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Examining legal and regulatory barriers to climate change adaptation in the coastal zone of the United States

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Abstract: This paper presents an analysis of key legal and regulatory instruments in the United States that impact climate adaptation planning. The analysis is framed within a social-institutional context, meaning the legal-regulatory environment is viewed from the perspective of the practices and norms that are created through existing laws and policies. Those norms and practices are then compared to current best practices for coastal climate adaptation to determine if and where divergence between recommended best practices and existing policy structures occurs. The results of this analysis suggest key policy instruments cumulatively act as barriers to adopting climate change assessment recommendations in coastal regions. The main causes for this disconnect between information and action seem to be historical path dependence, clear counter-incentives favoring coastal development, and multiple narratives of climate change, all of which diminish a unified public demand for coastal adaptation. Enumerated lessons presented from this analysis can be used as conceptual starting points when thinking about translating assessments of climate change into public action. In particular, the social-institutional framework provides an analytical construct for gaining insight into how existing



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PUBLIC INTEREST STATEMENT

Fundamental to sound policy development is the review of existing policies to determine how they might impact new policy directions. This paper examines two longstanding national policies in the US under a social-institutional analysis framework to examine how those policies will impact coastal climate change adaptation. The results suggest that these policies aid in the existing discounting of coastal hazard risk currently being observed in US coastlines. People in the US are moving to the coastlines in greater numbers, leading to higher coastal population densities. This, in-turn, is leading to increased coastal development in areas at heightened risk of coastal flooding. The findings in this analysis reinforce the importance of existing policies, particularly how those policies might influence new policy directions. A clear implication is that we must consider how existing policies, intended or otherwise, will influence the development of coastal climate change adaptation policies.

legal and regulatory instruments influence adoption of proposed adaptation strategies, including highlighting when divergence between existing and proposed policies occurs.

Subjects: Law; Development Studies; Environment; Social Work; Urban Studies; Built Environment

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1. Introduction

The continuing scientific study of climate change shows clear threats to many coastal regions of the world (Intergovernmental Panel on Climate Change, 2014). In the United States, for example, national assessments have shown many of its coastlines are under threat from climate-induced sea-level rise (U.S. Global Change Research Program, 2014). The implications of these assessments are clear: climate change requires significant adaptation measures along coastal regions. And this is particularly true in the US, where census data indicates a growing majority of the population lives within coastal regions (National Oceanic and Atmospheric Administration, 2013). Further, this preference for coastal living is coupled with measured rates of relative sea-level rise that, for example along the Atlantic coastline of the US, are some of the highest rates observed globally (National Research Council, 2014). As a result, the need for adaptation planning along coastal regions of the US in light of emerging climate change science is clear.

But observed sea-level rise, increased storm frequency and intensity, and overall increasing rates of coastal erosion along the US has not seemed to engender behavioral changes regarding, for example, the preference for coastal development. As shown through demographic trends, a disproportionate percentage of the national population prefers coastal living. And, increasingly, that preference has coincided with measured increases in both population numbers and capital expenditures in flood-prone areas (Kousky, 2010; Kunreuther & Michel-Kerjan, 2007). This is true even as losses from coastal storms are increasing nationally (CRS, 2013). Other research provides numerous examples of climate-related disasters in the US over the past several decades, noting the impacts of these storms financially (CRS, 2011). Meanwhile, Elliott and Clement (2017) has correlated historical natural hazard damages to actual development, showing how coastal area development tends to increase after a disaster and, for in-demand regions, remains at an increased development level compared to rates of development prior to the disaster. In sum, the data and existing research clearly suggests that people are, actively or passively, discounting the existing and emerging risks of living along the coast.

In order to understand why this discounting of coastal dangers may be occurring, this paper reviews specific US legal and regulatory policies that have potential to influence how individuals and groups respond to risk. Two national programmatic policies are reviewed for the purposes of this analysis. One deals with insuring against flood risk and providing compensation when coastal disasters occur. The other deals with coastal fortification. These policies have impacts that flow from the national to the local level. They influence decisions and actions from the largest to the smallest scales of government. As such, they represent important policies that influence social constructs, both nationally and locally, developed around coastal living. These constructs, in-turn, influence public receptiveness to coastal adaptation strategies.

