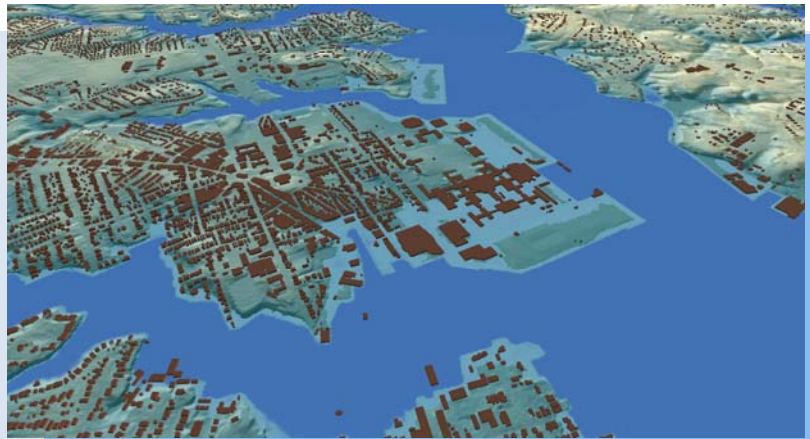


SUMMARY FOR POLICYMAKERS



Public Opinion and Policy Preferences on Coastal Flooding and Sea-Level Rise

Anne Arundel County, Maryland

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EXECUTIVE SUMMARY

With more than 530 miles of shoreline bordering Chesapeake Bay, Anne Arundel County will likely face important policy questions in coming decades in deciding how best to respond to increased impacts from coastal flooding and sea-level rise. Hurricane Isabel in 2003 left county residents with memorable images of historic Annapolis more than knee-deep in water, and widespread flooding, erosion and structural damage^{1,2}. At about a tenth of an inch a year³, the rate of sea-level rise in the region is one of the highest on the East Coast and is believed to be increasing⁴, contributing to the severity of storm surge from events like Isabel^{5,6}, slowly extending the coastal floodplain inland, and eventually potentially leaving some areas permanently underwater.

Local governments in the past few years have begun evaluate the scope of the problem and possible policy solutions to protect community assets, including public infrastructure, private property, and natural resources^{7,8,9,10,11}. Yet the effects of slowly rising waters may be difficult for county residents to recognize, and the issue seemingly removed from their daily lives. This report is part of a study funded by Mid-Atlantic Sea Grant¹² to test a public engagement model for making sea-level rise impact data salient to individuals and facilitating public deliberation on assessed vulnerabilities and policy responses, as conditions under which communities may be more likely to adopt policies that will lead to long-term solutions.

The study consists of two components. First, we conducted a survey of Anne Arundel County residents from randomly selected households that was fielded from March 28 to June 19. The resulting sample is of 378 adults age 18 years or older with a margin of error of +/-5 percentage points within a 95% probability. Second, we invited survey participants to attend a daylong Citizens' Discussion on coastal flooding and sea-level rise on April 28th in Severna Park, Maryland. A follow-up questionnaire was given to the 40 event participants to evaluate changes resulting from the deliberative experience.

Key findings, Anne Arundel County survey

Anne Arundel residents are uncertain how sea-level rise and coastal flooding will manifest in their communities – when impacts will become significant, and whether local governmental policies will adequately address them – but they are aware of the issue, and supportive of an array of local government responses. Incorporating sea-level rise into government planning is the most strongly preferred option, but there is even majority support for increased government spending on this issue. In line with Maryland state legislation¹³, residents favor maintaining natural forms of shoreline protection over employing structural barriers, like sea walls.

Perceived risks from sea-level rise and coastal flooding

- Majorities of county residents (60.4%) say that sea-level rise is occurring and that coastal flooding has become more of a problem in recent years (54.3%) (Figure 1).
- Half of residents do not know, or have no opinion, whether their local government's policies are adequate for addressing coastal flooding long term (50.0%) (Figure 2).
- It is not clear to most residents when the effects of sea-level rise will significantly impact the county. Almost a third – at the largest percentage of the response options (29.4%) – say they don't know (Figure 3).
- County residents are most concerned about the effects of shoreline erosion (64.6%), followed by private property damage or loss (59.3%), habitat loss (54.8%), and public infrastructure damage or loss (52.6%).

Knowledge about sea-level rise

- Though a slight majority, most residents correctly believe that scientists do not expect the current rate of sea-level rise to stay the same over the next 100 years (51.2%).
- Factors contributing to high regional rates of relative sea-level rise are not well understood. Fewer than one in five (15.8%) correctly say that about half of observed sea-level rise in the region is due to sinking land (subsidence).
- Almost two-thirds say that climate change is one of the causes of observed changes in sea-level rise (63.4%), but only slightly more than one-third (36.9%) correctly say that current sea-level rise is not solely the result of natural cyclical processes. This suggests that the majority of residents do not associate sea-level rise with human-induced climatic changes from greenhouse gas emissions.

