Climate Shocks, ICT, and Policy Resilience in Different Political Systems

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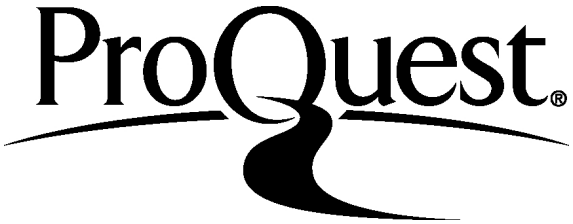

Dedication

The author wishes to dedicate this thesis to the millions of people he will never meet — both those alive today and who will come after — who will be face the challenges of a changing climate; his family and friends for always being in his corner, and to Professor Steven Livingston, for his lessons and encouragement to pursue deeper knowledge. And, of course, the author cannot forget to acknowledge his golden retriever, Gerico, for serving as a constant reminder that, even as we are concerned with the challenges of tomorrow, it also is important to enjoy today.

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Abstract of Thesis

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This thesis examines how the number of veto points and level of information communication technology (ICT) in different political systems influences policy resilience to extreme weather events, or climate shocks. Using the framework of punctuated equilibria advanced by Baumgartner and Jones, and Risse's theory of areas of limited statehood in policy fields, we seek to learn if climate shocks can serve as "focusing events" that alter or intensify the terms and direction of climate change policy. Meanwhile, we examine if the number of veto points in a state's political system affects its consolidation of statehood within its environmental field, or ability to create and implement climate change-focused policies, and if ICT may help fill some of these gaps in governance capacity. We conclude that, while high levels of ICT is helpful in disaster response and recovery during and after a climate shock, it may actually serve as a barrier to policy resilience by reducing the "shock value" of the climate shock to serve as a focusing event. Likewise, we conclude that states with lower numbers of veto points are more policy responsive to climate shocks.

Table of Contents

Chapter 1: Introduction

Climate change has become an urgent social, economic, and political problem as communities across the globe suffer from the increased frequency and intensity of extreme weather events. Often called climate shocks, these include severe hurricanes, heat waves, droughts, heavy downpours, and floods, which can disrupt key governance mechanisms, such as providing reliable electricity, clean water, and public safety, among others (Cordero, 2004). In March 2013, researchers at Oregon State University and Harvard University published a report showing that the planet is warmer today than it has been during 70 to 80 percent of the time over the last 11,300 years (Marcott and Clark, 2013). Later that same year, the world's leading climate scientists making up the Intergovernmental Panel on Climate Change (IPCC) confirmed that human influence is the dominant cause of global warming (IPCC, 2013). In other words: science has settled the climate change debate — the planet is heating up, and human activity is to blame. The same IPCC report warned that climate change will increase the likelihood of "severe, pervasive and irreversible damage" to the environment and society caused by climate shocks.

Despite the scientific consensus that climate change is happening and poses a significant threat to humanity's ability to survive and thrive, there has yet to be a concerted international policy response. The landmark Paris Agreement made at the 2015 United Nations Climate Change Conference (COP 21) in December 2015 may indicate a global shift in climate change policy that could help mitigate the worst impacts of climate

change; however, the world already is experiencing significant climate shocks, which the IPCC warns will continue to worsen even under a reduced warming scenario (IPCC, 2013). This means that states must embrace climate change resilience alongside mitigation. At the national level, some states have taken policy action to cut greenhouse gas emissions through mitigation and improve the ability of communities to "bounce back" from climate shocks through adaptation, but many continue to resist taking meaningful action — with some even deny that climate change is happening.

Given the high social, economic, and environmental costs of current and future climate shocks, resilience has become a buzzword for talking about building adaptive capacity against these impacts. Adaptive capacity refers to the preconditions necessary to enable climate change adaptation and the ability to mobilize these elements, represented by the set of available resources and the ability of the system to respond to disturbances (IPCC, 2013). It includes the capacity to design and implement effective adaptation strategies to cope with current or future events. Social resilience is defined as the ability of groups or communities to cope with external stresses and disturbances as a result of social, political, and environmental change. This definition highlights social resilience in relation to the concept of ecological resilience, which is a characteristic of ecosystems to maintain themselves in the face of disturbance (Adger, 2000). However, these prevailing definitions of resilience are too general to be useful in policymaking.

In alignment with political science and political communication scholarship, I define policy resilience as a state's policy responsiveness to promote adaptive capacity after experiencing a climate shock. Climate shocks inherently are dramatic in nature and, given their increased intensity and frequency, may introduce new ideas that serve as

policy punctuations that alter the terms of debate and redirect the policymaking process along a new course that promotes climate change mitigation and adaptation. This is the basis of Baumgartner and Jones's punctuated equilibria model of policy change, which argues that policy change usually is pegged to sudden onset events of a dramatic nature (Baumgartner and Jones, 2009). Policy change can be incremental or look more like the punctuated equilibrium model borrowed from evolutionary biology. Periods of stasis are disrupted by a sudden-onset event — a punctuation point. A punctuation point is accompanied by an explosion in new attention to the issue by the media, groups, organizations, and government institutions, which previously may have shown little interest. The steady relationships that define a period of stasis are ruptured and replaced by new regulators, regulations, and outside observers, such as new news beats. Industries also are disrupted, leading to new norms for what constitutes "business as usual."

Climate shocks may serve as focusing events that rapidly expand — and, often, fade — on the news media and on governmental agendas. These problem windows may help open up policy windows, which Baumgartner and Jones describe as opportunities for action on given initiatives that present themselves and stay open for only short periods (Baumgartner & Jones, 2009). If policy entrepreneurs cannot or do not take advantage of these opportunities, they must bide their time until the next opportunity comes along.

The consolidation of statehood within a state's environmental policy field may affect its ability to create and implement climate change mitigation and adaptation policies once a climate shocks open a policy window (Risse and Lehmkuhl, 2006, Baumgartner & Jones, 2009). Consolidation of statehood is a continuous variable, and states have varying levels of consolidation in their environmental policy fields. The

number of veto points in a state's political system may serve as indicators of the consolidation of statehood within its environmental policy field, which in turn may determine the state's policy resilience. After experiencing a climate shock, different political systems — including presidential systems (high veto points), parliamentary systems (low veto points), and single-party systems (low veto points) — may face different types and durations of policy windows within which policy change can occur. The fewer the veto points, the greater the state's policy resilience may be.

Information and communication technology (ICT) may help to improve policy resilience by creating new mechanisms for accountability and options for action. ICT can advance the speed of politics and undermine deliberation, consolidating the trend toward government-by-public-opinion poll (Abramson, Arterton, and Orren, 1988). ICT can help break policy monopolies by opening new avenues to citizen participation, flows of information, and policy options aimed at promoting mitigation and adaptive capacity. ICT also lowers information costs, which can produce tools that permit novel forms of action, behaviors, and in some cases forms of value (Bimber, 2003). These technologies create possibilities for new, more cost-effective policies that may be more capable of overcoming veto points. ICT can help communities prepare and respond to certain climate shocks, such as extreme weather, by providing advanced weather forecasting and climate monitoring, and disseminating information to large audiences via mobile phones. By providing early warning systems and better monitoring of soil conditions and water quality, ICT also can help address major adaptation risks such as food and water shortages and evacuations.

This paper seeks to inform the fields of political science and political communication on how ICT impacts policy resilience in high and low veto point political systems after experiencing the most dramatic and punctuated type of climate shock — tropical storms (hurricanes, cyclones, and typhoons). Using Baumgartner and Jones's punctuated equilibria as a theoretical framework for policy change, this paper looks at states with high and low veto point political systems and high and low levels of ICT, and how this affects policy resilience after a climate shocks. The paper will address two chief research questions:

* How does the number of veto points in a state's political system affect its policy resilience, or ability to create and implement climate change mitigation and adaptation policies after experiencing a climate shock?

* Does ICT help increase a state's policy resilience after a climate shock by creating new avenues of public participation, information flows or policy options that help to overcome veto points?

Chapter 2: Theory & Hypotheses

I theorize that the level of ICT and the number of veto points in a state's political system affects its policy resilience. Given that climate shocks are sudden onset events of a dramatic nature, they may serve as punctuation points that open policy windows for creating and implementing policies aimed at mitigating climate change or increasing adaptive capacity to future climate shocks (Baumgartner and Jones, 2009, Kingdon, 1984). Different political structures and different policy preferences lead to different modes of processing information, which may affect their policy resilience. Likewise, different political systems have different veto players, which can affect a system's capacity to produce policy change (Tsebelis, 1995).

In the United States, for example, the system of separated and divided powers is designed to retard change, even if the multiplicity of venues for policy action sometimes actually encourages it (Baumgartner and Jones, 2009). Despite experiencing several climate shocks, including Hurricanes Katrina and Sandy, the United States has displayed a low level of policy resilience by failing to create or implement climate change mitigation or adaptation policies. Conversely, the United Kingdom's Westminster parliamentary system may be more policy responsive due to the existence of only a single veto point — the majority party. In 2008, the British government passed the Climate Change Act, which established a framework to develop an economically credible emissions reduction path. It also strengthened the United Kingdom's leadership internationally by highlighting the role it would take in contributing to urgent collective action to tackle climate change under the Kyoto Protocol (CCC, 2015).

Single-party political systems are characterized by a low number of veto points, which suggest they may be more policy responsive to climate shocks. China's single-party political system, for example, is characterized by a low level of veto points. Although a legislature exists in China, it does not provide the kind of veto point found in other systems — the legislature has rarely stands up to dictates from the country's executive leadership (Barrington, 2012). While China has severely damaged its environment in strides toward economic development, the state recently has shown increased policy resilience to climate change and other environmental problems, committing to several mitigation and adaptation policies. In 2015, the Chinese government announced a climate change action plan that would completely halt growth in China's carbon dioxide emissions by 2030 (Buckley, 2015).

I theorize that ICT can help improve policy resilience by creating new accountability mechanisms and policy options that make it more likely for a state to overcome veto points that might otherwise inhibit action. ICT lowers information costs, which can produce tools that permit novel forms of action, novel behaviors and, in some cases, novel forms of value. This can help expand the scope of conflict, as Schattschneider would say, which can help break up policy monopolies by helping to change the agenda toward policy action. ICT also creates possibilities for new, more cost-effective policies that may more easily overcome veto points by opening information flows that create new accountability mechanisms. While climate shocks may only directly impact certain physical regions, ICT can inform at the national level and create a sense of urgency that puts pressure on the government to act. ICT such as remote sensing satellites can help communities prepare and respond to certain climate shocks, such as hurricanes and

typhoons, by providing advanced weather forecasting and climate monitoring, and disseminating information to large audiences via mobile phones, personal computers, and other technologies.

Hypothesis 1

I hypothesize that, as the number of veto points in a state's political system increases, its policy resilience to climate shocks decreases (Hypothesis 1). The more institutional veto points in a state's political system, the more opportunities there are for a proposed policy to be blocked or slowed and the more difficult it is for policy entrepreneurs to avail themselves of the policy windows a climate shock opens. Likewise, states with political systems characterized by a low number of veto points face fewer hurdles in creating and implementing new policies — making it easier for policy entrepreneurs to take advantage of policy windows opened by climate shocks.

Hypothesis 2

I hypothesize that states with high levels of ICT will be more able to overcome veto points and therefore will have a higher level of policy resilience (Hypothesis 2). Digital technologies decrease the cost and therefore increase the flow of information, which can create new policy options for climate change mitigation and adaptation. By helping to draw national attention to climate shocks that governments may otherwise ignore, these information flows also may help to create accountability mechanisms.

Hypothesis 3

I hypothesize that states with a high number of veto points and high levels of ICT will have a higher level of policy resilience than states with low levels of ICT after a climate shock (Hypothesis 3). As stated in Hypothesis 2, ICT decreases the cost and increases the flow of information, which can create new policy options for climate change mitigation and adaptation. This in turn may help create accountability mechanisms by drawing national attention to climate shocks that governments may otherwise have ignored.

Hypothesis 4

I hypothesize that states with a high number of veto points and low levels of ICT penetration will have lower levels of policy resilience after a climate shock than states with high levels of ICT (Hypothesis 4). As mentioned in Hypothesis 1, more institutional veto points in a state's political system creates more opportunities for a proposed policy to be blocked or slowed — making it more difficult for policy change to occur when climate shocks open policy windows. With low levels of ICT, information is costly and more difficult to come by, meaning there are fewer new policy options capable of overcoming the many veto points. Meanwhile, information-poor environments make it easier for governments to restrict knowledge on the magnitude of a climate shock, which may prevent a national climate change consensus from forming.

Hypothesis 5

I hypothesize that states with a low number of veto points and high level of ICT will have a higher level of policy resilience after a climate shock than states with a similar level of veto points and low levels of ICT (Hypothesis 5). Following from the claims made in Hypotheses 1 and 2, states with fewer obstacles to policy change and higher information flows should be the most policy resilient to climate shocks. A low levels of veto points means that it is easier for policy change to occur during the policy windows opened by climate stocks. High levels of ICT provide new policy options and accountability mechanisms that may create a greater national sense of urgency to pass climate change mitigation and adaptation policies.

Hypothesis 6

I hypothesize that states with a low number of veto points and low levels of ICT will have a lower level of policy resilience after a climate shock than states with a low number of veto points but higher levels of ICT (Hypothesis 6). While a lower number of veto points means there are fewer barriers to policy change, the lack of ICT suggests these states face fewer policy options for climate change mitigation and adaptation. At the same time, a low number of veto points combined with low information flows may make it easier for states to suppress knowledge of a climate disaster, which may reduce the likelihood of a national consensus for climate change action.

Chapter 3: Methods

To test my hypotheses, I will conduct a qualitative comparative case study analysis of nation-states with high veto points (presidential) and low veto points (parliamentary and autocratic) and high and low levels of ICT to determine their policy resilience after the same kind of climate shock: tropical storms (hurricanes, cyclones, and typhoons). Veto points are defined as political institutions capable of preventing policies from passing or undoing policies which already have passed, or non-institutional players capable of preventing a change from the status quo. For example, a state's executive, legislative, and judicial branches may or may not serve as veto points, depending on the type of the political system. I define high levels of ICT as states with high levels of mobile phone and/or internet penetration, as well as access to advanced technologies such as remote sensing satellites and geographic information systems (GIS). To determine mobile phone and internet usage, I will rely on the International Telecommunication Union, World Telecommunication/ICT Development Report and database, as well as World Bank data. I define a high level of policy resilience as a state either creating or building upon previous national policies aimed at promoting climate change mitigation or adaptation after a climate shock. I define a low level of policy resilience as a state failing to either create or build upon previous national policies aimed at promoting climate change mitigation or adaptation after a climate shock. In addition to a qualitative study of political system structures, I also will use the World Bank's Worldwide Governance Indicators (WGI) to examine government effectiveness, voice and accountability, and control of corruption.

