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Abstract

There has been little policy effort to address sea level rise in coastal states in the U.S. It is important to examine, at the state level, how the multitude of different (and changing) actors with different preferences and perspectives contribute to such inertia. This study examines state-level legislative inaction with regards to sea level rise. Using Kingdon's multiple streams framework, we draw a picture of the policy landscape in Virginia as one where the problem of sea level rise is perceived as a low priority, with little consensus on achievable policy solutions, and is politically controversial. We find that policy inertia in Virginia is a result of (1) fractious viewpoints regarding sea level rise as a problem, (2) a lack of clear consensus on policy solutions, and (3) conflicting perspectives of the role of the state.

Keywords: sea level rise, climate change, agenda setting, environmental policy

Introduction

Climate change is quickly becoming one of the most salient concerns occupying the attention of publics and governments around the world. Increases in severity and frequency of extreme global temperatures and weather patterns—and mounting evidence regarding the serious risks posed to natural resources, water supplies, and environmentally-vulnerable populations—has led scientists and governments to search for solutions to mitigate environmental impacts and adapt to changing circumstances.

Sea level rise (SLR) in particular poses a threat to coastal regions. Across many coastal areas worldwide and in the U.S., flooding due to SLR presents risks to personal and public property, transportation and other public infrastructure, and military operations. More frequent and severe flooding may also cause disruptions to economic activity, logistics, and supply chains (Intergovernmental Panel on Climate Change, 2007, 2013). Additionally, with a globalized economy, indirect economic effects are likely to be significant even far from the coastline (Nicholls & Kebede, 2012). For example, flooding may cause saltwater intrusion, which can alter the salinity of the groundwater supply, in turn threatening the overall food supply (Binder, 2011).

Approximately 10% of the world population lives in low-lying coastal areas (Greenfieldboyce, 2007). In the U.S., almost 48% of the population lives in coastal counties (U.S. Census Bureau, 2010). Furthermore, projections estimate an up to four-times increase in worldwide populations likely vulnerable to direct effects of SLR by 2070, and a 12-factor increase in assets exposed to SLR risk (Nicholls & Kebede, 2012). The risks posed by SLR to such a large portion of the population make it a particularly pressing issue for researchers and governments to address.

Worldwide, governments affected by SLR have implemented various policies and strategies to address SLR. However, government response in the U.S. to SLR has been limited. Unlike other climate-related issues, such as renewable energy, emission disclosure and carbon cap-and-trade, where states have actively enacted policies (Rabe 2010), the SLR policy landscape is almost barren, marked by policy inaction. For example, between 2008 and 2014, the National Conference of State Legislatures (2014) Energy and Environment Legislation Tracking Database noted only 15 SLR-related items in six states. Of these, seven failed, five are pending, and only three were enacted. In Virginia, the state we use as our case study of agenda setting of SLR at the sub-national level, the state legislature has only passed one SLR-related legislative item – targeted at studying adaptation strategies to prevent recurrent flooding in coastal regions of the state.[1]

This points to an interesting divergence between problem severity and legislative concern and raises the question of why state policymakers do not see SLR as an issue requiring legislative and policy redress. To answer this question, this study applies Kingdon's (1995) multiple streams framework to understand state level agenda setting as it applies to SLR. Using the example of the American state of Virginia, we explain how the conflict and lack of consensus within the respective streams, and the subsequent lack of convergence between the three streams, prevent SLR from rising onto the policy agenda. Our results show that the multiple streams framework is an apt model for answering the research question and surfacing the dynamics behind policy inaction. In Virginia, the issue of SLR is characterized by high conflict and political controversy, and is perceived as a low priority policy concern. These characteristics have, individually and collectively, contributed to SLR policy inertia.

The SLR Policy Domain

At the U.S. federal level, there has been some policy action regarding SLR. One key example is the federal Coastal Zone Management Act (CZMA) of 1972, the federal legislation for all state-based coastal-management programs and for the implementation of national coastal-management goals. The CZMA was amended in 1990 and 2005 to explicitly include the need to anticipate and plan for SLR.

However, despite the potential impacts of SLR, state governments have been slow to enact policies that directly address SLR concerns. For example, Rabe (2010) reviewed the top-ranked public management journals (between 1998 and 2009) and found only two articles on climate change. There is a lack of research from both an international and U.S. perspective that specifically examines the perceptions of SLR held by legislative decision makers at any level of government. Some notable exceptions are studies of Swedish politicians (Sundblad et al, 2009; Hjerpe et al, 2014) and Norwegian mayors (Orderud & Kelman, 2011). Brody et al. (2010) studied the perceptions of state and local officials regarding climate change, but did not include state legislators. Moser (2005) examined state-level policy and management responses to SLR in three American states, but also did not include legislators.