A key component of this analysis focuses on the social constructs that evolve from historical and existing legal-regulatory mechanisms. Under a social-institutional theory approach, the two national programmatic policies identified are analyzed to decipher the impact they have on coastal adaptation planning called for in the best science and policy prescriptions related to climate change. Key questions explored include the following: do these policies engender an

adoption or discounting of the risks posed by climate change in coastal regions? And, do these policies favor best practices regarding sea-level rise adaptation planning along the coastline?

The results suggest these two national policies create a clear discounting of risk that incentivizes development in sensitive coastal regions. Moreover, in large part due to discounting of risks, development in many coastal areas does not conform to best practices for coastal adaptation planning. Essentially, the current legal and regulatory environment has created a set of norms and practices that discount practical coastal adaptation planning. The proximate causes for this disconnect between coastal adaptation recommendations and actual practices along many coastal regions of the United States include the following three influences: a historical path-dependence, clear counter-incentives favoring coastal development, and a problem of multiple narratives of climate change frustrating a clear message to counterbalance the social-institutional narrative created by the existing legal-regulatory paradigm.

This paper is organized in the following manner. It begins by outlining the social-institutional context employed as an analytical framework to understand how historical and existing public policy can influence public perceptions. This is followed by a summary of the two national programmatic policies used to analyze a social-institutional construct for coastal climate adaptation in the US. Then, an analysis of these policies in light of coastal climate adaptation best practices is provided. The paper concludes by highlighting general proposals to overcome these legal and regulatory barriers to climate change adaptation, including specific reforms of existing laws and policies discussed. Recommendations include generalizing the lessons learned to a larger audience outside of the specific US context provided.

2. A social-institutional framework for analyzing barriers to climate change adaptation

Social-institutional theory seeks to understand the human dynamics involved in the creation, development, and maintenance of institutions. This includes looking at human behavioral aspects that help define and support institutions, and also the historical context in which institutions are created, particularly the historical process through which human beings align conduct and interactions around an institutional context (Selznick, Nonet, & Vollmer, 1969). From this perspective, institutions are the sum of the values, beliefs, and norms that coalesce around a generally accepted set of ideas and practices. Over time, these ideas and practices are refined in a normative context. What begins as a set of accepted practices of how things *are* done can evolve to the point of practices that defined how things *should* be done. This normative evolution creates a kind of hardening of the institutional practices into norms (Berman, 2000). For example, marriage can be defined as a set of practices. Expectations of marriage are met if these practices are achieved. But over time, the institution of marriage can become more normative, where the practices are no longer seen from a merely behavioral standpoint, but are now seen as a set of principles that must be upheld. In this way the institution of marriage evolves. Those who see it in a normative way will uphold the principles of marriage, which creates a set of expectations that go beyond the mere practice of actions that can be defined as marriage.

This social-institutional context is important because it requires us to look beyond the veneer of institutional practices to understand just how deeply those practices are held by supporters of the institution. By understanding how deeply institutional practices are held, one can better assess how amenable the institution is toward change. From a policy perspective, a proposed change that affects a foundational belief of the institution will likely receive much more resistance than a proposed change that affects a more ancillary practice of the institution. Consider the marriage example just mentioned. There are many practices associated with the ceremony of marriage. A proposed modification to a ceremonial practice, for example wedding vows, may be easily accepted in the community of supporters of the institution. Contrast this with the institutionalization of the traditional “meaning” of marriage as being reserved for only a “man” and “woman.” This practice has seemed to become “codified” at some point. For some who support the

institution of marriage, it is an underlying tenet of the institution that marriage exists only between a man and woman.

Climate change represents new information about our natural world, particularly regarding institutions that have developed around coastal zones. When the term “adaptation” is added to coastal zone management, it implies changes to existing ways of behaving in coastal areas. As such, a social-institutional analysis of key coastal policies can be useful in identifying the kinds of practices and beliefs that have developed. By engaging in such an analysis, one can determine the kinds of practices and beliefs that have become “institutionalized;” those that help define the institution of coastal management for a nation, region, or local coastal area. In addition, such an analysis can help decipher between aspects of coastal management that are more practice than principle. Further, by deciphering between practices and principles, a deeper understanding of the impacts of historical and current policies toward coastal management can be made. As noted by Hoffman (2015), institutions are both social and socially constructed, consisting of both patterns of activity and symbolic systems that categorize the patterns of activity into something greater that has shared meaning. Dissecting coastal management policies and practices—the patterns of activity—from the more symbolic systems surrounding coastal living is critical when attempting to identify and understand systemic barriers to climate change adaptation.

