9-29-2016

Playing for Keeps: Using Serious Games to Address Sea Level Rise and Flooding

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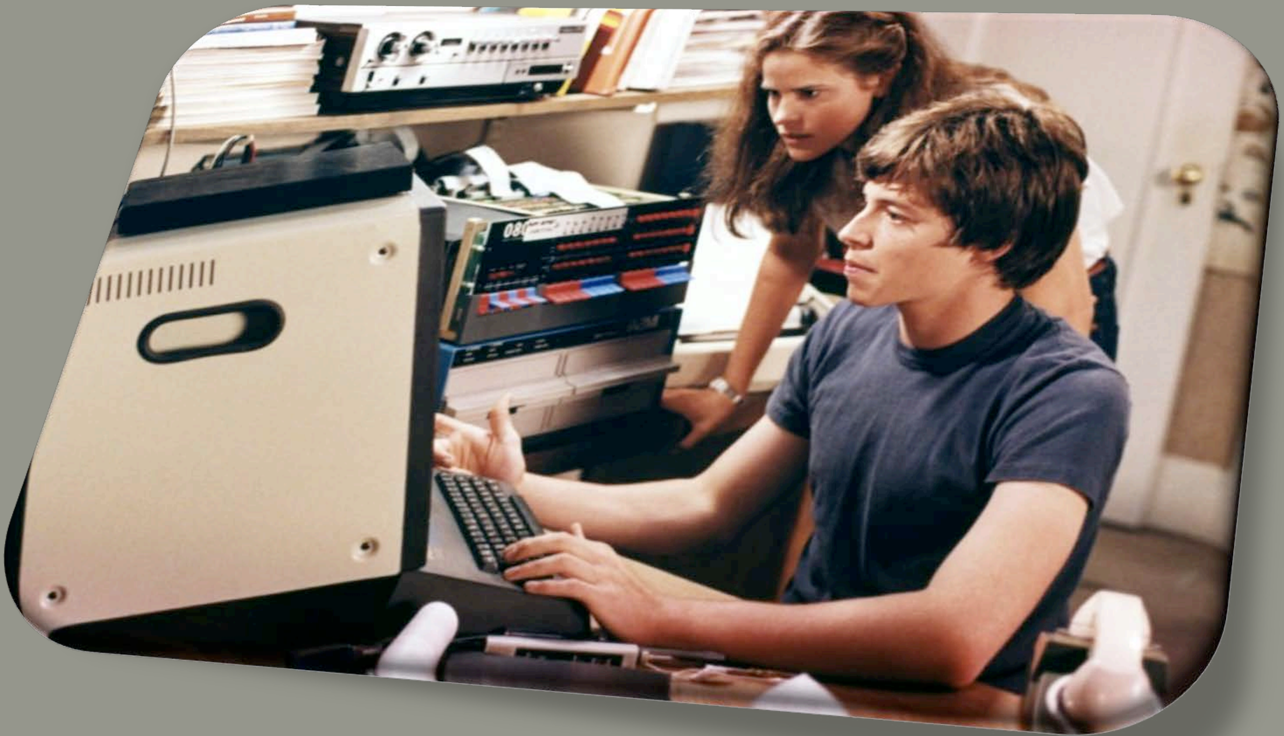
United States Army Corps of Engineers

PLAYING FOR KEEPS: USING SERIOUS GAMES TO ADDRESS SEA LEVEL RISE AND FLOODING



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September 29, 2016
Norfolk District, USACE

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BACKGROUND:

Why we are here:

- Provide an opportunity to look more closely at the risk in the cities of Hampton, Newport News, Poquoson and York County

What we have accomplished so far:

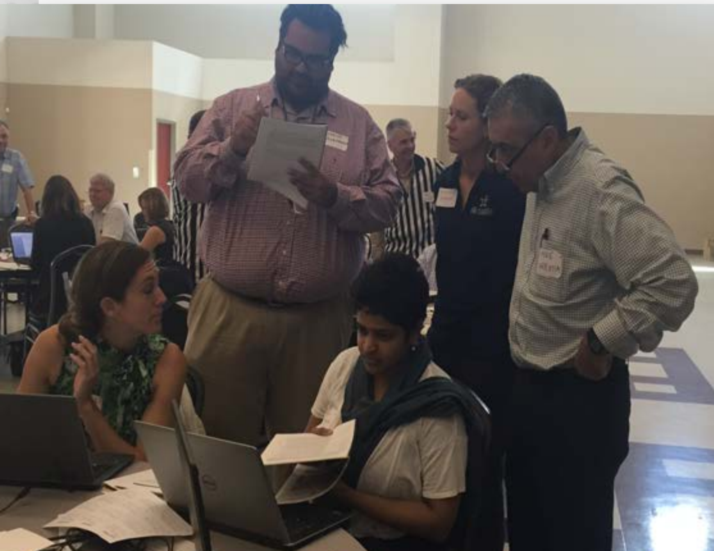
- Scoping Phase
- Coordination with VDEM, DCR, USGS, FEMA, CRS Workgroup and HRPDC
- Reviewed available data, models and opportunities

