



Results and Recommendations
Science Review Forum: Informing CRMC policy on Sea Level Rise (SLR)

June 8, 2007 8:30 – 4:00

Coastal Institute, Narragansett Bay Campus, Graduate School of Oceanography

Objectives:

1. Review existing sea level rise science and discuss its applicability to managing Rhode Island coasts
2. Clarify key management questions related to sea level rise
3. Provide input to CRMC on key management issues as it relates to sea level rise policy and regulation
4. Identify key knowledge gaps to address sea level rise in coastal policy for Rhode Island’s coasts
5. Identify priority next steps to advance policy recommendations for CRMC

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Part I - THE SCIENCE

1. What do we know about the science? *Complemented by the presentations of John King, Jon Boothroyd*

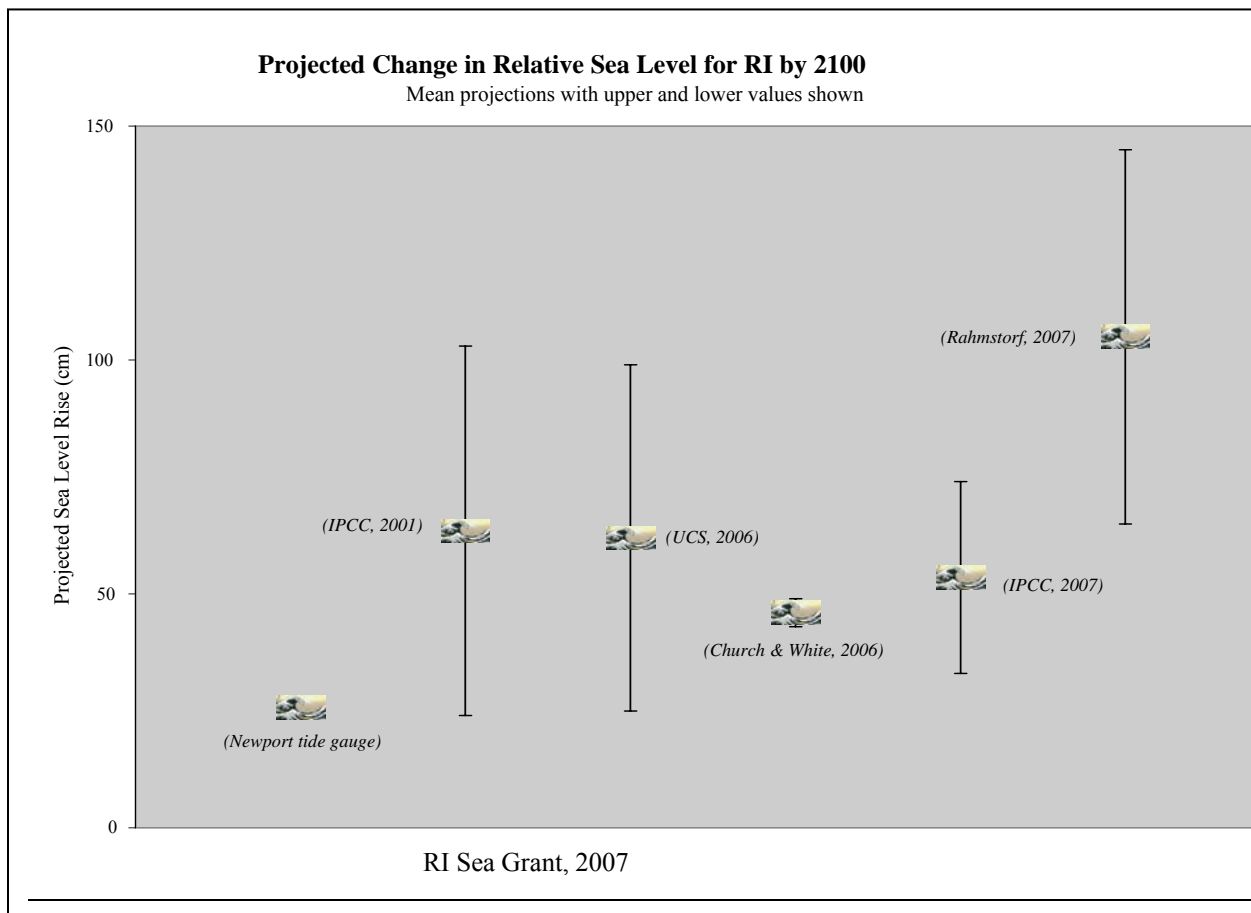
- Historic Newport tidal gauges show an average increase of sea level of 25.7 cm/century, since the early 1900s. This relative sea level rise includes eustatic and isostatic, where eustatic accounts for approximately 13-15 cm/century. The historic rate of rise, as seen on the tide gauges, is different between Newport and Providence. Newport tide gauge SLR rate is similar to others in the region, but is different than Providence. This leads the participants to think that there is something wrong with the Providence gauge, which should be investigated by NOAA. It is felt that there will be no large scale changes in tidal range differences globally, but there may be localized exceptions where tide range may change with increased sea level rise.
- IPCC 2007 states a potential rise in sea level of 18 - 59 cm by 2100, depending on the scenario chosen. This does not include the potential for ice flow. The group felt that the IPCC 2001, which included contributions from ice flow, was a more reasonable estimate, not as influenced by politics.
- The group agreed that for planning purposes, RI should expect a minimum rise of 3-5' by 2100. This estimate was derived by looking at the high estimate of IPCC 2001 (103 cm of relative rise) and the mid range (105 cm) to high range (145 cm) from Rahmstorf, 2007.
- It may make sense to go with the precautionary principle, and look to the higher estimates. Looking at past scenarios and data, it is seen that 1) models under-predict sea level rise and 2) data seems to follow the high range scenarios.
- Regarding some of the higher scenarios, it is noted that there is a need to lower greenhouse gases way before 2100 or a threshold shall be exceeded resulting in positive feedback loops that may rapidly increase warming trends. This is especially evident in the Overpeck estimates of a potential increase of 13-20 feet maximum (not associated with a specific date).
- Barriers retreat up, narrow, and move inland. Historic erosion rates for RI beaches and barriers have been calculated.
- Differences in topography, geomorphology, and wave exposure are key to evaluating existing and future impacts of sea level rise (i.e. South shore vs. Metro Bay). There is a need for better coastal elevation data for the entire state. One foot contour interval LIDAR would be the most useful. There are current modeling efforts in the U.K. linking SLR, waves, and geomorphology
- Systems are not static, and it is difficult to understand the potential changes and how to communicate them when we are talking about exponential changes for the future.