3. Key national coastal climate change policies in the united states

There are two programmatic national policies in the United States that significantly influence coastal climate change adaptation strategies. One deals with insuring against flood risk and providing compensation when coastal disasters occur. The other deals with coastal fortification, establishing clear choice preferences when protecting against effects of climate change at the coastline. An examination of these two policies from a social-institutional context can provide insights into the form and dynamics of the “institution” of coastal zone management.

3.1. Insuring and compensating against coastal damage

The first programmatic national policy deals with insuring against flood risk and providing compensation when coastal damage occurs due to natural disaster. The two major federal policies in the United States that compromise this programmatic approach to risk of damage along coastlines are the National Flood Insurance Program (NFIP) and federal disaster assistance. Both programs derive from laws and regulatory frameworks at the national level. As Knowles and Kunreuther (2014) point out, while federal disaster relief has existed in the United States since its beginnings as a nation, national flood insurance began much later in response to escalating federal costs borne by greater financial damage via increasingly intense coastal storm events. These two national policies have helped to shape the social-institutional context of coastal management by influencing the expectations of those who live along the coast. The underlying principles of institutional development from these two policies are observed through a historical examination of their co-evolution.

Modern coastal flood insurance in the United States was borne of both political and financial necessity. Prior to 1968, the main mechanism for dealing with flood damage was federal disaster relief, a process where the federal government declares an area a disaster and provides financial and other relief assistance to the affected area and citizens (Knowles & Kunreuther, 2014). Federal disaster relief itself has a history connected to cold war disaster planning in the US, which has evolved from preparing for human-induced disasters (nuclear war for example) to preparing for natural disasters (Dauber, 2013). Noting how federal disaster relief creates a potential for moral hazard by incentivizing coastal development and living in flood prone areas, the US government adopted a public model of national flood insurance to begin sharing flood risks with flood-prone communities. Communities most likely to flood would pay the highest premiums, while less flood-prone communities would pay lower premiums (Anderson, 1974). Moral hazard would be diminished through a mix of risk shifting behavior through

insurance adoption requirements, as well as penalties for non-compliance including the loss of federal disaster assistance eligibility (CRS, 2013).

These original goals for coastal flood insurance and disaster relief policy have never been fully implemented for the following reasons. The program began as a completely voluntary measure (Kunreuther, Ginsberg, & Miller et al., 1978). Most communities and individuals decided against purchasing flood insurance under voluntary circumstances, providing some evidence previous policy had reinforced the conditions of moral hazard. Voluntary adoption of insurance was seen as an inferior option to the expectation of federal disaster relief in the event of a natural disaster (Michel-Kerjan, 2010). The low voluntary adoption rates for insurance led to incremental changes. First the system moved from an entirely voluntary option to a mandatory requirement for certain flood-prone communities. Failure to adopt mandatory flood insurance included the risk of losing federal disaster relief assistance (Knowles & Kunreuther, 2014). But subsidies for insurance premiums remained, even though adoptions of flood insurance have increased substantially, standing at 5.5 million policies providing US\$1.28 trillion in property coverage as of December 2012 (Kunreuther, Michel-Kerjan, & Pauly, 2013). Effectively all of these policies contained below market premiums heavily subsidized by the federal government (Property Casualty Insurers Association of America, 2011).

By 2012, the NFIP faced a substantial deficit brought on by costs associated with flood damage that far exceeded the program's reserves: the federal government had to increase the borrowing authority of the NFIP several times, from US\$1.5 billion in 2005 to, ultimately, US\$30 billion (American Academy of Actuaries, 2011; Congressional Research Service, 2013). The federal government acted in 2012 by passing the Biggert-Waters Flood Insurance Reform Act. This law attempted to remove many of the subsidies inherent in the NFIP. Revisions included a recalculation of flood zones based on updated information, and a phasing out of premium subsidies for second homes, businesses, and properties suffering repetitive losses (United States Government Accountability Office, 2013). All of these proposed changes mirrored initial recommendations for the national flood insurance program from the 1950s and 1960s (Grossman, 1958; Michel-Kerjan, 2010; Platt, 1999). Unfortunately, 50-plus years of highly subsidized and rarely enforced coastal flood insurance policies institutionalized the expectations of the affected population such that special interests converged to push back the implementation of Biggert-Waters. In early 2014 the Menendez-Grimm Homeowner Insurance Affordability Act was passed, rolling back the key provisions of Biggert-Waters including a key amendment, subsidy removal to better reflect actual risks of coastal living (Knowles & Kunreuther, 2014).

