

# *Sea-Level Rise and Drainage: Where the Water Hits the Road*



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# Overview

- Why should you care about Florida?
- The problem
- What solutions?!
- Drainage & local government in Florida
- Why should you care about Florida? (reprise)



# Why Should You Care What Happens in Florida?

- Florida will be expensive for everyone
- The relevant distinctions in Florida law similar in many states
- Drainage issues may contribute to *de facto* “rolling easements”





# Sea Level Rise and Coastal Flooding Impacts

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



Sea Level Rise   Confidence   Marsh

Vulnerability   Flood Frequency

Sea Level Rise ?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

3 ft SLR

Legend

- Water Depth
- Low-lying Areas
- Area Not Mapped
- Visualization Location

View Levees

## Overview

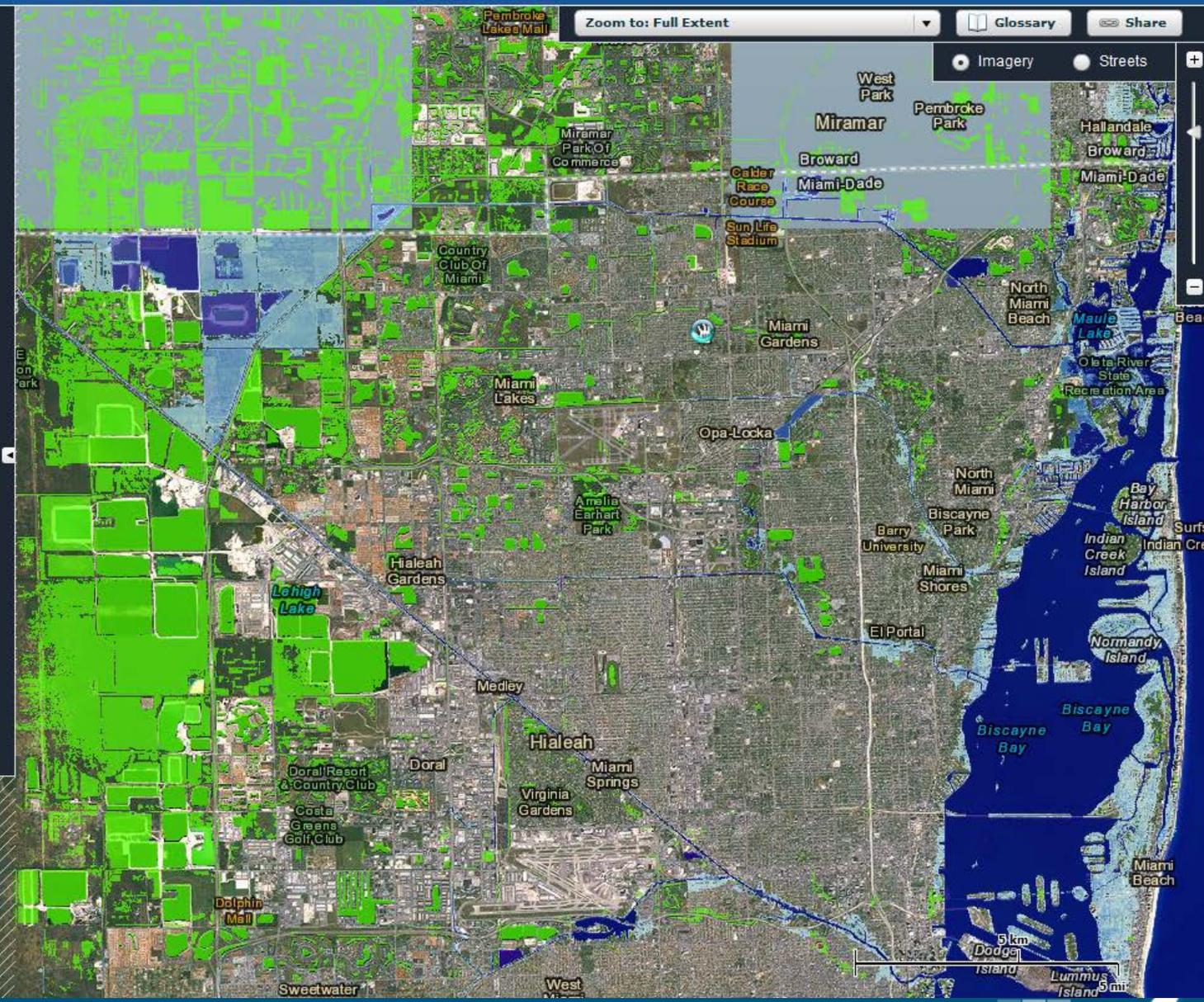
Use the slider bar above to see how various levels of sea level rise will impact this area.

