Ministry of Foreign Affairs of the Netherlands

Joint Subcommittee on Coastal Flooding

Brock Environmental Center

Virginia Beach, VA

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# The Dutch Approach


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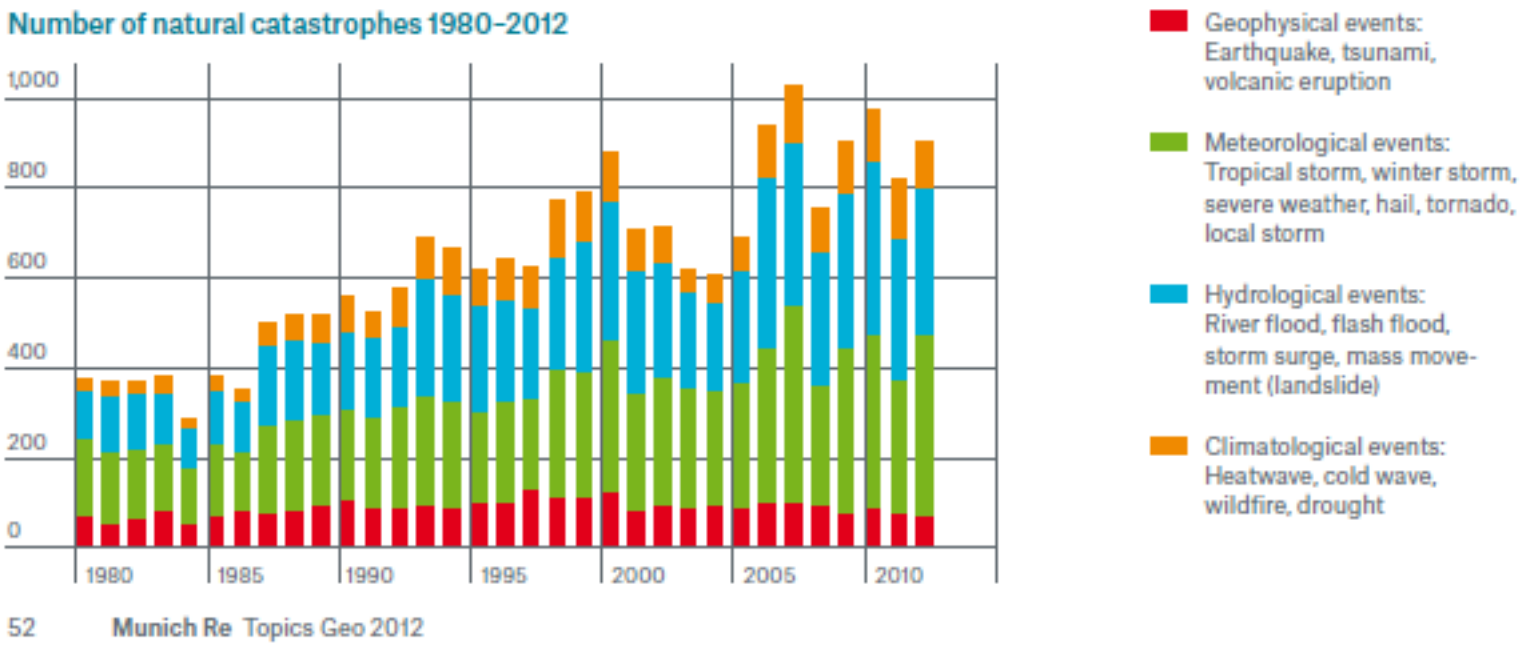
# Trend is clear: we’re all-in a leaky boat.




52 **Munich Re** Topics Geo 2012

# Munich RE

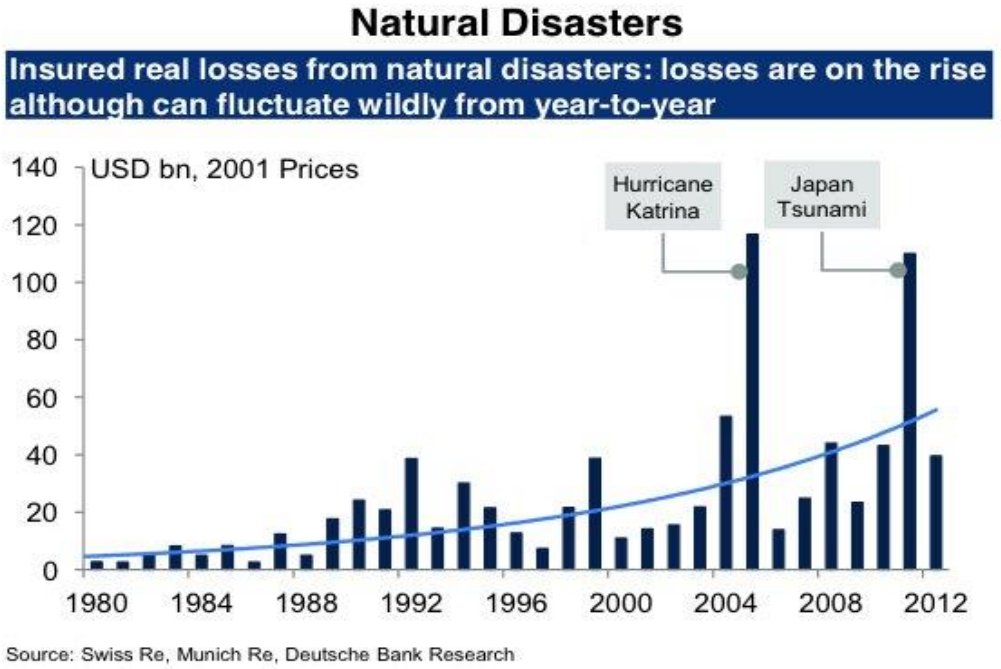
Since 1980, $1 billion disasters in the U.S. have tripled. More people, more wealth, more capital in coastal areas.

…from 1980 to 2011, weather-related catastrophes cost…**an average of more than $34 billion a year**. Losses…are rising in a long-term trend consistent with models of climate change.

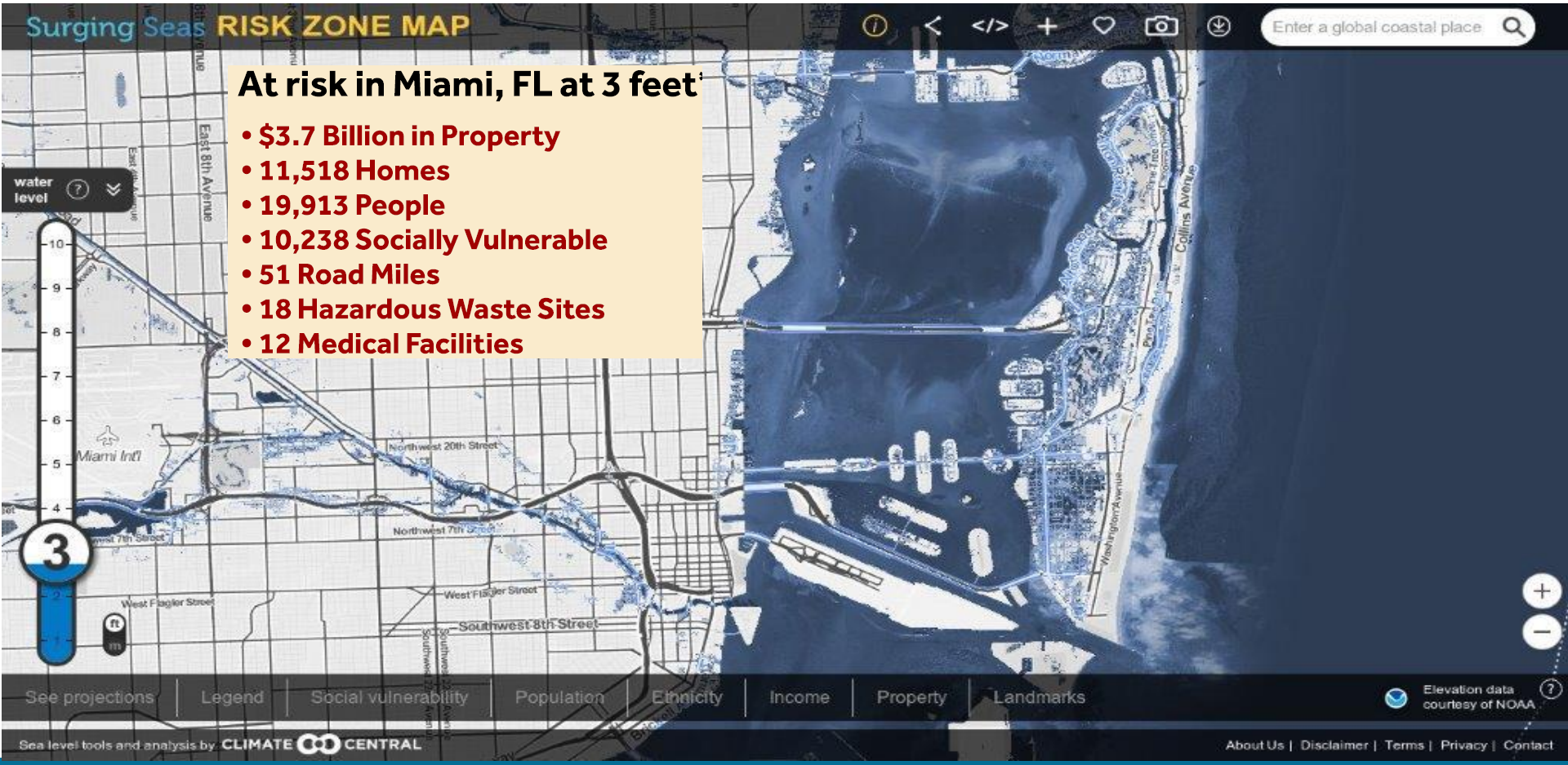
Katrina $150 b, Sandy $60 b, Ike $40 b, Isaac $2.9 b

