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Climate-Induced Sea Level Rise and Sustainable Coastal Management: The Influence of Existing Policy Frameworks on Risk Perception

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Abstract

This article looks at the role of existing government policies on perceptions of risk and the impact they have on developing forward-looking sustainable policy instruments. Coastal flood insurance policy in the United States is examined as a way of exploring the relationship between policy instruments and risk perception. Insights include the importance of understanding the role of community risk perception in policy development, as well as the role of historical and existing policies in influencing community risk perception.

Introduction

The foundations of public planning are similar to sustainability goals in that both require contemplation of the future. Planning, fundamentally, attempts to discern the future and make decisions based on identified goals.¹ Sustainable planning, in-turn, requires that one perceive the future given current information and attempt to take actions today that prioritize certain factors, such as ecological integrity.²

Community risk perception is one of the main drivers of public planning decisions. As a simple example, if a community perceives a high degree of risk with future development of the area (i.e., the community is anti-development), then public planning will tend toward restrictive development. Conversely, if the community perceives a low risk associated with future development (i.e.,

the community is pro-development), then public planning will tend toward development. Indeed, community perceptions of risk have been shown to dominate government decision making, including decisions about planning for the future.³

Risk perception is a term that is meant to describe a perceived risk associated with a given activity. Risk perception does not necessarily describe an actual risk from an objective standpoint. Perceived risks can correlate with actual risks measured through objective means, but they can also show a noncorrelative relationship: for example staying constant with increases in actual risks, or even declining as actual risks increase.⁴ Identifying and observing the relationship between perceived and actual risks can be helpful when engaging in planning for the future. This is particularly true in the context of climate-induced

sea level rise. Assuming sea level rise is a newly encountered risk factor, its perception among coastal community stakeholders will impact future policy directions.

One important factor influencing community risk perception is the existing policy environment. Accepted long-standing policy initiatives can create a kind of path dependence, or habituation, for those impacted by the policy.⁵ One way to understand this is to consider public policies as a set of formal rules that, over time, help to create a background set of expectations influencing public perception. New policy initiatives that strongly deviate from prior and existing policy frameworks can impact individual and collective worldviews. This, in-turn, can make it difficult for new policy proposals to receive public support. Thus, when policy instruments attempt to implement

sustainability goals, and that implementation process includes a significant change to existing policy conditions, it may conflict with public acceptance.

This article examines the influence of risk perception on policy development by looking at the relationship between a current government policy in the United States, coastal flood insurance, and its impact on the public's perception of risk associated with climate-induced sea level rise. Planning for sustainable outcomes requires an awareness of how existing policies can influence public perception, and also how public perception itself can lead to risk assessments that may not necessarily correlate with the actual and foreseeable risks presented. By understanding the role of risk perception within existing policy frameworks, planners can better account for the likely levels of community acceptance (or rejection) of new policy proposals, particularly proposals that alter existing community expectations.

Foundations of Risk Perception

Numerous theories help to explain how public policy develops, operates, and changes over time.⁶ A major driving force of public policy development in democracies like the United States is public opinion, which itself is comprised of individual and community heuristics, which leads to forming worldviews.⁷ New information has the potential to alter individual and public worldviews, but there is no certainty of this occurring. New information can be fully or partially discounted and not internalized in value expressions of the voting public. Or new information can alter opinions, but the process may be slow, taking years or even decades to occur.

With public perception playing such a vital role in public policy development, it becomes imperative to understand how public opinion is established and changes over time. It is not only important to understand the dynamics of public opinion in general, but also to consider these dynamics under conditions presented by climate-induced sea

level rise: an incremental, long-term process catalyzed by diffuse causes and often requiring the development of forward-looking policy instruments. Importantly, the impact of new policy directions on existing community expectations must be identified and noted. The extent to which new policy proposals deviate from existing public expectations will influence the extent of public acceptance for the new proposal.