The slow nature of SLR, coupled with the perception that immediate threats are limited only to coastal regions, makes SLR a largely invisible, easily ignored problem that takes a backseat to more pressing issues. The association between SLR and climate change has also made SLR a politicized and contentious issue, further restricting the consideration of SLR as a policy concern. The lack of SLR awareness among the general public and policymakers, coupled with strong economic pressures to allow development in coastal areas, makes addressing SLR difficult, as evidenced by the experiences in South Carolina and North Carolina (Moser,

2005). Yet, unlike climate change in general, the impacts of SLR are more tangible and identifiable, making it more relevant to populations in low-lying coastal areas.

In the U.S., individual states have the authority to decide how to handle climate change issues such as SLR (Selin & Van Deveer, 2007; Wheeler, 2008), and because the effects tend to be localized, SLR is more likely to be addressed on a state or regional level. Our study examines how public policy concerning SLR is understood and addressed at the state level. The focus on state legislators — in this case, Virginia legislators — is important because state officials normally place environmental mitigation below the mid-range of their concerns. As Brody et al. (2010) found in their study, "climate change mitigation and adaptation are generally low-priority issues for local and state decision-maker organizations … compared with other issues such as jobs or transportation" (p. 600).

Agenda Setting and the Multiple Streams Framework

Agenda setting focuses on how and why certain issues succeed or fail in being recognized as problems requiring government attention (Howlett, Ramesh, & Perl 2009) and is important for understanding how people pay attention to issues and shape policy. Pralle noted that "[a]n agenda-setting perspective can help us understand current climate policy politics by identifying factors that will help the climate change issue rise up and stay high on the agendas of governmental and non-governmental institutions" (2009, p. 783).

Several theories attempt to explain the agenda setting process. Early models of agenda setting focused on political and economic conditions as explanations for why certain issues made it to the government agenda. However, these explanations do not account for problem definition, issue framing, or institutional structures (Howlett et al. 2009). Subsequent theories approach

agenda setting as a process affected by multiple and interrelated variables. These frameworks typically revolve around different groups of policy actors--including elected officials, public bureaucracies, interest groups, the media, and the public--and assume the socially constructed nature of the problem definition process. According to the issue-attention cycle (Downs, 1972), an issue quickly gains awareness as a problem needing government action. Steps may be taken to address the problem, but once it becomes clear that the problem is not easily solvable or other issues gain greater traction, it recedes from the public consciousness. Baumgartner and Jones (1993) characterized the policy process as having long periods of stability with sudden bursts of significant change. This punctuated equilibrium theory focuses on how the policy agenda (and policy change) are affected by changes in relationships between policy actors and shifts in issue definition.

The multiple streams framework, developed by John Kingdon (1995), addresses the issue of how various problems make it onto the policy agenda and the conditions under which a particular policy is likely to be adopted. Kingdon argued that, instead of one definable point of origin, the policy formation process typically is a product of a combination of different factors. The policy environment is characterized by different actors with varied and often inconsistent or conflicting preferences, a lack of clarity regarding the role played by the government in society, and constant change in the participants involved in decision-making processes. Three different processes, or streams, are involved in agenda setting: problem recognition, formation of policy proposals or solutions, and politics. While the same participants may be involved in more than one stream, the streams themselves are viewed as independent from each other and subject to different forms of capacity or constraints.

The *problem recognition stream* involves the identification of issues that require attention. As Kingdon (1995, p.109) stated, "Conditions become defined as problems when we come to believe that we should do something about them." Values play a large role in problem definition, and an individual's ideology can often influence whether a condition is viewed as a problem. To that end, the way information is gathered on an issue and how it is categorized matter a great deal in determining whether that issue gets defined as a problem. Issues that are highly salient to the public, that are easily quantifiable, that have identifiable solutions, or that are the product of a crisis event, all have a greater likelihood of being defined as problems. Problems may fade from the agenda due to the passage of new legislation that gives the impression that the problem is fixed, or because enthusiasm over the issue wanes, perhaps from the entry of new problems or because of a realization of the high costs of action.

The *political stream* encompasses elections, changes in administrations, adjustments in the balance of power in government, and the national mood. Changes in any of these areas can facilitate or constrain policy action. For example, turnover among elected officials or within administrative agencies may alter the priorities on the policy agenda, as new officials bring with them different priorities. Organized groups that have a vested interest in particular policy areas may strongly resist change that threatens their interests. Within the political stream, coalition building is very important. Elected officials often compromise and bargain with each other, exchanging support of one policy for support of another. Once a policy proposal receives extensive support, some legislators feel pressure to back such a popular proposal. This tendency is particularly strong among elected officials who are perpetually concerned with winning the next election.

Finally, the policy formation process, or the *policy/proposal stream*, involves many "policy communities" (Kingdon, 1995, p.117). Each policy area has a community that comprises experts in that field. These people interact with each other continuously and, while affected by political events, remain independent from most of the action that takes place in the political stream. Within policy communities are policy entrepreneurs, people who expend considerable time and resources to advocate for particular policy proposals. Once generated, policy proposals often get altered or combined with other proposals in a process that Kingdon (1995) suggested more resembles the evolutionary process of survival than the rational decision making model. For a policy proposal to survive, it must be technically and politically feasible, must satisfy such value concerns as equity and efficiency, and must be palatable to the public. It is the job of the policy entrepreneurs to "soften up" elected officials, agency bureaucrats, and the public to a particular proposal, and to show how that policy idea will solve an important problem.