2. What are the gaps? What don't we know?

- There are areas in the global climate system are not well understood, and therefore the impacts are difficult to predict. For instance, the collapse of Greenland is not a linear process, therefore, we don't know when/if Greenland ice sheets are going to rapidly melt and break apart. Because of the unprecedented rate of warming, we don't know the ocean

circulation impacts. For instance, will there be a shut down of thermo-haline circulation in the Atlantic?

- Is the rate of barrier accretion faster than sea level rise?
- Can wetlands keep up? Where would be the most feasible areas for wetlands to retreat?
- How will SLR impact navigation channels?
- Sea level rise rate, as evidenced by the tide gauges, are different in Newport and Providence. This does not make sense geologically; therefore there may be a problem with the tide gauge.
- There is a data gap in terms of topography and bathymetry, which prevents more detailed scientific analysis and scenario development. Need LIDAR in 1 ft contour intervals.
- There is a communication gap between federal, state agencies, municipalities, and scientists to determine what data is needed and who is doing what.



Part II - THE MANAGEMENT RESPONSE

The participants had a facilitated discussion to address key management questions that had been identified ahead of time. They then had an opportunity to prioritize actions, which lead to the conclusions below. One of the key assumptions in the prioritization exercise was that above others, LIDAR, was the utmost priority, for base lining existing conditions, monitoring change and developing any models related to future scenarios.

1. Recommended actions to address management questions related to beaches, dunes and bluffs

Preliminary Management Questions: 1) Should setbacks incorporate a factor to address potential SLR impacts? Should the 30/60 year factor currently employed by CRMC be changed? 2) How might CRMC address landward migration of barrier beaches (and potential destabilization) with increased sea level rise?

Priority actions

- Establish a 100-year erosion line by incorporating a 3' freeboard above wave envelope + five feet + fifty year erosion (short/medium term)
- Educate town DPW and homeowners on practices of maintaining beaches after a storm (short term)
- Remove houses that are on active beaches or in the water (short term)
- Develop incentives for retreat (medium term)

Other actions

- Identify an appropriate “design life” setback. This will help insure that development meets regulations for its entire life, not just 30-year mortgage timeframe.
- Provide education to Judges, since they are key to enforcement
- Identify roads that shouldn't be plowed, and maintain them at grade so that they can roll over as the barriers migrate landward
- Consider a revoking the special exception for allowing public infrastructure on undeveloped barriers.
- Determine how to overcome National Historic register obstacles to enhanced floodplain management

2. Recommended actions to address management questions related habitat protection

Preliminary Management Questions: 1) What aspects should we include when evaluating/prioritizing restoration activities to address SLR? 2) How can we insure that buffers are adequate to allow for landward migration of wetlands salt marsh?