To better understand the relationship between public opinion and policy proposals within the context of risk perception, a simplified formula for the concept of risk is offered as follows: $\text{risk} = \text{hazard} + \text{outrage}$. This basic equation is meant to highlight two main categories of risk: *hazard* representing the actual objective factors of risk, and *outrage* representing the more subjective factors of risk.⁸ Risk perception focuses on the second, more subjective factor of risk: outrage. Outrage, in essence, measures the perception of risk in a community. It is not directly associated with objective risk factors, although it can correlate with and be influenced by objective factors. For example, something that has a high degree of objective risk (hazard) may nonetheless be perceived as a low risk because there is little community outrage presented. Alternatively, something that has a high degree of objective risk may be equally perceived as risky because the objective and subjective factors of risk are aligned. Jumping out of a flying plane without a parachute is hazardous and almost all people would perceive that activity as hazardous in rough proportion to the actual risks posed.

One illustrative example of the disassociation between objective and subjective factors of risk that have been studied is the proposed use of reclaimed water for residential activities. Although the objective risks—the hazards associated with reclaimed water—are low, the public often perceives them as high.⁹ While reclaimed water is safe for intended uses, outrage of individuals and groups over its use is based on a subjective assessment of risk. Alternatively, the relationship between objective and subjective risk assessment can work in the opposite direction. Many sporting

activities are inherently dangerous, but those who regularly engage in the activity often discount the actual risks presented. In this case the participants tend to underestimate the objective risks, whereas in the case of water reclamation, the affected public tends to inflate the objective risks.

The tendency to over or under assess objective risks has little to do with the underlying characteristics of the actual risks presented. The kind of risk measured for hazards is inherent in the object or activity. For example, radiation presents inherent dangers for humans. The extent of the hazard is conditioned on certain factors (intensity, exposure, etc.). These factors help us measure the degree of the objective risk, but the inherent dangerous characteristics of radiation is the basis upon which we understand its hazardous nature.

Outrage, or subjective perceptions of risk, is categorically different because the basis of the outrage is not dependent on an inherent characteristic of an object or activity. Thus, unlike hazard, which can be measured with some predictability, outrage is hard to measure in advance. Although perceptions of risk may be roughly equivalent to actual risk under certain conditions, it is just as likely that perceptions deviate from actual risk. While there are numerous factors influencing the interactions between actual and perceived risk, certain attributes of actual risk are more likely to allow for a deviation between actual and perceived risks,¹⁰ including that: 1.) the risk accumulates over time, 2.) the risk is hard to quantify, and 3.) there is a history of discounting the actual risk.

These three attributes collectively identify the conditions, triggering a greater likelihood for actual and perceived risks to diverge. Many risks associated with sustainability—climate change as one example—exemplify the kind of scenario in which these attributes dominate. Human-induced climate risks are cumulative, and the values of those who perceive the risk are hard to quantify because they are not readily reflected in market systems.¹¹ As a result, these values have historically been externalized and discounted. The result is that

for many climate-related issues, the perception of risk does not match evolving evidence of the actual risks.

Climate-induced sea level rise exemplifies a scenario in which the actual risks, both present and emerging, are likely to be discounted, allowing for a divergence between actual and perceived risk. Sea level rise is uncertain, occurring over a long period of time, and existing policies have favored coastal development by, in part, subsidizing hazards associated with coastal flooding. Once the first two attributes of sea level rise are identified, the uncertainty of its full extent and the fact that it occurs incrementally over time cannot easily be controlled through human actions so as to alter perceptions of risk. However, the third characteristic—existing public policies—can be altered through direct human intervention. This article now looks at coastal flood insurance policy in the United States and examines its influence on the public perception of risk.