When the problem recognition, political, and policy/proposal streams converge, they create a "policy window" (Kingdon, 1995). Under such conditions, there is an agreed upon problem, an identifiable solution, and a political climate that encourages action on the issue. Open for only a brief time, policy windows allow issues to be placed on the policy agenda and be given policy priority. Issues are more likely to become part of the policy agenda when they receive attention from an engaged citizenry, organized coalitions, or political actors. Part of what drives attention to a problem is a focusing event. Events that may lead to a policy window opening include shifts in political leadership or balances of power, the emergence of new problems or the amplification of current problems, and large-scale disasters or crises. For example, areas that are at high risk of SLR-related impacts are more likely to adopt adaptation

strategies (Brody et al., 2010), indicating that, for these communities, high risk has placed SLR on the policy agenda. However, as shown in the NCSL's Energy and Environment Legislation Tracking Database (National Conference of State Legislatures, 2014), for the most part, SLR has not emerged on to state policy agendas, even in coastal states.

Kingdon's multiple streams framework was developed in the context of agenda setting at the federal/national level, but we apply the framework to state-level policy, similar to its use by other policy scholars in studying prison privatization (Culp, 2005) and education policy (Brown, 2007). The multiple streams framework as applied to SLR policy is summarized in Figure 1. Kingdon's multiple streams framework is the most appropriate policy framework for understanding SLR as a policy issue because it can be broadly applied regardless of policy subsystem, pluralist movement, or elite interests (Solecki & Shelley 1995), and the concepts of the three streams and policy window are relevant to the context of SLR. Other agenda setting models tend to focus on policy change, thus assuming that the issue has made it onto the policy agenda. The multiple streams approach is better suited to explaining why an issue does *not* become the focus of government attention, which is the focus of our study. Furthermore, we are concerned primarily with the perceptions of state legislators regarding SLR. In this context, the multiple streams framework is more suitable than other models that focus on the role of policy subsystems, and media and public influence. Finally, the multiple streams approach has been used to study other environmental issues such as climate change (Pralle 2009), acid rain and clean air (Simon & Alm 1995), and pollution (Solecki & Shelley 1996).

Understanding Sea Level Rise in Virginia

Virginia is particularly well-suited for the study of sub-national, state-level SLR policy in the U.S. Reports indicate that Virginia's coastline is highly vulnerable to extensive asset damage due to accelerated SLR (Governor's Commission on Climate Change, 2008; National Oceanic and Atmospheric Administration, 2012; Strauss, Ziemlinkski, Weiss & Overpeck, 2012). For example, Virginia Governor Tim Kaine's 2008 Commission on Climate Change report (Governor's Commission on Climate Change, 2008) and the Hampton Roads Planning District Commission's 2010 Report on Climate Change both placed the southeastern region of Virginia in the top 10 globally for assets at risk due to storm surge and high wind damage. The potential threats across coastal Virginia include damage to regional transportation and other public infrastructure, ports and logistics, military operations, tourism, wetlands, and coastal ecosystems (Hampton Roads Planning District Commission, 2010; Pyke et al., 2008; Wu, Najjar, & Siewert, 2009).

So, why has SLR not risen onto the state-level policy agenda in Virginia? Our analysis takes a comprehensive look at this question by examining the SLR policy playing field and the different players and factors that are involved. To understand the legislative perspective, we rely on data from a 2012 survey of Virginia legislators regarding the saliency of SLR as a policy issue (Yusuf, St. John & Ash, 2014).

Yusuf et al. (2014) conducted a web and mail survey that was sent to 140 Virginia legislators. A total of 36 legislators completed the survey (10 each from non-coastal Republicans and Democrats and 8 each from coastal Republicans and Democrats) for a response rate of 26%,[2] reflecting 26% of the population of the House of Delegates and 25% of the Senate (see Yusuf et al., 2014, for the complete survey methodology).

We build on the survey results presented by Yusuf et al. (2014) and present additional survey findings (see Tables 1 through 4). We also utilize results and findings from the extant literature to frame and support the analysis of the Virginia legislature survey data. The goal of this paper is to apply Kingdon's multiple streams framework to the analysis of SLR as a policy issue in Virginia. Our analysis compiles the results of the Virginia legislative survey with those of other studies, and integrates and contextualizes them within the multiple streams frameworks.

In general, policymakers tend to agree that most issues or problems are important, but policy action only occurs for those policy issues about which lawmakers have very strong feelings. State legislators must address myriad issues that warrant some concern for policy (i.e., they are generally agreed to be important), but only a very few issues make it onto the policy agenda because they evoke much stronger preferences or perceptions among a greater number of legislators. We characterize these strong preferences as the issue threshold beyond which the issue becomes highly salient and relevant, and legislators have a stronger predisposition to act. In our analysis of the Virginia legislator survey data, we focus on legislator responses that reflect these strong perceptions. For example, we focus on the extent to which legislators indicate that specific policy solutions for addressing SLR are "very effective."