Levels represent inundation at high tide. Areas that are hydrologically connected are shown in shades of blue (darker blue = greater depth).

Low-lying areas, displayed in green, are hydrologically "unconnected" areas that may flood. They are determined solely by how well the elevation data captures the area's hydraulics. A more detailed analysis of these areas is required to determine the susceptibility to flooding.

## Understanding the Map

### Additional Information



# What “Solutions”?!

- Nourishment: for 39” of SLR = \$6-\$39 billion
- Elevation?
  - Expensive, legal concerns and liability
- Floating development?
  - Challenging with storm surge, wave action, and wind; also need to flood proof infrastructure
- Surge barriers?





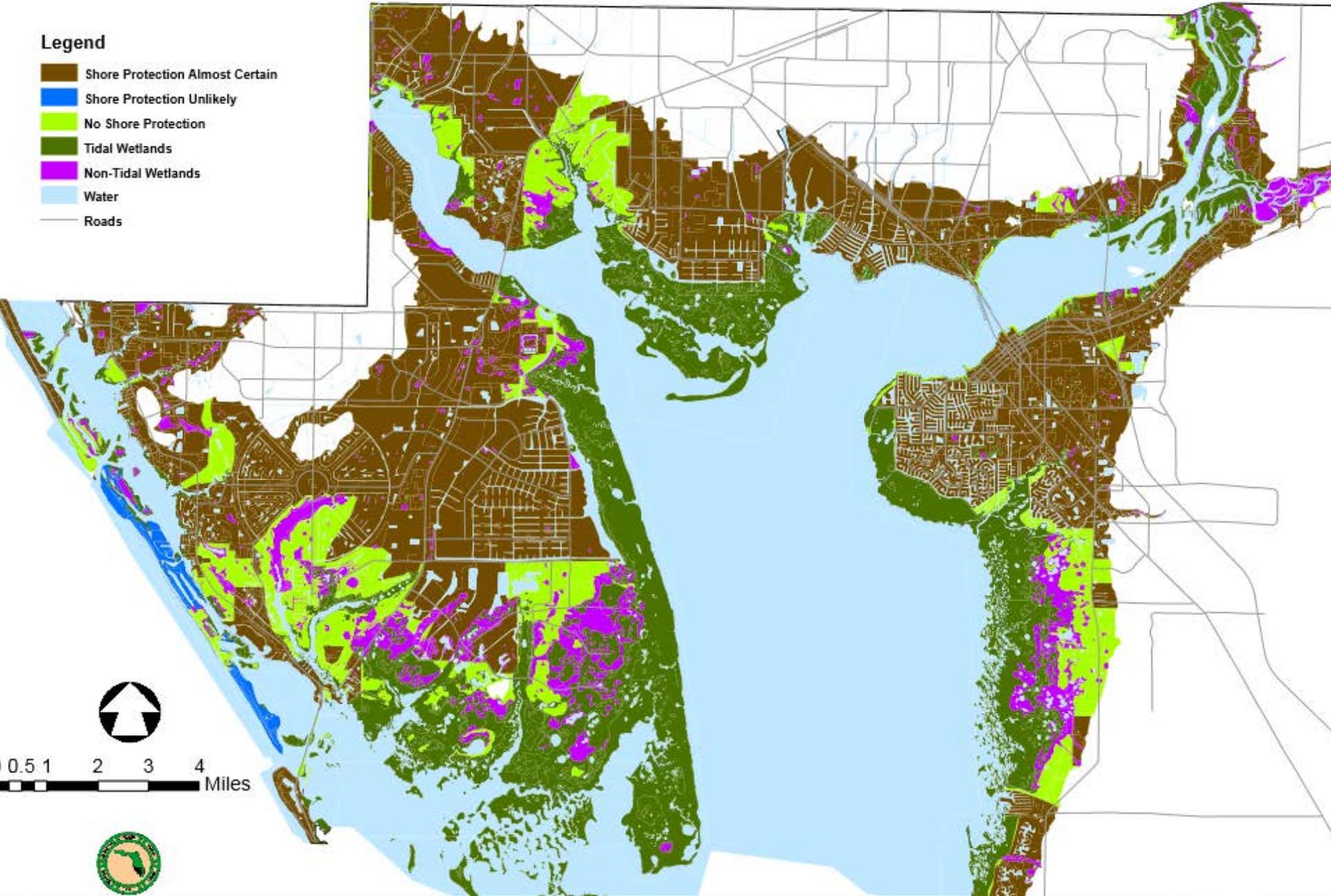
How many billions to  
“armor” United States  
cities?