Influence of Coastal Flood Insurance Policy on Risk Perception

Coastal flood insurance in the United States is essentially a government function aimed at pooling risks associated with coastal development. The federal government provides flood insurance through the National Flood Insurance Program (NFIP), which is administered through the Federal Emergency Management Agency (FEMA). Under this program, most properties located within nationally determined flood zones are required to carry flood insurance.¹²

Prior to the passage of the National Flood Insurance Act in 1968, which created the NFIP, there was no market for flood insurance. Federal lawmakers conducted a feasibility study for private flood insurance in the 1950s, but difficulties in establishing premiums based on risk probabilities made such a market unfeasible to private insurance companies.¹³ The federal government stepped in because it was already providing a de facto flood insurance through federal disaster relief assistance. Unwilling to underwrite the full risks of coastal liv-

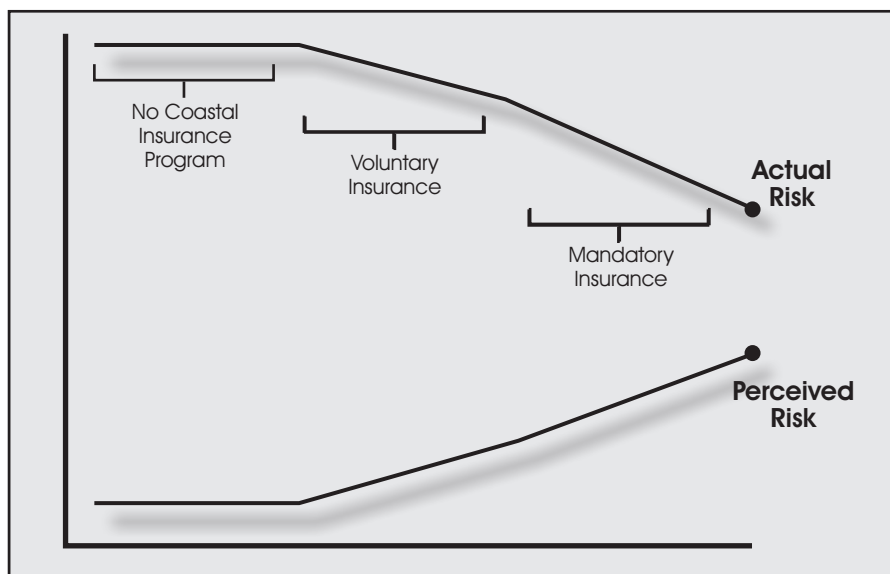


Figure 1. The impact on the relationship between actual and perceived risks as seen through the evolution of National Flood Insurance Policy

ing, the National Flood Insurance Act of 1968 was created.

Initially the federal flood insurance program was entirely voluntary, but participation rates remained low. However, after Hurricane Agnes in 1972, which wrought substantial damage to the Northeastern Seaboard to mostly uninsured coastal properties, Congress amended the NFIP making insurance mandatory for properties located in vulnerable Special Flood Hazard Areas (SFHAs). Later amendments required entire coastal communities that have SFHAs to join the NFIP as a condition of receiving federal disaster assistance.¹⁴

The evolution of flood insurance policy in the United States provides a historical context to understanding the effect of current policies on public perceptions of risk. Historically there was no mandatory requirement for coastal flood insurance. However, there remained a federal commitment to supporting coastal development through federal disaster relief. By unintentionally providing a zero premium insurance policy to coastal dwellers, the federal government incentivized the discounting of actual risks associated with coastal living.

By attempting to rationalize coastal flood relief efforts by first looking to private insurance (which was not inter-

ested) and then developing a voluntary system of public insurance, the federal government placed itself in the position of negotiating marginally more effective policies aimed at linking actual and perceived coastal risks. Deciding to make coastal insurance mandatory under certain conditions in the 1970s can be seen, intentionally or otherwise, as an effort to move public perceptions of risk closer to actual risks presented. A diagram showing this evolution of policy development and its impact on the relationship between actual and perceived risks is presented in Figure 1.

