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Climate change and adaptive decision making: Responses from North Carolina coastal officials

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ABSTRACT

While climate change is a global phenomenon, adaptive action starts at the local level. Understanding how local decision makers make sense of climate change and the decision to adapt or not is imperative for advancing action on climate change. This article advances the scholarship on local decision making about adaptive action through a study of North Carolina (NC) coastal communities that face an assortment of threats from climate change. During March and April of 2014, 283 officials were surveyed across the 20 NC coastal counties to explore their willingness to take adaptive action (WTAA). The study utilized five risk scenarios to probe officials' knowledge about climate change, whether they perceived climate change as a threat to their community, and their political ideology. Findings indicated an officials' professed knowledge of climate change was not associated with WTAA. Officials who perceived climate change as a threat to their community were largely more WTAA. However, when the perceived threat was identified as uncertain, no significant relationships were identified. Findings for political ideology and WTAA indicated no significant differences under a low level of risk, yet under an average level of risk and an uncertain level of risk moderates were more WTAA than conservatives. Under higher than average and very high levels of risk moderates were more WTAA than both liberals and conservatives.

1. Introduction: local decision makers, adaptive action and climate change

Climate change is projected to increase the severity and frequency of coastal erosion, flooding, salt-water intrusion, sea-level rise, loss of infrastructure, as well as reduce tourism expenditures, compromise ecosystems, and create multiple adverse public health issues in coastal areas across the United States (IPCC, 2014; Riggs et al., 2008; Strauss et al., 2014). Adaptive action at the local level will be important to address the challenges that lie before all coastal areas. By its very definition, adaptive action is a process of planning, preparing, and adjusting for actual and anticipated impacts of climate change (IPCC, 2014) and is a critical intervention for officials across multiple scales to undertake. While researchers posit that climate change mitigation responses typically require a coordinated regional approach, those best situated to take adaptive action are local officials (Brody et al., 2010; Tang et al., 2011). However, little is known about local decision makers' perception of climate change and their appetite for adaptive action.

The literature at the intersection of local decision making, climate change and adaptation tends to focus on conceptual topics that relate the global to the local scale (Adger et al., 2005; Rauken et al., 2015). While the role of local public institutions is readily acknowledged as important (Agrawal, 2010; Urwin and Jordan, 2008), there is very little empirical work to facilitate understanding of local decision makers' action or inaction. According to Mozumder et al. (2011), a significant portion of climate change research tends to focus on the perception of the general public to climate change, but does not investigate local officials' risk perception of climate change or their adaptive decision making processes. Research on what localities can do to adapt to climate change is taking place (e.g. Roberts, 2008; Tribbia and Moser, 2008) and work in coastal communities is especially of interest (Dolan and Walker, 2006; Nilsson et al., 2012; Tribbia and Moser, 2008). Some limited empirical work exists on how decision makers perceive adaption options and risks (Harries and Penning-Roswell, 2011; Spanger-Siegfried et al., 2014). Preston et al. (2011) note that many municipal officials have a “limited appreciation of the wider

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governance context in which both climate change and its management will manifest" (p426). Barriers related to climate change facing coastal officials across the U.S. are many including: legal, regulatory, information, financial, institutional, as well as political and community will (Spanger-Siegfried et al., 2014).

While coastal communities like those in North Carolina (NC) have long been affected by tropical storms, hurricanes, tornados and other weather-related events, the long range future for coastal communities is of particular concern when coupled with climate change projections. Because there has been little to no peer-reviewed published research into the adaptive decision making of public officials, the willingness of those coastal officials to take adaptive action remains an open question. This study begins filling that gap in the literature. Given the precarious nature of the NC coast and the dearth of literature regarding adaptation along this area of the eastern seaboard, the aim of this study was to investigate how NC coastal officials differentiated between various risk scenarios in determining whether or not to take adaptive action on climate change. The conceptual model for this study investigates the willingness of NC coastal officials to take adaptive action regarding climate change by exploring 1) an officials' knowledge about climate change, 2) whether or not they perceive climate change as a threat to their community, and 3) their political ideology as decision levers associated with adaptive action.