SLR in the Problem Recognition Stream

In the problem recognition stream, the main question is whether SLR is perceived as a problem to be addressed by the state legislature. This hinges on two issues: (1) the severity of SLR as a problem affecting the state as a whole, and (2) the need for state-level action.

In terms of the severity of SLR as a problem, scientific data and indicators such as tide gauges have shown accelerating SLR globally, nationally, and along the Virginia coastline

(Governor's Commission on Climate Change, 2008; Intergovernmental Panel on Climate Change, 2013; National Oceanic and Atmospheric Administration, 2012). This information, technically, should establish the basic condition of SLR as a problem. Beyond this, the problem of SLR is also highly linked to the problem of flooding; a major consequence of SLR is increased severity of flooding. Flooding and associated social and economic impacts can and have, in low-lying coastal areas, served as focusing events. However, while floods have placed SLR onto local agendas, there is little evidence that Virginia legislators strongly perceive it as a statewide concern.

Brody et al. (2010) found that, nationwide, climate change was generally perceived as being a low priority issue for local and state decision-makers. This is also the case for Virginia legislators. As shown in Table 1, 71.5% of legislators, at a minimum, agreed that the increased risk of flooding due to SLR is likely to adversely affect the state's economic well-being. However, only 29% of Virginia legislators strongly agreed that the increased risk is likely to adversely affect the economic well-being of the state. This suggests that while there is general concern for SLR, it is not viewed as a pressing issue.

Table 1. Perceptions of State-level Risk of Flooding due to SLR (N=35)

The increased risk of flooding due to sea level rise is likely to adversely affect the economic well-being of Virginia	
Strongly agree	28.6%
Agree	42.9%
Disagree	17.1%
Strongly disagree	11.4%

A similar trend can be seen in terms of legislator perceptions of the likelihood of specific risks or consequences of flooding due to SLR, such as loss of private and public property, and disruption to economic activities. While some risks are perceived as more likely to occur than

others, most of the risks were rated, on average, in the middle ground between likely and not likely. For example, on average, Virginia legislators perceived temporary damage to private property to have the highest likelihood of occurring, rating it 3.31 on a scale from 1 being not at all likely to 4 being very likely. But, more than half of the risks of SLR listed in the survey were not rated as highly, with ratings between likely and not likely. For example, on average, legislators rated disruptions to commercial port activity a 2.58 and contamination of freshwater sources a 2.80. These ratings suggest that legislators generally do not consider most SLR risks as very likely to occur in the state over the next several decades.

When it comes to problem recognition, state lawmakers must also consider SLR-related policies within the context of the mission of the organization (Brody, et al., 2010). While the mission for a state legislature is not always clear-cut, the broader drivers of legislative action, in a democratic context, are state-wide constituent issues and concerns. However, constituency concerns about SLR are complicated by the localized nature of SLR impacts.

Virginia legislators serving coastal districts do tend to consider SLR a more serious problem for their districts compared to their non-coastal counterparts (see Table 2). On a scale from 1 (strongly disagree) to 4 (strongly agree), the mean response to the statement 'The increased risk of flooding due to SLR is likely to adversely affect the economic well-being of my district' was 2.81 for coastal legislators and 2.05 for non-coastal legislators (differences statistically significant, $p=.003$). Still, only slightly less than 19% of coastal district legislators strongly agreed that SLR presented an adverse risk to their constituents.

Table 2. Perceptions of District-level Risk of Flooding due to SLR

	The increased risk of flooding due to sea level rise is likely to adversely affect the economic well-being of my district	
	Coastal Districts (N=16)	Non-coastal Districts (N=19)
Strongly agree	18.9%	0%
Agree	50.0%	26.3%
Disagree	25.0%	52.6%
Strongly disagree	6.3%	21.1%

Finally, since SLR is both a local and global problem, a key issue is determining if the state should take a policy leadership role. This problem recognition issue, which is associated with multi-level governance (Biesbroek, Termeer, Kabat, & Klostermann, 2009), manifests itself in Virginia, where one of the factors keeping SLR a relatively low priority within the problem stream is the general perception by state legislators that SLR is a problem that calls upon federal government to take the lead in developing policies (Yusuf et al., 2014). Out of a list of 10 policy lead actors, state actors—such as state agencies, the Governor, and the General Assembly—were identified as top three SLR policy leaders by only 39%, 36% and 31% of legislators surveyed, respectively (Yusuf et al., 2014).

Legislators from both coastal and non-coastal districts showed greater preference for federal government leadership of SLR policy efforts (Yusuf et al., 2014). But, the localized nature and impact of SLR complicates the story. There is disagreement between state legislators representing coastal and non-coastal areas about whether SLR is a problem for which the state legislature should take policy leadership, with coastal legislators more strongly preferring state involvement (Yusuf et al., 2014).