Houston April 2016 $1.2 b,
Memorial Day 2015 $2 b
San Antonio / Austin 2015 $1 b

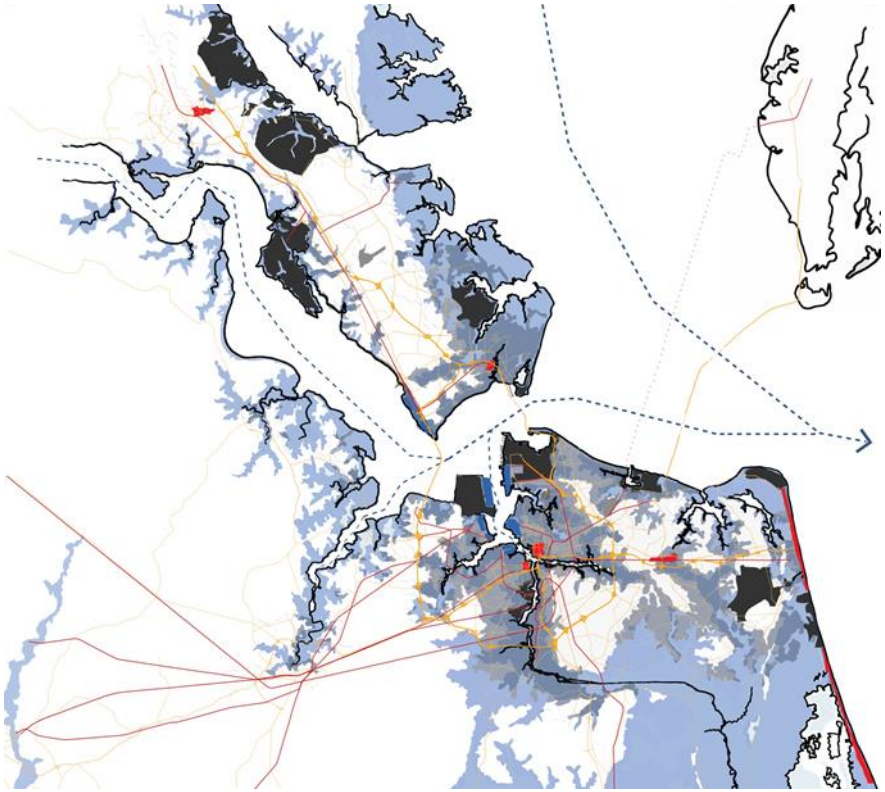
Charleston / SC 2015$2 b
Baton Rouge $9 b ??
Ellicott City $25 m
Hermine (Dare Cty, NC)$2.6 m

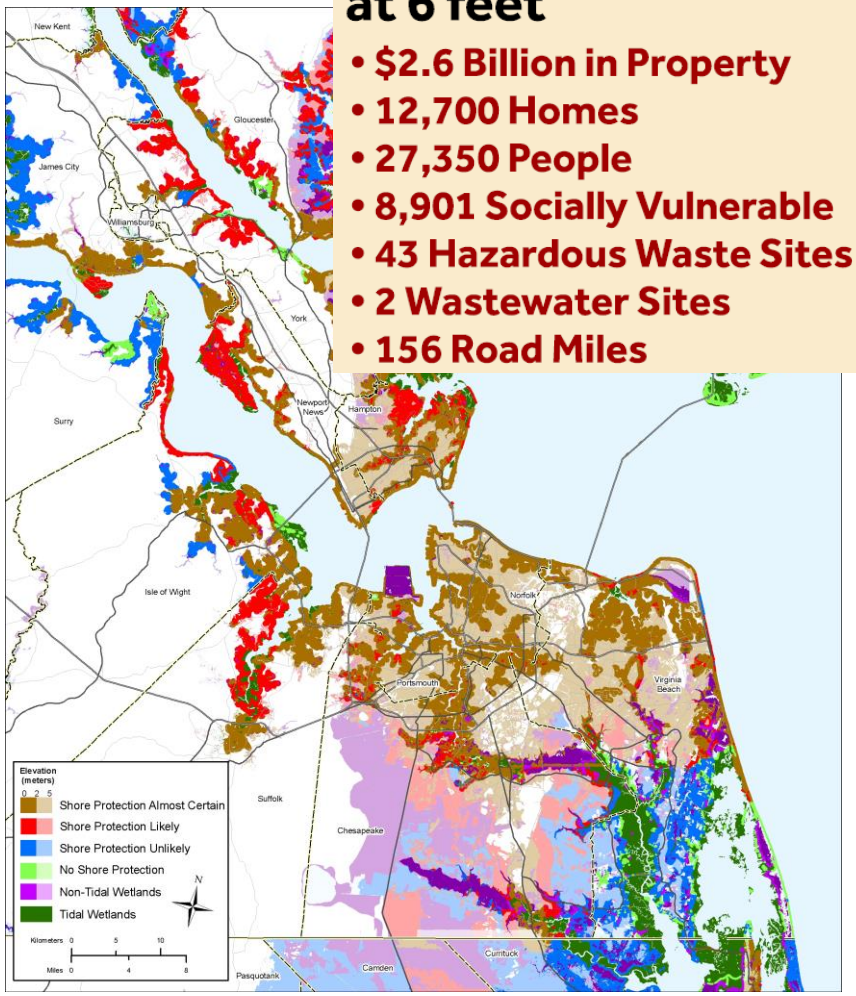


# Miami, +3ft, no surge (other east coast cities consistent)



# Hampton Roads / Norfolk, Virginia






**At risk in Norfolk, VA at 6 feet***

- **$2.6 Billion in Property**
- **12,700 Homes**
- **27,350 People**
- **8,901 Socially Vulnerable**
- **43 Hazardous Waste Sites**
- **2 Wastewater Sites**
- **156 Road Miles**

# The Netherlands, and is its approach transferable?

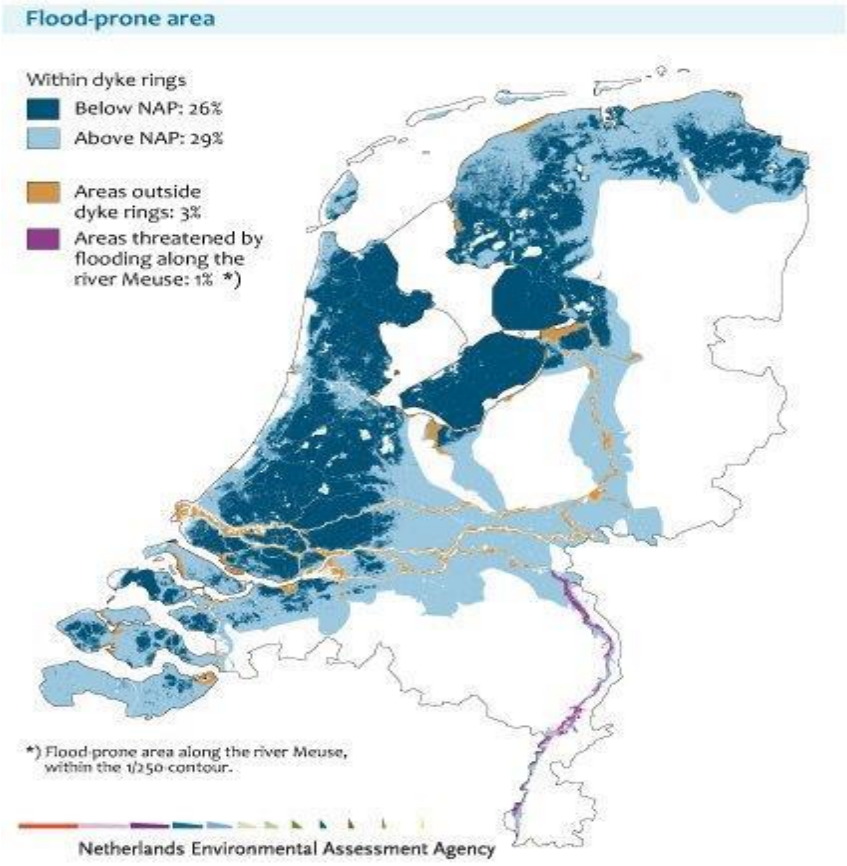
- Risk is high: 59% of land is at or below sea level
- 17 million people, 70% living in flood-risk areas
- 70% GDP produced in flood-prone areas (investment risk?)
- Subsidence slowing, but...

- Estimated Sea Level Rise

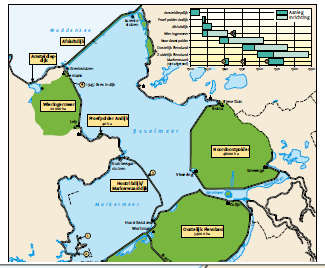
--8 inches in 2050

--34 inches in 2100

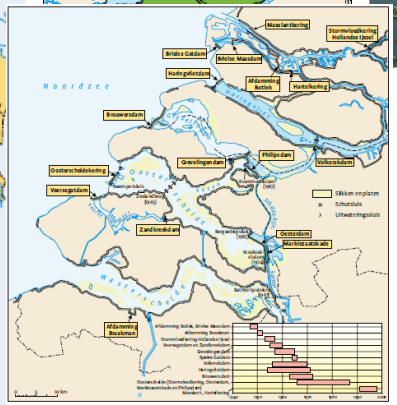
- The challenge: How to combine flood-mitigation $ with *normal* infra CIP money to enhance ROI?