Priority actions

- Include SLR within the State's restoration program (i.e. CELP funding) as criteria and target efforts to those areas where wetlands can migrate. This may be able to be linked to other priorities of flood reduction, therefore, it would be useful to compare FEMA A zones with wetlands (short term)

- Identify and map target areas to invest in restoration. This includes a prioritization of primary/secondary wetland restoration sites and potential linkages to nutrient management (short term)
- Develop a monitoring program: Collect and exchange information among researchers and implementers on restoration sites (note that micro-relief is critical) (short term)
- Manage for “adaptation” not only preservation (medium term)
- Incorporate SLR as a element of the buffer policies, and encourage consistency, without issuing too many variances (medium term)
- Reconfigure management/regulatory authorities to suite a new management regime – what can coastal zone management do? This is not just a CRMC issue. (medium term)
- Acquire land (inland of existing wetlands) now. Invest in uplands. Wetlands should already be safe. It is more cost effective now than in the future. This may be used for habitat purpose or for future retreat (medium term)

Other actions

- Identify alternative technology options to compensate for loss
- Promote an approach of active management of living shoreline
- Map the creep of the shoreline
- Regulate the continuous edge; encourage buffers; think about what the future landscape will look like
- Revise the definition of wetlands to accommodate future changes
- Identify incentives such as tax credit or waived permit fee for developers to consider SLR
- Consider the role of hard policy vs. outreach to willing homeowners. While promoting things like ecological yard maintenance and guidance leads, homeowners may need something more tangible to abide by to make a long term difference.

3. Recommended actions to address management questions related land and water-based structures (new, rebuilding and retrofit)

Preliminary management questions: 1) What is the recommended freeboard to add to “Stillwater level” and base flood elevation to account for SLR? 2) How might the CRMC and communities accommodate the landward migration of flood zones with higher sea levels? (for instance, borderline V/A zone or landward of A zones)

Priority actions

- Prohibit fill in coastal A-zone (short term)
- CRMC specify a structural design life. Need to identify how to addresses “grandfathered” structures, since the design life should incorporate a longer period of time. (short term)
- Identify critical infrastructure and the needs for retrofit (short term)
- Establish “LEED” criteria for coastal building (short term)
- Identify effective mechanisms to inspect/ enforce/ exchange information between building code and CRMC (including variances and 50% rule) (short term)
- Incorporate a freeboard on structures to accommodate SLR (short term)
- Increase CRMC jurisdiction to cover future coastal properties in 2100 (short term)
- Develop a robust education/outreach program on new building code (medium term)

Other actions

- Designate coastal A-zone, where V-zone construction standards are required
- Redefine local zoning, regarding building height, to accommodate SLR freeboard
- Incorporate hazard resilience into smart growth strategies
- Determine what adaptation needs to be made for regional infrastructure (Rt 95 /Amtrak)
- Insure datum consistency (use NAVD 88) between CRMC + building code
- Incorporate “fitness of use” as a performance standard
- Promote the policy and practice of raise up (elevate) vs. beef up (expand)

Part III – POTENTIAL NEXT STEPS

These are activities suggested by the participants. These next steps do not suggest a designated person or agency, but will be used by CRMC to determine how to move forward on this issue.

1. Policy and Regulation

- Initiate policy work in CRMC’s Special Area Management Plan regions (i.e. Metro Bay) to develop CRMC and municipal standards related to freeboard. This can be a “pilot” area which can then be expanded upon to other SAMPs or CRMC jurisdictions.
- Identify a forum for discussing the strategy of moving ahead (include decision makers, practitioners)
- Evaluate ways to incorporate actions noted above within the CRMC CELP restoration program
- Utilize federal consistency tool to insure that federal actions and projects incorporate SLR
- Discuss options to incorporate SLR within the State guide plan and local comprehensive plans (i.e. a Coastal Overlay District).
- Clarify how CRMC can be an agency with a design function vs. a regulatory (MRDP) and enabling legislature. This would include elements of 1) Adaptability and resilience 2) another way to approach this, since regulations usually rigid 3) Network Responsibilities

2. Outreach

- Summarize research, impacts and opportunities and develop appropriate outreach materials for CRMC and Sea Grant (i.e. on www page and other venues)
- Educate insurance industry as to the good coastal policies in RI. Could be an advantage to drop rates.
- Provide a presentation to RI congressional delegates
- Link into other RI venues addressing climate change; develop summary one pager on what state and federal agencies are doing on climate change; develop a clearing house for information related to Sea Level Rise and its role within climate change

3. Research

- Get Lidar and multi beam as a baseline; coordination with neighbors to drop costs
- Develop scenarios for the future barriers to include: SLR + Waves + Erosion + Development
- Monitor tide gauges, erosion and habitat restoration; RI monitoring collaborative is a forum

- Contact NOAA to determine why there is a difference between Newport tide and Providence tide
- Look at other places and how they adapt to SLR (i.e. Halifax)
- Identify ways to translate SLR onto FIRM maps
- Participate in a Regional Sediment Study
- Utilize the Coastal Ponds as a national opportunity for adaptation (potentially linking to other TNC sites nationwide)
- Develop economic evaluations to include: costs of retrofitting infrastructure for SLR impacts; natural resource valuation.
- Identify funding options: 1) Sectional Application Research Program (SARP/NOAA); 2) GSO/Insurance Research Study expansion 3) CICEET 4) EPA