Chapter 4: Literature Review

Global Warming and Climate Shocks

In March 2013, researchers at Oregon State University and Harvard University published a report showing that the planet is warmer today than it has been during 70 to 80 percent of the time over the last 11,300 years (Marcott, Shakun, and Clark, 2013). In September 2013, leading scientists from around the world making up the IPCC released a report claiming they are 95 percent confident that human influence is the dominant cause of global warming (IPCC, 2013). As far as science is concerned, climate change is a settled issue — the planet is heating up, and human activity is to blame.

The IPCC report also warned that, if left unaddressed, climate change would increase the likelihood of "severe, pervasive, and irreversible damage to the environment and society" (IPCC, 2013). As the planet warms and sea levels rise, climate shocks will increase in frequency and intensity, marked by extreme weather events such as superstorms, mega droughts, heat waves, heavy downpours, and floods, among others. Weather and climatic extremes can have serious and damaging effects on human society and infrastructure as well as on ecosystems and wildlife, and are usually the main focus of attention of the news media in reports on climate (Meehl et al 2000). Although no single extreme weather event can be directly attributed to climate change, the increased frequency and intensity of extreme weather events form a long-term trend that can be tied to rising global temperatures. A 2012 report by the National Oceanic and Atmospheric Administration (NOAA) likened the rising risk of extreme weather events to a baseball

player's improved performance after taking steroids: "For any one of his home runs... you would not know for sure whether it was caused by steroids or not.... But you might be able to attribute his increased number to the steroids" (NCDC, 2012). A 2016 study found that scientific advances over the past several years have helped scientists to link increases in frequency and intensity of temperature and extreme weather to climate change (NASEM, 2016). While it originally was believed that the worst impacts of climate change would not be felt for centuries, scientists now claim this climate comeuppance will take place within the next several decades, and will increase dramatically as humans continue to pump greenhouse gasses into the atmosphere (Hansen et al., 2016).

Keen and Pakkot argue that natural disasters have become major concerns among governments and peoples around the world, as their frequency and socioeconomic costs increase (Keen and Pakkot, 2011). These costs continue to grow even as the low probability of these events striking in any one place has hindered careful understanding of the possibility of worst cases (Clarke, 2005). Events such as Hurricane Katrina, the Deepwater Horizon oil spill, and the September 11 attacks have increased thinking about catastrophic disasters that render local and sometimes national governments unable to effectively respond to the disaster (Quarantelli, 2005). Meanwhile, other extreme weather events like Hurricane Sandy raise fears to the possibility of even worse outcomes from stronger disasters in the future.

Disasters are important because they disrupt the normal, expected workings of society; however, their effects do not often alter existing organizational or stakeholder relationships based on economic or political power (Birkland, 2013). Birkland writes that disasters can cause significant losses of life and property, which can compel citizens,

political leaders, and interest groups to look for policy failures and ask whether policies to prepare for, mitigate, respond to, and recover from disasters should be improved (Birkland, 1997). Major disasters also can lead to questions about the appropriate distribution of responsibility between the central government and the local governments, or in federal systems, between the national government and the state or provincial and local governments (Birkland and DeYoung, 2011).

Areas of Limited Statehood in Environmental Policy Fields

Impacts from climate-related extremes, such as heat waves, droughts, floods, cyclones, and wildfires may disrupt a state's capacity to provide collective goods through alteration of ecosystems, disruption of food production and water supply, and damage to infrastructure and settlements (IPCC, 2014). At the same time, people who are socially, economically, culturally, politically, institutionally, or otherwise marginalized are especially vulnerable to climate change and also to some adaptation and mitigation responses. Where disruptions of this sort occur, political scientists have referred to as areas of limited statehood, which concern those parts of a country in which government lacks the ability to implement and enforce rules and decisions.

Livingston and Walter-Drop point out that governance often is confounded with government, which is also at times confused with statehood (Livingston and Walter-Drop, 2014). They point to Risse, who defines governance as "institutionalized modes of social coordination to produce and implement collectively binding rules or to provide collective goods" (Risse, 2011). Collective goods can include security, economic welfare,

education, public health, sustainable infrastructure, and a clean and safe environment, which may be thought of as governance services, rather than government services (Livingston and Walter-Drop, 2014). Along these lines, creating and implementing environmental policies that promote climate change mitigation and adaptation can be thought of as a form of governance service.

Many social scientists maintain that governance implicitly or explicitly remains connected to an ideal type of modern statehood, with full domestic sovereignty and the capacity to make, implement, and enforce decisions. However, Risse argues that from a global and historical perspective, the Western modern nation state constitutes the exception rather than the rule (Risse, 2006). In reality, many areas of limited statehood exist — many states contain areas of limited statehood where central authorities lack control over the entire territory, do not completely enjoy the monopoly over the means of violence, and/or have limited capacities to enforce and implement decisions, at least in some policy areas or with regard to large parts of the population (Risse, 2006).

It follows that statehood is best understood as a continuous variable, which ranges from fully consolidated states to failed states (Acemoglu and Robinson, 2012). Risse claims that areas of limited statehood are not confined to fragile, failing, or failed states — even otherwise highly consolidated states, such as the United States, might contain areas of limited statehood in which they do not enjoy domestic sovereignty, at least temporarily. This means that the United States, for example, may be unable to respond to environmental problems due to the existence of an area of limited statehood in its environmental policy field. Castells argues that consolidated states in the West are

themselves straining under the weight of wealth and income inequality, unmet public service needs, and the fraying legitimacy of core institutions (Castells, 2012).

In addition to being parts of a state's physical territory, areas of limited statehood also can encompass a policy area, which includes the inability to create and implement environmental laws (Risse, 2006). Risse is careful to specify that limited statehood should not be confused with "neoliberal" statehood in the sense of deliberate decisions by national governments to withdraw from providing public services and governance in various policy areas. Limited domestic sovereignty primarily refers to a lack of capacity rather than willingness of states to enforce decisions — states often choose not to enforce the rules in some issue areas for a variety of reasons even if they could (Risse, 2006 pp. 7).

When applied to the concept of policy resilience, this suggests that states which fail to respond to climate shocks with policies aimed at promoting climate change mitigation and adaptive capacity are, in fact, displaying areas of limited statehood in their environmental policy fields. A lack of policy resilience to climate shocks also may lead to other failures in governance capacity, such food security and even national security. Many people living in poor communities in Ethiopia, India, Peru, and Vietnam, for example, experience climate shocks such as droughts and floods, and many face episodes of food insecurity (Dornan et al, 2014).

Governments themselves also should not be considered to be consolidated actors — in the United States, even as Congress fails to take action on climate change, the U.S. Department of Defense has recognized the reality of climate change as "an urgent and growing threat to national security, contributing to increased natural disasters, refugee

flows, and conflicts over basic resources such as food and water" (DOD, 2015). These impacts already are occurring, and the scope, scale, and intensity of these impacts are projected to increase over time.

Punctuated Equilibrium and Policy Change

While policy change is a widely researched topic area in political science and political communication, why policies change remains a poorly understood phenomenon (Cerna, 2013). Bennett and Howlett define policy change as "incremental shifts in existing structures, or new and innovative policies" (Bennett and Howlett, 1992). Major policy change typically is referred to as policy reform, or the process of improving the performance of existing systems and of assuring their efficient and equitable response to future changes (Berman, 1995). Erikson defines policy responsiveness as when government action responds to the preferences of its citizens. This is conceptually distinct from representation, whereby government actions mirror the preferences of public opinion. Governments can be representative without a direct responsiveness causal mechanism, as policy can respond to public opinion but remain biased due to other influences besides the public (Erikson, 2013). Although policy responsiveness is a goal of democratic government, Erikson says, it is no certain result because there are many links in the causal chain that must remain unbroken for it to be at work. Powell claims that this causal chain begins with the policy preferences held by citizens, and moves link by causal link through such stages as voting; election outcomes; the formation of policy-making coalitions; the process of policy making between elections; and public policies

themselves. The process is ongoing and dynamic — the policies that actually are adopted and the consequences that flow from them affect the future preferences of citizens (Powell, 2004).

Baumgartner and Jones argue that policy change in the United States "is not gradual and incremental, but rather disjoint and episodic" (Baumgartner and Jones, 2009). Long periods of relative policy stability are interrupted by bursts of "frenetic policy activity." Although these bursts can occur through the mechanism of electoral change, Baumgartner and Jones champion the idea of policymaking at equilibrium occurring in relatively independent subsystems, in which policies are determined by specialists located in federal agencies and interested parties and groups (Baumgartner and Jones, 2009). Kingdon calls these opportunities for policy change policy windows, which present themselves and stay open only for short periods. A window opens because of change in the political stream, including change in administration, shift in partisan or ideological distribution in Congress, or shift in national mood; or it opens because a new problem captures the attention of governmental officials and those close to them (Kingdon, 1984). These so-called focusing events can cause problems to become pressing, creating an opportunity for advocates of proposals, otherwise known as policy entrepreneurs, to attach their solutions to it.

When shocks or changes are introduced in this system via focusing events, they may lead not just to a temporary deviation from normal — with a more or less rapid return to the status quo — but rather to new points of stability, as the system settles down at a point radically different from the original (Baumgartner and Jones, 2009). Although the underlying facts may change only slowly, media coverage of those facts may shift

dramatically from positive to negative, or from little attention to a sudden fascination. As attention shifts from one dimension to another, different policymakers become interested, different media outlets and journalists within them begin to generate different types of stories, the self-reinforcing processes that link all these venues together can contribute to rapid changes in policy outcomes (Baumgartner and Jones, 2009).

Birkland claims that natural disasters can serve as focusing events, which can lead interest groups, government leaders, policy entrepreneurs, the news media, or members of the public to identify new problems, or to pay greater attention to existing problems that were previously perceived to be dormant — potentially leading to a search for new solutions in the wake of an apparent policy failure (Birkland, 1998). However, if an event threatens to reduce the power of advantaged groups to control the agenda, these groups are likely to respond defensively to focusing events — and argue that an event is not as important as claimed by opposing groups, that existing policy is able to deal with any problems, or that if new policy is needed, the policy proposed by the contending groups would be ineffective or counterproductive (Birkland and Nath, 2000). Groups that are more powerful will work to downplay an event's significance by providing officials and the public with alternative explanations of the meaning and significance of the event (Birkland, 1997).

Technically complex issues such as climate change are particularly vulnerable to policy entrepreneurs who attempt to take advantage of the routines of journalists using symbols and metaphor to move their issues into more receptive venues (Nelkin, 1987). Likewise, the media often give the impression that there is no scientific consensus about complex issues when, in fact, there might be only a small number of scientists disagree

with the dominant view (Cohen, 1980). However, Kingdon points out that a focusing event is by its nature of short duration, and if participants cannot or do not take advantage of these opportunities, they must bide their time until the next opportunity comes along (Kingdon, 1984). Baumgartner and Jones concur, writing that "rarely do individuals, political systems, or the media focus for long on many aspects of the same issue" (Baumgartner and Jones, 2009).

If a focusing event leads to widespread feelings of public enthusiasm to solve a major national problem, political leaders will do whatever they can to provide support for specialists who convince them that they have the power to solve it (Baumgartner and Jones, 2009). Baumgartner and Jones reason that leaders want to be seen as facilitating, not hindering, the work of experts when the public believes that something good may come of it. However, the presence of a focusing event does not guarantee policy change. Downs argues that a state of alarmed discovery and euphoria generates much attention, followed by a realization of the costs of solving the problem and a gradual decline in public interest (Downs, 1972). Climate change fits well into this framework — it is a problem that initially sparked a state of alarmed discovery in 1979 when the IPCC first recognized humans' role in causing climate change at the first international climate change conference. However, climate change widely is perceived as an issue that would be too costly or disruptive to solve.

Baumgartner and Jones, writing nearly a decade after Downs, point out that environmental issues remain much higher on the national political agenda than they were at any time before Downs wrote about them. Speth writes that when the perception of an issue is systematically altered to engage a new and broader audience, perhaps by a crisis

or major event, far-reaching change is possible (Speth, 2004). He offers that, if Baumgartner and Jones are correct, today's bleak prospects for global environmental threats might rapidly change, giving way to the sea of change of progress on global challenges that we saw on domestic environmental issues in the 1970s (Speth, 2006).

Some issues remain high on the public agenda for considerable periods of time, and some problems really do get solved (Baumgartner and Jones, 2009). Although there may be cycles of public attention, one important element of alarmed discovery of a national problem may be the institutionalization of programs meant to deal with it. Kingdon writes that policies result from combinations of the problems that interest political leaders and the solutions proposed by the bureaucratic and other experts (Kingdon, 1984). Problems with viable solutions are more likely to result in policy change (Cohen, March, and Olsen, 1972).

Climate Change and Policy Change

Lane calls climate change "the great white whale" of environmental policy problems because it presents a huge challenge for which definitive solutions seem infinitely elusive (Lane, 2006). The lag between costs and benefits is a key political problem in its own right — while it is difficult to predict when climate change may become significantly harmful economically, "human-induced green-house warming will probably develop over many decades and may not have truly serious implications for humankind for a half century or more after the signal is first detected" (Homer-Dixon, 2002). At the same time, forces operating beyond the narrow arena of national and

international environmental policy also will heavily influence the prospects for policy responsiveness to climate shocks. National security and fiscal policy challenges may well outcompete the climate issue for both public attention and economic resources (Lane, 2006). However, as scientific understanding of the link between increases in frequency and intensity of temperature and extreme weather to climate change improves, scientists warn that climate change's worst impacts already are being felt and will worsen over the next couple decades rather than centuries (NASEM, 2016, Hansen et al., 2016). This growing awareness of imminent danger may help push climate change to the forefront of policy agendas.

At its core, climate change mitigation and adaptation involves transferring wealth from current generations to future ones. Although people, in their private affairs, often sacrifice current consumption to improve the economic prospects of their children, the long-term challenge climate change presents is not one that democratic political institutions handle especially well (Lane, 2006). Likewise, taking climate change action, such as through the passage of greenhouse gas emission control legislation, is further impeded by resistance from strong and well-organized energy industries and labor unions (Arnold, 1990). Fossil fuel interests have been able to appeal successfully to larger coalitions in the United States because consumers likely would absorb most of the costs of carbon emission controls. Arnold claims that legislators have a well-founded fear of taking actions that visibly impose costs on their constituents — they anticipate the electoral problems that might result from such policy choices and seek to avoid them (Arnold, 1990).