BACKGROUND:

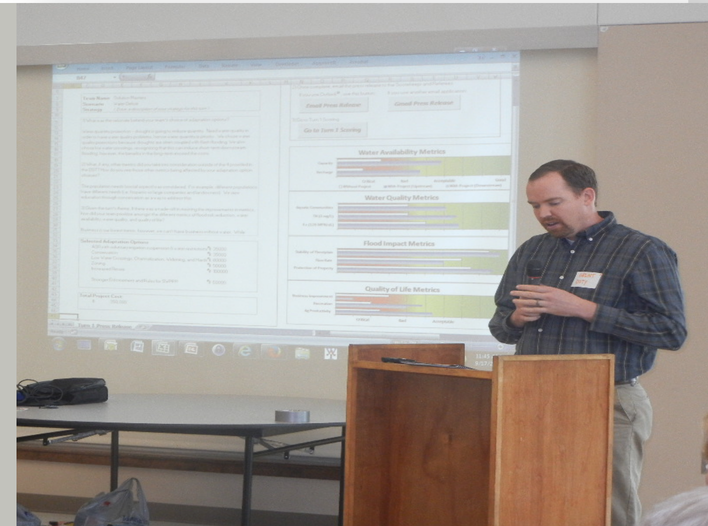
What we have heard:

1. Meeting Fatigue
2. Look at other communities
3. Develop a Floodplain Management Plan Template
4. Identify available funding sources

WHY A TOURNAMENT?



- Low Cost/ low regret
- Communicating different watershed interests
- Focused attention on problem areas
- Learning together
- Creating new knowledge



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MANAGEMENT MEASURES

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Table IV-4. Coastal Storm Risk Management and Resilience Attributes Associated with the Full Array of Measures

Aggregated Measure Type[1]	Category[2]	Coastal Storm Risk Management Function			Multi-Benefits[3]	Resilience
		Flooding	Wave Attenuation	Erosion		Adaptive Capacity[4]
Acquisition (building removal) and relocation[5]	Non-STR	High	High	High	High	High
Building retrofit (e.g., floodproofing, elevating structures, relocating structures, ringwalls)	Non-STR	High	Low	Low	Low	Low
Enhanced flood warning and evacuation planning (early warning systems, emergency response systems, emergency access routes)	Non-STR	Low	None	None	Low	High
Land use management/ conservation and preservation of undeveloped land, zoning, and flood insurance	Non-STR	Medium	None	None	High	Medium
Deployable floodwalls	STR	Medium	None	None	None	Low
Floodwalls and levees	STR	High	Low	None	Low	Low
Shoreline stabilization (seawalls, revetments, bulkheads)	STR	Low	High	High	Low	Low
Storm surge barriers	STR	High	Medium	None	Low	Low
Barrier island preservation and beach restoration (beach fill, dune creation)	STR/NNBF	High	High	Medium	High	High
Beach restoration and breakwaters	STR/NNBF	High	High	High	High	Medium
Beach restoration and groins	STR/NNBF	High	High	High	High	Medium
Drainage improvements (e.g., channel restoration, water storage/retention features)	STR/NNBF	Medium	Low	Medium	Medium	Low
Living shorelines	STR/NNBF	Low	Medium	Medium	High	High
Overwash fans (e.g., back bay tidal flats/fans)	NNBF	Low	Medium	High	Medium	High
Reefs	NNBF	Low	Medium	Medium	High	High
Submerged aquatic vegetation	NNBF	Low	Low	Low	High	Medium
Wetlands	NNBF	Low	Medium	Medium	High	High

1 *An extensive list of management measures was compiled as part of the NACCS Measures Working Meeting in June 2013. The measures presented here represent an aggregated list of the categories of measures and corresponding conceptual parametric unit cost estimates.*