# Charlotte County Florida 5' Sea Level Rise

## Legend

- Shore Protection Almost Certain
- Shore Protection Unlikely
- No Shore Protection
- Tidal Wetlands
- Non-Tidal Wetlands
- Water
- Roads

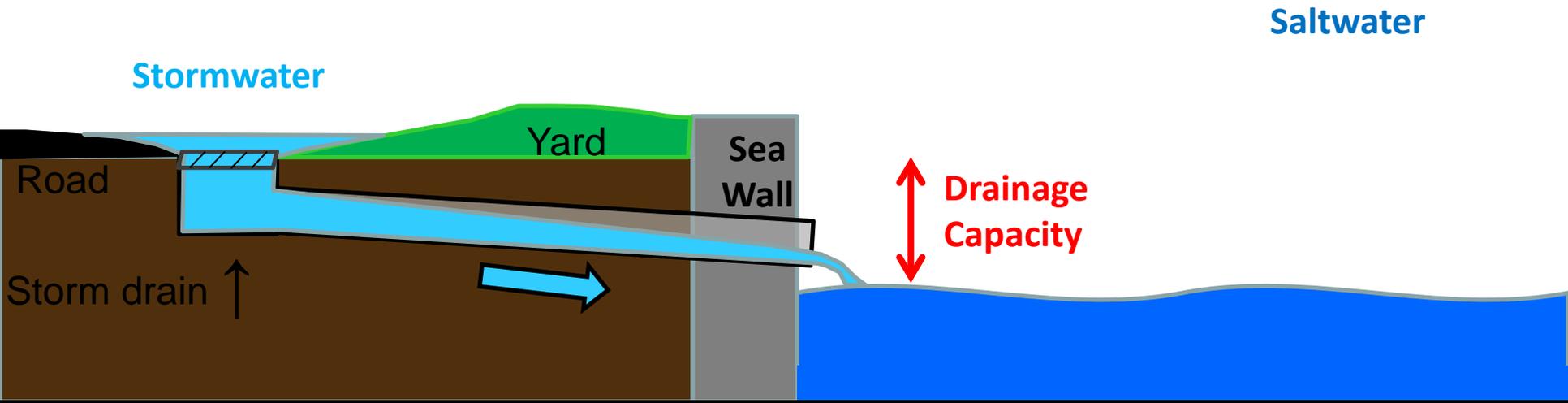


# Protection Costs

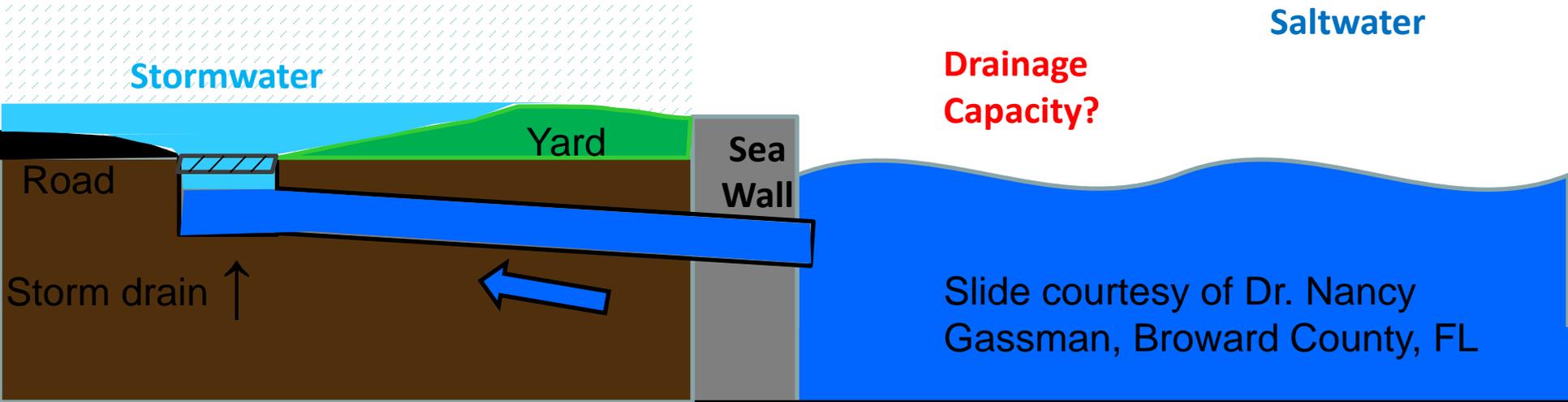
- **Armoring: Costs : \$300-\$4,000 per linear foot**
  - Punta Gorda: almost **\$382 million for bulkhead + \$935 million for fill + \$252 million for salary = \$1.57 billion**
  - DOES NOT consider legal feasibility of backfilling PG to 6 feet above current MHW
  - Typical estimates for armoring cost DO NOT include cost for drainage—a very important and costly consideration