See references for knowledge questions in appendix, p. 68.

Policy preferences for coastal adaptation

- Of policy tools that local governments could use to address coastal flooding and sea-level rise, long-range planning is the most supported (81.9%), followed by regulatory changes (72.5%), and tax incentives to property owners to reduce their risk (67.2%). Use of government spending is the least supported (51.7%).
- County residents are most in favor of maintaining beaches and wetlands against rising waters in publicly owned natural areas (73.3%), followed by buying adjacent lands to enable the movement of natural areas inland (62.5%), and building walls and other structural barriers to

Figure 1.

In your opinion, has coastal flooding become more or less of a problem in the county in recent years? *n=376*

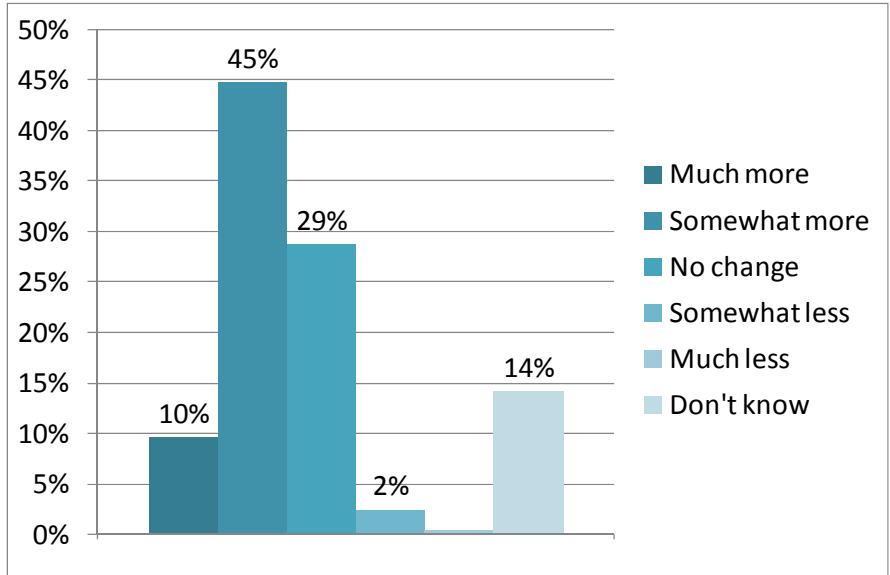


Figure 2.

Would you agree or disagree that your local government's policies are adequate for addressing coastal flooding over the long term (e.g., over a decade or more)? *n=376*

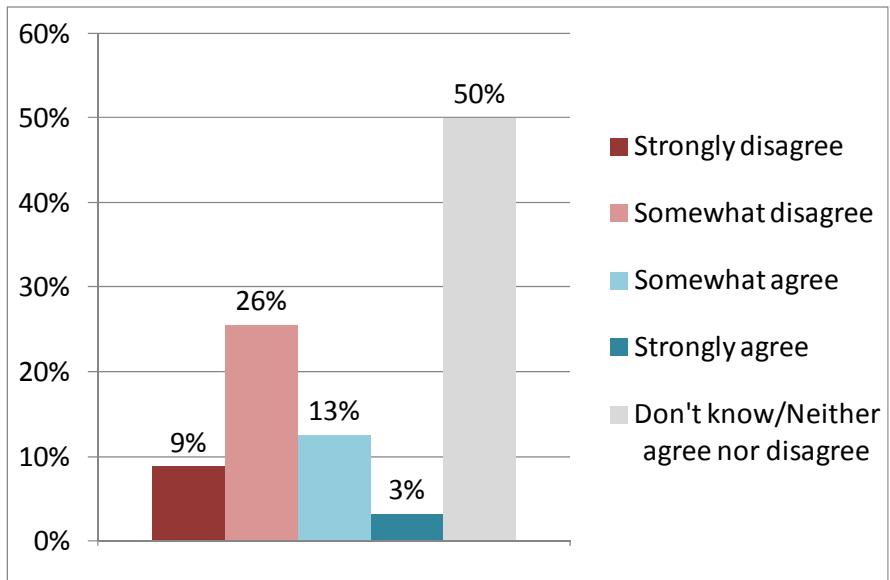
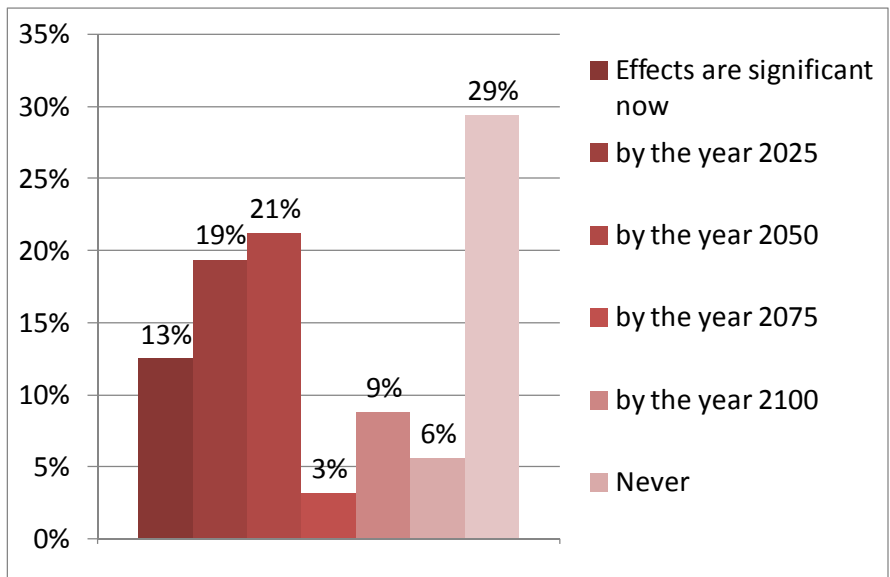