Veto Points in Different Political Systems

Baumgartner and Jones write that "different political structures and different policy preferences lead to different modes of processing information" (Baumgartner and Jones, 2009). Pointing to the United States political system, they argue that the system of separated and divided powers is designed to retard change, even if the multiplicity of venues for policy action sometimes encourages it. Different political systems have different veto players, which can affect the capacity to produce policy change (Tsebelis, 1995).

Tsebelis defines the basic concept of veto player as individuals or collective actors whose agreement by majority rule for collective actors is required for a change of the status quo. He identifies two categories of veto players: institutional and partisan. Institutional veto players exist in presidential systems and include presidents and chambers, while partisan veto players (parties) exist at least in parliamentary systems (Tsebelis, 1995). In modern democratic political systems, judicial review also is one of many potential veto points; however, Watkins and Lemieux conclude that judicial review likely is to be a modest net positive for democracy, particularly when compared to other veto points commonly found in contemporary democratic political systems (Watkins and Lemieux, 2015).

While Westminster systems, dominant party systems, and single-party minority governments have low numbers of veto players, presidential or federal systems have multiple veto players. Tsebelis argues that the potential for policy change decreases as the number of veto players increases due to the lack of congruence and the cohesion of these

players. Holding constant the extent of policy disagreements, an increase in the number of veto points will not decrease policy stability and may increase it. In other words: the more veto points there are, the more difficult it is to gain approval for a policy change. Tsebelis and Money find that, holding constant the number of veto points, an increase in the extent of policy disagreements among the actors will not decrease policy stability and may increase it (Tsebelis and Money, 1997).

Weaver and Rockman argue that two-party unicameral parliamentary systems — the Westminster systems — might respond more quickly than presidential systems to social and economic challenges (Weaver and Rockman, 1993). Because presidential systems are characterized by multiple veto points — a House, Senate, and President — whose members are able to block attempts at policy change, the systems' responses to social and economic challenges often are problematic. Conversely, parliamentary systems may be more policy responsive due to the existence of only a single veto point — the majority party. However, Weaver and Rockman point out that this institutional explanation is insufficient to account for the patterns of policy change that they empirically observe (Weaver and Rockman, 1993). Rather, a second kind of division among politicians also seems to be important — focusing on the extent of policy disagreements among the elected officials within and among the veto points. When policy disagreements across institutions are modest, a political system's capacity for policy responsiveness to social and economic challenges may seem to be greater than when policy disagreements among the institutions are larger.

After examining the number of institutional veto points in a system and the extent of policy disagreements among the elected officials in these veto institutions, Hammond

concludes that, as a general rule, policy choices by a system must be seen as the product of an interaction between the policy-making rules and the preferences of the actors in the system (Hammond, 1997). Hammond and Butler warn that the number of veto points may not distinguish policy stability in presidential systems from policy stability in parliamentary systems (Hammond and Butler, 2003). Rather, differences in policy stability between two different kinds of systems depend on the interaction between the number of veto points and the distribution of preferences — what they call the preference profile — of the elected officials populating the veto points in the two kinds of systems. For some preference profiles, presidential and parliamentary systems should be expected to select similar policies and exhibit similar patterns of policy change, despite the institutional differences of the two systems.

The veto point theory suggests that non-democratic political systems may be more policy responsive to social and economic problems. China is a one-party system, and partisan veto points are not present. Although a legislature exists in China, it does not provide the kind of veto point it can in other systems — the legislature rarely has stood up to dictates from the country's executive leadership (Barrington, 2012).

In addition to the high-level institutional veto points already discussed, some political systems also contain party veto players and subnational governments, which are strong in federal systems but weak in unitary systems (Hallerberg, 2002). In single-party unitary governments, identification and control over policy are clear; in multiparty coalition governments in unitary systems, identification is traditionally difficult. Under federalism, parties that constitute the central government have less control over policy.

Powerful special interest groups also can serve as non-institutional veto points by preventing certain issues from ever reaching the government's formal agenda. The high politicization of a settled scientific issue such as climate change may be indicative of non-institutional veto players at work. These players prevent climate change policy options from reaching the formal agenda by perpetuating the illusion of debate in the political system. Conway and Oreskes argue that a loose-knit group of high-level scientists and scientific advisers — with deep connections in politics and industry — has run effective campaigns to mislead the public and deny well-established scientific knowledge over four decades, which includes climate change (Conway and Oreskes, 2011).

ICT and Climate Change Resilience

Information communication technologies (ICT), including remote sensing satellites, GIS, sensors, mobile phones, and smartphones may improve policy resilience to climate shocks by advancing the speed of politics, thus undermining deliberation and consolidating the trend toward government-by-public-opinion poll (Abramson, Arterton, and Orren, 1988). Dahl writes that ICT may provide important remedies for political inequality by making political information more universally accessible (Dahl, 1989). However, Bimber argues that the revolution in information technology means that democracy is growing increasingly information-rich and communication-intensive — not simply that democracy is now characterized by the use of one particular technology or another (Bimber, 2003). Bimber writes that information is "vital to democracy in myriad

ways: in the process by which citizen preferences are formed and aggregated, in the behaviors of citizens and elites, in formal procedures of representation, in acts of government decision making, in the administration of laws and regulations, and in the mechanisms of accountability that freshen democracy and sustain its legitimacy." Bimber reasons that, as information becomes more abundant and less well institutionalized thanks to ICT, the possibilities for unstable cycling of agendas and preferences may arise (Bimber, 2003). ICT produces tools that permit novel forms of action, novel behaviors, and in some cases novel forms of value. New actions made possible by these technologies can affect social and economic structures as well as values.

Livingston and Walter-Drop write that ICT is best suited to the provision of collective goods that are strongly affected by information; however, the real-time ability to gather information from ubiquitous or nearly ubiquitous sensors, such as internet-enabled mobile phones or smartphones, affects the human capacity to generate awareness of need and to manage the distribution of material resources in response (Livingston and Walter-Drop, 2014). Today, there are almost as many cell-phone subscriptions (6.8 billion) as there are people on the planet (7 billion) (ITU, 2015). In 2013, there were 96 cell-phone service subscriptions for every 100 people in the world. Likewise, today there are 2.6 billion smartphone subscriptions globally, and by 2020 this is expected to grow to 6.1 billion (Ericsson, 2015). Put more simply: by 2020, some 70 percent of the world's population will be using smartphones. When combined with technologies such as GIS, this can be particularly powerful in the context of crisis- or event-mapping, where crowdsourcing can help populate significant events on a digital map during a natural disaster (Livingston and Walter-Drop, 2014). Livingston and Walter-Drop write that

people who are caught up in a crisis can use mobile phones and other communication devices to share awareness of local circumstances with a central aggregating platform, such as Ushahidi.com.

Given the punctuated equilibria framework of policy change, ICT and the rise of network society may reduce the need for formal organizations, which were once needed to meet the resource demands of collective action (Bimber, Flanagin, and Stohl, 2005). ICT offers new possibilities for improved governance efficiency, new ways of citizens' engagement and their more active participation in policy making, resulting in rebuilding of trust and transformation of relations between governments and their citizens (Guchteneire and Milkota, 2008). ICT also can help enable new structures within the socio-political environment which can foster inclusiveness and participation in the design and implementation of adaptation processes, thus reducing the potential for emergence of social tension or instability (Tandon, 2009). With climate change disproportionately harming the poor, ICT may help give underrepresented groups a bigger voice in political discourse which can even the playing field. This is significant because, as Schattschneider concluded in his 1960 critique of the group basis of politics in the United States, the flaw in the pluralist heaven is that "the heavenly chorus sings with a strong upper-class accent" (Schattschneider, 1960).

Within the context of climate change adaptation, Ospina and Heeks define e-resilience as a property of livelihood systems by which ICTs interact with a set of resilience sub-properties, enabling the system to adapt to the effects of climate change (Ospina and Heeks, 2010). Innovation and flexibility are key characteristics in building local resilience to changing conditions in the short, medium and long term. According to

Ospina and Heeks, innovation is the ability of the system to do new things with existent determinants, and is therefore, closely related to flexibility as a resilience sub-property. ICT can help bridge and focus the priorities of actors at the micro, meso, and macro levels, as well as to broaden access to assets, capabilities, and supporting organizations and institutions towards the enactment of adaptive functioning (Ospina and Heeks, 2010). ICT applications also can help alleviate the pressures posed by migration and redistributions of people triggered by sea-level rise, drought, desertification or extensive flooding, among other potential impacts of climate change. Ospina and Heeks write that applications such as remote sensing and GIS can facilitate urban planning, which "improves the habitat conditions of displaced populations that are forced to settle in deprived and/or over-populated areas." ICT also enables social media platforms, such as Twitter, to be used for disaster relief during climate disasters (Kongthon et al., 2012).

Chapter 5: Case Studies

Methodology

To help compensate for the complexities involved with analyzing and comparing tropical storm climate shocks and subsequent policy responses, a comprehensive approach was taken to analyzing four such extreme weather events that have struck states with different political systems in the past 11 years. The research focused on storms that have occurred since 2005 because this is when the concept of climate shocks was becoming better understood by governments around the globe; likewise, this also was when ICT was becoming more common in many areas of the world. While there certainly are climate shocks predating 2005, it is more methodologically sound to compare cases from the same era of relative ICT ubiquity. To test the hypotheses, states were selected with different levels of veto points and varying levels of ICT that have experienced a tropical storm climate shock.

To determine the level of veto points in different political systems, scholarly literature, government websites, and news articles were examined to qualitatively assess if a state's political system can be characterized as having a high or low number of veto points. The World Bank's Worldwide Governance Indicators (WGI) also were used to establish context for a state's government effectiveness, voice and accountability, and level of corruption, which could impact policy resilience after a climate shock.

Both quantitative and qualitative indicators were used to establish measurements of high and low levels of ICT in different states. Significant weight was given to a state's

internet and mobile phone penetration based on the World Development Indicators (WDI) — which includes data from International Telecommunication Union, World Telecommunication/ICT Development Report and database. States with more than 50 internet users and mobile phone subscriptions per 100 people were considered to have high levels ICT, and those with less than this threshold to have low levels. However, these indicators were supplemented with a qualitative assessment of scholarly literature, government websites, and news stories to tip the scale one way or the other. In the case of India, for example, while there was a low level of internet users and high level of mobile phone users, the qualitative assessment showed that India should be considered a high ICT state.

To capture each climate shock and subsequent policy response as holistically as possible, the case studies are presented through a common format. First, Geographic Context briefly describes the state's size, coastline, elevation, and other key geographic elements that provide context for the tropical storm climate shock's impact. Second, The Storm's Story chronicles the tropical storm climate shock, including when it formed, where it hit, and the damage it inflicted. Third, The Policy Window Opens discusses policy entrepreneurs' initial response to the climate shock, including the politicians, scientists, environmentalists, the media, and other actors. Fourth, The Veto Points section examines the state's political system to make the case for why it is characterized by a high or low level of veto points, looking at the previously mentioned indicators and a qualitative analysis of government structure. Fifth, The ICT section analyzes the state's level of ICT using the previously mentioned quantitative and qualitative evidence. Sixth, The Policy Response section ties it all together to determine if the state displayed a high

or low level of policy resilience to the climate shock and if high or levels of ICT helped or hindered the policy change process. This section also looks at the state's history of policy responsiveness, or lack thereof, to climate change in order to put the case study into context.

The first case study examines the United States, a high veto point and high ICT state, and its policy response to Hurricane Sandy in 2012, which tests Hypotheses 1, 2, and 3. The second case study looks at the Philippines, a high veto point and low ICT state, and its policy response to Typhoon Haiyan in 2013, which tests Hypotheses 1, 2, and 4. The third case study considers India, a low veto point and high ICT state, and its policy response to Cyclone Phailin in 2013, which tests Hypotheses 1, 2, 3, and 5. The fourth and final case study examines Cuba, a low veto point and low ICT state, and its policy response to Hurricane Dennis in 2005, which tests Hypotheses 1, 2, 3, and 6.

High Veto Point and High ICT: The United States and Hurricane Sandy

Geographic Context

The United States is the third largest country in the world, covering 9,857,306 square kilometers. With its North American territory spanning from the Atlantic to Pacific Oceans, the state contains a diverse number of topographies and climates. Massive mountain ranges, low-lying plains, alpine forests, tropical swamps, and deserts

characterize much of its geography. The U.S. has one of the highest lengths of coastline in the world, stretching 153,645 kilometers, which includes the non-contiguous areas of the country. While many of its coastal areas are low-lying, the state's average elevation is 760 meters. The state's southern and eastern regions are the most susceptible to tropical storms forming in the warm waters of the Gulf of Mexico, which often make landfall.

The Storm's Story

Hurricane Sandy made landfall in the northeastern United States on October 29, 2012, devastating everything in its path with winds of up to 80 miles per hour. Classified as a superstorm by many meteorologists, Hurricane Sandy disrupted and altered the lives of millions of Americans along the shores of New Jersey, New York, Connecticut, and in two dozen other states (NASA, 2013). The streets of New York City and other major population centers were flooded, power lines knocked out, and trees ripped from their roots. Satellite imagery later showed that even the landscape of the east coast was changed by the storm (NASA, 2013). Hurricane Sandy left more than 8.5 million people without power, caused widespread flooding throughout the East Coast, and contributed to acute fuel shortages in parts of New York and New Jersey. The storm also damaged or destroyed hundreds of thousands of homes, caused tens of billions of dollars in damages, and killed at least 162 people in the United States (FEMA, 2013). By the time the storm subsided, it had disrupted the lives of millions of people and inflicted around $50 billion worth of damage (Sharp, 2012). The only previous storm to cause more damage had been Hurricane Katrina in 2005, which cost around $108 billion. Hurricane Sandy punctuated

a trend of mounting climate-related disasters afflicting the United States — it has faced 178 weather and climate disasters since 1980, inflicting more than $1 trillion in total economic costs, along with incalculable human suffering (NCEI, 2015).

Prior to Hurricane Sandy's landfall, the Federal Emergency Management Agency (FEMA) prepositioned commodities and assets, activated response centers, and deployed over 900 personnel. The organization also worked closely with state and local governments, private and nonprofit sectors, faith-based organizations, communities, and individuals to prepare for the storm and anticipate survivor needs (FEMA, 2013). Assisting with the initial response to the storm, FEMA coordinated with its partners to provide federal resources and to develop solutions to address power restoration, transportation, fuel distribution, and housing needs. To aid in recovery efforts after the storm, the agency executed one of the largest deployments of personnel in its history, delivered over $1.2 billion in housing assistance to more than 174,000 survivors, and obligated over $800 million for debris removal and infrastructure restoration (FEMA, 2013). While FEMA's response to Hurricane Sandy showed notable improvement to its fumbled response to Hurricane Katrina nearly a decade earlier, the agency admitted that future larger-scale incidents will stress its capacity for effective response and recovery.