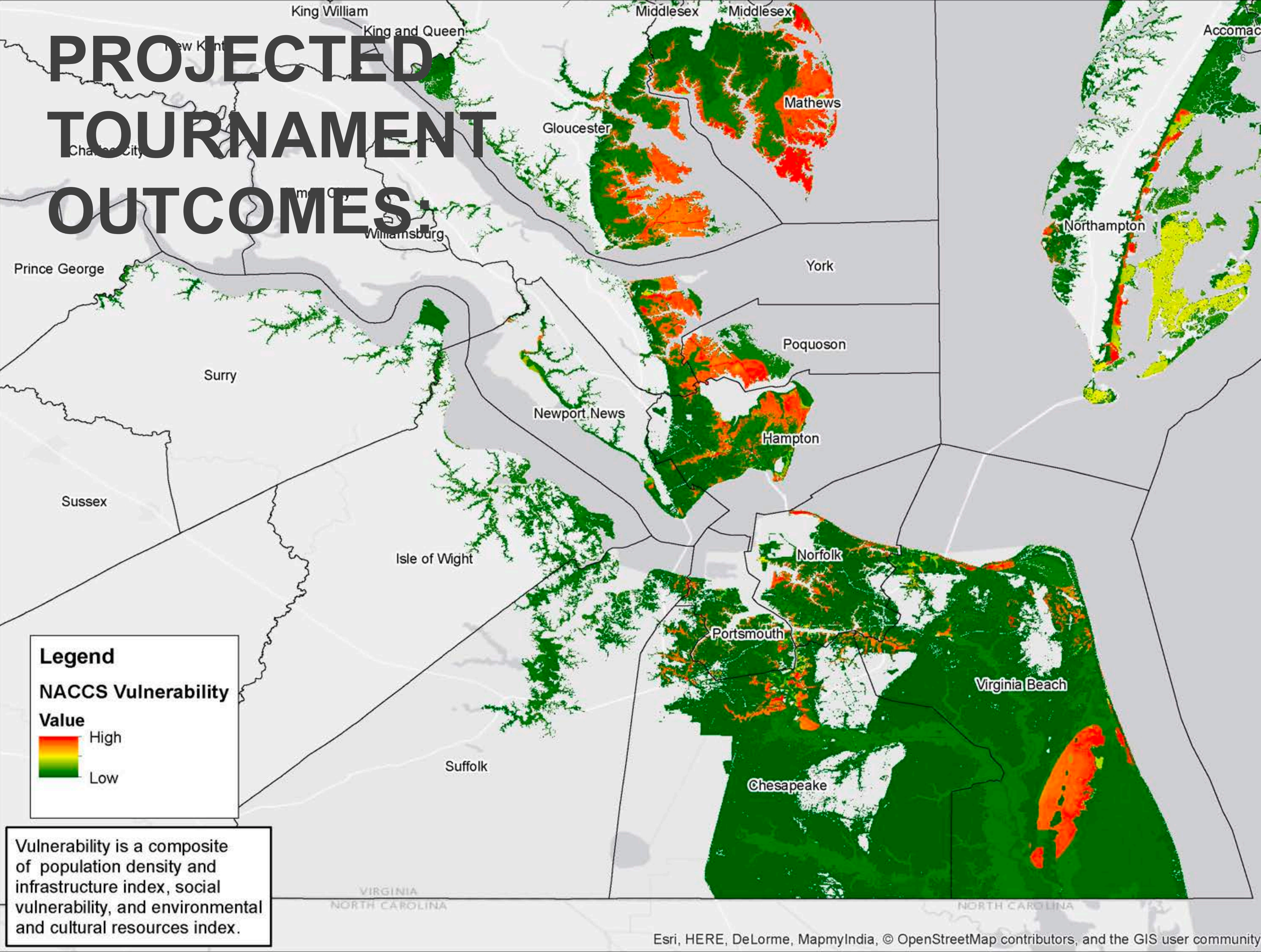
2 *STR = structural measure, Non-STR = nonstructural measure, and NNBF = Natural and Nature-Based Features measure. Multiple measures are listed if the aggregated measure type is made up of a combination of measures.*

3 *Multi-benefits focus on socioeconomic contributions to human health and welfare above and beyond the risk management benefits already highlighted in this table (i.e., flooding, wave attenuation, etc.). These benefits could include increased recreational opportunities, development of fish and wildlife habitat, provisioning of clean water, production of harvestable fish or other materials, etc.*

4 *Adaptive capacity is the assessment of a measure's ability to adjust with changing conditions and forces (including sea level change) through natural processes, operation and maintenance activities, or adaptive management, to preserve the measure's function.*

5 *Acquisition, relocation, and buyouts do not actually prevent flooding and erosion but remove the population and associated development from its effects.*

PROJECTED TOURNAMENT OUTCOMES:



PROJECTED TOURNAMENT OUTCOMES:

1. Floodplain Management Plan Template
2. Available funding sources
3. Decision Support Tool

WHAT'S IN IT FOR US?