3.2. Coastal fortification

Nationally, coastal fortification is primarily controlled in the United States under the Federal Clean Water Act. Of its many protections, the Clean Water Act controls development in coastal waters through a mandatory permitting process (Clean Water Act, 2012). But there is an important exception that has been developed by the US Army Corps of Engineers, the government entity responsible for permitting in these instances. The exception is known as Nationwide Permit 13, and it excludes from permitting requirements the private hard armoring of coastlines (Army Corps of Engineers, 2012). Hard armoring in this context refers to the creation of seawalls made from concrete, stone, and other relatively permanent structures. Critically, the waiver of permitting requirements under Nationwide Permit 13 does not apply to any other type of coastal erosion and sea-level rise mitigation measure. For example, the waiver does not apply to soft armoring techniques, which mimics the natural shoreline in its use of materials and its contours, providing a short to mid-term protection against coastal erosion and sea-level rise (NRC, 2007).

Nationwide Permit 13 has been in existence since the 1970s. It establishes a clear preference for hard armoring over less permanent coastal protection techniques. If one wishes to build a seawall under the conditions of Nationwide Permit 13, then there is no government process that needs to be followed. No notice needs to be given, no environmental analysis required, no public review of

the proposed impacts, and no fees associated with permitting. But any other kind of protection proposed, like soft armoring, does require notice, environmental analysis, the opportunity for public review, and fee payment. Under these conditions, hard armoring becomes the clearly preferred choice for coastal protection (Biber & Ruhl, 2014; NRC, 2007).

The preference for hard armoring under Nationwide Permit 13 is unclear. The Army Corps of Engineers has only noted that it believes the individual and cumulative impacts associated with small private armoring project are minimal, without justifying this conclusion with any meaningful evidence (ACOE, 2012). But the evidence for individual and accumulated impacts of hard armoring since the 1970s is actually significant. For example, it has been clearly shown that hard armoring exacerbates coastal erosion in both the immediate vicinity of the seawall and even more so at the periphery of the wall due to redirected wave energy (CRS, 2016). It also starves coastal replenishment zones, such as dunes and bluffs, from mitigating the impacts of coastal erosion (United States Geological Survey, 2010). And, it has been shown that hard structures reduce the amount of coastal habitat and prevent the movement of coastal wetlands and associate flora and fauna inland (Titus et al., 2009). And while there is currently no comprehensive national census of hard armoring in the US, primarily because permitting is not federally mandated for many projects, efforts by coastal states have shown its impact. For example, in a recent study for Massachusetts, approximately 300 of the 1,100 miles, 27%, of the Commonwealth's coastline is hard armored (Massachusetts Office of Coastal Zone Management, 2013).

4. Analysis

Best practices for coastal climate change adaptation espouse a general framework that includes the following considerations. First, in an era of climate change, the risks to coastlines must be fully understood and appreciated. Second, understanding that for many coastlines adaptation planning will need to include loss of coastal land due to sea-level rise and erosion, management practices need to be deployed that ensure the ability of coastal features to migrate inland (McGuire, 2013). This second point incorporates a deeper understanding of the benefits of coastlines to include not only direct economic benefits, but also the more indirect economic benefits including ecological integrity and similar considerations (Titus et al., 2009). In sum, establishing and maintaining a buffer between a retreating coastline and the built environment ensures the safety of humans and the integrity of the coastline.

These best practices for coastal climate adaptation can be assessed within a social-institutional context based on the key national coastal climate change policies described earlier in this paper: insuring-compensating against coastal damage and coastal fortification. A framework for analyzing these programmatic policies within a social-institutional context can be stated from the following question: What impact do these identified US national policies have on the existing institution of coastal management, and how does climate change adaptation, as a concept, impact the existing institutional construct of coastal management derived from the national policies explored?