The Policy Window Opens

During and after Hurricane Sandy, many members of the media, politicians, environmentalists, scientists, and other policy entrepreneurs drew connections between the storm and climate change. Media outlets ranging from The New York Times to

Bloomberg connected the dots between the storm and climate change (Keefe, 2012). Pulitzer-prize winning author Nicholas Kristof, after interviewing climate scientists, explained in his column in The New York Times that climate change "is warming our oceans, altering our weather patterns and causing sea levels to rise, and those conditions, in turn, add fuel and energy to storms — super-charging monster storms like Sandy while simultaneously increasing the chances of flooding."

Kristof admitted that, while there are no easy solutions to climate change, the United States "may need to invest in cleaner energy, impose a carbon tax or other curbs on greenhouse gases, and, above all, rethink how we can reduce the toll of a changing climate" (Kristof, 2012). In an op-ed in The Huffington Post, UC Berkeley linguistics professor George Lakoff argued that global warming systemically caused Hurricane Sandy, as well as the resulting loss of life, material damage, and economic loss. However, Lakoff recognized that because systemic causation is less obvious, it requires greater attention if it is to be understood and its negative effects controlled. In general, Lakoff wrote, causation in ecosystems, biological systems, economic systems, and social systems tends not to be direct, but is no less causal (Lakoff, 2012).

Scientists, while at the time reluctant to draw direct connections between climate change and Hurricane Sandy, largely agreed that it was part of a growing trend made worse by climate change. The National Oceanic and Atmospheric Administration (NOAA), an American scientific agency within the United States Department of Commerce focused on the conditions of the oceans and the atmosphere, released a report after Hurricane Sandy that said "climate-change related increases in sea level have nearly doubled today's annual probability of a Sandy-level flood recurrence as compared to

1950." The report concluded that ongoing natural and human-induced forcing of sea level ensures that Sandy-level inundation events will occur more frequently in the future from storms even with less intensity and lower storm surge than Sandy (Peterson et al. 2013).

Some politicians also were quick to tie Hurricane Sandy to an overarching climate change trend. New York governor Andrew Cuomo jokingly told President Barack Obama: "We have a 100-year flood every two years now." Cuomo later added: "There's no such thing as a 100-year flood. These are extreme weather patterns. The frequency has been increasing" (Lovett, 2012). Former vice president and high-profile climate change activist Al Gore warned that Hurricane Sandy was "a disturbing sign of things to come," and called for decisive climate change action (Restuccia, 2012). Following the storm, Rep. Henry Waxman (D-CA) and Rep. Bobby Rush (D-Ill.) wrote in a letter to Rep. Fred Upton (R-MI), Chairman of the House Committee on Energy and Commerce: "Hurricane Sandy is exactly the type of extreme weather event that climate scientists have said will become more frequent and more severe if we fail to reduce our carbon pollution." The Congressman called for a lame-duck hearing to discuss the connection between climate change and Hurricane Sandy. However, Upton did not agree to the hearing (Geman, 2012).

Veto Points in the United States Political System

The United States has a presidential political system characterized by a high level of veto points in the policymaking process. It is a federal constitutional republic in which the President of the United States, Congress and the judiciary share powers reserved for

the national government, and the federal government shares sovereignty with the state governments. When it comes to the policymaking process, the President has no direct lawmaking authority; however, he or she can set the policy agenda and propose specific legislation (Eshbaugh, 2005). The President also wields limited veto power — meaning that he or she can veto only specific parts of legislation, and it can be overridden by a two-thirds vote by Congress (Cornell, 2016). One area where the President holds significant policymaking power is through the issuance of executive orders, which have the force of law but do not have to be approved by Congress.

Congress wields significant institutional veto power in the U.S. political system. The bicameral structure of Congress was established by the founders to minimize the possibility of any one governmental body becoming too powerful. The House was meant to be the most democratic of the national institutions, as its members are subject to reelection every two years. The Senate was designed as an elite body that would act as a check on the House (Paletz, 2013). Typically, Congress has been controlled by the same party. Since 1945, the House and Senate have been controlled by different parties only seven times (14 years) — but three of those have been since the 2000 elections. In addition, there have been only two complete turnovers of Congress since 1949 — one in 1995 and the other in 2007 (Gil, 2014). However, in modern U.S. political history, the same political party has not controlled the White House, the Senate, and the House of Representatives. Indeed, only 13 times (26 years) since 1945 have both branches of Congress and the Presidency been controlled by the same party — and Democrats have held this advantage more often than Republicans.

Bicameralism has been criticized for giving rise to so many veto points that it causes the democratic will to be thwarted. By its very nature, bicameralism makes it harder to enact legislation because it allows measures to be defeated whenever one house is unwilling to approve of them (Levinson, 2006). Even if bicameralism is endorsed, the president's veto power has become an important part of the lawmaking process. The U.S. now has had more than 2,500 presidential vetoes.

In the U.S. political system, the judiciary also serves as a veto point through its power of judicial review, or the power of the courts to declare that acts of the other branches of government are unconstitutional, and therefore unenforceable. While there is a popular perception that the Supreme Court increasingly is becoming a politicized rather than a neutral and politically independent body, almost half of the cases in 2013 were decided unanimously, and the Justices' voting pattern split by the political party of the president to whom they owe their appointment in fewer than 7 percent of cases (Hamilton, 2013).

The U.S. government has a relatively high level of effectiveness, scoring a 1.46 (89.9 percentile) in 2014 on the World Bank's Worldwide Governance Indicators (WGI), which scored -2.5 as the lowest to 2.5 being the highest. However, this effectiveness score fell 3.4 points from 1.8 in 2004. The U.S. government scores lower in Voice and Accountability, falling into the 79.8 percentile with a score of 1.05 in 2014. Interestingly, corruption increased significantly in the U.S. between 2004 and 2014, as its Control of Corruption score fell from 1.86 to 1.32, respectively.

In addition to these many institutional veto points, the U.S. also contains non-institutional veto players, which may reduce policy resilience by preventing climate

change issues from reaching the government's formal agenda. Pseudo-scientific think tanks such as the Heartland Institute claim to "discover, develop, and promote free-market solutions to social and economic problems." However, the group peddles misinformation about climate change, such as that "most scientists don't believe the effect of human activities on climate is sufficiently well understood to make predictions about future climate conditions, and many believe the modest warming that may occur would be beneficial" (Sourcewatch.org, 2016). Mimicking legitimate think tanks, Heartland has produced more so-called educational material on climate change than all but a handful of organizations in the world, including reports and books, which are reported on and cited as legitimate sources by the media. Despite the scientific community's denouncement of climate-denying organizations such as Heartland, the U.S. media continues to treat it as legitimate — in 2012, The Economist called Heartland "the world's most prominent think tank supporting skepticism about man-made climate change" and The New York Times called it "the primary American organization pushing climate change skepticism" (Sourcewatch.org, 2016).

Heartland also uses its reports to directly lobby Congress to oppose climate change action. The organization claims to have made more than 1 million contacts with elected officials in 2014, and 22,578 of those contacts were one-on-one in person, by phone, or by one-to-one emails (Sourcewatch.org, 2016). Members of Congress looking to oppose climate change action are able to leverage Heartland's reports as counters to the claims of the scientific community, which is reported on by the media and can influence public perceptions.

ICT in the United States and Hurricane Sandy

The United States is characterized by a high level of ICT based on the indicators of internet access and mobile phone penetration. In 2012, the year Hurricane Sandy hit, there were 79.3 internet users for every 100 people, according to World Bank Data. This includes individuals who have used the internet from any location in the last 12 months. According to this indicator, internet can be used via a computer, mobile phone, personal digital assistant, games machine, and digital TV. That same year, there were 96 mobile cellular phone subscriptions per 100 people. Mobile cellular telephone subscriptions are subscriptions to a public mobile telephone service that provide access to the public switched telephone network (PSTN) using cellular technology. This includes the number of postpaid subscriptions, and the number of active prepaid accounts. The indicator applies to all mobile cellular subscriptions that offer voice communications and excludes subscriptions via data cards or USB modems, subscriptions to public mobile data services, private trunked mobile radio, telepoint, radio paging and telemetry services. In September 2012, 45 percent of American adults owned smartphones, according to Pew (Rain, 2012).

Remote sensing satellites played an important role in predicting Hurricane Sandy's landfall, which attracted a great deal of publicity and praise in the immediate aftermath of the event (McNally et al., 2014). Five days before Hurricane Sandy hit the East Coast, a computer model run by a European weather modeling center accurately predicted its track and strength, compelling weather forecasters to sound the alarm. In the hurricane's

aftermath, the NOAA released a report that showed the value of polar-orbiting satellites in developing life-saving forecasts with longer lead times. Knowledge of where the hurricane was likely to hit allowed many to escape the danger zones — and without this technology, the death toll likely would have been higher than the 125 killed in the U.S. (Freedman, 2012).

Internet usage on the east coast increased by 114 percent when Hurricane Sandy struck, with many people turning to social media platforms such as Twitter, Facebook, Reddit, and others to retrieve and share information. Within the first 24 hours of the storm, over one million people mentioned the word hurricane on Twitter; Facebook witnessed an outpour of Sandy postings; ten storm-related pictures were posted per second on Instagram; and internet-based chatting services such as Skype saw a significant spike in traffic (Giroux, Roth, and Herzog, 2013). This information also translated into community action, with tweets mentioning the Red Cross increasing by thirty fold between October 28 and 30, 2012 as people looked for ways to make donations and assist victims. Government officials such as New York City Mayor Michael Bloomberg and Newark Mayor Cory Booker used Twitter as a medium to communicate crisis preparation and response efforts, while private actors such as Google set up a dynamic crisis mapping platform and electricity provider Con Edison used Twitter to provide service updates to customers (Giroux, Roth, and Herzog, 2013). Interestingly, despite the high level of mobile phone penetration in the U.S., this technology was rendered all but useless after Hurricane Sandy knocked out cell towers and triggered a communications blackout, exposing a critical vulnerability to communication infrastructure (Smith, 2013).

United States Policy Responses to Hurricane Sandy

In the years following Hurricane Sandy, the United States political system displayed a gross lack of policy resilience in the face of the climate shock. Meanwhile, the American public failed to recognize climate change as a top-level threat, even after climate shocks such as Hurricane Sandy. At first glance, it appears that Hurricane Sandy may have reduced climate change skepticism in the American public. While a March 2012 Gallup poll found that 52 percent of Americans believed the effects of climate change already had begun, a Pew poll less than six months after Hurricane Sandy struck found that 69 percent of Americans agreed there was solid evidence the earth was warming (Saad, 2012, Drake, 2013). Despite this increased awareness and acceptance of climate change, only 33 percent of those polled in March 2013 described it as a "very" serious problem, while another 32 percent said it was "somewhat serious." In total, 40 percent of Americans said climate change was a major threat to the U.S, which was well below the median of 54 percent in the global survey (Drake, 2013).

Climate change's politicization in the United States becomes clear when looking at Pew's poll from a partisan perspective. A healthy majority of Democrats (84 percent) said there is solid evidence that the earth has been getting warmer over the last few decades, and 64 percent attribute this warming to human activities. Conversely, less than half of Republicans (46 percent) agreed there is solid evidence that the earth has been getting warmer over the last few decades, and a meager 23 percent of them attribute climate change to human activities (Drake, 2013).

The high politicization of a scientific issue may be indicative of non-institutional veto players at work, who prevent climate change policy options from even reaching the institutional veto points by perpetuating the illusion of debate in the political system. In their 2011 book, Merchants of Doubt, Conway and Oreskes argue that a loose-knit group of high-level scientists and scientific advisers — with deep connections in politics and industry — have run effective campaigns to mislead the public and deny well-established scientific knowledge over four decades, which includes climate change (Conway and Oreskes, 2011).

In order to achieve the greenhouse gas emissions reductions scientists say will be needed to avoid the worst impacts of climate change, 82 percent of the world's coal, 49 percent of its gas, and 33 percent of its oil must remain in the ground (CTI, 2013). With this translating to trillions of dollars of so-called "stranded assets" on the line, the fossil fuel industry has a strong economic interest in perpetuating the climate change debate. However, because the fossil fuel industry lacks credibility to outright deny climate science, it often relies on proxies to manufacture a debate through the media. A 2014 report by the Union of Concerned Scientists found a strong link between dark money in politics and climate change denial, involving money flowing through trade associations such as the American Petroleum Institute (API) and American Chemistry Council (ACC). Other corporate interests rely on direct control over the media to push a climate change denial agenda (UCS, 2014).

While President Barack Obama has made significant strides to leverage his executive power to promote climate change mitigation and adaptation, Congress has failed to pass any meaningful legislation — and many members have continued to deny

the very science behind climate change. Still, plenty of members of Congress have shown they recognize climate change as a threat: the 113th Congress (2013-2014) introduced nearly 230 bills focusing specifically on climate change, and many more bills touched on energy, environment, transportation, agriculture and other areas that could have an impact on or be affected by climate change (C2ES, 2014). This was twice as many climate-related bills than in the previous Congress, suggesting Hurricane Sandy's devastation may have served as a focusing event that drew renewed attention to climate change as a problem.

Little climate-related legislation passed — a total of 144 bills (62 percent) supported climate action in some way; 48 were intended to build resilience to climate impacts; and 4 sought to reduce short-lived climate pollutants. Meanwhile, as many as 90 percent of the Republican leadership in both House and Senate denied climate change, and only 26 bills supporting climate action had bipartisan co-sponsorship. Despite the influx of climate change legislation, Congress only voted on 48 of the bills — three-quarters passed the House of Representatives, and nearly 35 percent of these bills would curb the Environmental Protection Agency's (EPA) greenhouse gas regulatory authority (C2ES, 2014). Only three bills loosely related to climate change — although not directly referencing it — passed and were signed into law: the Disaster Relief Appropriations Act and the Hurricane Sandy Relief bills, as well as Public Law 113-89, which reversed many of the provisions of the Flood Insurance Reform Act of 2012, and was enacted into law despite being opposed by climate action and taxpayer advocates (C2ES, 2014).