Figure 3.

When do you believe the effects of sea-level rise will significantly impact the county, if ever? *n=377*



protect them (47.9%).

- For built communities, including low-density residential areas and high-density commercial and residential areas, county residents say they most prefer maintaining and restoring natural areas (respectively 86%/87.3%), followed by retreating inland (72.9%/71.2%) and designing and retrofitting buildings to be more flood resilient (58.9%/63.2%) .
- The least popular strategy to protect against coastal flooding is building walls and other structural barriers along the shore, though hardened defenses are supported by just under half for low-density resident areas (45.1%), and by just over half of respondents for high-density commercial and residential areas (52.6%).

Key findings, Citizens' Discussion of coastal flooding and sea-level rise

On April 28th, 40 county residents spent a day learning about coastal flooding and sea-level rise, and discussing the issue with fellow community members. By large margins, the Citizens' Discussion participants became less concerned about the immediacy of the risk both to their own properties and the timing of when impacts would become significant, but more convinced coastal flooding was an increasing problem for the county. About one-third of the 40 participants were from areas of the county most likely to be directly affected, either having homes on the waterfront, or within one block of the water (32.5%).

- Participants became more convinced that coastal flooding has become more of a problem in the county in recent years (+30 pct pts) after attending the Citizens' Discussion event.
- Perceptions of the risk from sea-level rise to their own homes declined (no risk, +29.5 pct pts), as did perceptions of risk to their neighborhoods (no or very little risk , +22.4 pct pts).
- After the discussion, participants were more likely to say that sea-level rise would significantly impact the county later in the century, e.g. not until 2050 to 2100 (+22.5 pct pts).
- The Citizens' Discussion increased individuals' subject knowledge in some areas. Participants were significantly more likely to correctly identify half of observed sea-level rise as due to land subsidence (+22.5 pct pts), and that scientists do not expect the rate of sea-level rise to stay the same over the next 100 years (+25.5 pct pts).
- Some of participants' preferences for response strategies also changed. Participants became more opposed to building walls and other structural barriers to hold back waters in publicly owned natural areas (+14.1 pct pts), and more opposed to retreating inland from high-density commercial and residential areas (+17.4 pct pts).

Conclusions

The long-term, incremental nature of sea-level rise makes its impacts less easily identifiable, but no less real. This study demonstrates that coastal flooding and other impacts from the rising waters of the Chesapeake Bay are of concern to residents, but that they are uncertain of the dimensions of the problem in terms of its risks, and response options and time frames. The Citizens' Discussion contributed to residents' learning about these issues, in terms of their knowledge, risk perceptions and policy preferences. Significantly, it also increased participants' sense of political self-efficacy. This suggests the utility of community discussions on difficult long-term policy issues not only in facilitating their public consideration, but increasing citizens' beliefs in their ability to participate in local policy decisions.

More in-depth analysis, a description of the research methodology, and tables with complete response frequencies to each survey question can be found in later sections of the report. A toolkit of materials from the initiative – including an online impacts visualization and educational materials – is publicly available at www.FutureCoast.info.

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¹² Sea Grant is a nationwide network (administered through the National Oceanic and Atmospheric Administration [NOAA] under the U.S. Department of Commerce), of university-based programs that work with coastal communities. See <http://www.seagrants.noaa.gov/aboutsg/index.html>

¹³ Water Management Administration – 2008 Living Shoreline Protection Act of 2008, HB 973, Maryland General Assembly, 2008 Session. Available at http://mlis.state.md.us/2008rs/fnotes/bil_0003/hb0973.pdf