First, it is clear the legal-regulatory environment created by subsidized coastal flood insurance, disaster relief, and a national incentive for hard armoring has created institutional practices and norms that discount the effects of climate change, thereby discounting coastal adaptation strategies emanating from the effects of climate change. Recall that social-institutional theory requires not only an understanding of institutional practices themselves, but also an understanding of just how deeply those practices are held by supporters of the institution. In other words, one must look at how existing federal policy has created the coastal environment in its current form, which in-turn will help one understand not only the practices, but more importantly the beliefs of those who live under the explicit and implicit assumptions built into the current legal-regulatory environment.

The key policy instruments described in this paper have collectively acted as barriers to adaptation strategies based on climate change in the following ways. A historical path dependence has

been created that discounts the risk of coastal hazards, and this discounting of risk has become embedded in the mindset of those inhabiting the coast. As a result, new information about increased coastal risks contradicts this low perception of risk. In addition, the existing legal-regulatory environment has created clear counter-incentives for adapting to climate change in the coastal zone. While best practices in adaptation call for land use planning that limits development along the coastline and allows for the migration of coastal zones landward, existing laws and policies favor continued development and barriers that prevent coastal migration. Finally, multiple narratives of climate change create confusion among the regulated public. Competing narratives dilute a climate change message to counter existing practices and beliefs surrounding coastal living. Without a clear, singular message regarding climate change, the public is left to fall back on existing belief structures, reinforcing the existing institution of coastal management that runs counter to a climate change narrative.

There is ample evidence being uncovered on the effects of subsidized national flood insurance and federal disaster relief policy. Ultimately, the main problem is that the programs, individually and combined, lower perception of risk related to coastal living. Programmatic reviews of these two programs have made compelling arguments for this proposition (McGuire, 2015). But specific studies on behavioral aspects of the NFIP and federal disaster relief programs provides clear evidence of risk discounting. For example, recent studies on how long policyholders keep flood insurance policies indicate a median tenure of flood insurance between two and four years, while an average length of time in residence of seven years (Michel-Kerjan, Lemoyne De Forges, & Kunreuther, 2012). Also, even when required to have flood insurance under federal law, only half of those surveyed actually maintained insurance (Kriesel & Landry, 2004). The strongest correlation showed that if homeowners were not actively monitored to maintain *required* flood insurance, at least half of them did not do so. The uncertainty of a loss event occurring, coupled with the low flood premiums, seems to reinforce a belief that the risk of coastal loss is lower than the actual risk, even when presented with accurate information regarding the risk of loss.

If coastal adaptation is about accommodating the effects of climate change, in particular more intense coastal storms and increased erosion exacerbated by sea-level rise, then the current state of coastal development policy in the US is running counter to this reasonable definition of accommodation. Beyond the population demographics showing a clear preference for living along the coastline, current legal and regulatory instruments are paving a path for coastal development in spite of climate change. One of the key policies creating this path is Nationwide Permit 13, which as discussed earlier incentivizes hard armoring over other coastal protection options. The permit allows a coastal property owner to construct a bulkhead or seawall up to 500 feet in length without having to provide any notification or seek any permit from the federal government (ACOE, 2012). And because many coastal states in the US also provide for expedited permitting for this kind of armoring, property owners can build seawalls in sensitive coastal wetlands of US national waters with little to no limitation. Thus, the exemptions created under Nationwide Permit 13 provide strong counter incentives for coastal adaptation strategies, like allowing the coastline to migrate inland, that accommodate the effects of climate change.

Compounding the effects of risk discounting and incentivized coastal armoring is the competing narratives surrounding the nascent “institution” of climate change. Recent work has been done to decipher the multiple narratives that are competing for attention when it comes to defining a policy response to climate change. Narratives are important because, as noted by the US Global Change Research Program, “[c]limate changes interact with other environmental and societal factors in ways that can either moderate or intensify these impacts” (USGCRP, 2014, p. 10). These narratives provide a foundation for understanding both how the public comes to understand change, and also how that understanding is formed.

In the context of climate change, a new narrative is being developed that is based on changes to background environmental conditions. In many ways, to accept climate change is to accept a new narrative about change generally, and about how parts of the earth functions specifically. And this is not only true for the public at-large, but the narrative dynamic also has relevance for public institutions. As Melinda Harm Benson has observed in the context of environmental management, “How we think about environmental management challenges is important. It matters because our characterization of these challenges dictates both how we perceive them and then, correspondingly, how we integrate these perceptions into our legal and institutional frameworks” (Benson, 2015, p. 100). So the narrative of climate change is not only important in how it impacts the public’s perception of climate change, but it also matters in whether and how our government incorporates that narrative into its legal and institutional frameworks.