# Drainage Challenge with Sea Level Rise

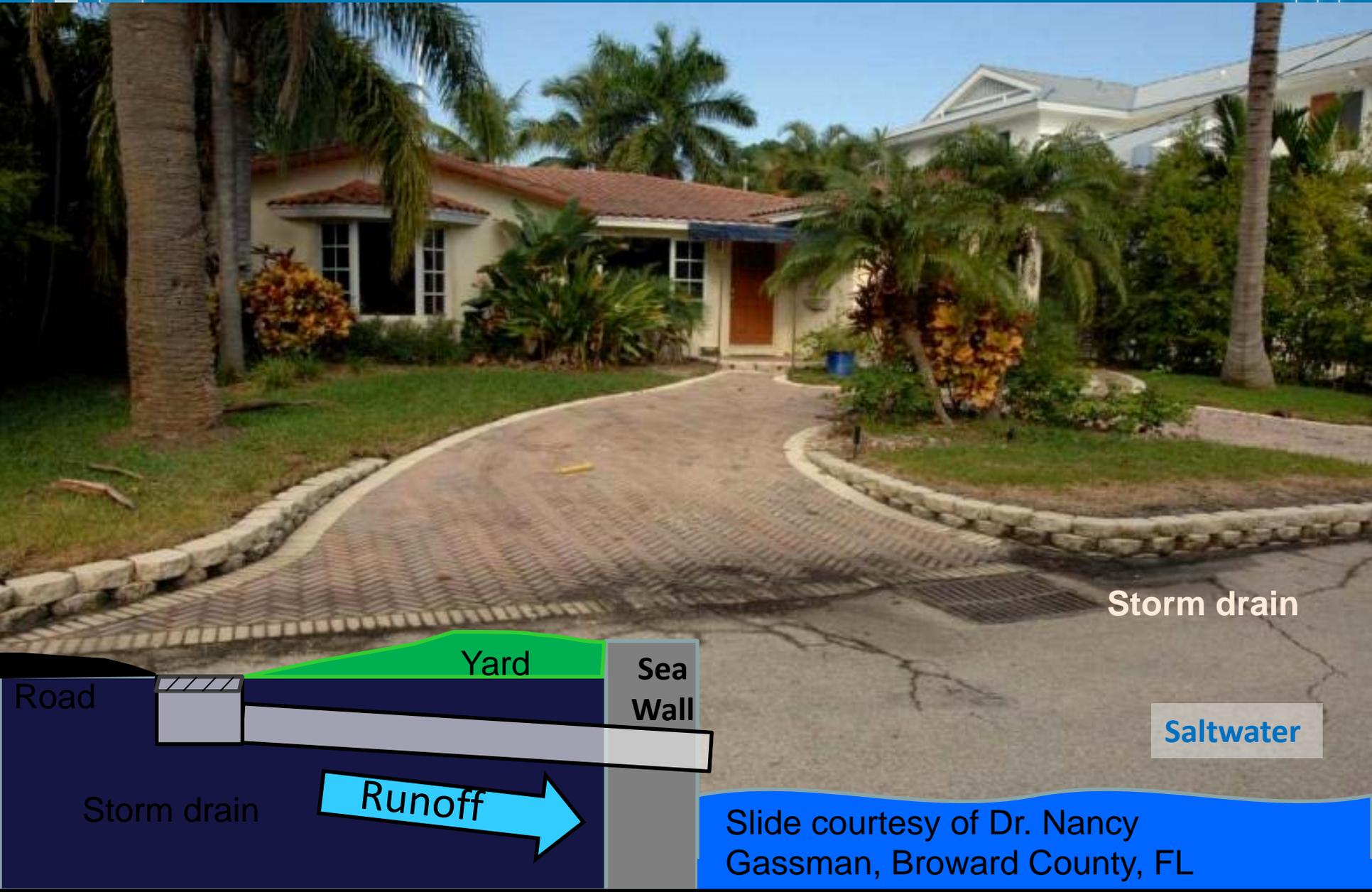
CURRENT AVERAGE TIDAL CONDITIONS



EXTREME HIGH TIDE OR SEA LEVEL RISE



# Drainage Under Average Tidal Conditions



Storm drain

Saltwater

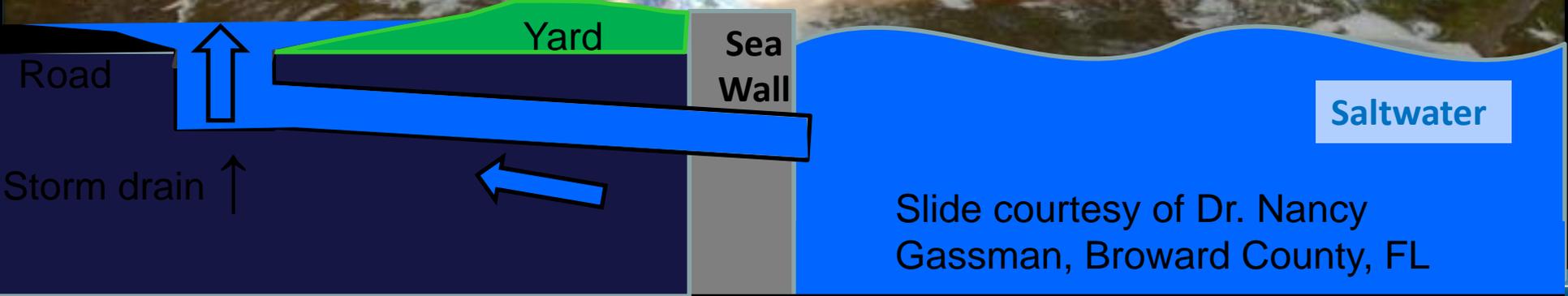
Slide courtesy of Dr. Nancy Gassman, Broward County, FL

# Drainage Challenge with Sea Level Rise



Saltwater

Storm drain



Saltwater

Slide courtesy of Dr. Nancy Gassman, Broward County, FL

# Suppositions and a Conclusion

- Suppositions:
  - Proposed “solutions” to SLR cost (local) government lots of money
  - (Local) Government lacks sufficient money to keep all people, property, and infrastructure from harm
- An ugly conclusion:
  - Losses of property, value, safety, etc. will occur

# Drainage & Local Gov't

- No duty of local gov't to provide drainage
  - As with many services, *authority* or *power* to provide, but not duty (fire, police, etc.)
- However, if provided, duty to maintain arises
  - Maintenance must be done with reasonable care
  - Liability for failure to maintain



# Maintenance vs. Upgrade

- But, no duty to upgrade (road analogy in Florida)
- Why the difference?
  - For existing, people now depend on it
  - No right to depend on what hasn't been built
  - Separation of gov't powers
  - Need to preserve the discretionary power of the legislative branch



# Maintenance vs. Upgrade

- Immunity through “planning” vs. “operational” distinction
  - Immunity for planning as this is legislative
  - No immunity for “operations” as everyone has a duty to act with reasonable care to avoid harm to others



- Local government has immunity from damage that occurs as a result of a local government's policy decision not to upgrade a drainage system
  - *Christopherson v. City of Albert Lea*, 623 N.W.2d 272, 276 (MN Ct. App.2001)
- Failure to upgrade is a failure of design and construction, for which political subdivisions enjoy immunity, and not a claim based on a failure to properly maintain, for which there may be liability
  - *Coleman v. Portage Cty. Eng'r*, 975 N.E.2d 952, 960 (Ohio 2012)

# Maintenance

- Maintenance:
  - Tires, brake pads, plugs, wires, etc.