# 1953 Flood = 1959 Delta Act. 40 year, comprehensive plan and investment strategy (shorten coastline)

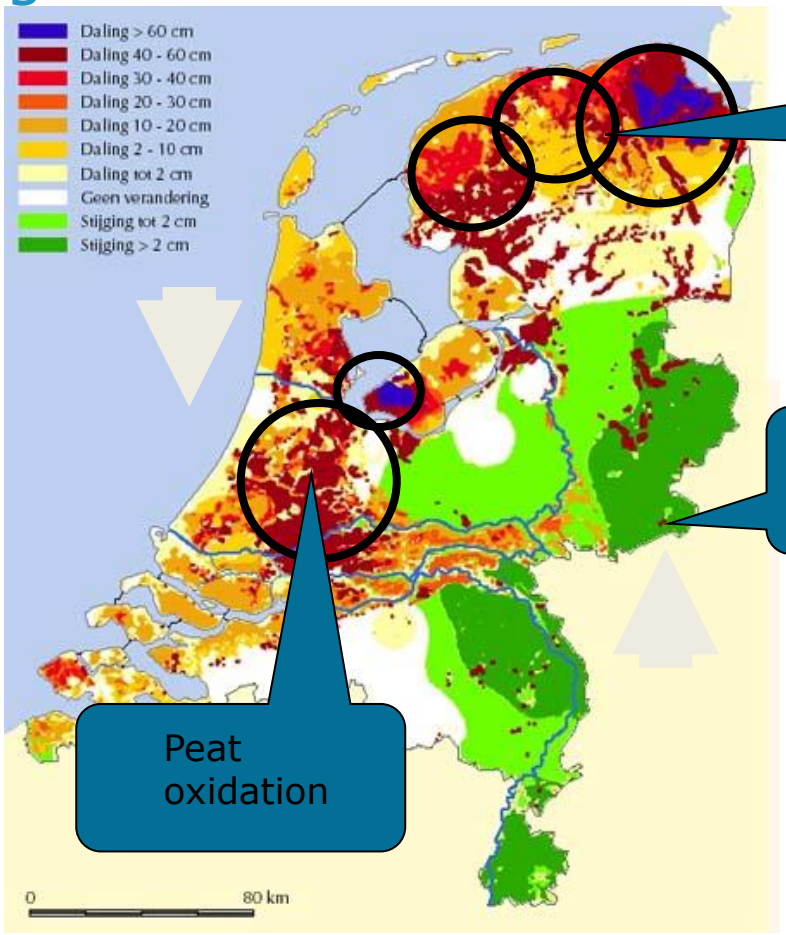



186 miles → 27 miles


466 miles → 31 miles

# Manage Subsidence

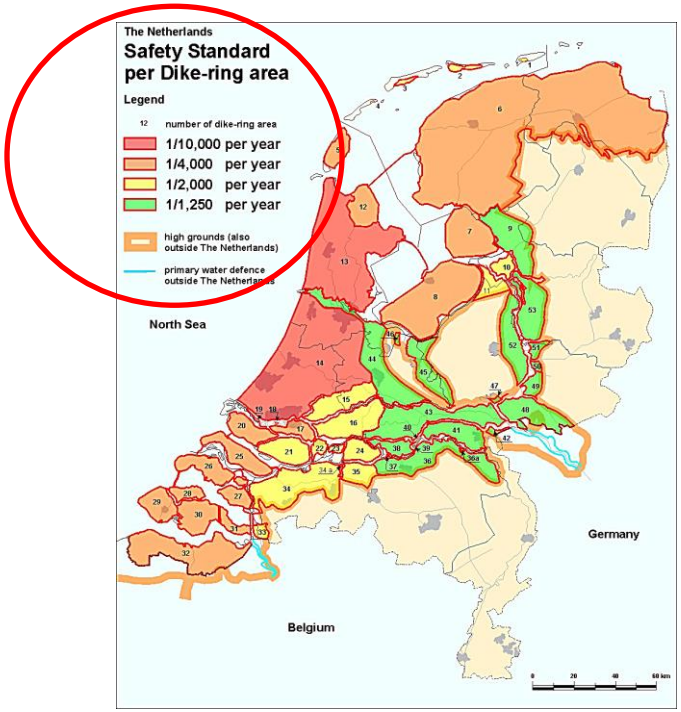



Natural gas and salt extraction

Geological

Peat oxidation

# 1958 Binding, Legal Safety Standards




"Never Again" mentality

Areas with most risk have highest levels of protection: 1/1250 to 1/10,000

One size does not fit all (1/100)

Cost-Benefit Analysis for all major infra projects

Caveat: 1/10,000 NL = 1/500 US Gulf Coast

Focus on safety ensured long-term support for project funding

# The Safest Delta in the World

- $5 billion invested (40 years)
  - 300 flood control structures
  - 10,500 miles of dikes, dams, levees
- Investment co-benefits:
  - Economic Connectivity (transport, regional development, tourism)
  - FDI "not at risk" (US FDI in NL #1)


# Safe? The Work is Never Done, and the Risk is Always Evolving

1993-1995: 1/300yr “near floods” cost 500 mln euro, exposed increasing riverine flood risk

# Part 1: Never let a disaster go to waste
# 1996 Flood Defenses Act

Mandatory 6/yr Inspection of All Primary / Secondary Flood Defense Infrastructure

Review of Flood Protection Standards in light of economic, demographic, hydraulic or hydro-dynamic change (are current safety standards sufficient?)

After Inspection and Standards Review: Mandatory Report to Parliament
recommendations / cost projections to restore flood defenses to the legal standards

Government / Parliament agree to legislation, funding to restore protection
Subnational entities impacted

Repeat…

# 2001: First National Flood Risk Assessment Results

Critical Coastal Protection Infra had "weak links"

Dune height, width insufficient (wind erosion)

Beach width insufficient (wave erosion)

Human penetrations of critical dune areas

"The backbone of coastal infra is below legal standard"

10 year Coastal Action Plan (2005 – 2015)

Address "weak links" with special project $ plus combine ongoing CIP

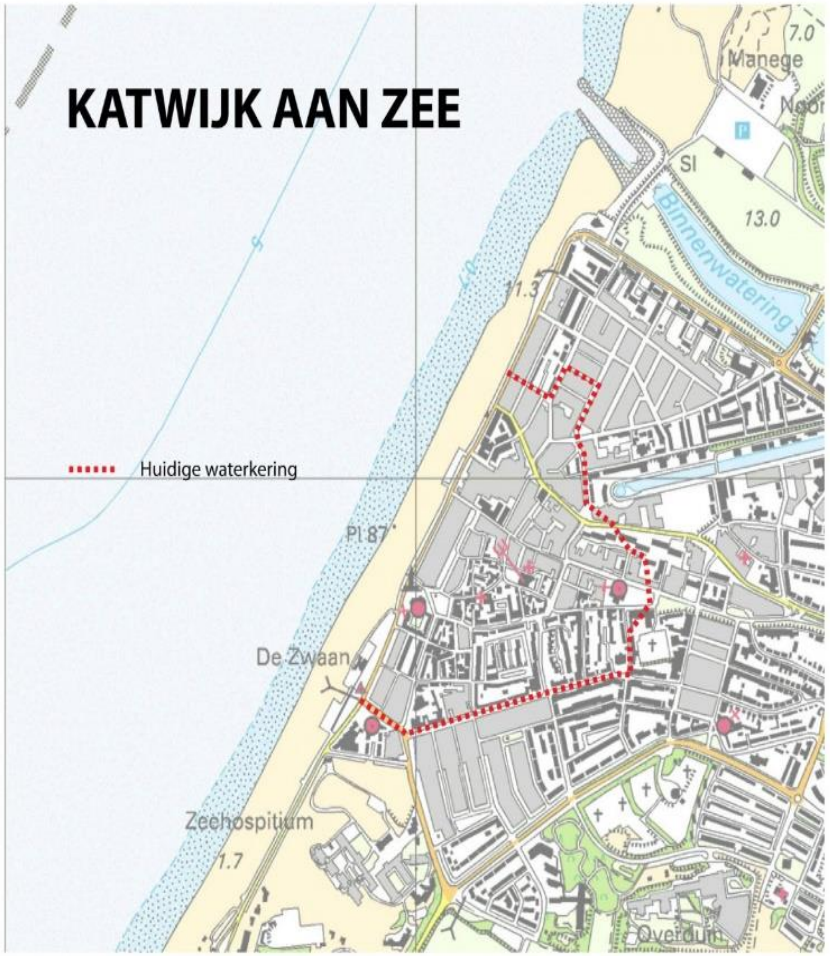
Plus, work with provincial / local govts for on collateral benefits: transport, mobility, ecological, housing

# Katwijk

National Gov’t Preferred option:

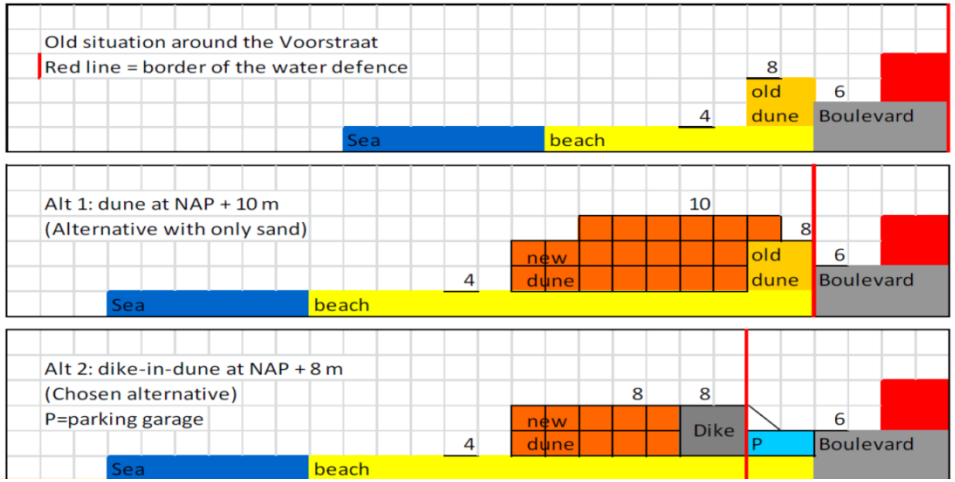
--coastal dune widening and heightening
--beach widening
--sand is #1 tool
--straigten the line of protection (red line)

Local Gov’t had concerns…



# Beach / dune: higher, wider, stronger, better?

## Original situation, Dunes solution or Dyke in Dunes and parking




## Original – Dune solution – Dyke in Dune

# Katwijk (Dike in Dune), 2013 - 2015

Protection + Spatial Quality

Wider beach = better safety

Wider beach = better nature

- Ecosystem benefits

Improved beachfront boulevard (retail) and Parking

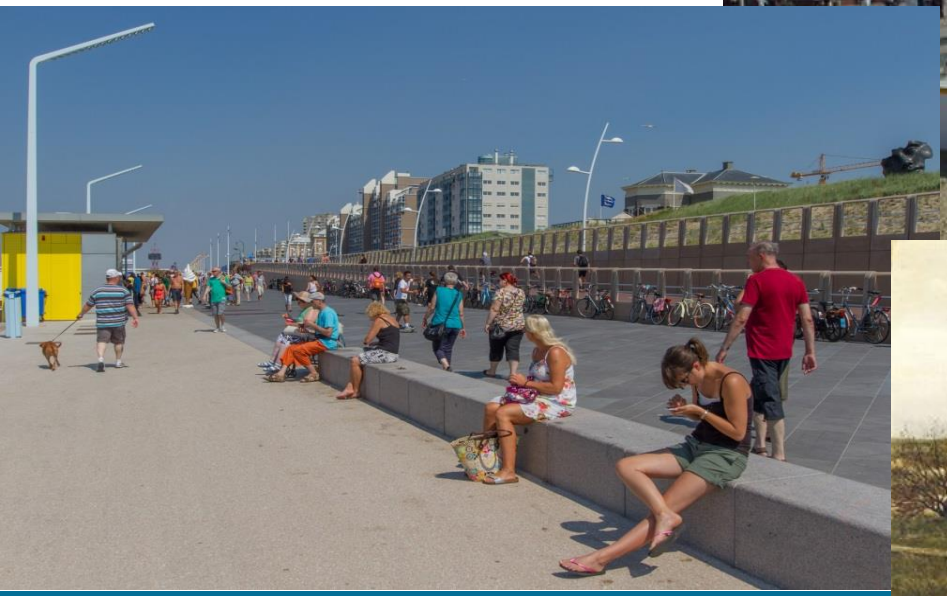
Parking @ PPP

Total Project Cost: 78 mln euro

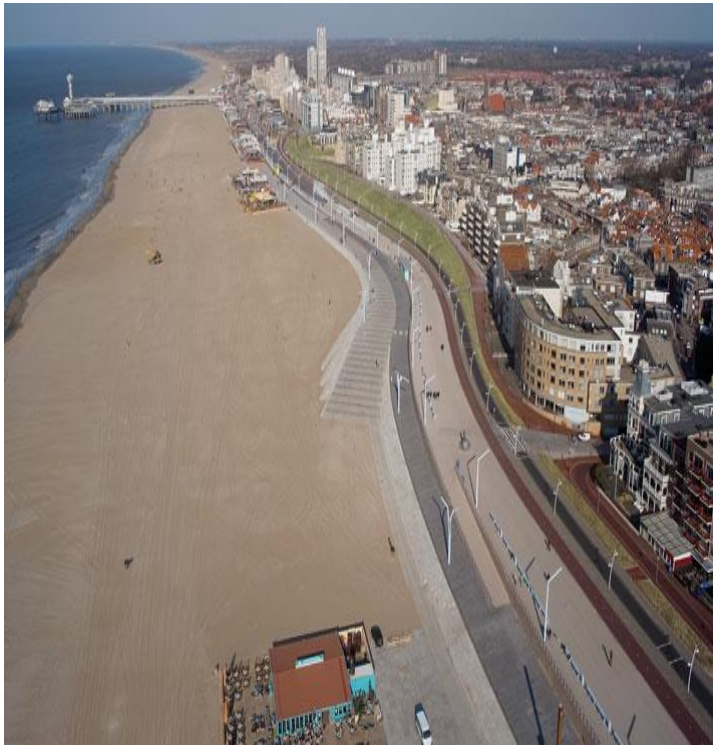
# 660 hidden beachfront parking spaces

# Scheveningen Blvd

heavily used, iconic, tourism
+ primary coastal protection for The Hague



Strengthen primary coastal defense, improve pedestrian and public transit access/retail, don't disrupt commerce, maintain historic aesthetics.
$400 million (4 miles)