The 2014 midterm elections saw the balance of power in Congress move even further right, with major gains by Republicans in both chambers. The Republican

leadership listed several energy issues they wanted to address, including approving the Keystone pipeline, spurring fossil fuel development, and curtailing environmental regulations such as proposed limits on carbon emissions from power plants (C2ES, 2015). As many as 163 elected representatives from the 113th Congress publicly denied the existence of climate change, who also took over $58.8 million from the fossil fuel industry — the primary producer of the carbon emissions that cause global warming (Germain, 2013). The current 114th Congress, which began in January 2016, has introduced nearly 100 bills focusing specifically on climate change. Over 70 percent favor climate policy action, while nearly half of those bills focus on climate change adaptation and climate science. Many more relate to energy, environment, transportation, agriculture and other areas that could have an impact on or be affected by climate change.

After years of facing an obdurate Congress, President Obama in June 2013 unveiled an executive climate action plan in a highly publicized speech at Georgetown University. The plan would cut carbon pollution, prepare the U.S. for climate change impacts, and lead international efforts to combat global climate change and prepare for its impacts (EOP, 2013). This would be achieved through establishing tighter pollution controls on coal- and gas-fired power plants and setting strict conditions for approval of the proposed Keystone XL pipeline. The president also announced that the government would take climate change into consideration in its everyday operations, which could affect decisions on a range of issues, including bridge heights, flood insurance rates and how the military gets electricity overseas. Reiterating that climate change is a top priority, President Obama made clear he was willing to use his veto power to block legislation that could exacerbate global warming.

In his speech, the president drew the connection between Hurricane Sandy and climate shocks:

"Now, we know that no single weather event is caused solely by climate change. Droughts and fires and floods, they go back to ancient times. But we also know that in a world that's warmer than it used to be, all weather events are affected by a warming planet. The fact that sea level in New York, in New York Harbor, are now a foot higher than a century ago — that didn't cause Hurricane Sandy, but it certainly contributed to the destruction that left large parts of our mightiest city dark and underwater" (Obama, 2013).

In August 2015, the EPA released the final version of its Clean Power Plan, which strengthened the overall 2030 emissions reduction goal from 30 to 32 percent below 2005 levels, greatly expanded the role for renewable energy in cutting emissions, and established an interstate trading program for states that want to avail themselves of that option as a practical, cost-effective way to lower carbon pollution (Sustainable Brands, 2015). A strong majority (73 percent) of Americans support requiring significant reductions in greenhouse gas emissions from new power plants, and slightly fewer Americans (67 percent) support the Clean Power Plan to reduce carbon emissions from existing power plants (Rabe, Mills, and Borick, 2015). The Clean Power Plan also received widespread support from the business community, with some 365 companies and investor groups sending letters to more than two dozen governors across the United States voicing their support for President Obama's plan, and encouraging the state's "timely finalization" of state implementation plans to meet the new standards (Sustainable Brands, 2015).

But not everyone was happy about the proposed rules — a coalition of 24 states and a coal mining company filed lawsuits in October 2015 to challenge the Clean Power Plan, accusing the EPA of going far beyond the authority Congress granted to it by ordering a significant transformation of states' electricity generation, moving away from fossil fuels like coal and toward lower-carbon sources like wind and solar power (Cama, 2015). In February 2016, the Supreme Court ruled in a 5-to-4 vote — with the court's four liberal members dissenting — to temporarily block the EPA's regulating emissions from coal-fired power plants. The New York Times pointed out that the ruling was unprecedented — never before had the Supreme Court granted a request to halt a regulation before review by a federal appeals court (Liptak and Davenport, 2016). While the brief order will not necessarily halt Clean Power Plan from moving forward in the long run, it is a shocking example of a conservative Supreme Court's ability and willingness to serve as a veto point to policy resilience to climate change. However, the unexpected death of conservative Justice Antonin Scalia in February 2016 could mean that the Supreme Court will be more likely to uphold climate change action if the Senate approves a more climate change conscious Justice appointed by President Obama and confirmed (Moravec, Horwitz, and Markon, 2016).

While ICT created new policy options for emergency response to Hurricane Sandy and future climate shocks, these technologies did not help policy entrepreneurs to overcome the U.S. political system's high level of veto points to create and implement climate change mitigation and adaptation policies. While the U.S. government was able to use satellite data to predict the storm's path and preposition its emergency response and disaster relief assets — which undoubtedly helped to reduce Hurricane Sandy's

socioeconomic impact — many of the other digital technologies employed during and after the storm may not have had a significant political impact. As previously mentioned, Twitter allowed people in affected areas to instantly access information, and also allowed people around the world to easily donate to charities such as the Red Cross that were engaging in disaster relief operations. Open source GIS programs such as OpenStreetMaps were used by New York City to allow residents to identify evacuation zones for certain areas to avoid confusion. Even webcams were used to get live footage of areas to keep people updated on loved ones and to dissuade people from going outside and checking.

The evidence seems to indicate that without ICT, Hurricane Sandy would have been even more destructive, which may have created more of a national consensus to at least pass policies aimed at strengthening adaptive capacity to future storms. While digital technology allowed for Hurricane Sandy's destruction to be communicated nationwide, this did not lead to mass public outcry or help fuel the state's fledgling climate change movement. With the U.S. public slow to draw the connection between Hurricane Sandy and climate change, and also ranking climate change as a low-priority issue, the U.S. political system ultimately displayed a low level of policy resilience to this climate shock.

High Veto Point and Low ICT: The Philippines and Typhoon Haiyan

Geographic Context

The Philippines is an archipelago composed of more than 7,000 islands covering 300,000 square kilometers in Southeast Asia. The country's climate is tropical rainforest, tropical savanna, tropical monsoon, or humid subtropical characterized by relatively high temperature, oppressive humidity and abundant rainfall. As a nation made up of islands, it has a long coastline, stretching 36,289 kilometers. While the average elevation is 442 meters, many of its population centers are located at or near sea level. Sitting across a typhoon belt, the country is prone to dangerous storms from July through October. The Philippines is the fourth most disaster-prone country in the world, according to the United Nations Office for Disaster Risk Reduction (UNISDR), and on average 20 typhoons make landfall every year (Montenegro, 2015).

The Storm's Story

In November 2013, Typhoon Haiyan devastated Southeast Asia and the Philippines in particular, where it killed at least 6,268 people (Disaster Tech Lab, 2014). The thirtieth named storm of the 2013 Pacific typhoon season, Typhoon Haiyan — known as Typhoon Yolanda in the Philippines — was one of the strongest tropical cyclones ever recorded. Originating off the coast of Micronesia on November 2, the

storm rapidly intensified as it moved westward toward the Philippine archipelago. By November 6, the Joint Typhoon Warning Centre assessed the system as a Category 5-equivalent super typhoon on the Saffir-Simpson hurricane wind scale. At one point, meteorologists recorded one-minute sustained winds of up to 195 miles per hour — making Typhoon Haiyan the strongest tropical cyclone ever observed based on wind speed. Once the eye of the storm made landfall in the Philippines at Guiuan, Eastern Samar, Typhoon Haiyan became the strongest storm ever recorded at landfall (Disaster Tech Lab, 2014). Gradually weakening, the storm made five additional landfalls in the country before emerging over the South China Sea.

Typhoon Haiyan's devastation was overwhelming — houses, schools and health centers were destroyed, and over 14 million people were affected. More than 4 million were displaced, including 1.7 million children (UNICEF, 2014). Those hardest hit were on coastal and inland areas of Leyte, Samar, Eastern Samar, northern Cebu and Panay Island, which even before the storm were among the Philippines' most vulnerable and impoverished. Four months after the storm subsided, bodies still were being found and more than 4 million people still were displaced — even as the Philippine government and humanitarian groups struggled to restore access to basic governance services. The storm exacerbated poverty levels that likely will make these communities even more vulnerable to future climate shocks (UNICEF, 2014).

The Policy Window Opens

Typhoon Haiyan punctuated a long and destructive trend of climate shocks battering the Philippines. The five most devastating typhoons ever recorded in the Philippines have occurred since 1990, which affected 23 million people — and four of the costliest typhoons anywhere occurred during the same period (Tisdall, 2013). With mean temperatures in the Philippines rising by 0.14 degrees Celsius each decade and sea levels rising around the archipelago, scientists expect the onslaught of destructive typhoon climate shocks to increase significantly.

Typhoon Haiyan struck just as Naderev Sano, a young Filipino diplomat, was getting ready to lead his country's negotiations in the UN climate talks in Warsaw, Poland. Sano gave an impassioned speech in front of the delegates of 190 countries, which linked Typhoon Haiyan to anthropogenic climate change and urged the world to wake up to the reality of what he said was happening from Latin America to southeast Asia and the U.S. (The Daily Conversation, 2013). The diplomat denounced rich countries, who he charged as being the most responsible for generating the greenhouse gas emissions that cause climate change, and dared climate change deniers to go to his country to see what was happening.

Sano said: “Typhoons such as Yolanda (Haiyan) and its impacts represent a sobering reminder to the international community that we cannot afford to procrastinate on climate action. Warsaw must deliver on enhancing ambition and should muster the political will to address climate change.”

Sitting down sobbing, the delegates gave him a standing ovation.

UN Framework Convention on Climate Change head Christiana Figueres, who helped oversee the Warsaw talks, said the typhoon was part of the "sobering reality" of global warming. At Warsaw, participants from small island developing states (SIDS) said the typhoon served as a stark reminder of "the cost of inaction." In a statement, Olai Ngedikes, the lead negotiator for the Alliance of Small Island States (Aosis), said that the storm should motivate the work in Warsaw (The Daily Conversation, 2013). Focusing discussions on the issue of loss and damage, a key element for developing countries, she argued that this must proceed at pace.

"It has become clear that there are now impacts from climate change that can no longer be avoided," Ngedikes said.

Veto Points in the Philippines Political System

The Philippines is a republic with a presidential form of government, characterized by a high number of institutional veto points divided among its three branches: executive, legislative, and judicial. Fashioned after the U.S. political system, the Philippines government structure follows the principle of separation of powers, where legislation belongs to congress, execution to the executive, and settlement of legal controversies to the judiciary (GoP, 2016). These similarities can be traced to the Philippine's status as a U.S. colony from 1989 to 1946. From 1902 to 1934, the Philippines were subject to U.S. economic and social interests while gradually receiving greater autonomy. In 1902, the U.S. government established a Philippine Assembly, and by 1907 the Philippines held its first election, formed a legislature, and had been

introduced to U.S. teachers, engineers, and missionaries. Free trade with the U.S. arrived in 1913, limited self-government in 1916, and in 1934 the U.S. government assured independence within ten years (History Wired, 2016). The largest difference between the U.S. and Philippine political systems is that the latter has a multiparty system.

In the Philippine political system, power is divided strictly by the executive and the legislative branches. The president monopolizes the executive power and has the authority to appoint secretaries of departments, who are not allowed to hold a seat in the legislature. From a comparative perspective, the presidential legislative power in the Philippines is at the middle level, in both constitutional and partisan powers (Shugart and Carey, 1992). The President of the Philippines is elected through direct vote by the people for a term of six years. Unlike the U.S. political system, the president may only serve for one term, and is ineligible for reelection (GoP, 2016). Conflicting views about the strength of the Philippine executive branch include that the president is strong because of his or her constitutional powers, and the administrative control over the bureaucracy; while another view emphasizes the influence of dominant social class in the congress — presidential legislative initiatives that undermine the social interests usually fail, due to congressional resistance (de Dios, 1999, Abueva, 2002). In reality, the Philippine president's power likely falls somewhere in between these views. While the president cannot introduce legislation, he or she has the exclusive power to introduce budget proposals to the congress, which is not allowed to amend the budget proposal to exceed the total amount of the presidential proposal (Kawanaka, 2010). The president also can exercise a partial veto aside from the package veto on the budget bill approved by the legislature, which allows the president to amend the budget virtually at the final

stage. With ordinary policy implementation, regulatory power is under the sole jurisdiction of the president — he or she issues executive orders for this purpose under the mandate of the statutes (Kawanaka, 2010).

The Philippine legislature is bicameral, composed of the Senate and the House of Representatives. The Senate has 24 members elected from the national constituency, while the House has more than 200 members elected from single member districts and the limited proportional representation (Kawanaka, 2010). The legislature is dominant in general legislation due to the fact that the president has no power to introduce bills or intervene in the session. The president only is given the package veto power, but not the partial veto — therefore, the degree of presidential intervention is limited. Due to the reverse power balance between the president and the congress in regular legislation, bargaining arises between the budget making/implementation and the ordinary policy implementation. As a precondition for bargaining, the president and the congress must have different preferences in each area — in the general legislation, the congress usually prefers the status quo, while the president prefers to leave the status quo, particularly in regards to economic issues (Kawanaka, 2010). Conversely, for the budget process the president prefers to restrain the expenditure, while the congress prefers to secure more allotment for their local projects, which eventually leads to expansion of the expenditure. Because the ordinary legislation technically is independent of the budget process and policy implementation, the decision making often proceeds as though they are not related. Compromises are made and exchanged across the different areas, and such bargaining as a whole decides the final outcome (Kawanaka, 2010).

Judicial power in the Philippines rests with the Supreme Court and lower courts, which settle actual controversies involving rights which are legally demandable and enforceable. The judiciary enjoys fiscal autonomy, and its appropriation may not be reduced by the legislature below the appropriated amount the previous year (GoP, 2016). Appointments to the judiciary are made by the president of the Philippines based on a list submitted by the Judicial and Bar Council, which is under the supervision of the Supreme Court — its principal function is to screen prospective appointees to any judicial post. As early as 1936, the Philippine Supreme Court has unequivocally asserted its constitutional authority to engage in judicial review, which was affirmed in the Supreme Court decision in Angara v. Electoral Commission, 63 Phil. 139 (1936). However, the Court has since often declined to exercise judicial review by invoking the political question doctrine.

In 1987, the constitutional convention formed to draft a new charter decided to provide for a definition of "judicial power" as a means of preventing the Supreme Court from frequently resorting to the political question doctrine. The 1987 Constitution states in part that judicial power includes the duty of courts of justice to settle actual controversies involving rights which are legally demandable and enforceable, and to determine whether or not there has been a grave abuse of discretion amounting to lack or excess of jurisdiction on the part of any branch or instrumentality of the government (Castañeda, 2001). Through judicial review the Philippine Supreme Court can act as an institutional veto point to policies passed by the executive or congress.

The Philippine government has a moderate level of effectiveness, scoring 0.19 (61st percentile), according to the World Bank's Worldwide Governance Indicators (WGI), which scores -2.5 as the lowest to 2.5 being the highest. Voice and Accountability

in the Philippines was scored at 0.13 (52nd percentile), indicating that citizens' voices are not always heard or heeded by the government. Corruption is a major problem in the Philippines, which scored -0.44 (40th percentile) in the Control of Corruption category. However, corruption decreased significantly from 2009 to 2014, falling from -0.77 to -.044, respectively.

