 |
| Tree Planting             | Yes                       | Yes                    | Yes                              | Yes             | No                              | No                            | Yes             | Yes           | Yes                 | Yes                      | No                        | No                            | Yes                  | No                                                          | Yes                 | Yes                           | Yes                           | Yes                 | Yes                          | Yes                 |
| Bioretention & Infiltration | Yes                      | Yes                    | Yes                              | Yes             | No                              | No                            | Yes             | Yes           | Yes                 | Yes                      | No                        | No                            | Yes                  | No                                                          | Yes                 | Yes                           | Yes                           | Yes                 | No                           | Yes                 |
| Permeable Pavement        | Yes                       | Yes                    | Yes                              | Yes             | No                              | No                            | Yes             | Yes           | Yes                 | Yes                      | No                        | No                            | Yes                  | No                                                          | Yes                 | Yes                           | Yes                           | Yes                 | No                           | Yes                 |
| Water Harvesting          | Yes                       | Yes                    | Yes                              | Yes             | No                              | No                            | Yes             | Yes           | Yes                 | Yes                      | No                        | No                            | Yes                  | No                                                          | Yes                 | Yes                           | Yes                           | Yes                 | No                           | Yes                 |
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- Please refer to the slide number and/or speaker when you post your question
- Please keep your questions succinct!
- Staff will ask the presenters questions, as time permits
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- 1 CEC for Certified Floodplain Managers
- 2 CLE for Florida attorneys (1708851N - Intermediate)
- .125 CEUs for Florida Environmental Health Professionals.

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Check out our Legislative Webpage!

Available at:
www.1000friendsofflorida.org/2018-florida-legislative-session-custom/

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- Includes Growth Management, Transportation and Conservation Legislation
- Includes links to the bills
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