MUSEUM BEELDEN AAN ZEE

# Part 2: Never let a disaster go to waste
# Delta Act for the River (Room for the River)

2001: Delta Act for Rivers (binding legal and $ standards)

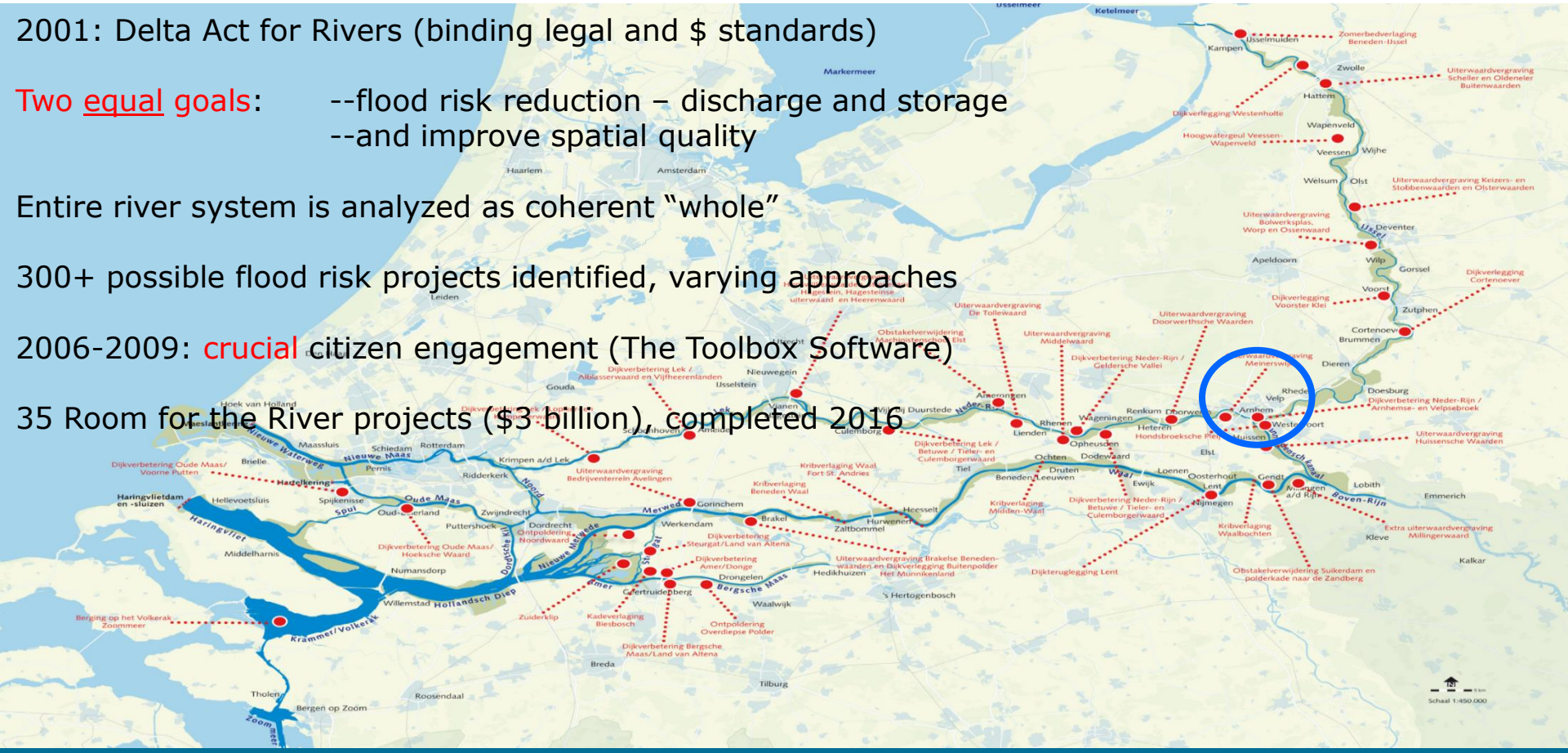
Two equal goals: --flood risk reduction – discharge and storage
--and improve spatial quality

Entire river system is analyzed as coherent "whole"

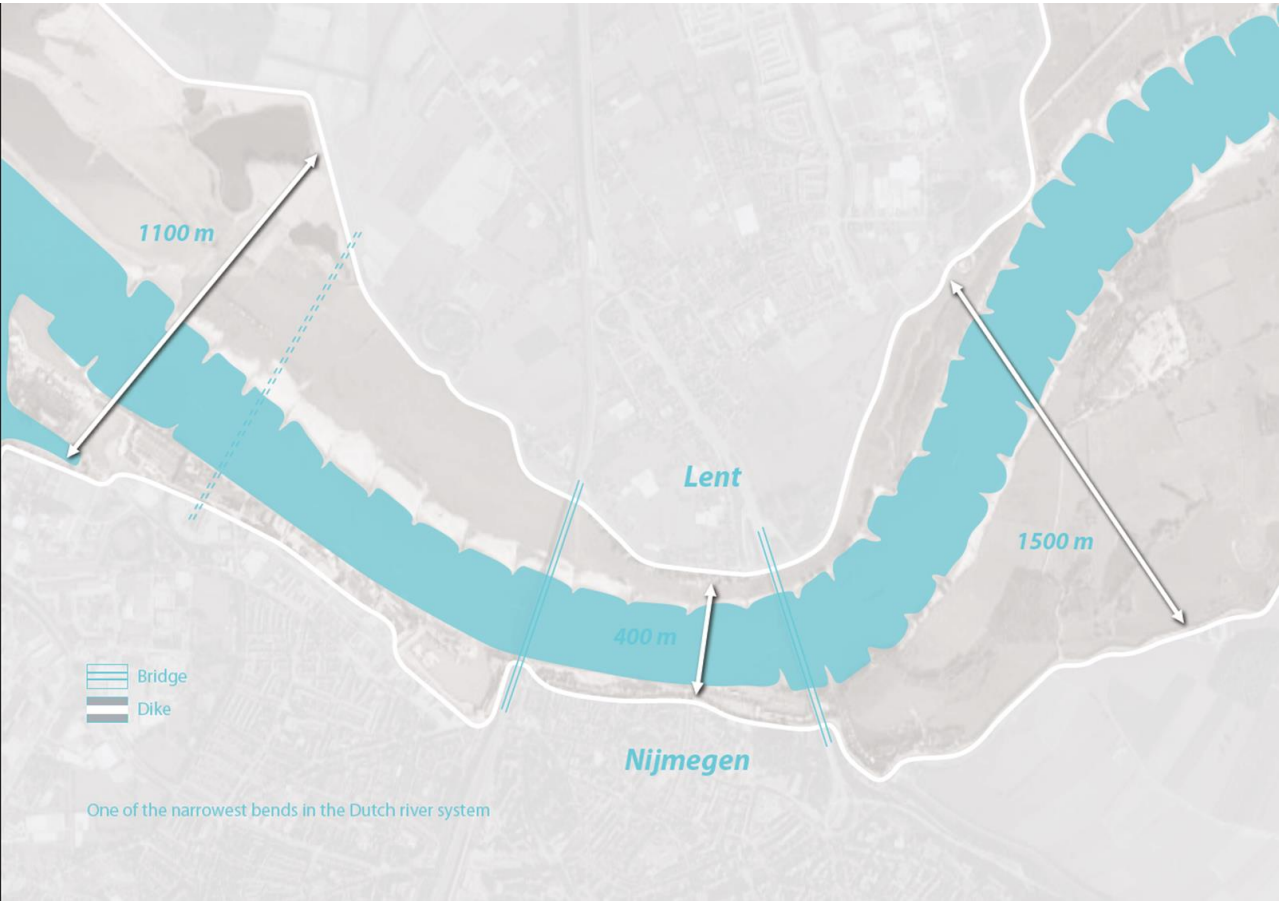
300+ possible flood risk projects identified, varying approaches

2006-2009: crucial citizen engagement (The Toolbox Software)