SLR in the Political Stream

Independently of the processes of problem recognition and identification/development of policy proposals and solutions, political events take place according to their own dynamics and rules. The political stream includes, among other components, public opinion, organized political forces, and perceptions of other government priorities.

In general, research shows that public opinion of, and support for, environmental policy influence lawmakers' decisions on climate legislation (Agnone, 2007; Lubell, Zahran, & Vedlitz, 2007). However, existing research indicates a lack of public knowledge and informed public opinion about the dynamics of SLR and its danger to low-lying coastal areas (Moser, 2005; Nisbet and Myers, 2007; Selman and Daigle, 2011; Stamm et al., 2000). In a telephone survey of Washington state residents, Stamm et al. (2000) found that 65% of respondents had heard of SLR, but only 22% were "very concerned" about its effects. Similarly, more recent national surveys of the US, while not focused exclusively on SLR, reveal a degree of public disengagement about climate change. A nationwide survey conducted by the Brookings Institute reveals that, since the spring of 2010, an average of 40 percent of Americans either do not believe, or are not sure, that there is evidence of climate change (Borick & Rabe, 2012). An October 2012 survey by Pew revealed similar numbers; when asked to rate the seriousness of global warming, 36 percent of Americans either indicated it was not a serious problem or did not know (Pew Research Center, 2012)

This lack of strong public concern is similarly manifest in Virginia. Results of the Life in Hampton Roads Survey reveals that 36% (in 2012) and 40% (in 2013) of respondents in coastal southeast Virginia were not concerned about SLR (Social Science Research Center, 2012, 2013). However, even if public opinion in Virginia strongly favored the need to address SLR,

politicians might not heed these concerns, as survey results found that Virginia legislators tend to discount citizens as sources of information regarding SLR. On a scale from 1 (not at all credible) to 4 (extremely credible), on average, legislators rated their constituents a 1.4, suggesting that citizens have little credibility as sources of information (Yusuf et al., 2014).

In the U.S., the science of climate change is closely tied to the politics of climate change; politics have penetrated the debate to the point where ideology often trumps science (Jacques, Dunlap, & Freeman, 2008). Climate change has been politicized in other countries as well (see for example Weingart, Engels, & Pansegrau, 2000), but the U.S. appears to have a more intense political debate regarding the existence and seriousness of climate change compared to other Western countries.

The politicization of environmental issues can be seen in the debates over cap and trade and greenhouse gas policies (Cook, 2010; Grundmann, 2007; Macneil, 2013), and is likely to be present in SLR debates as well, since SLR is one effect of climate change and SLR-related policies would likely have similar impacts on economic development. Results of the Virginia legislator survey revealed that political partisanship does exist in the discussion of SLR, with Democrats and Republicans differing in how they viewed the credibility of sources of information about SLR and who they believed should lead policy efforts to address SLR.

Republicans and conservatives in the U.S. are generally skeptical of climate change and tend to be against most climate change policies (Grundmann, 2007; Jacques, et al, 2008). In response to the perceived threat of climate change policy to global market capitalism, conservative groups have attacked environmentalism by questioning the science of climate change, succeeding in influencing the media such that "major media outlets portray ... climate science as an evenly divided debate between skeptics and non-skeptics" (Jacques et al, 2008,

p.356). Substantial media coverage of environmental skepticism has increased the politicization of climate policy and contributed to disagreement among citizens regarding the necessity and desirability of climate change policy (Grundmann, 2007; Jacques et al, 2008).

Political partisanship over SLR and climate change more broadly has also inhibited SLR from raising onto the policy agenda because it has resulted in a lack of political consensus among Virginia legislators (see Table 3). This is evident in legislator responses to the survey question about factors that make it difficult to adopt policies. A lack of political consensus on both the importance of SLR and the need to take action regarding SLR were the top obstacles cited by Virginia legislators who responded to the survey (77% and 85%, respectively).

Table 3. Challenges to Adopting SLR Policies

Which of the following makes it harder for Virginia to adopt policies to address risks of flooding posed by sea level rise? Select all that apply. (N=34)

Lack of political consensus on the need to take action now regarding sea level rise	85.3%
Lack of political consensus on the importance of sea level rise	76.5%
Lack of funding	76.5%
Lack of knowledge about available policy solutions	44.1%
Lack of scientific information	44.1%
Lack of private sector support	38.0%
Lack of support from the federal government	35.3%
Lack of regulatory authority	32.4%
Lack of administrative or agency capacity	32.4%
Lack of support from municipal governments	23.5%

SLR in the Policy Proposal/Solution Stream

In the policy solution stream, a problem, once recognized, gains momentum when coupled with a policy proposal/solution. Kingdon noted that problems lacking available and feasible solutions may fail to rise on the agenda. As Pralle stated, "for climate change to rise and stay high on agendas, the public and policymakers must be convinced not only that we *should* do

something to combat climate change, but that we *can*" (2009, p. 786). In Virginia, SLR appears to be a problem with no amenable or readily-identifiable policy solutions.