ICT in the Philippines and Typhoon Haiyan

The Philippines is characterized by a relatively low level of ICT use based on the indicators of internet access. In 2013, the year Typhoon Haiyan hit, there were only 37 internet users for every 100 people according to World Bank Data. This includes individuals who have used the internet from any location in the last 12 months. Internet can be used via a computer, mobile phone, personal digital assistant, games machine, and digital TV. In 2013, only 22.9 percent of Filipinos had internet access at home (ITU, 2013). For those with internet access in the Philippines, they experience some of the slowest internet connectivity speeds in the world. Mobile phone penetration is significantly higher in the Philippines, with 105 mobile phone subscriptions for every 100 people in 2013. However, many of these phones lack internet access and generally are used for calling and short message service (SMS). Filipinos send an average of two billion SMS messages per day, among the most in the world (Marcus, 2013).

Recognizing the slow growth of internet access, the Philippine government in 2011 established the Philippine Digital Strategy (PDS), a five-year ICT roadmap administered by the Information and Communications Technology Office (ICTO) of the

Department of Science and Technology (DOST). The blueprint acknowledges many of the enduring weaknesses in the country's ICT landscape, and sets out ambitious targets for digital inclusion, widespread broadband deployment and regulatory reform. However, the plan largely has failed to deliver much of what it set out to achieve. One of the largest barriers to internet growth in the Philippines is its highly concentrated telecommunications sector, which is dominated by two companies that have focus on commercially viable, often densely populated areas while largely ignoring rural regions (Guzman, 2015)

The magnitude of Typhoon Haiyan knocked down power, phone, and Internet lines, making various forms of ICT nearly impossible. As an archipelago composed of more than 7000 islands, the Philippines could have benefited greatly from ICT-enabled disaster response. However, unlike during Hurricane Sandy where social media platforms such as Twitter were used to great effect during disaster response, most Filipinos were unable to leverage these digital tools during and after Typhoon Haiyan (Takahashi, Tandoc, and Carmichael, 2015). Given the low level of ICT in the Philippines, most were unable to access the internet to use Twitter. Despite high levels of mobile phone usage in the Philippines, these were disabled when cellular towers were knocked offline.

In the first month of the Typhoon Haiyan response, one of the priorities facing the international community was to reestablish internet connectivity in order to facilitate information sharing and the provision of assistance. The primary challenge was repairing infrastructure damaged by the tidal surge. In many areas, the electricity infrastructure was totally destroyed, the mobile phone networks were brought down, and the landline telephone networks and internet service providers were severely damaged (Hall and

Ashcroft, 2014). While survivors had an urgent need for information about available services and aid, as well as support in finding ways to communicate with each other, the lack of ICT infrastructure led to increased confusion and mounting insecurity. To help remedy this, international relief organizations, the Philippine government, Philippine Telecoms providers, and others began assessing damage to communications infrastructure. Groups such as the Disaster Tech Lab arrived in the country to establish internet access points in regional disasters response and rebuilding hubs, which had little to no internet access following the typhoon (Disaster Tech Lab, 2014).

The Philippines Policy Responses to Typhoon Haiyan

The international community and Filipinos alike criticized heavily the Philippine government over its perceived slow response to the disaster, made infinitely more difficult by the shattered infrastructure. In addition to bringing down the Philippines' meager ICT infrastructure, Typhoon Haiyan shattered its flimsy transportation infrastructure, leaving many roads impassable and cluttered by debris from broken buildings that were destroyed when the ocean surged ashore (McDonell, 2013). The Philippines displayed a near total inability to respond to humanitarian nightmare Typhoon Haiyan wrought in its wake.

Despite the Philippine's display of limited statehood in the areas of disaster response, it has shown significantly more policy resilience in its environmental policy. In 2009, the country passed the Climate Change Act, which acknowledged climate change as a national priority and established a national climate change action plan. The National

Climate Change Action Plan on Climate Change established the goal of building the adaptive capacities of women and men in their communities; increase the resilience of vulnerable sectors and natural ecosystems to climate change; and optimize mitigation opportunities towards a gender-responsive and rights-based sustainable development (PCCC, 2010). The plan focuses on enhancing adaptive capacity of communities, resilience of natural ecosystems, and sustainability of built environment to climate change. However, implementing this plan in a meaningful way has been stymied by the Philippines' limited governance capacity likely connected to its poverty.

Typhoon Haiyan made the Philippines the poster child for the malevolent effects of climate change. While poor countries such as the Philippines are the least responsible for contributing to climate change, they are the most likely to suffer from its negative impacts (IPCC, 2014). The Philippines is the number one most affected country by climate change, according to the Global Climate Risk Index 2015, thanks in large part to its geography — it is located in the western Pacific Ocean, surrounded by naturally warm waters that likely will get even warmer as average sea-surface temperatures continue to rise (CRP, 2016). This has grave economic consequences for the Philippines — the state faces economic losses from climate change amounting to 2.5 percent of its gross domestic product per year (Saunar, 2015). In 2010, this equaled to about $45 billion, and losses are expected to increase to up to $418 billion in 2030. Typhoon Haiyan alone cost the Philippines around $12.9 billion.

After Naderev Sano's stirring speech at the UN climate talks in Warsaw, the Philippines made finance the centerpiece of its climate change action strategy — which focused on domestic and international policy. In August 2012, two months before Haiyan

struck, the Philippine congress passed the People's Survival Fund (PSF), which provides for at least 1 billion Philippine pesos ($22.8 million) per year in government spending and international donor aid for climate change adaptation initiatives led by local governments and communities. The PSF is designed to build resilience at the national, local government and individual level by financing targeted investments to improve resilience to climate change and natural disasters and provide funds to local governments for climate change adaptation and disaster risk reduction, as well as recovery and reconstruction. While the PSF already had made it through the legislature, Typhoon Haiyan brought the law to the forefront politically, and ensured that the president signed an amendment to the Climate Change Act that would promulgate the implementing rules and regulations required to make the PSF operational. Although it took three years, in October 2015 the PSF finally became operational and today can be accessed by local government units and community organizations needing financial support for climate change adaptation and disaster risk reduction (Ranada, 2015).

But the multi-million-dollar PSF still is too small to adequately handle the billion dollar costs of many climate shocks hitting the Philippines. That is why the Philippines turned to the international community for additional climate change adaptation support. It currently leads the Climate Vulnerable Forum (CVF), a global partnership of countries which are disproportionately affected by the consequences of global warming. The CVF was formed to increase the accountability of industrialized nations for the consequences of global climate change. In 2015, members of the CVF formed the "V20" or "Vulnerable 20," consisting of the top 20 nations from all over the world that are most affected by climate change impacts, including Afghanistan, Ethiopia, Rwanda,

Bangladesh, Barbados, among others. The V20 called for a significant mobilization of public and private finance for climate action at the international, regional and domestic level ahead of the COP21 talks in Paris in December 2015 (World Bank, 2015). While the international climate change agreement coming out of COP21 has been hailed as a major step forward toward protecting the world's poorest from climate shocks, the deal offers only vague promises of future funding to help at-risk countries adapt (Rowling, 2015).

The low level of ICT in the Philippines limited the government's policy options for disaster response. With communication, transportation, and electricity infrastructure wiped out, the Philippine government was forced to rely on foreign aid to reestablish basic governance capacity. As many as 66 U.S. military aircraft and 12 naval vessels were involved in relief efforts and nearly 1,000 U.S. military personnel were deployed directly to the disaster areas. U.S. military assistance included clearing roads, transporting aid workers, distributing 2,495 tons of relief supplies, and evacuating over 21,000 people (Lum, 2014). The political shock Typhoon Haiyan generated — the latest in a series of severe storms — was enough to allow policies aimed at promoting climate change mitigation and adaption to pass through the Philippine political system's high level of veto points. If a high level of ICT and other infrastructure had been present in the Philippines when Typhoon Haiyan struck, this likely would have reduced the storm's negative socioeconomic impact. This gives credence to the idea that, while ICT can improve adaptive capacity in terms of disaster response, by reducing the shock value of climate shocks, ICT may actually reduce policy resiliency in the long term. However, while the Philippines displayed a high level of policy resiliency and consolidation of

statehood in its environmental policy field in terms of creating policies aimed at promoting climate change mitigation and adaptation, its limited governance capacity for disaster response and in other areas means that it may be unable to implement many of these climate change policies without international assistance, or increased ICT adoption.

Low Veto Point and High ICT: India and Cyclone Phailin

Geographic Context

India is the seventh largest country in the world, with a total area of 3,287,263 square kilometers. On the south, India projects into and is bounded by the Indian Ocean — by the Arabian Sea on the southwest, the Laccadive Sea to the south, and the Bay of Bengal on the southeast. India's coastline stretches 7,517 kilometers. The country contains six major climatic subtypes, ranging from arid desert in the west, alpine tundra and glaciers in the north, and humid tropical regions supporting rainforests in the southwest and the island territories. While the average elevation is relatively low at 160 meters, it has some of the highest elevations in the world, specifically in the Himalaya Mountains. Cyclones and other tropical storms commonly affect the state's southeastern region near the Bay of Bengal.

The Storm's Story

In October 2013, Cyclone Phailin became the most powerful tropical cyclone to make landfall in India since the devastating 1999 Odisha cyclone (Mohapatra, 2014). Originating within the Gulf of Thailand to the west of Phnom Penh, Cambodia, the storm moved westward, passing over the Malay Peninsula, and earning its classification as a named cyclone when it entered the Bay of Bengal. When Cyclone Phailin made landfall in India, huge waves hit the coast as winds reached more than 124 miles per hour. Cyclone Phailin left a trail of destruction in its wake, flooding communities and flattening buildings (Poulter and McDiarmid, 2013). The storm killed a total of 45 people and inflicted $696 million worth of damage. Given advanced warning by meteorologists that Cyclone Phailin was heading towards the states of Odisha and Andhra Pradesh on India's east coast, communities and authorities took immediate action to evacuate nearly a million people from the storm's projected path. Authorities moved emergency response teams and supplies into position, readied helicopters and rescue boats, and put military personnel on standby (Perera, 2013).

While the devastation of Cyclone Phailin could have been much worse, India was able to mitigate it largely due to its ongoing experience with extreme storms. Since 2008, India has faced a severe cyclone nearly every year, including Cyclone Nisha (2008), Cyclone Phyan (2009), Cyclone Jal (2010), Cyclone Laila (2010), Cyclone Thane (2011), and Cyclone Nilam (2012), which collectively killed hundreds, displaced hundreds of thousands, and affected millions of people, as well as inflicting significant economic

damage (Skymet, 2013). Cyclone Phailin often is compared to the similarly-sized 1999 Odisha cyclone, but which killed more than 10,000 people and caused $4.5 billion worth of damage. With Cyclone Phailin, India also dodged the proverbial bullet due to the fact that the storm made landfall in an area with a relatively sparse population, and a steep continental shelf and elevated overland terrain that helped limit flooding due to storm surge (Sandri, 2014). Had the storm hit a more densely-populated and low-lying region, the outcome may have been much more morbid.

The Policy Window Opens

One month after Cyclone Phailin hit, representatives of the Indian government at the COP19 UN climate conference in Warsaw, Poland were reluctant to draw the connection between the cyclone and climate change. Green NGOs from India accused Indian negotiators of having an "attitude problem" as they failed to mention Cyclone Phailin or another recent extreme weather event, the Uttarakhand floods — which killed nearly 6,000 people and affected more than 4,000 villages — in their opening statement (FirstPost, 2013). At Warsaw, the more recent climate shock of Typhoon Haiyan hogged the limelight, thanks to Philippine negotiator Naderev Sano's impassioned speech.

Indian NGO policy entrepreneurs lamented the Indian government's reluctance to connect extreme weather events to climate change, perhaps in recognition that these disasters had opened a new policy window for climate change action.

Chandra Bhushan, an Indian climate expert and deputy director general of a New Delhi-based NGO Centre for Science and Environment (CSE) said in a statement:

"Everyone is talking about Philippines... no one is talking about India. I think this is an attitude problem of Indian negotiators. Thousands of people have died in Uttarakhand. Not a word from Indian side on the climate disaster in India from Uttarakhand to Cyclone Phailin in Odisha." (FirstPost, 2013).

Major international media outlets, including The New York Times, Wall Street Journal, and The Huffington Post, all drew the connection between Cyclone Phailin and climate change. Writing in The Huffington Post, environmental organizer Chaitanya Kumar wrote:

"Climate change is as much about politics as it is about science and to act on it would require political mobilization preceded by a greater public demand to acknowledge and act on this clear and present danger."

While he commended the Indian government on its disaster response to the cyclone, Kumar concluded: "Phailin should therefore be another stark reminder for us to think hard about climate adaptation in what is now a new normal in our planet's weather" (Kumar, 2013).

But most Indian media did not even mention climate change or global warming in their coverage of Cyclone Phailin. Indian environmentalist Subhankar Banerjee noted that most coverage of the cyclone in the Indian media focused on the issue of what to call the storm and who to blame for what went right and wrong in the disaster response. While many of them used terms such as supercyclone to describe Cyclone Phailin, most avoided associating it with climate change (Banerjee, 2013).

Some in the Indian media criticized the government's "move or perish" mass evacuation strategy — while thousands of lives were saved, many were needlessly disrupted. One Indian journalist writing for Tehelka Magazine said the Indian government had done little to identify areas vulnerable to inundation at different surge and wind speed levels. Because the vulnerable areas along the coastline are at different elevations, such a study could have assisted the government in identifying specific target areas for evacuation. A targeted evacuation at a smaller scale could have allowed people time and space to minimize other losses — their livestock could have been salvaged, evacuated families could have carried more assets to safety, and relief efforts would have been less difficult, faster and more effective (Mazoomdaar, 2013).

Veto Points in the Indian Political System

The Indian political system has very few institutional veto points because it is a parliamentary democracy where the leader of the largest party or coalition of parties in the lower house of Parliament is elected as prime minister. In turn, the prime minister appoints the Cabinet of Ministers — meaning there is little separation between executive and legislative powers. The ruling party or coalition can pass almost all legislation at will since, by definition, it has an absolute majority in parliament, and because a constitutional amendment in 1985 allows the disqualification of members of parliament who abstain or vote against their party's directions (Bang and Underdal, 2015). The only practical limit on a government's legislative powers is the need to keep coalition members on board, which can sometimes be an issue given India's vibrant multi-party

system. As the world's largest democracy, there can be many conflicting interests. India has a population of more than 1.25 billion people and more than 20 official languages.