35 Room for the River projects ($3 billion), completed 2016



# Nijmegen (Waal River)




Oldest city in NL

200k residents

Waal = Europe's busiest inland shipping river

Nat'l Govt goal: Reduce flood risk

- Broaden channel

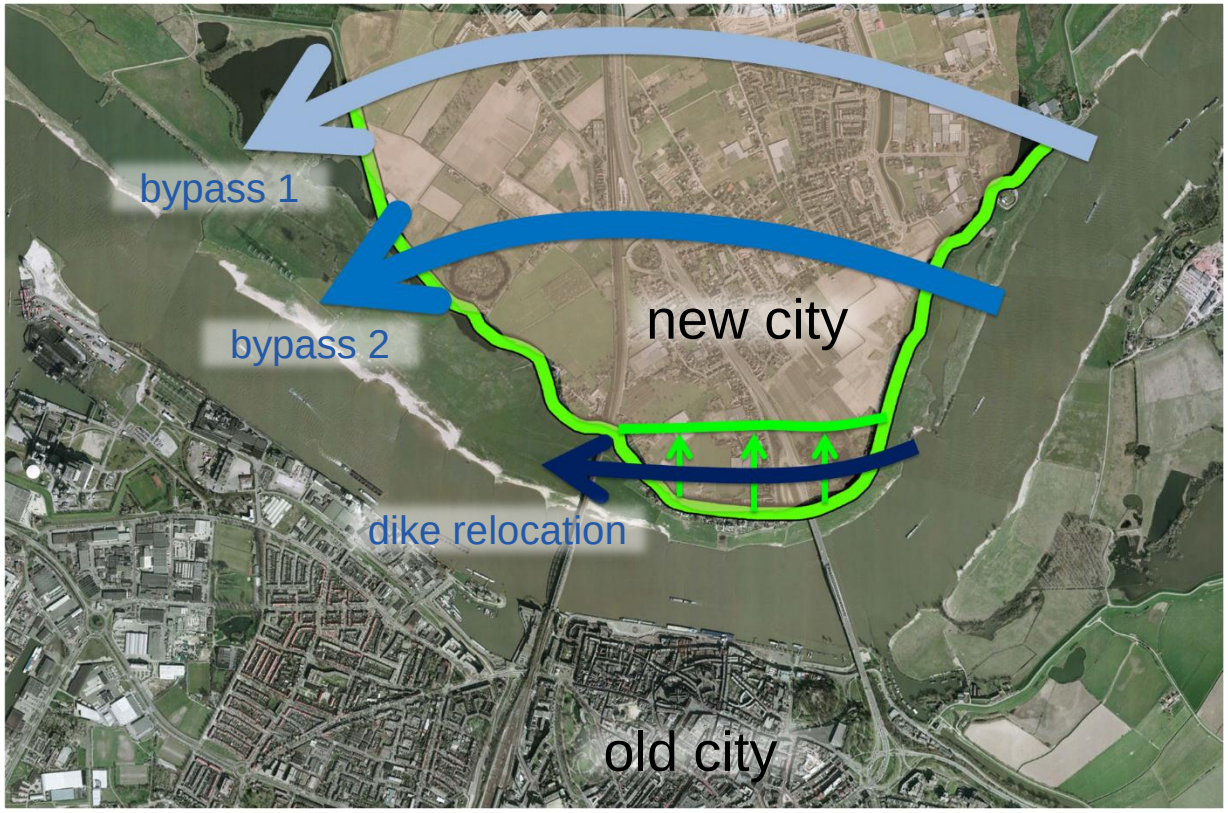
Local Gov't goal

- Reduce flood risk *and* improve citizen lives

NIMBY lives: at start, citizens were opposed to everything

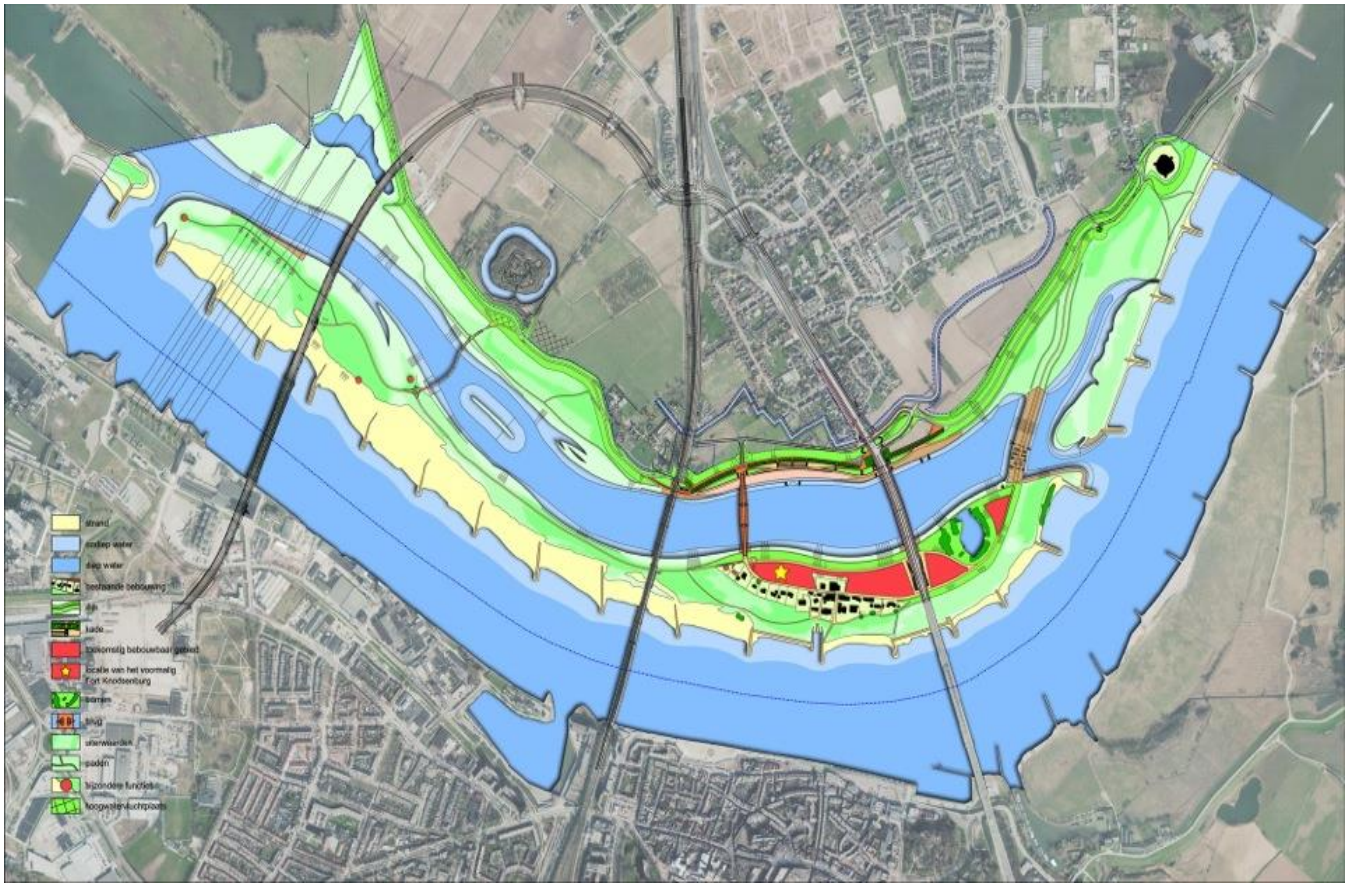
- Citizen engagement, plus added amenities (mobility, connectivity, recreation, economic development), enabled project to grow from simple flood risk reduction to something more

# 2000: “bad” options



- €365 ($475)
- 50 households displaced
- 2,5 km side channel
- 3 new bridges

  *NS Rail improvement*
- 7 public authorities
- Waterfront housing
- Waterfront retail




Johan Roerink /


Johan Roerink / Aeropicture.nl

# Part 3: Never let a disaster go to waste
## *Katrina* and The Netherlands, Veerman Commission

# Veerman / Delta Commission

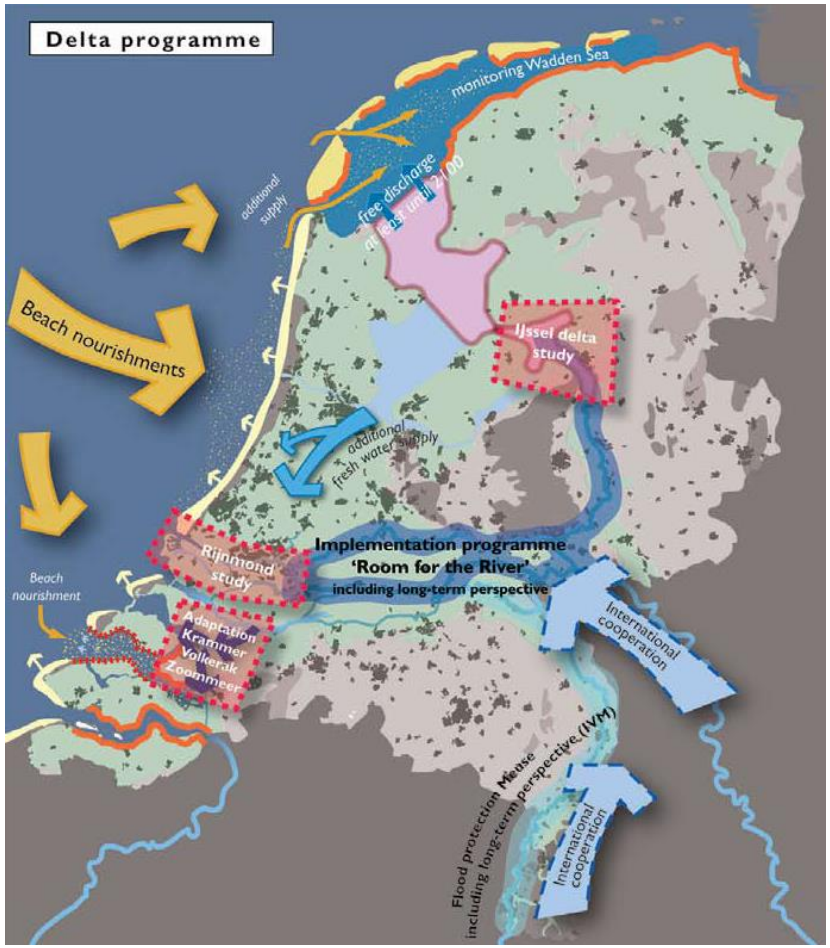
*The threat is not acute,*

*but measures to improve*

*flood risk management and*

*fresh water supply*

*should be urgently prepared!*



# The Delta Programme


One Aim:

- Maintain NL as safe and attractive place to live and work *for present and future generations*
  - → long term perspective)

Two Goals:

- Flood Safety, now and in the future (2050-2100)
- Fresh water supply guaranteed, also in dry periods

Three Basic values:

- Solidarity (generational, regional, sectoral)
- Flexibility (in governance, in technical approaches, in funding)
- Sustainability

Proactive, not Reactive (re disasters)