According to Craig (2016), there are currently at least four identified narratives of climate change competing for attention in the US public sphere as follows:

- (1) It’s not happening
- (2) It’s happening, but it’s not related to human activity
- (3) It’s happening but technology will save us
- (4) It’s happening and all is lost—prepare for the apocalypse

These narratives are closely correlated with recent polling by Roser-Renouf, Maibach, Leiserowitz, and Rosenthal (2016) of the US population that attempts to derive public belief, concern, and motivation regarding global warming, which as of 2016 breaks down as follows:

- (1) Alarmed: 17%
- (2) Concerned: 28%
- (3) Cautious: 27%
- (4) Disengaged: 7%
- (5) Doubtful: 11%
- (6) Dismissive: 10%

The evidence currently available suggests that the US public has yet to settle on a single narrative regarding climate change. And without a clear narrative to coalesce public opinion, it will be difficult to overcome the historical path dependence and the counter incentives contained in the existing federal laws and regulations discussed in this paper. Indeed, in many ways, the current legal and regulatory policies outlined will influence the choice of narrative, for example, the ubiquitous existence of hard armoring along the shoreline will aid in choosing a narrative about climate change that corresponds to armoring as a viable solution.

5. Conclusion

Laws and regulations are created and evolve within a policy context that is dynamic and subject to multiple influences over time (Jones & Baumgartner, 2005). The examples of national flood insurance, disaster relief, and permitting exemptions for hard armoring provided in this paper show how a collection of laws and regulations can combine to create a policy environment that is inhospitable to coastal climate change adaptation strategies. Each of these policies have their own history and rationales outside of a climate change context. Most exist in a responsive setting, where policy has been created to deal with an acute issue presented. Disaster relief developed under the umbrella of US federalism, where the federal government could aid state governments under duress due to natural disasters. National flood insurance emerged in response to the conditions created by federal disaster assistance. Coastal development flourished in an era where the risks of development could be shifted to the federal government. Without private insurers willing to step into the void, the federal

government developed a plan to incrementally begin shifting the risks of coastal development back onto the states through insurance requirements. Finally, Nationwide Permit 13 emerged from a management decision by a federal government agency, the Army Corps of Engineers, that was intended to defray administrative burdens on the agency, but ended up resulting in creating a preference for hard armoring along the coastline when faced with sea-level rise and coastal erosion; the very kinds of threats posed by climate change.

When viewed as a whole, these legal and regulatory mechanisms create both literal and constructive barriers to coastal adaptation strategies in an era of climate change. Heavily subsidized coastal living engenders a sense of entitlement to live along the coastline. Indeed, when disasters strike, the political response carries a clear message of rebuilding; the concept of “resiliency” in this context becomes one of building bigger and stronger rather than accommodating the coastline for climate change (Adams-Schoen, 2016). And even when faced with options of how to be resilient along the coastline, entrenched policies like Nationwide Permit 13 place the thumb clearly on the scale toward choosing protection through hard armoring rather than accommodation through soft armoring or no armoring options like strategic retreat from the shoreline.

Constructive barriers follow from the reinforcement of existing policies and political responses to coastal harm that help to sway the public opinion toward a narrative of climate change that either dismisses it outright or suggests that human innovation will provide the answer to the problem (Craig, 2016). This construct does not readily match the kind of proactive thinking that often emerges from a deliberate consideration of coastal adaptation best practices in light of climate change. The key, then, is being able to see how existing legal and regulatory instruments can, individually and collectively, create and then reinforce a set of public expectations that run counter to coastal adaptation planning in an era of climate change. These policies can exist in any environment: they are certainly not unique to the United States. By seeing how existing policy structures influence the socio-political process, one can properly identify the barriers, whether literal or conceptual, to implementing meaningful coastal adaptation planning. The prognosis can then be crafted. For example, the inherent subsidies created in national flood insurance and disaster relief must be removed so the public can properly gauge coastal risk. And certainly Nationwide Permit 13 needs to be amended, if not fully repealed, to remove the bias it creates for hard armoring as a response to increasing coastal risks. Of course, even with a clear prescription in-hand, the process of moving from thought to action is difficult, particularly when dealing with entrenched policies. Getting the public to accept a clear narrative of climate change that is based on the actual risks posed would certainly be helpful. Thus, while this paper may not be able to establish an exact guide to fixing existing legal and regulatory barriers that run counter to climate change adaptation, it provides a framework for identifying these barriers and placing their impact into a larger context.