India's constitution divides legislative and administrative responsibilities between the central government and the states: the Union List — the exclusive prerogatives of the central government such as defense and telecommunications; the State List — the prerogatives of the state governments such as agriculture and public health; and the Concurrent List, which includes items where both the central and state governments may legislate and administer such as environmental policy (Bang and Underdal, 2015). In practice, however, the central government typically gets its way through its control of public finances. The lack of institutional veto points and centralization in the Indian political system has proven to be a mixed blessing when it comes to policy resilience to climate change — central directives often pass without proper local-level support and therefore either are not seriously undertaken or are actively or passively sabotaged at the local level.

India's Supreme Court does exercise a limited veto point through its power of judicial review. During its initial years after the establishment of the Indian Constitution, the Supreme Court was characterized by caution and circumspection. Following in the British tradition of limited judicial review, the Court generally adopted a pro-legislature stance (Rao, 2003). Over the years, however, the Supreme Court has become more activist in its rulings — particularly with environmental issues. In a 2014 order, the Supreme Court required the central government to set up a national environment regulator with offices in every state, entrusted with appraising and approving projects for environmental clearances (Jain, 2014). The Supreme Court also has availed itself of the

innovative tool of Public Interest Litigation (PIL) — a judicial pill for relief against executive wrongs.

The Indian government has a low level of effectiveness, scoring a -0.2 (47th percentile) in 2013, according to the World Bank's Worldwide Governance Indicators (WGI), which scores -2.5 as the lowest to 2.5 as the highest. India scored much higher in Voice and Accountability in the Philippines, with a 0.42 (61st percentile). However, the government suffers from significant corruption, scoring a dismal -0.46 (35th percentile).

ICT in India and Cyclone Phailin

When it comes to ICT penetration, India sits in an interesting place. At first glance it appears to be characterized by low level of ICT use — in 2013, there were just over 15 internet users for every 100 people — but there still were a whopping 205 million internet users in India when Cyclone Phailin struck. Over the following year, India added another 100 million new internet users, crossing the 300 million mark by the end of 2014 (Janu, 2015). To put this into perspective, there currently are more Indian internet users than the total population of the United States.

Many Indians also are accessing the internet via their mobile phones. In 2013, there were 71 mobile phone subscriptions for every 100 people, and as many as 110 million people used their mobile phone to access the internet. However, it is important to note that in the Indian state of Odisha — which bore the brunt of Cyclone Phailin — only 1 percent of the households had access to the internet, according to 2011 data (Discover

BBSR, 2014). Granted, internet access is expected to have increased in this region by 2013, when the storm struck.

India is unusual among developing countries in that it maintains its own fleet of multipurpose geostationary satellites, called the Indian National Satellite System (INSAT). Launched by the Indian Space Research Organisation (ISRO), India's space agency, this satellite system is used to for telecommunications, broadcasting, meteorology, and search and rescue operations. INSAT is the largest domestic communication system in the Asia Pacific Region, and The Indian space agency is engaged in research studies and activities related to the Earth's climate system, designing sensors and satellites, and established ground based observations systems for studying the climate and environmental parameters (ISRO, 2016). It has designed and developed indigenous systems for ground-based observations of weather parameters, including automated weather stations that provide hourly information on critical weather parameters such as pressure, temperature, humidity, rainfall, wind and radiation from remote and inaccessible areas; meteorological towers to measure soil temperature, soil moisture, soil heat and net radiation, wind speed, wind direction, pressure and humidity; and Doppler weather radar to monitor extreme weather events such as cyclone and heavy rainfall.

Four days before Cyclone Phailin hit, an ISRO satellite called OCEANSAT-2 accurately predicted the storm's changing intensity, timing, and landfall location, which made possible the timely evacuation and minimal loss of human life. In total, nearly 1.2 million people were evacuated, which resulted in the largest evacuation operation in India in 23 years. Early warning also allowed for the relocation of more than 30,000 animals —

important for the economic survival of many rural Indians. In addition to traditional communication channels such as the print and television news, the Indian government leveraged ICT to warn the at-risk population about the impending cyclone. The government communicated warnings and alerts via email, internet news, fax, and telephone, which included sending text message alerts to more than 10,000 people in Andhra Pradesh the day before the cyclone made landfall (Price, 2013). The information garnered from the satellites was conveyed even through such low-tech means as loudspeakers in various districts to warn residents of impending danger and to warn fishing boats that were out at sea (Senapati, 2013). To ensure that warning communications continued during the storm, the Indian government distributed satellite phones to representatives in the 14 most vulnerable districts (GoO, 2013). In 2016, OCEANST-2 reached its end-of-life, and ISRO began developing a new, miniature weather-forecasting satellite called ScatSat — capable of predicting future cyclones at a fraction of the cost.

The Indian Policy Response to Cyclone Phailin

The Indian government displayed a moderately high level of policy responsiveness to Cyclone Phailin. On the one hand, the Indian government's representatives at COP19 in Warsaw did not mention the cyclone or other recent extreme weather events in their remarks — much to the chagrin of many Indian NGO policy entrepreneurs. Internationally, India has been somewhat obstructionist in climate

negotiation. On the other hand, however, the Indian government has passed many policies aimed at mitigating climate change and promoting adaptive capacity.

In 2008, the Indian government released its first National Action Plan on Climate Change (NAPCC) outlining existing and future policies and programs addressing climate mitigation and adaptation. The plan identifies eight core "national missions" running through 2017, which focus on promoting renewable energy, improving energy efficiency, water conservation, sustainable agriculture, and improving understanding of climate science, among others.

In 2010, India placed a levy on coal, which puts the funds toward the National Clean Energy Fund. India has the world's fourth largest coal reserves, which make up more than half of the country's energy production (BP, 2015). It is important to note that, as a developing country, India has no obligations under the 1992 United Nations Framework Convention on Climate Change (UNFCCC) — to which it is a party — but still has coordinated comprehensive policies across its domestic economy covering both mitigation of greenhouse gas emissions and adaptation.

Nevertheless, India remains the world's third largest greenhouse gas emitter, after the United States and China. India's emissions increased by 67.1 percent between 1990 and 2012, and are projected to grow 85 percent by 2030 under a business-as-usual scenario (C2ES, 2016). Between 2008 and 2014, coal consumption in India increased significantly from just over 500 million metric tons to just over 800 million metric tons, respectively (GoI, 2014). Despite the destruction it experienced from Cyclone Phailin and other extreme weather events, the government of India in 2015 set ambitious target to increase domestic coal production to 1.5 billion tons by 2020. Millions of rural Indians

still live without electricity, and expanding energy production is part of the Indian government's plan for helping to lift these people out of poverty.

India's government has made it clear to the international community that its number one priority is promoting economic growth to help alleviate its epic poverty. For the most part, this has been working: over the past decade poverty in India has declined sharply, from 37.2 percent in 2005 to 21.9 percent in 2015, defined as those having an income of less than $1.25 a day. However, India remains one of the poorest countries in the world, with one-fourth of the world's poor and more than one-third of all malnourished children (Agarwal, 2015). This economic growth has come largely at the environment's expense. In a 2014 survey of 178 countries whose environments were surveyed, India ranked 155th overall and almost last in air pollution exposure. The survey also found that India's environmental quality is far below all BRIC (Brazil, Russia, India, and China) countries. In addition, according to another recent WHO survey, across the G-20 economies, 13 of the 20 most polluted cities are in India (World Bank, 2014).

The two years following Cyclone Phailin were significant ones in the global effort to combat climate change, but the Indian government has behaved obstructionist in international climate talks. When it comes to climate change mitigation, India has espoused equity concerns — that the West achieved its high level of prosperity by burning fossil fuels, and India also has the right to develop in the same manner. Indian Prime Minister Narendra Damodardas Modi, who entered office months after Cyclone Haiyan struck, was noticeably absent from the 2014 UN Climate Summit in New York City, which was attended by more than 120 world leaders, including President Barack Obama. Some interpreted this as showing India's lack of seriousness in engaging in

international negotiations on climate change. Around the same time, Modi made remarks expressing doubt about the seriousness of climate change.

"Climate has not changed. We have changed. Our habits have changed. Our habits have got spoiled. Due to that, we have destroyed our entire environment," Modi was reported to have said (Sharma, 2014).

This seemed to conflict the Modi's previous views on climate change. During his time as Chief Minister of Gujarat, he launched the first state-level ministry to address climate change and promoted the use of renewables, especially solar (Antholis, 2014).

While the leader of Gujarat, Modi expressed his climate change views to one reporter: "For me, this is a moral issue. You don't have a right to exploit what belongs to future generations. We are only allowed to milk the earth, not to kill it."

Whatever Modi's views on climate change may be, at COP20 in Lima, Peru the Indian government showed significant policy resilience by pledging to boost its solar power capacity five-fold to 100 gigawatts by 2030 — increasing the country's solar energy share from 6 percent to 15 percent (Climate Group, 2014). The following year at COP21 in Paris, Modi and French president François Hollande launched an international solar alliance of over 120 countries, which involved India pledging to source 40 percent of its electricity from renewable and other low-carbon sources by 2030 (Vaughan, 2015). Climate Action Tracker, which rates countries based on their stated climate change commitments and actions, currently rates India as "medium," indicating that India's climate plans are at the least ambitious end of what would be a fair contribution; however, it is not consistent with limiting warming to below 2°C, unless other countries

make much deeper reductions and comparably greater effort (Climate Action Tracker, 2015).

The Indian political system's moderate level of policy responsiveness to the Cyclone Phailin climate shock may be tied to the state's high level of ICT creating new policy options for disaster response and other adaptation techniques, which made it simpler to bypass the low number of veto points. As previously mentioned, Cyclone Phailin likely would have been inflicted much greater socioeconomic harm without the use of satellite data to predict the storm's path and preemptively evacuate at-risk populations. However, this digital technology only was effective due to the Indian government's high level of governance capacity for evacuating such great numbers of people, thanks to its large professional military. Images from the disaster communicated via digital technology also created a high level of awareness throughout India about Cyclone Phailin's destruction, which may have put additional pressure on the Indian government to create and implement policies aimed at promoting climate change mitigation and adaptation.

Low Veto Point and Low ICT: Cuba and Hurricane Dennis

Geographic Context

Cuba is an island nation in the Caribbean sea, with a total area of 109,884 square kilometers and a coastline of 5,746 kilometers. As a small island state, Cuba's average elevation is only 108 meters — making it particularly vulnerable to sea level rise and storm surges. While the island of Cuba makes up most of the state's land mass, it actually is part of a small archipelago of even smaller islands, which surround the main island. Cuba consists largely of flat and rolling plains, and contains a small steep of mountains, the Sierra Maestra, in its southeastern. Cuba's climate is tropical, but has a drier season from November to April, and a rainier season from May to October. The state lies in the path of hurricanes, which are most common in September and October.

The Storm's Story

Hurricane Dennis was the first major hurricane of the record-breaking 2005 Atlantic hurricane season, which included three of the six most intense Atlantic Hurricanes ever recorded — Wilma, Rita, and Katrina. Passing over Haiti and Jamaica, Hurricane Dennis hit Cuba twice as a Category 4 hurricane on the Saffir-Simpson scale, reaching wind speeds of up to 149 miles per hour. The storm dumped heavy rain across the country, with rainfall reaching up to 43 inches — making it one of the wettest storms

in Cuba's recent history. The storm flattened houses and downed trees and power lines alike. As many as 120,000 homes were damaged, and 15,000 were destroyed. More than 1,000 electricity posts were felled and 21 municipalities were left without power. The lack of electricity led to 2.5 million people losing access to a direct water supply (CubaHurricane.Org, 2008). The storm also devastated Cuba's citrus and vegetable industries, as the country's primary agricultural regions were the hardest hit. Many agricultural animals died, including 73,000 chickens. Following the storm, Cuban President Fidel Castro immediately announced plans for an additional investment of $400 million for foodstuffs to help with disaster relief. Hurricane Dennis left 16 people dead and caused $1.4 billion in damages. The storm was more destructive than the previous year's Hurricane Charley and is widely regarded as the worst hurricane to strike Cuba since Hurricane Flora in the 1963 season.

The Policy Window Opens

In a television roundtable after Hurricane Dennis passed, President Fidel Castro did not directly mention climate change, focusing instead on the economic damage and the government's disaster response. Reflecting on the storm's damage, Castro emphasized the importance of developing an "energy culture" among the people, to intensify the saving of energy to avoid elevated fuel costs, as well as wasting water, which leads to unnecessary costs (Orama, 2005). During the roundtable, the first secretaries of the Communist Party in the provinces of Cienfuegos, Matanzas, Habana, and City of Havana offered information on the government's efforts to restore electricity,

gas and water supplies. Later, Castro established a dialogue with the defense council presidents in each of the most affected areas, which lead to the creation of coordinated relief strategy. The government aid focused in eastern Cuba, which even before the storm had been suffering from a long drought. Meanwhile, Castro rejected $50,000 in hurricane aid offered by the United States, claiming that even if the U.S. were to offer a billion dollars, Cuba would not accept it.

While climate change already was well-understood by scientists in 2005, the connection between climate change and extreme weather events had yet to be established. Mere months after Hurricane Dennis, Cuba in October 2005 endured Hurricane Wilma, the most intense tropical cyclone ever recorded in the Atlantic basin, and until Hurricane Patricia in 2015 the most intense tropical cyclone recorded in the western hemisphere (NOAA, 2005). Hurricane Wilma hit Cuba from all sides, but never made landfall on the island. However, it is important to note that a hurricane making landfall only means that the eye of the storm crosses the shoreline. Hurricanes are massive systems sometimes bigger than states, and just because a storm fails to make landfall does not necessarily mean it will not devastate a particular region (Laden, 2012). Hurricane Wilma dropped torrents of rain on eastern Cuba, and later engulfed Havana and flooded low-lying farm areas along Cuba's northwest coast. Reaching winds of 185 miles per hour, the storm generated 20 foot waves that broke through the Malecon sea wall in Havana, sending waist-high surges along streets deep into the city (Whitney, 2005). Miraculously, no one in Cuba died from Hurricane Wilma.

One woman told a reporter on the ground: “In all the 50 years that I have lived here, I’ve never seen anything like it. The sea broke everything.” Many Cubans were reminded of the so-called Storm of the Century, which had devastated Cuba in 1993.

Veto Points in Cuba

Cuba is an independent socialist republic controlled by a single party, the Cuban Communist Party (PCC), and its political system is characterized by a low number of veto points. As one of the world’s last remaining socialist countries following Marxist-Leninist ideology, the country’s constitution describes the Communist Party as “the leading force of society and of the state” (GoC, 2002). Fidel Castro is the head of the Communist Party and serves as commander-in-chief of the Cuban Republic, heading both executive bodies of the national government — the Council of Ministers, and a Council of State. Fidel Castro’s brother, Raul Castro, serves as first vice-president of the party and two executive bodies. The Communist Party is led by a group of 25 individuals chosen by the party’s head, which molds organizations that cover every facet of society, including youth, women, workers, and small farmers, among others — and around 80 percent of the population has membership in at least one of these organizations. This network ensures that the Communist Party’s agenda is communicated to the masses (GoC, 2002).