→ Multi-governance, multi-functional measures

# 2010 Flood Defense Act Update: multi-layer approach in effect (never-again mentality modified)

- Prevention

  *Limit the risk of a flood disaster*

  *(dikes, dunes and barriers)*

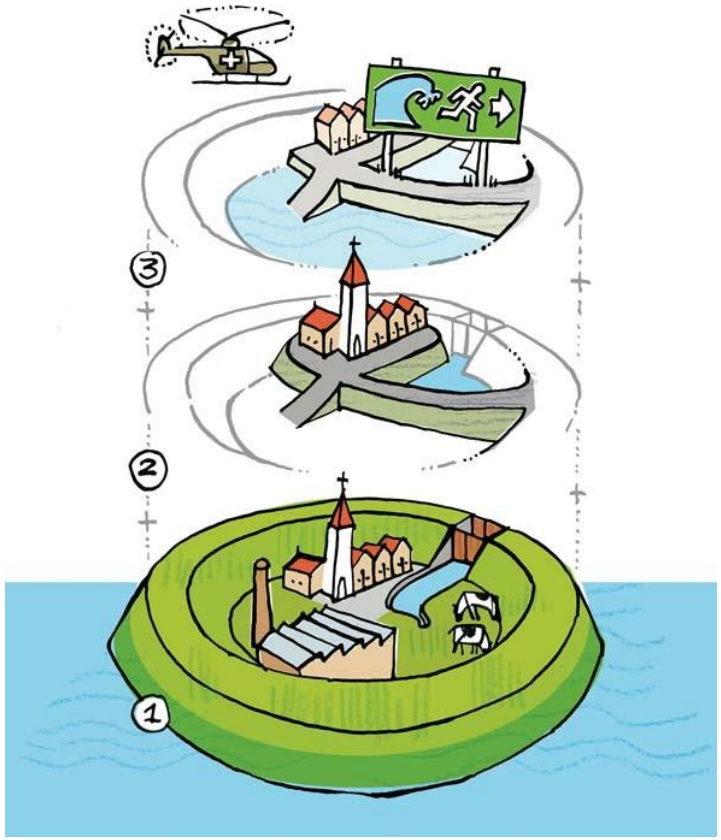
- Sustainable spatial planning

  *Limiting the effects of flooding*

  *Achieve other benefits from flood mitigation investments*

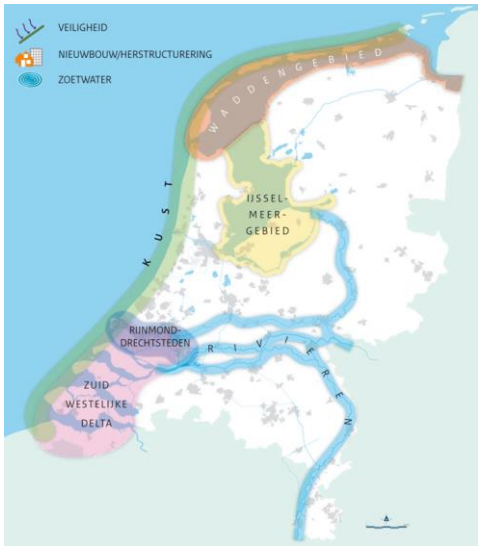
- Crisis management

  *Reducing the consequences of a flood*

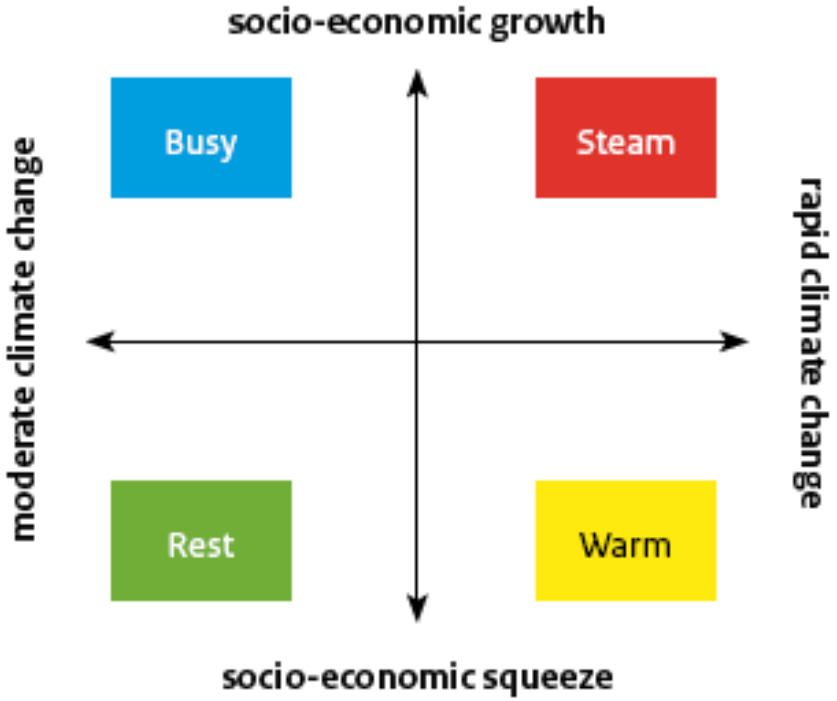


# Delta Program Implementation

- **Delta Program**: annual update to Parliament on actions
- **Delta Decisions** (strategic, 2015)
  - On Flood Risk level (1/100,000, cost-benefit)
  - On Freshwater Supply
  - On Ijsselmeer water levels (summer and winter)
  - On Flood Protection in the Delta
  - On Land-Use and Planning, "water-robust"
  - On Sand (coastwide sediment budget = to SLR)
- **Delta Commission (small staff)**
  supervising coherence and adequate multi-governmental implementation
- **Delta Fund**, 1.0 bln € / yr (guaranteed to 2030)
- **Delta Act**, legal "anchoring" Delta-commissioner, program and fund



# Risk-based, cost-benefit approach
# 4 Delta scenario's




- Climate change
  - sea level rise
  - river discharge
  - Surge heights / erosion
  - Increased precipitation and drought
- Socio-economic developments
  - Population growth and location
  - critical economic features
  - land use/urban development
  - fresh water supply/demand

# Veerman Commission recommendations: 2008

10x increase in protection standards throughout country, over 50 years. From 1/10,000 to 1 / 100,000

2009 – 2012: Delta Commission staff developed new cost-benefit model to assess where and when investments may be needed

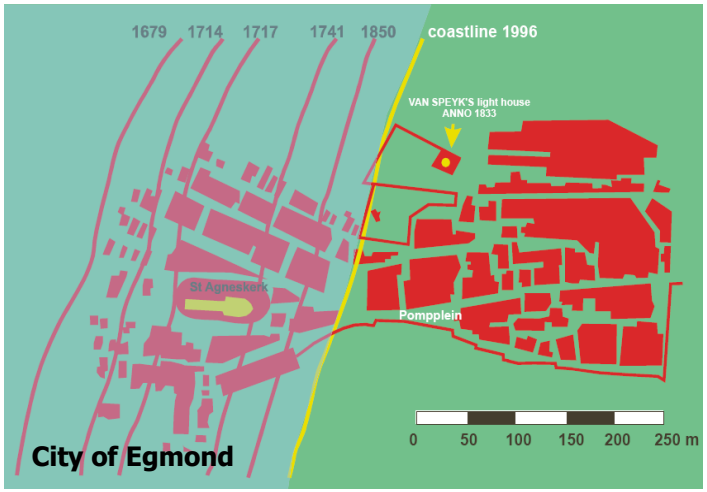
*Risk = probability x impact (human life, economic, direct and indirect), x cost of recovery*

New cost-benefit recommendations: only 3 of 53 protection areas need increased protection between now and 2050 / 2080. Cost reduction: 7.8 billion euro

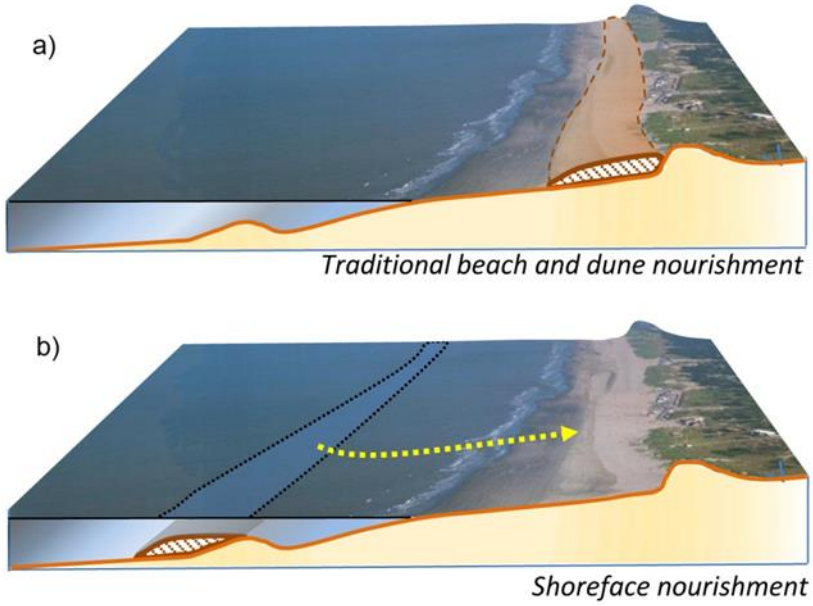
2013: Commission wins Franz Edelman Prize (analytics)

# Dutch Context, coastal erosion

Effects: ongoing erosion
1996 coastline alignment fixed in Delta Act



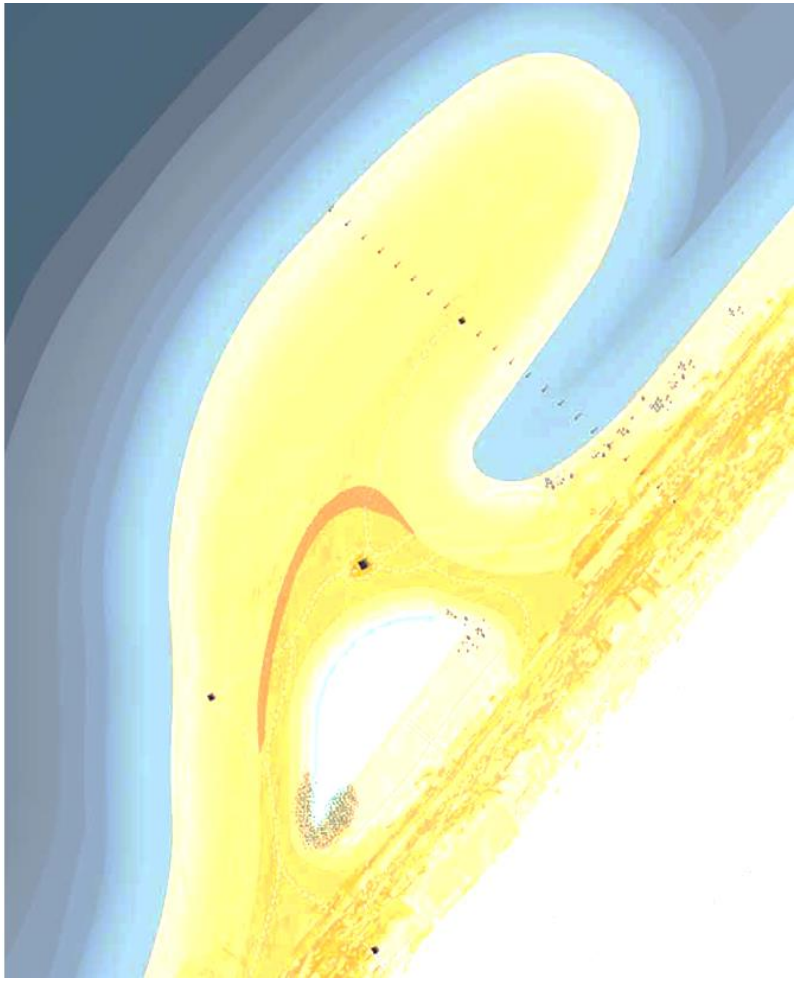

Solutions: Nourishments




1990s: 6 mln $m^3$/yr
2000s: 12 mln $m^3$/yr
2020s: 40-85 mln $m^3$/yr

# The Sand Engine

- enhanced safety against flooding
  - wave attenuator, wider dune buffer
- cheaper per m3 compared to
  traditional nourishments
- 21 mln cubic meter, 70 mln euro
  $4 cubic meter
- 20 yr period between nourishments
- recreation potential
  - tourism, wind surfing