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References

- Adams-Schoen, S. (2016). Taming the super-wicked problem of waterfront hazard mitigation planning: The role of municipal communication strategies. In R. K. Craig & S. R. Miller (Eds.), *Contemporary issues in climate change law and policy: Essays inspired by the IPCC* (pp. 123–141). Washington DC: Environmental Law Institute.
- American Academy of Actuaries (AAA). (2011). The national flood insurance program: Past, present... and future? Retrieved from: https://www.actuary.org/pdf/casualty/AcademyFloodInsurance_Monograph_110715.pdf
- Anderson, D. R. (1974). The national flood insurance program: Problems and potential. *The Journal of Risk and Insurance*, 41(4), 579–599. doi:10.2307/251956
- Army Corps of Engineers (ACOE). (2012). Decision document nationwide permit 13. Retrieved from: http://www.usace.army.mil/Portals/2/docs/civilworks/nwp/2012/NWP_13_2012.pdf

- Benson, M. H. (2015). Reconceptualizing environmental challenges – Is resilience the new narrative? *Journal of Environmental & Sustainability Law*, 21(1), 100–126.
- Berman, P. S. (2000). Law, culture, and community. *Political and Legal Anthropology Review*, 23(2), 170–177. doi:10.1525/pol.2000.23.2.170
- Biber, E., & Ruhl, J. B. (2014). The permit power revisited: The theory and practice of regulatory permits in the administrative state. *Duke Law Journal*, 64(2), 133–234.
- Clean Water Act. (2012). 33 U.S.C. §§ (pp. 1251–1387).
- Congressional Research Service (CRS). (2011). National flood insurance program: Background, challenges, and financial status. Retrieved from: <https://fas.org/sgp/crs/misc/R40650.pdf>
- Congressional Research Service (CRS). (2013). The national flood insurance program: Status and remaining issues for congress. Retrieved from <https://fas.org/sgp/crs/misc/R42850.pdf>
- Congressional Research Service (CRS). (2016). Sea-level rise and U.S. coasts: Science and policy considerations. Retrieved from <https://fas.org/sgp/crs/misc/R44632.pdf>
- Craig, R. K. (2016). Learning to live with the trickster: Narrating climate change and the value of resilience thinking. *Pace Environmental Law Review*, 33(3), 351–396.
- Dauber, M. L. (2013). *The sympathetic state: Disaster relief and the origins of the American welfare state*. Chicago: Chicago University Press.
- Elliott, J. R., & Clement, M. T. (2017). Natural hazards and local development: The successive nature of landscape transformation in the United States. *Social Forces*, 96(2), 851–876. doi:10.1093/sf/sox054
- Grossman, D. (1958). Flood insurance: Can a feasible program be created? *Land Economics*, 34(4), 352–357. doi:10.2307/3144548
- Hoffman, A. J. (2015). *How culture shapes the climate change debate*. Stanford: Stanford University Press.
- Intergovernmental Panel on Climate Change (IPCC). (2014). Climate change 2014: Impacts, adaptation, and vulnerability. Retrieved from: <http://www.ipcc.ch/report/ar5/wg2/>
- Jones, B. D., & Baumgartner, F. R. (2005). *The politics of attention: How government prioritizes problems*. Chicago: Chicago University Press.
- Knowles, S. G., & Kunreuther, H. C. (2014). Troubled waters: The national flood insurance program in historical perspective. *The Journal of Policy History*, 26(3), 327–353. doi:10.1353/jph.2014.0017
- Kousky, C. (2010). Learning from extreme events: Risk perceptions after the flood. *Land Economics*, 86(3), 395–422. doi:10.3368/le.86.3.395
- Kriesel, W., & Landry, C. (2004). Participation in the national flood insurance program: An empirical analysis for coastal properties. *Journal of Risk and Insurance*, 71(3), 405–420. doi:10.1111/j.0022-4367.2004.00096.x
- Kunreuther, H. C., Ginsberg, R., Miller, L., Sagi, P., Slovic, P., Borkan, B., & Katz, N. (1978). *Disaster insurance protection: Public policy lessons*. New York: John Wiley & Sons.