When asked to identify factors that make it difficult to adopt policies to address SLR, Virginia legislators cited several constraints (see Table 3). In terms of policy solutions, legislators noted the lack of funding as a key constraint (77%), in addition to lack of scientific information about SLR (44%) and lack of knowledge about policy solutions (44%). These responses mirror the results found by Mozumder et al. (2011) in their study of policy decision making in the Florida Keys. Their research identified several obstacles, including budget constraints, absence of leadership, staff and resource insufficiencies, lack of concern among public officials, and lack of public demand for action.

One critical challenge is that there appears to be lack of agreement among legislators as to the appropriate policy remedy, particularly in terms of potential effectiveness. The Virginia Governor's Climate Change Taskforce identified several policy solutions for addressing SLR (Governor's Commission on Climate Change, 2008), but when state legislators were asked about these policy solutions, there was no strong consensus about which options would be most effective (see Table 4).

Specifically, most potential solutions — such as developing a state adaptation strategy, directing funds to monitor and report flooding and SLR changes, and providing funds to municipal governments to address SLR adaptation needs — were viewed as very effective by less than 25% of the surveyed legislators. Revising the state's Floodplain Management Plan to address flooding due to SLR was the policy solution perceived to be most effective – almost 94% of Virginia legislators in the survey indicated it was an effective solution. However, only 30% of legislators identified it as *very* effective. This suggests that, there is a significant concern that

state legislators do not perceive the existence of mutually-agreeable, technically-feasible policy actions that will be highly effective at addressing the SLR problem. Mozumder et al. (2011) similarly found in the Florida Keys that, while there was general agreement that climate change is real, there was considerable disagreement regarding whether solutions exist.

Table 4. Perceived effectiveness of policy solutions

Rate the following for their potential effectiveness in addressing flooding due to sea level rise in Virginia. Please indicate whether you think each of the following are 'very effective,' 'effective,' 'not very effective,' or 'not at all effective.'

	Very Effective	Effective	Not very effective	Not at all Effective	N
The Department of Conservation and Recreation revises the Virginia Floodplain Management Plan to address flooding due to sea level rise	30.3%	63.6%	6.1%	0%	33
Local governments devise sea level rise adaptation plans	26.5%	55.9%	14.7%	2.9%	34
The State Corporation Commission works with the insurance industry to determine the areas most vulnerable to losses related to sea level rise	24.2%	48.5%	24.2%	3.0%	33
The General Assembly requires local governments along Virginia's shoreline to develop sea level rise adaptation plans	23.5%	52.9%	20.6%	2.9%	34
State agencies facilitate public/private partnerships to implement sea level rise adaptation plans	23.5%	52.9%	20.6%	2.9%	34
Private sector owners of infrastructure develop sea level rise adaptation plans as a condition for approval of any required permits	18.2%	45.4%	33.3%	3.0%	33
The General Assembly funds municipal governments to address sea level rise adaptation needs	15.6%	37.5%	40.6%	6.3%	32
The General Assembly directs funds to scientific and technological institutions that monitor and report flooding and sea level rise changes	14.7%	52.9%	29.4%	2.9%	34
The Secretary of Transportation insures that sea level rise is included in all transportation planning	12.1%	57.6%	27.3%	3.0%	33
The development of a state adaptation strategy regarding flooding due to sea level rise	11.8%	76.5%	11.8%	0%	34