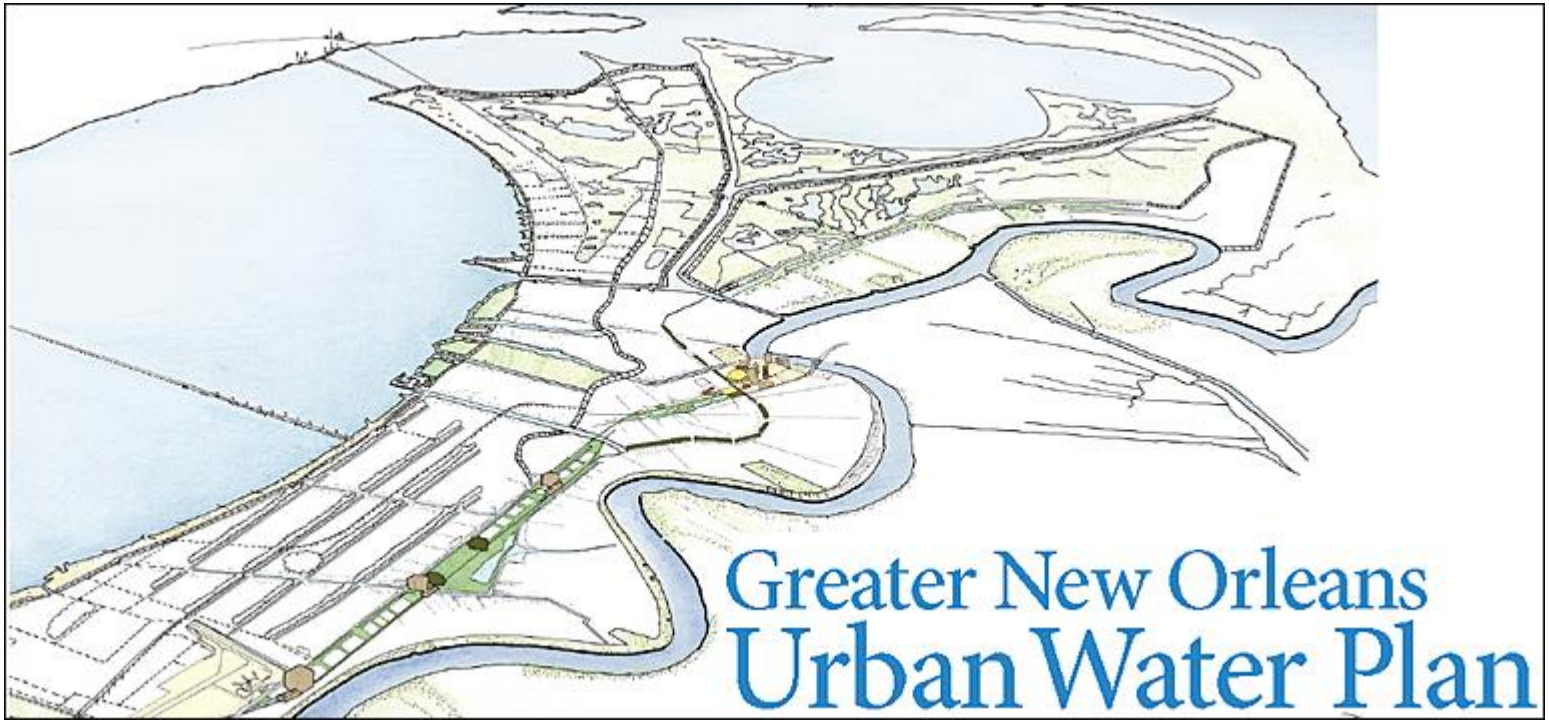

Constructed


After 6 months

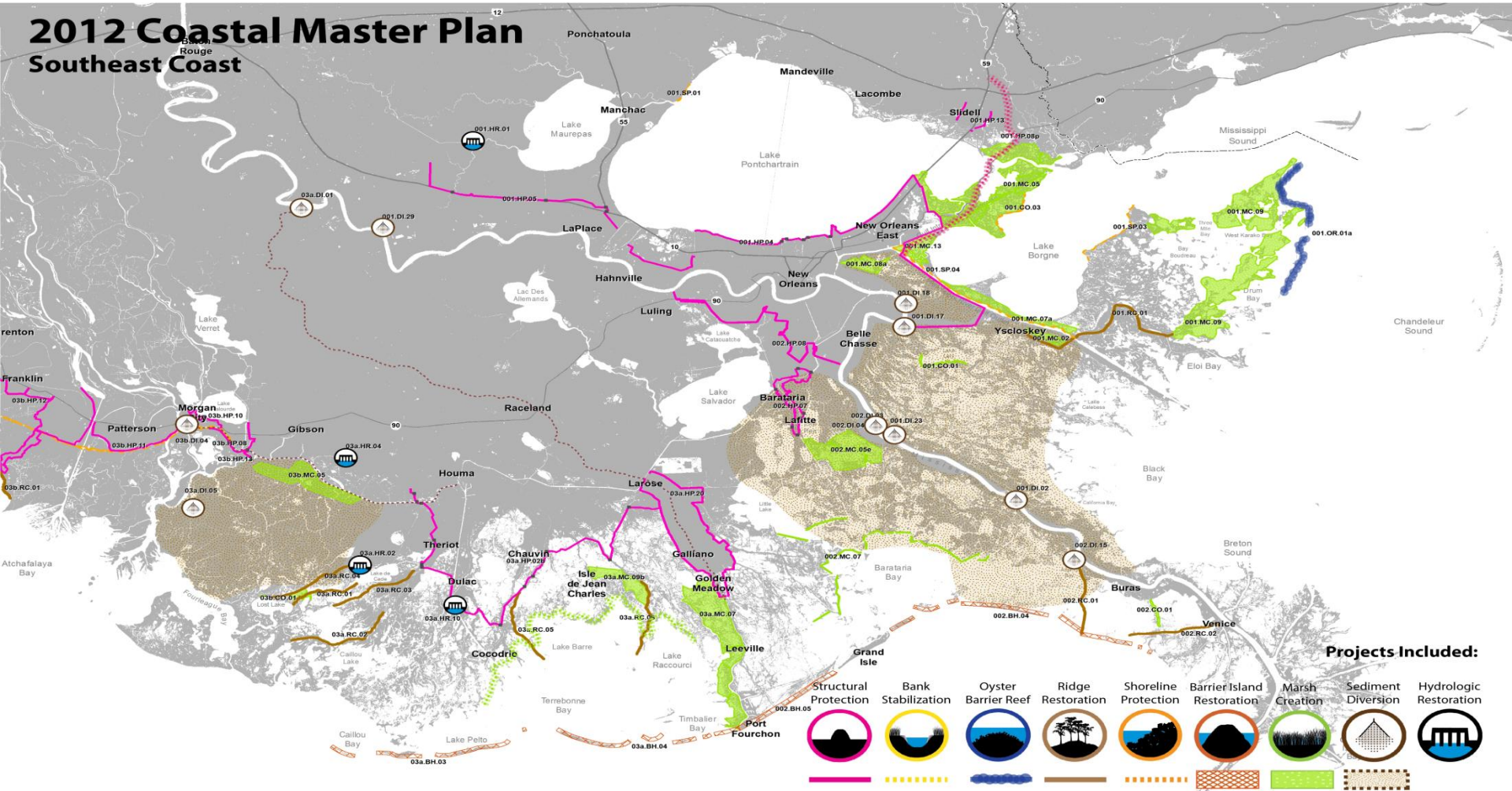

After 18 months


After 42 months

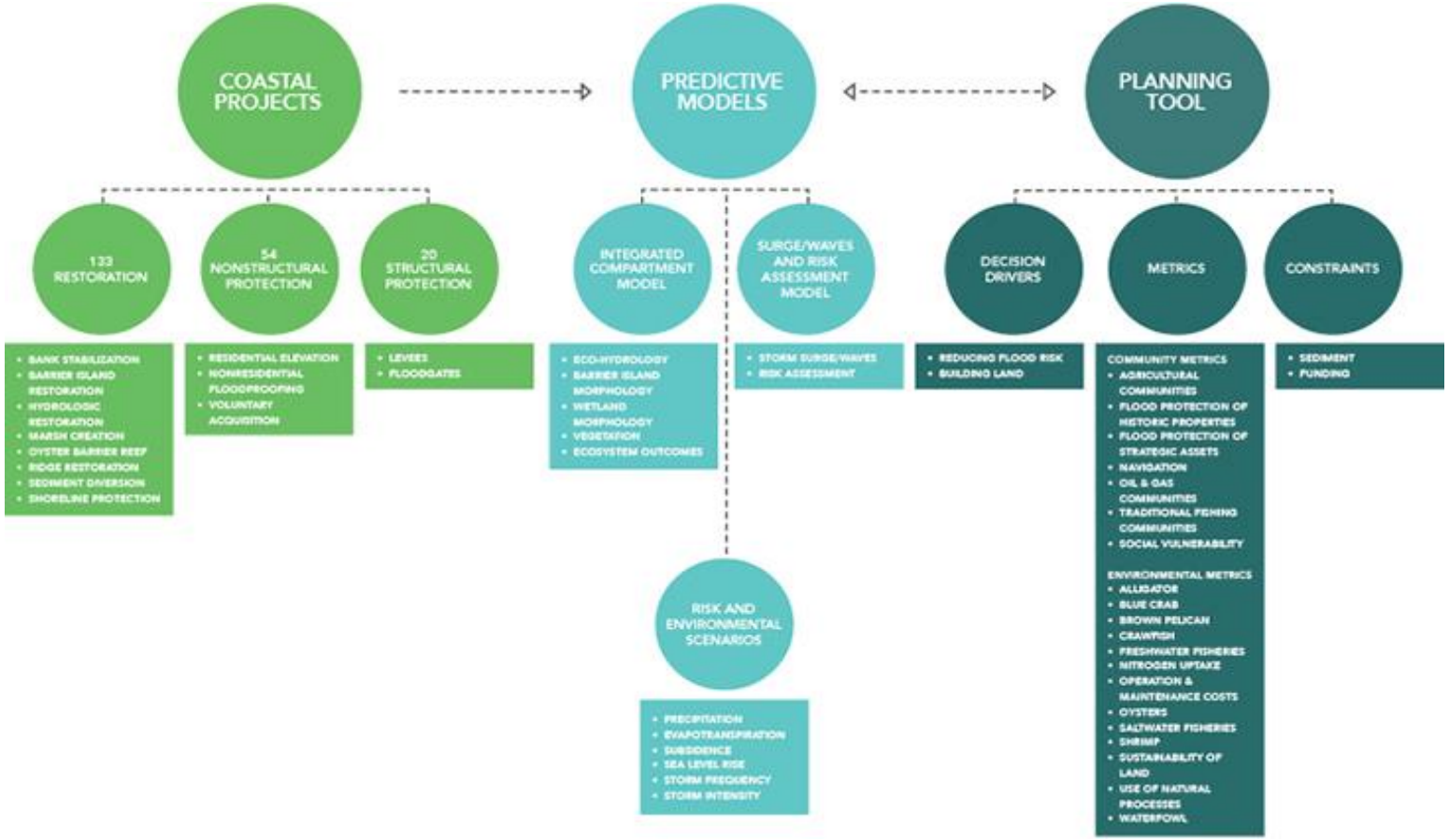
# Inspiration in the US



# Louisiana Coastal Masterplan, + Flood Protection Authority regionalization / streamlining

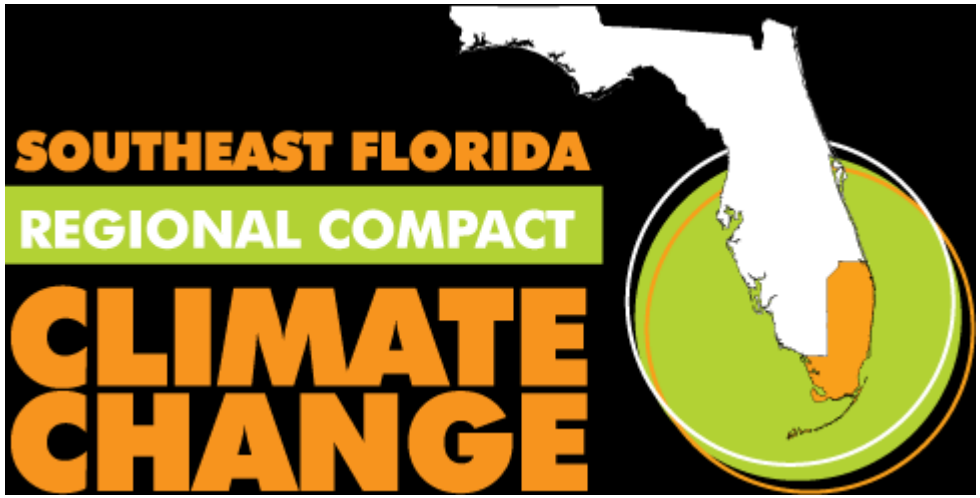


# …and the 2017 LA Masterplan Update

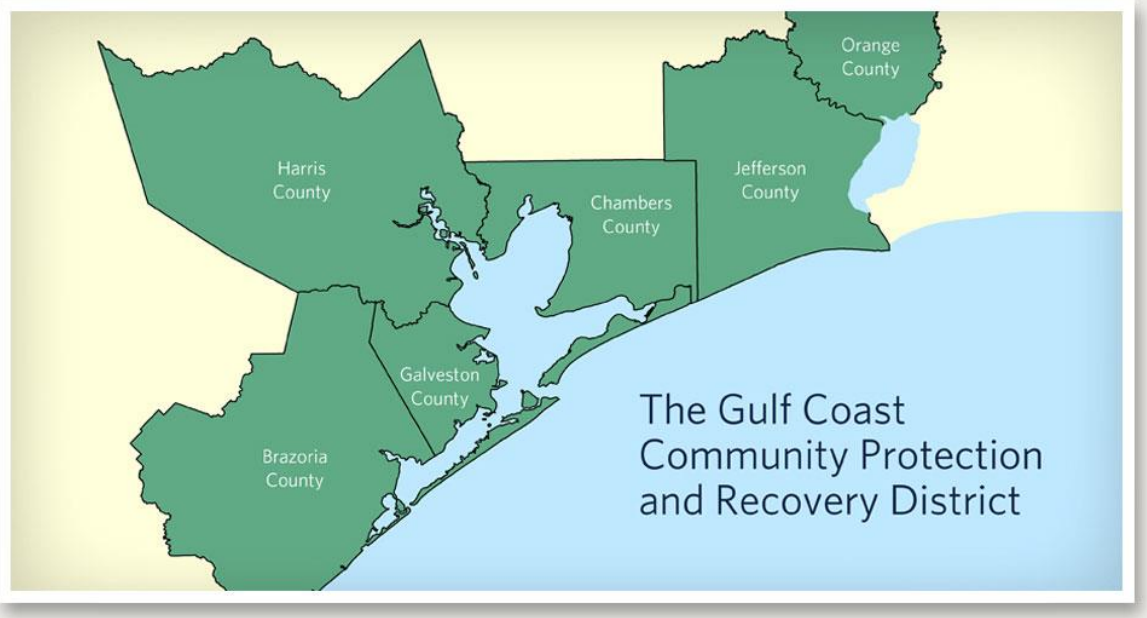


# Inspiration: SE Florida Regional Climate Change Compact

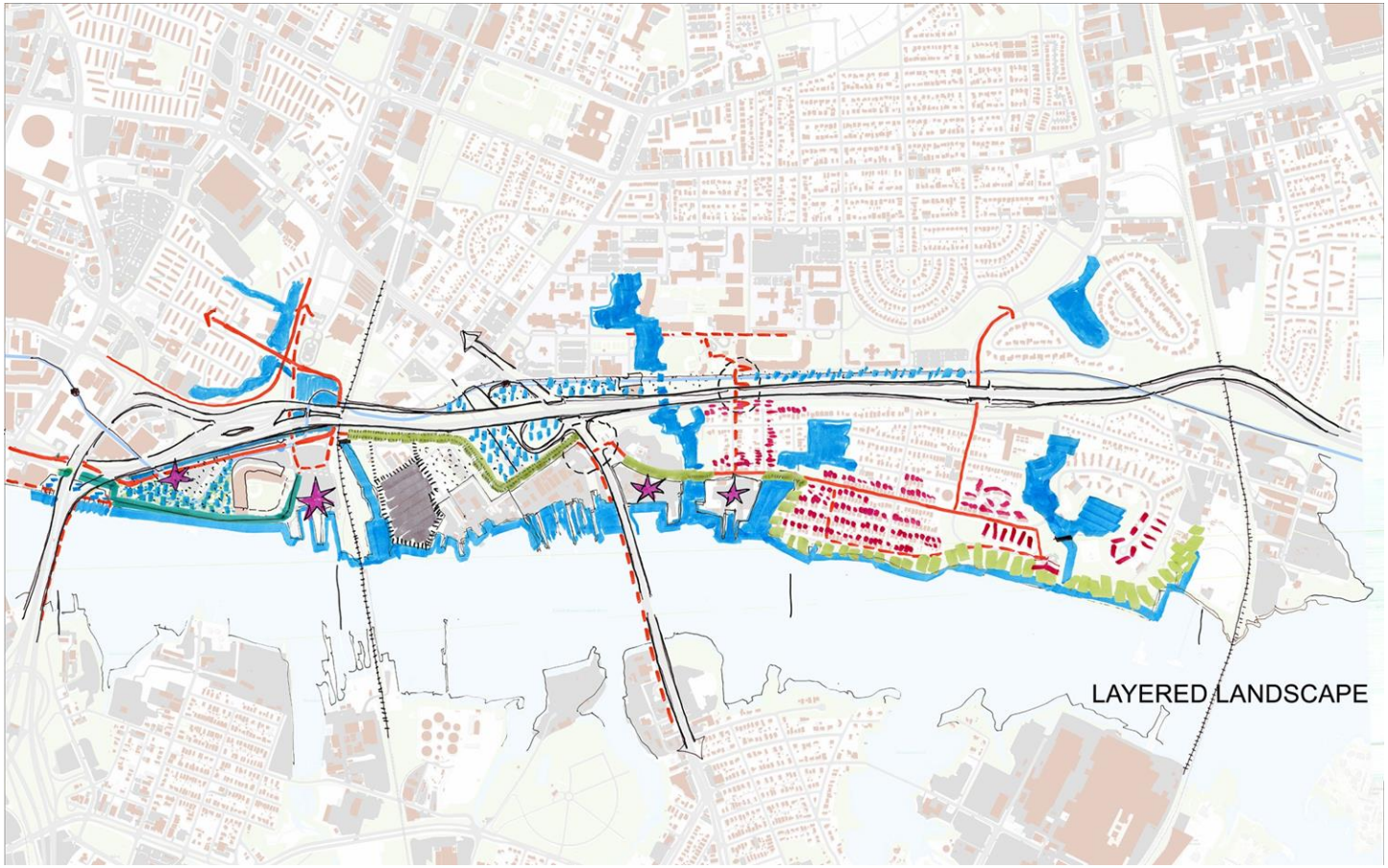
The Southeast Florida Regional Climate Change Compact was executed by Broward, Miami-Dade, Monroe, and Palm Beach Counties in January 2010 to coordinate mitigation and adaptation activities across county lines. …a new form of regional climate governance designed to allow local governments to set the agenda for adaptation while providing an efficient means for state and federal agencies to engage with technical assistance and support.



# Inspiration: Texas Gulf Coast Community Protection and Recovery District



# Inspiration: NDRC Norfolk



# Governance and Policy
# *Options?*

- Start a SLR compact with frontline cities (city managers) with the support of business alliance (CEO roundtable)
- Develop a shared, long-term *Hampton Roads* / eastern Shore T vision
- Create (regional) political subdivision within VA with a SLR / coastal flooding focus
- Create regional investment authority for water management + infrastructure, and dedicated funding stream

# Final Thoughts

- Awareness and Urgency
  - Until now, Hampton Roads and eastern Shore have been lucky. Nuisance flooding and ongoing coastal erosion are increasing, and costly too.

- Tidal VA challenges = Commonwealth's challenges (and DOD's challenges).

- Coastal risk reduction is embedded in VDEM. VDOT, VDEQ, VDHCD, plus local agencies have key roles and money, too. Does coastal flood preparedness / adaptation need a specific focal point – a one-stop shop -- in Richmond?
  - VDEM is doing great job, but lacks overall coordinating authority
    - At a minimum, interagency TF needed to coordinate overlapping VA programs that reduce flood risk / increase resiliency.
    - "Until someone is in charge, no one is in charge."

- Revenue: what federal-state funding streams can support long-term, coordinated VA coastal investments? EG: Restore Act, CWPPRA, SELA, CIAP. Ad-hoc, piecemeal responses are insufficient.

- Proactive vs. Reactive? Cynics elsewhere. Please don't wait for disaster to act.