For all of the efforts by the federal government to better match actual and perceived coastal flood hazard, evidence suggests that, historically, the policy of discounting and subsidizing coastal hazards has prohibited narrowing the gap between actual and perceived risks. Recent work after Hurricane Sandy in 2012 has shown a NFIP participation rate of approximately 18 percent among homes located in flood zones.¹⁵ In addition, while the total number of policies issued has increased consistently since the NFIP's inception, the average policy tenure for an insured homeowner is between two and four years. And, of the insured experiencing a loss due to flooding, those with high-value losses (for example, full home replacement) are more likely to drop their insurance

than those experiencing small-to-moderate losses.¹⁶

As of the writing of this article, the NFIP insures approximately \$1.28 trillion dollars of property value, while charging approximately \$3.8 billion dollars in premiums.¹⁷ Due to recent storms, including Hurricane Sandy, the NFIP has outstanding obligations in excess of \$15 billion dollars, an amount far exceeding the \$4 billion in cash and borrowing authority it is currently provided by Congress. The evidence clearly supports the proposition that the NFIP is underfunded. Further, it suggests that premiums charged for existing policies are far below a reasonable pooling of risk to make the program solvent. The influence of coastal flood insurance policy on public risk perception becomes clear when using the cost of the insurance premiums as a proxy for perceived risk: The existing policy framework supports a low perceived risk of coastal living that is out of line with not only existing actual risks, but also likely out of line with future risks based on assumptions of continuing sea level rise.

Discussion

This article outlines some of the core issues encountered when attempting to develop sustainable policy instruments, particularly under conditions in which actual risks exceed perceived risks. There are cognitive, social, and practical reasons that perceived risks might not match actual risks. Risk perception is derived from a complex set of factors including the norms, habits, and personal characteristics of the decision maker.¹⁸ Information can influence risk perception, but the impact of information varies with the individual and group: Some may fully internalize new information, while others may discount the same information.

As seen with coastal flood insurance in the United States, government can play an important role in how information impacts risk perception. If government adopts a policy that favors discounting risk, then it is more likely that information will lead to a discounting of risk. If government adopts a policy favoring the internalization of risk, for example

through higher insurance premiums, then that policy will more closely match perceived and actual risks through price signaling. This, in-turn, would make future sustainability policy proposals more publicly acceptable because the existing policies would more accurately reflect actual risks, thereby correlating public perception of risk to actual risks.

While research is needed to better understand the dynamics associated with risk perception, there are some general directives that can be drawn from the current state of coastal insurance policy in the United States. For one, those looking to develop forward-looking policies must consider the effect of the current policy environment on the affected public. For coastal property owners, there is a legacy of government subsidy in varying degrees that is very likely to have played a role in disassociating perceived and actual risks. This legacy creates a kind of path dependence that can impede new policy directions. Clear evidence of this path dependence was observed when Congress passed the Briggert-Waters Flood Insurance Reform Act of 2012, which extended the NFIP for five years but required significant reform. The reforms focused on placing more of the insurance risk onto coastal property owners by updating flood zones and increasing premiums to more accurately reflect the hazards presented. Affected coastal homeowners resoundingly rejected these amendments, due in large part to the sticker shock of insurance premium increases, resulting in a repeal of the legislative amendment and a multiyear moratorium on policy changes.

The recent failure to more accurately reflect actual and impending hazards of coastal living highlights the role of risk perception in policy development. Two lessons stand out. First, risk perception must be seen as an important part of measuring the concept of risk. Relying unilaterally on objective formulations of risk may lead to inaccurate assessments of policy acceptance. Said another way, if how the public feels about the risk is not considered, then an important element in developing successful policy proposals can be missed.

The second lesson reminds us of the importance of understanding the historical and existing policy context in which a new policy proposal is being made. In the case of coastal flood insurance in the United States, there is a long history of initiating public policies that incentivize the discounting of risk. This policy environment creates the opportunity for disassociation between actual and perceived risks. Failing to see this connection can frustrate the successful development of new policy directions, particularly those that run counter to public expectations created, in part, from preexisting policies.

Author Disclosure Statement

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