Conclusion and Implications

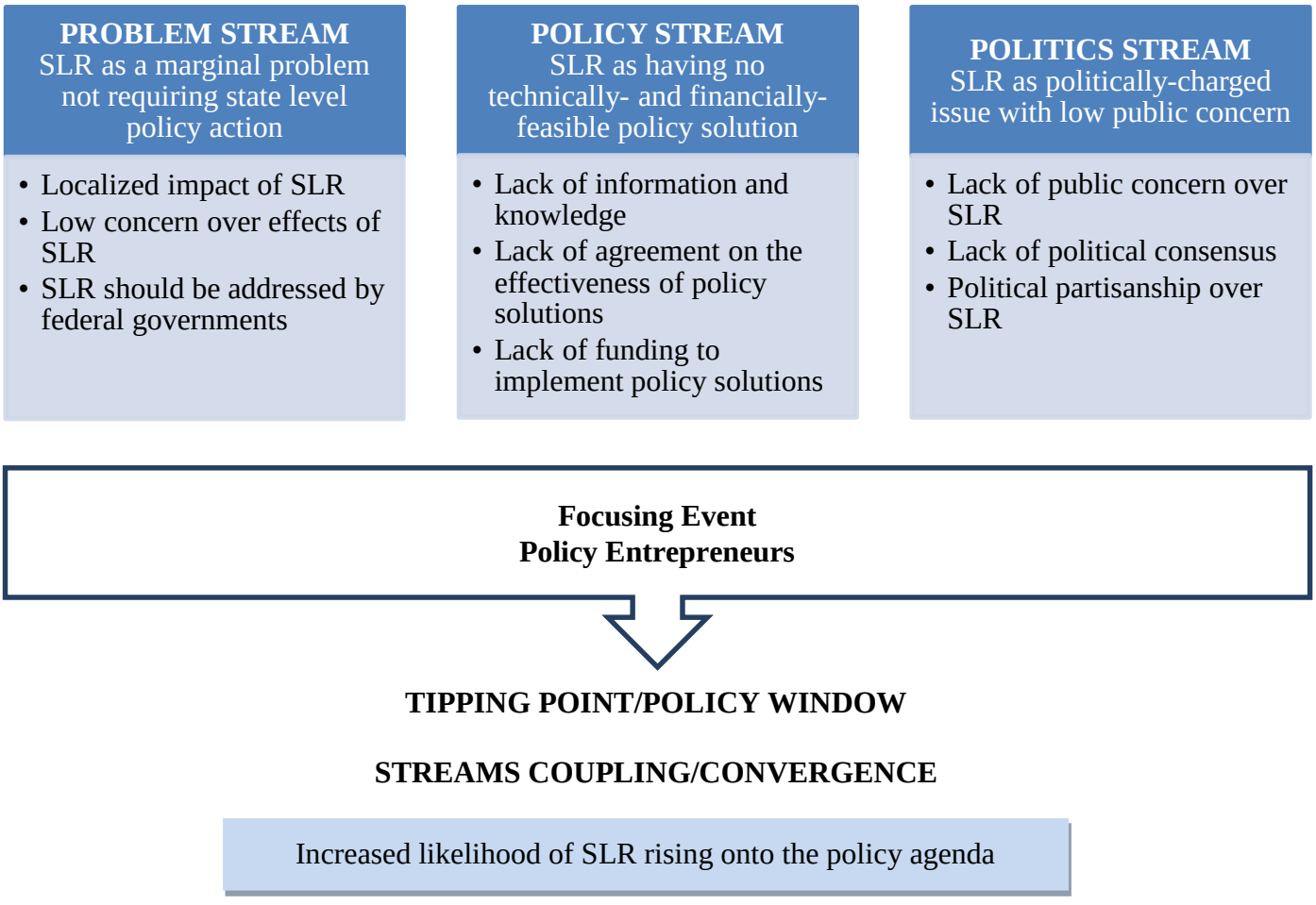
As Biesbroek et al. (2009) pointed out, climate change policy does not take place in a vacuum, and is affected by established norms, old and new policy, and the goals of political actors. Additionally, Kingdon (1995, p.123) argued that people often get attached to a certain policy proposal to the extent that, rather than focusing on solving problems, they "become advocates for solutions and look for current problems to attach to their pet solution." These factors, combined with the continued uncertainty surrounding SLR and its potential impacts, contribute to making SLR a challenging policy issue (Biesbroek, et al., 2009; Brody, et al., 2010). Furthermore, the absence of coercive policies measures and formal regulations to facilitate action further exacerbates policy inaction (Biesbroek et al., 2009). Other barriers include the impact of established land use patterns, existing laws and regulation, community values, and government contracts and relationships with developers (Moser et al., 2008).

Our examination of SLR policy through the multiple streams framework is summarized in Figure 1. For the problem stream, the challenge for SLR as a policy issue in Virginia is that it is perceived as a problem at the margin that does not require state-level policy action. The low salience of SLR as a state-wide problem is largely due to (1) the localized impacts of SLR that make it a problem that affects coastal regions of the state more so than non-coastal regions; and (2) the general lack of strong agreement among legislators that SLR poses adverse effects for the state. When coupled with preferences for the federal government to assume SLR policy leadership, assessment of the problem stream suggests that the problem of SLR as a state-level policy concern is unlikely to receive sufficient attention to raise it onto the policy agenda.

The policy stream is characterized as lacking technically and financially feasible policy solutions. This arises out of perceptions that there is lack of scientific information and

knowledge of SLR, in addition to a lack of funding to address the problem. Furthermore, there is general absence of agreement among legislators regarding the effectiveness of possible policy solutions. Within the politics stream, issue attention to SLR is challenged by the low level of public concern over SLR and lack of political consensus on the importance of SLR and on the need to take action to address it. This is further complicated by the politically-charged nature of the issue; the resulting political partisanship over SLR as a policy issue has made achieving political consensus problematic.