1.1. Climate change and adaptation in North Carolina

Adapting to climate change, whether in NC or other states, is largely about addressing existing or emerging vulnerabilities, and there are many natural ecosystems and communities with substantially built environments along the NC coast that have such vulnerabilities (Nicholas Institute for Environmental Policy Solutions, 2010; Wootten et al., 2014). In fact, northern parts of the NC coast and the Outer Banks in particular are already experiencing sea level rise at a rate higher than the global average (Spanger-Siegfried et al., 2014). Climate change is a politically contentious issue in NC. A report by the NC Coastal Resources Commission's Science Panel on Coastal Hazards suggested that NC officials adopt 1 m (39 inches) of sea level rise as the official projection for the coast of NC (2010). That government report generated considerable backlash within certain segments of NC. Two years later, the state passed a moratorium on any new sea level rise policies and disbanded the Science Panel from 2010. In 2012, a new panel was formed and instructed to look no more than 30 years into the future when making sea level rise projections. In early 2015 that second Science Panel released their final report (NC Coastal Resources Commission Science Panel, 2015). Even after incorporating the reduced time horizon that the Science Panel was instructed to use, the 2015 report reiterated that NC could expect at least 2 inches of sea level rise along the southern coastline and 6 inches of sea level rise along northern stretches of the coast (NC Coastal Resources Commission Science Panel, 2015; Shutak, 2014).

There is considerable consensus among researchers and institutions studying climate change that adaptive action is a sound strategy to minimize the impacts of climate change (Smith, 2011; National Climate Assessment, 2014). Operating in a politicized environment can make it challenging for those interested in implementing change. A report from the Nicholas Institute for Environmental Policy Solutions (2010) found that some elected officials and public managers in eastern NC disputed the concept of climate change and were not convinced that climate change-induced sea level rise threatened their communities. That sentiment ran counter to what Wootten et al. (2014) found. Their research noted that although the scale and extent of the effects of climate change were uncertain, the likelihood of their occurrence was quite high, and complex planning was required (2014). Scholars agree that integrative planning is necessary to manage the multitude of challenges facing coastal communities including assessing infrastructure readiness, protecting drinking water supplies, securing wastewater treatment operations, managing flooding and water management issues, protecting estuarine and ecosystem health, planning for future economic development, as well as protecting public health (Barton, 2013; Fussel, 2007; Jabareen, 2013; Smith, 2011). So while it appears that there are many pressing reasons for coastal officials to be concerned about climate change and the need to take adaptive action, an open question remains about their perceptions of these risks and under what scenarios or conditions they would take action.

2. Theory and concept (knowledge, threats, ideology)

Knowledge, perceptions of threat, and ideology make powerful framing structures that can confine and define problems and policies related to climate change. Framing is important in environmental issues, including climate change, because the frame can create impetus for action or inaction (Dunlap and Brulle, 2015). Peters (2005) notes how problem framing is directly linked to policy design, outputs, and implementation protocols, and therefore is capable of facilitating and improving adaptive decision-making. Within the context of this study, knowledge, perception and ideology are identified as frames that could influence the adaptive action of NC officials.

2.1. Theory and concept: knowledge

Often researchers concentrate on how information, awareness, or knowledge about climate change act as drivers of adaptive action. While Mozumder et al. (2011) research on communities in the Florida Keys discovered awareness and serious concern among local decision makers about climate change, they found a lack of institutional direction, funding, education and leadership in how to address climate challenges. Kellstedt et al. (2008) explored the position that officials who are more aware of climate change might be more likely to express concern and be motivated to take adaptive action. However, findings from their study indicated that a higher level of knowledge or better information did not correspond with greater concern regarding climate change impacts. Furthermore, their study provided evidence undermining the knowledge-deficit model, which suggested better alignment with expert opinion would occur by improving or increasing the information that the general public received. Hansen et al. (2003) found similarly weak support for models linking enhanced knowledge and risk-based decision making in their study regarding food safety. Although the knowledge-deficit model commonly situates public officials and technical experts as the knowledgeable group and the general public as those with the deficit, our study modifies the model to position technical experts as those with the knowledge and officials as those with deficient knowledge.

Taken together these studies create doubt about whether simply providing coastal officials with more or better information about climate change will necessarily lead to adaptive action. This research investigates whether knowledge and information are important links working together to form the foundation of adaptive decision making to address climate change, but there is reason for skepticism: the literature is inconclusive. The following research hypothesis will be confirmed or refuted:

H1. There is a direct relationship between an official's perceived knowledge about climate change and their willingness to take adaptive action.