# Maint. or Upgrade?

- **Upgrade:** altering a system in response to changed conditions that no longer permit the system, as designed, to provide the service desired



# Why do I care what happens in Florida (reprise)

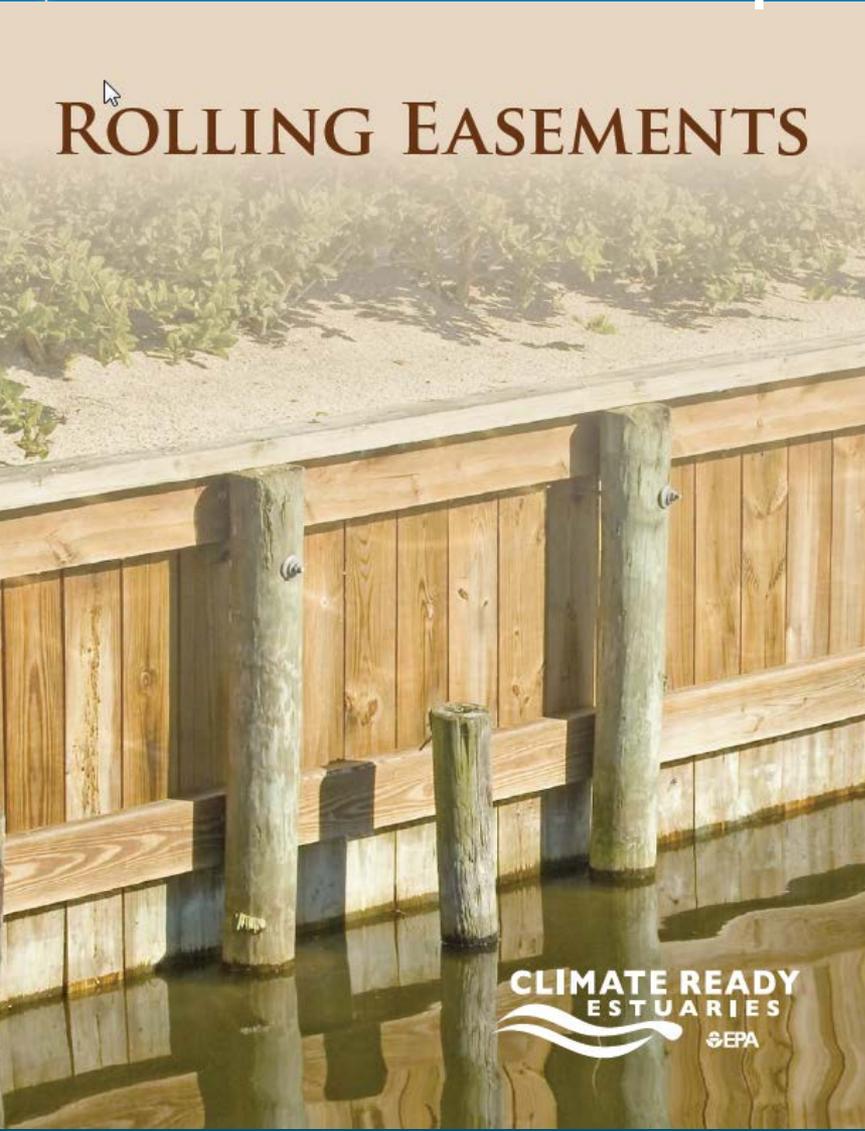
- The common dynamic:
  - People already in vulnerable areas
  - Difficult to move people out of a populated area, regardless of risk, cost, etc.
  - Local gov't cannot afford to mitigate all risk
- Default “solution”
  - Some areas will not be upgraded against more frequent flooding



A rolling easement is a legally enforceable expectation that the

## ROLLING EASEMENTS

shore or human access along the shore can migrate inland instead of being squeezed between an advancing sea and a fixed property line or physical structure.



# Summary

- Gov't can't afford to keep everyone happy
- Whether we proactively choose which areas or allow them to flood by default, losses to SLR will occur
- Failure to upgrade existing drainage may be the only way that people leave areas without local gov't paying \$ it doesn't have

A coastal scene featuring a wooden structure on stilts in the upper right, a rocky beach in the middle ground, and a large, weathered concrete block with a circular hole in the foreground. The background shows the ocean under a clear blue sky.

“[A] foolish man . . . built his house on sand. The rain came down, the streams rose, and the winds blew and beat against that house, and it fell with a great crash.”

Matthew 7: 26-27

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