Figure 1. Analysis of Sea Level Rise Policy through the Multiple Streams Framework



Our findings indicate that there appears to be at least a two-foldsconcern: 1) difficulties withSLR being identified as a problem and 2) a lack of consensus that some policy solutions have the potential to be effective at addressing SLR. These findings are congruent with thismultiple streams framework precept: a lack of strong perceptions and/or concerns about an issue (in this case, SLR) translates into the absence of a tipping point for policy action. The above analysis points to how SLR policy inertia is a result of fractious viewpoints on the matter, mixed with perceived gaps in solutions and conflicting perspectives of the role of the state concerning SLR. These points of friction may come in to fuller view as extreme events (e.g. major floods or large storms) raise awareness of the very real threats from SLR (Næss et al, 2005; Penning-Rowsell et al, 2006; Zahran et al, 2005), or as policy entrepreneurs become visible and influential within the national or state landscape. Such developments are conducive to stakeholders becoming more concerned with how SLR will impact them, conveying to legislators that, at a minimum, the socioeconomic health of the state is at severe risk. For example,within the problem recognition stream, increasing difficulties in obtaining and affording insurance in flood-prone areas may force state lawmakers to pay more attention to SLR. In coastal areas of Virginia, homeowners have a difficult time getting flood insurance from private providers, and in some cases cannot get it at all. Additionally, as storms like Hurricane Sandy raise awareness about the realities of SLR, residents (both homeowners and businesses) who own coastal property may become concerned about the future value of their properties. In this way, the socioeconomic effects of SLR are primed to be placed within the problem recognition stream.

Within the policy stream, federal pressure and incentives, such as federal mandates or funds to address SLR issues, may be ways to gain state attention and to elevate possible policy

solutions. Federal leadership through the crafting of a national framework for addressing SLR may also be important for raising SLR onto the state policy agenda. For example, in June 2014, the U.S.'s Environmental Protection Agency announced it would take a more assertive stance in assisting states with adaptation strategies, to include providing technical resources, training and financial assistance, especially to areas immediately vulnerable to SLR (EPA, 2014).

Within the political stream, SLR remains a controversial topic in the U.S. because of its connection to climate change. However, given the nation's current political climate, removing the ideological debate from the practical issue of how to address climate change is a daunting task. What can likely precipitate a tipping point is continual focus on the risks and impacts of SLR and avoiding debates about its causes. This strategy may be limited in its effectiveness, however, because it allows only for a narrow treatment of the issue.

Our study focused on SLR policy inertia at the subnational, state level in the U.S. The themes associated with policy inaction that we have identified, such as a lack of political consensus, financial/budgetary constraints, difficulty marshaling solutions/technology, and low salience, are not unique to the state, sub-national policy milieu. As other studies show, these factors are relevant at all levels of government from local and regional to national and supranational levels. Our results are also consistent with studies of policy landscapes beyond the U.S., suggesting that this study can help in better understanding SLR and climate change policy in other countries.

To illustrate, Crabbe and Robin (2006) found financial constraints and lack of knowledge about adaptation policy solutions to limit possible climate responses by Canadian municipalities. The lack of a clear role for government, as evident in our finding that Virginia state legislators did not see a strong role for the state, is also consistent with existing research on local

governments in Norway (Amundsen et al, 2008). Our finding regarding the lack of political engagement among Virginia state legislators also mirrors that of Swedish local politicians (Hjerpe et al, 2014).

Our findings also point to the important interplay between different levels of government in responding to SLR. Legislators in Virginia perceived the problem of SLR to be one on which the federal government should lead policy action, which contributed to minimal state-level responses. Our analysis thus squarely plants SLR policy within a multilevel governance framework. This is consistent with other studies that point to the challenges associated with multilevel governance for developing effective policy responses to SLR.

For example, Hong Kong's efforts to address SLR have been hampered by multi-level governance issues related to resources, tasks, and power (Francesch-Huidobro 2012). Amundsen et al (2010) identified the interactions between national and local governments in Norway as the key barrier to climate adaptation. To address such barriers, Urwin and Jordan (2008) pointed to the need for climate policy at multiple levels, such as having the federal/national government prioritize climate policy focus areas and local governments implementing policy tailored to their unique needs. In the Ireland context, McGloughlin and Sweeney (2011) noted that climate policy is marked by lack of vertical integration across government levels, and concluded that higher-level governments may need to formalize the commitment to climate change and mandate implementation by local governments. Orderud and Kelman (2011) found that, in Norway, municipal governments believe they should have greater policy design roles, while the national government should address the costs. In a similar vein, Dannevig et al. (2013) concluded that "without a clearer national adaptation policy and greater resource allocation and legislation, adaptation to climate change within Norwegian municipalities is unlikely to progress further."

That our findings are, for the most part, consistent with those of other studies of sub-national climate change policies across a variety of geographic settings suggests that state-level SLR policy in the U.S. may not be significantly different or unique. Consistent with the findings of this study, experiences in other countries may offer additional insights into creating tipping points within the multiple frames that can allow governance systems to effectively approach the problem of SLR. At a minimum, this study finds that, to be able to reach that tipping point, a confluence of actors, options, and events are needed to establish a saliency for SLR that rises above fractious viewpoints.

End Notes

1. Virginia Senate Joint Resolution No. 76 requested a study of adaptation strategies to prevent recurrent flooding in the Tidewater and Eastern Shore localities (which are vulnerable to SLR). It was passed in February 2012.
2. While a response rate of 26% may raise non-response bias concerns, the adequate representation from coastal and non-coastal districts, and from both the House of Delegates and the Senate, suggests such bias may be minimal.

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