1. Introduce/Share/Teach NAACS Methodology.
2. Refine Tier 1 analysis to Tier 2 to support the tournament (and provide a dataset).
3. Improve understanding of risk within the region

DATA

AVAILABLE:
- Water levels – NACCS
- LiDAR (FEMA)
- Depth Damage Curves (USACE)
- Content to Structure Value (USACE)
- Sea Level Rise Curves

Other potential datasets:
- UDF Analysis (HMP)
- Depth Grids (FEMA)

NEEDED:
- Buildings (OCC, foundation, value)
- Elevation Certificates

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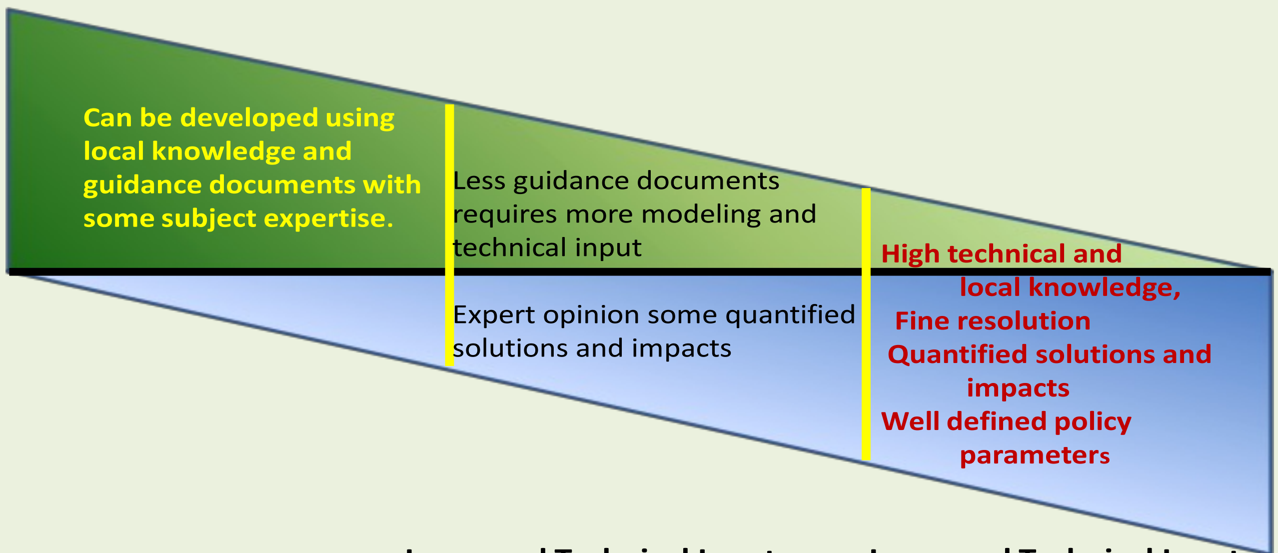
WHAT CAN BE ACCOMPLISHED / LIMITATIONS?

Progressively more complexity for increasingly specific issues

Increasing quantification of Risks, Solutions, Impacts and Costs.



Low Technical
Risk and Risk Mitigation
Sensitization
Systems Thinking

Increased Technical Input
Systems Thinking
Better quantified risks, impacts, and risk mitigation options, costs , constraints, tradeoffs and feedbacks.

Increased Technical Input
Highly quantified risks, impacts, and risk mitigation options, costs, constraints, tradeoffs and feedbacks.

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WHAT DOES SUCCESS LOOK LIKE?

For Us?:

- Use available data
- Regionally applicable tool
- Potential CRS points (FPMP)

What would success look like to you?

SO….WHERE ARE WE?

We are here

Tournament Phases

Scoping Phase

- USACE District Champion Identification,
- Stakeholder Identification,
- Problem and Objectives definition
- Resource Identification

Technical Development and Logistics,

- Scenario development,
- Describe the impact of the hazard,
- Definition of the types of adaptation options,
- Identify the effects, tradeoffs and synergies of alternation adaptation choices by eliciting expert opinion or modeling,
- Develop the decision support tool,
- Create workbook
- Complete the logistics (Invitations, recruit referees, etc.)
- Design of agenda

Testing and Implementation

- Dress rehearsal,
- Actual tournament,
- Post tournament evaluation

Documentation

- Post tournament reports,
- Articles

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