- Kunreuther, H. C., & Michel-Kerjan, E. (2007). Climate change, insurability of large-scale disasters, and the emerging liability challenge. *University of Pennsylvania Law Review*, 155(6), 1795–1842.
- Kunreuther, H. C., Michel-Kerjan, E., & Pauly, M. (2013). Making America more resilient towards natural disasters: A call for action. *Environment: Science and Policy for Sustainable Development*, 54(4), 15–23. doi:10.1080/00139157.2013.803884
- Massachusetts Office of Coastal Zone Management (MA CZM). (2013). Mapping and analysis of privately-owned coastal structures along the Massachusetts shoreline. Retrieved from: www.mass.gov/eea/docs/czm/stormsmart/seawalls/private-coastal-structures-2013.pdf
- McGuire, C. J. (2013). *Adapting to sea level rise in the coastal zone: Law and policy considerations*. Boca Raton: CRC Press.
- McGuire, C. J. (2015). The role of risk perception in building sustainable policy instruments: A case study of public coastal flood insurance in the United States. *Interdisciplinary Environmental Review*, 16(2–4), 232–252. doi:10.1504/IER.2015.071013
- Michel-Kerjan, E. (2010). Catastrophe economics: The national flood insurance program. *Journal of Economic Perspectives*, 24(4), 165–186. doi:10.1257/jep.24.4.165
- Michel-Kerjan, E., Lemoine De Forges, S., & Kunreuther, H. (2012). Policy tenure under the U.S. National flood insurance program. *Risk Analysis*, 32(4), 644–658. doi:10.1111/j.1539-6924.2011.01671.x
- National Oceanic and Atmospheric Administration (NOAA). (2013). National coastal population report: Population trends from 1970 to 2020. Retrieved from: <https://aamboceanservice.blob.core.windows.net/oceanservice-prod/facts/coastal-population-report.pdf>
- National Research Council (NRC). (2007). Mitigating shore erosion along sheltered coasts. Retrieved from: <https://www.nap.edu/catalog/11764/mitigating-shore-erosion-along-sheltered-coasts>
- National Research Council (NRC). (2014). Reducing coastal risk on the east and gulf coasts. Retrieved from: <https://www.nap.edu/catalog/18811/reducing-coastal-risk-on-the-east-and-gulf-coasts>
- Platt, R. H. (1999). *Disasters and democracy: The politics of extreme natural events*. Washington DC: Island Press.
- Property Casualty Insurers Association of America (PCI). (2011). True market-risk rates for flood insurance. Retrieved from: <https://www.pciaa.net/pciwebsite/common/page/attachment/13821>
- Roser-Renouf, C., Maibach, E., Leiserowitz, A., & Rosenthal, S. (2016). *Global warming's six Americas and the election*. Yale Program on Climate Change Communication. Retrieved from <http://climatecommunication.yale.edu/publications/six-americas-2016-election/>.
- Selznick, P., Nonet, P., & Vollmer, H. M. (1969). *Law, society, and industrial justice*. New York: Russell Sage Foundation.
- Titus, J. G., Hudgens, D. E., Trescott, D. L., Craghan, M., Nuckols, W. H., Hershner, C. H., ... Wang, J. (2009). State and local governments plan for development of most land vulnerable to rising sea level along the US Atlantic coast. *Environmental Research Letters*, 4(4), 04408. doi:10.1088/1748-9326/4/4/044008
- U.S. Global Change Research Program (USGCRP). (2014). Climate change impacts in the United States: The third national assessment. Retrieved from: http://s3.amazonaws.com/nca2014/high/NCA3_Climate_Change_Impacts_in_the_United%20States_HighRes.pdf
- United States Geological Survey (USGS). (2010). Puget sound shorelines and the impacts of armoring – Proceedings of a state of the science workshop, May 2009. Retrieved from: <https://pubs.usgs.gov/sir/2010/5254/pdf/sir20105254.pdf>
- United States Government Accountability Office (GAO). (2013). Flood insurance: More information needed on subsidized properties. Retrieved from: <https://www.gao.gov/assets/660/655734.pdf>



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