The members of the Council of Ministers are proposed by the president of the Council of State and ratified by the National Assembly, Cuba’s national legislature. The members of the Council of State and its president and vice-president are elected by the

National Assembly. The National Assembly consists of 609 members who serve five-year terms (GoC, 2002). The assembly meets twice a year, and between sessions legislative power is held by the Council of Ministers. While Fidel Castro has made many statements over the years that Cuba is a democracy or has democratic features, this is only partially accurate. Candidates for the Assembly are approved by public referendum, and all Cuban citizens over 16 who have not been convicted of a criminal offense can vote. However, Fidel and Raul Castro's executive power has never been truly challenged. During the 1998 election, the last one to take place before Hurricane Dennis hit, Fidel and Raul Castro were elected unanimously. As a single-party state, there are no competitive elections.

The Cuban governmental structure is heavily bureaucratic, organized into many agencies and until 1993 the Central Planning Board (JUCEPLAN, or Junta de Planificación Central), was responsible for economic planning (Nations Encyclopedia, 2016). After 1993, different economic sectors became the responsibility of various ministerial bodies, as part of a move to create greater efficiency and to decentralize. This included the Ministry of Tourism, the Ministry of Science, Technology, and the Environment, the Ministry of Industry, the Ministry of Sugar Planning, and the Ministry of Foreign Investment and Economic Cooperation, among others. The government controls most of the Cuban economy, with 75 percent of the labor force employed by the government (Nations Encyclopedia, 2016). Due to this fact, decisions that are made within each state-run ministry have a great impact on the economy and on Cuban citizens. In Cuba, environmental issues are concentrated under central government

jurisdiction, with the Ministry of Science, Technology and Environment as the main authority (LSE, 2016).

Cuba's highest national judicial body is known as the People's Supreme Court, which is elected by and accountable to the National Assembly. The Supreme Court theoretically is independent from the executive branch, and all judges are elected by the National Assembly. The court comprises a president, a vice president, and all professional and lay judges, and is structured as follows: the Whole, the Council of State, criminal, civil, administrative, labor, crimes-against-the-state and military courts (Wikipedia, 2016).

In 2004, the Cuban government had a low level of effectiveness, scoring a -0.44 (41st percentile), according to the World Bank's Worldwide Governance Indicators (WGI), which scores -2.5 as the lowest to 2.5 being the highest. Voice and Accountability in Cuba was even worse, with a score of -1.83 (2nd percentile), reflecting the fact that the Cuban people have very little influence over government policy, most of which are directly handed down from the upper echelons of government. Cuba fares better controlling corruption, scoring 0.25 (63rd percentile).

ICT and Hurricane Dennis

In 2005, Cuba had a remarkably low level of ICT use. Few people used mobile phones — there only was one mobile phone subscription for every 100 people. Internet usage was not much better — there were less than 10 people using the internet for every 100 people. Since its first introduction in the late 1990s, the internet in Cuba has

stagnated due to lack of funding, tight government restrictions, the U.S. embargo, and high costs. State-run telecommunications companies hold a monopoly on internet service in Cuba, giving them unchecked control over users' ability to communicate with one another and the outside world (Kelly et al., 2011). Consequently, internet in Cuba is characterized by a low number of connections, limited bandwidth, censorship, and high cost. While it is illegal for Cuban citizens to have internet in private homes, government-owned internet cafes offer limited internet access.

Given the low level of ICT, Cubans were forced to rely on more basic mediums to access information when Hurricane Dennis hit. The storm knocked out 85 percent of the country's power lines, which inflicted heavy damage to the already limited communications infrastructure. Even before the storm, Cuba had been experiencing a prolonged electricity crisis, with blackouts happening regularly. Sometimes these blackouts have contributed to political dissent, such as in August 1994 when Havana saw unprecedented rioting and a migration crisis in which 30,000 people set out to sea on rafts. With no other means of acquiring information about the storm, most Cubans had to rely on Fidel Castro's roundtable, broadcasted via television and radio, to learn about the scope of the damage and recovery efforts. Due to this delay, much of the information came too little, too late.

Cuba's Policy Response to Hurricane Dennis

Prior to Hurricane Dennis, Cuba already had a long history of strong climate change policies, likely due to its high vulnerability to climate shocks. As an island nation located

in the western Caribbean Sea, Cuba is affected by many hurricanes and other extreme hydro-meteorological events each year (UNDP, 2010). Between 1998 and 2008, Cuba was affected by over 20 tropical storms that caused significant and widespread damage to infrastructure. Coastal flooding and sea water inundations have put Cuba's limited water supply at risk, which is dependent on rain water. The country's agriculture sector also is vulnerable to reduced water availability, droughts, and extreme weather events such as hurricanes (Oxfam, 2011). Warmer temperatures associated with climate change also may affect the health of Cuba's population, including a possible increase in cardiovascular and respiratory disease, and a rise in dengue fever, diarrhea, chicken pox, and other illnesses (Oxfam, 2011).

In 1991, Cuba created a National Commission on Climate Change with a mandate to study the impacts of climate change on its population, food production, water supplies and health (Oxfam, 2011). In the process of developing its First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), Cuba established several institutional and legal frameworks for climate change, including the National Climate Change Group that brings together all relevant governmental and NGO institutions. Cuba also established a sophisticated national disaster risk reduction framework through the creation of a comprehensive Civil Defense System. This system is designed to protect lives in the case of extreme weather events and acts as an early warning system, which involves a series of preparatory actions, annual large-scale simulations, and a broad network of logistical support centers across the country (Oxfam, 2011).

For Cuba, Hurricane Dennis may have served as a punctuation point for showing the vulnerability of the country's energy grid. In 2005, the Cuban government launched the "Energy Revolution," a policy focused on increasing energy savings, efficiency and renewable sources (Oxfam, 2011). The Energy Revolution proposed a reduction in energy consumption to one third of the level consumed in 1990, and included measures that range from social actions to energy policies. One of the centerpieces of this policy was the decentralization of electric energy generation through the construction of local generation plants that have reduced losses in energy transportation and vulnerability in the face of hurricane climate shocks (Oxfam, 2011). With no institutional veto points to prevent these climate change policies from being passed or implemented, the Energy Revolution was able to quickly take effect.

In 2008, only three years after Hurricane Dennis knocked out Cuba's power grid, hurricanes Gustav and Ike — which were in the same league of destruction as Hurricane Dennis — left the hardest hit areas of Cuba without power for only a week. Before the Energy Revolution, damages from hurricanes to the electrical grid typically left communities without power for two to three month (Oxfam, 2011). This suggests that the policy resilience in Cuba led to increased resilience in its infrastructure's resilience.

Recognizing the threat of climate change to its economy, in 2007 the Cuban government launched the Cuban Society Program to Face Climate Change, which analyzes all sectors of the Cuban economy in terms of vulnerability to climate change and required adaptation measures. This program focuses on adaptation, which includes prioritizing and concluding studies on hazard, vulnerability and risk for the whole country, as well as endorsing a technological, sanitary and social perspective. It also calls for incorporating

climate change in environmental education plans at different educational levels (LSE, 2016).

The Cuban government's climate change policies are informed by a holistic vision, combining actions and policies for mitigation, adaptation, risk management and disaster response (Oxfam, 2011). The country also has shown enthusiasm for working with the international community on taking climate change action. It cooperates with the Caribbean Community (CARICOM) members on climate change initiatives, which includes a 2008 statement calling for increased financing to address climate change adaptation (GoC, 2008). Cuba ratified the UNFCCC in 1994 and the Kyoto Protocol in 2002. Between 1990 and 2011, Cuba's total greenhouse gas emissions decreased by 17.43 percent between 2011 and 1990, mainly due to structural economic changes (LSE, 2016).

The lack of ICT in Cuba complicated the government's disaster response to Hurricane Dennis by forcing it to rely on less sophisticated methods of communication and disaster relief. With a majority of the state's power knocked out, the small ICT infrastructure became useless. However, given the state's small size, this did not result in a severe humanitarian crisis. While the government did not directly link Hurricane Dennis to climate change, it displayed a high level of policy resilience in its willingness and ability to pass policies aimed at mitigating and adapting to climate change. Given that Cuba is a small island state, climate shocks and rising sea levels present an existential threat, which may make the Cuban government more interested in taking action on climate change.

Chapter 6: Discussion

The case studies indicate that, as the number of veto points in a state's political system increases, policy resilience decreases (Hypothesis 1). While both the United States and the Philippines both are characterized by a high number of institutional veto points, the former displayed a low level and the latter a high level of policy resilience after experiencing a climate shock. Keep in mind, however, that policy resilience is defined as the ability to create and implement policies aimed at promoting climate change mitigation and adaptation. The Philippines created and implemented the People's Survival Fund (PSF), which fits the criteria of a policy aimed at promoting climate change mitigation and adaptation; therefore, it displayed a high level of policy resilience after Typhoon Haiyan. However, the Philippines fumbled response to the climate shock showed an area of limited statehood in disaster response. Disaster response is a key component of climate change adaptation, meaning that if the Philippine government fails to improve in this area; its policy resilience will diminish. While the United States showed a high level of consolidation of statehood in its disaster response policy field, it was unable to create or implement meaningful climate change mitigation or adaptation policies.

This divergence may be explained in part by the presence of different non-institutional veto players in the U.S., such as powerful interests groups that leverage economic and political power to steer the national agenda away from creating and implementing policies aimed at mitigating climate change or adapting to its negative impacts. However, it stands that states with few institutional veto points exhibit higher

levels of policy resilience simply because there are fewer barriers to passing climate change policies once the government decides that is what it wants to do — as was seen in India and Cuba after their respective climate shocks. It is important to note that both of these low veto point states also are characterized as developing countries which are particularly vulnerable to climate shocks. It stands to reason that low veto point states in geographic areas less susceptible to climate shocks may be less amenable to implementing climate change policies. In other words: if a low veto point state decides it does not want to prioritize climate change in its national policy agenda, it may be much easier for it to do so.

ICT appears to generate a net positive for policy resilience in terms of disaster response to climate shocks, but it is less clear if there is a significant positive impact on policy resilience in terms of helping to change the national political conversation to support increased policies aimed at mitigating climate change and adapting to its impacts (Hypothesis 2). Without high levels of ICT, including remote sensing satellites providing early warning and digital communication technologies helping to coordinate disaster response, the United States undoubtedly would have suffered much more from Hurricane Sandy. Even in this information-rich environment, the U.S. political system displayed a low level of policy resilience, as it was unable to overcome its many veto points to create or implement meaningful policies aimed at climate change mitigation and adaptation (Hypothesis 3). While India has a high level of ICT and displayed a relatively high level of policy resilience to Cyclone Phailin, it is possible that the key explanatory variable was its low number of veto points rather than its high level of ICT (Hypothesis 5). In the case of Cyclone Phailin, there is little doubt that the climate shock would have been

significantly more destructive in terms of human lives and economic costs had satellite data and other ICT tools been absent. It is possible the causal error points the other way — high levels of ICT, by aiding in disaster preparation and response, may lessen the perceived threat of climate shocks to the point that it reduces the likelihood of policy resilience to climate change.

Low levels of ICT in the Philippines helped magnify the destruction of Typhoon Haiyan by complicating disaster response and recovery. Additionally, given the state's island geography, even had it been able to accurately predict the storm's path, there would not have been anywhere for evacuees to go. Despite the high number of institutional veto points in the Philippine political system, it displayed a high level of policy resilience to the climate shock (Hypothesis 4). However, while the Philippine government does not display an area of limited statehood in its environmental policy field, its lack of governance capacity in other areas — namely, transportation and communication infrastructure — creates significant limitations for its policy resilience.

Contrary to my initial expectations, Cuba displayed high levels policy resilience after Hurricane Dennis despite its low levels of ICT (Hypothesis 6). Cuba's recent history of increased intensity and frequency of extreme weather events, punctuated by Hurricane Dennis and other storms, compelled government to respond with policies aimed at climate change mitigation and adaptation. Given the island state's weak ICT infrastructure, it is safe to say the government's disaster response and recovery may have been stronger with the aid of digital tools, but it seemed to make due without. As Cuba moves forward on its plans to bring about an "Energy Revolution" that focuses on distributed energy generation, it may be better able to withstand future climate shocks

more effectively. As long as the Cuban government continues to restrict free speech and access to information, it is unlikely its ICT levels will increase anytime soon. However, in light of the recent thawing of relations between the U.S. and Cuba, these may change in the future.

This study sought to increase understanding of the role of climate shocks, ICT, and policy resilience in different political systems. My case analyses show that lower levels of institutional veto points increase policy resilience after a climate shock. When climate shocks pose a social, economic, and even existential threat to a state's well-being, it is easier for necessary policies to be created and implemented if there are viewer veto points or players to prevent it from happening. Due to climate change's complex nature, some special interests benefit from the status quo of burning fossil fuels and preventing or stalling the transition to low-carbon economies. States with a high number of institutional and informal veto points may have more opportunities for non-institutional veto players to preempt or block climate change mitigation and adaptation policies — thereby reducing policy resilience. While the evidence indicates that ICT can improve disaster response and recovery to climate shocks, future research should examine the correlation between ICT and policy resilience. Future research also should expand the scope of climate shocks to look at non-tropical storm extreme weather events, including droughts, floods, and heat waves, among others. It would be interesting to evaluate policy resilience in the face of slow-unfolding climate shocks such as long-term droughts afflicting Kenya and areas of the American West and Southwest.

Chapter 7: Conclusion

Policy resilience is, at its core, the consolidation of statehood within a state's climate change policy field. Policies aimed at mitigating and adapting to climate shocks can be viewed as a form of governance service, alongside security, economic welfare, education, public health, sustainable infrastructure, and a clean and safe environment. When a state is unable to pass or implement these policies, it is displaying an area of limited statehood in its environmental policy field. As the four case studies illustrate, India, Cuba, and the Philippines displayed varying levels of policy resilience. India and Cuba demonstrated an ability to create and implement climate change mitigation and adaptation policies after climate shocks. The Philippines showed an ability to pass these kinds of policies, but it struggled to effectively implement some of them. Meanwhile, the United States displayed a low level of policy resilience, passing few policies at the national level aimed at mitigating or adapting to climate change despite suffering climate shocks.

The concept of climate shocks serving as focusing events fits within the Baumgartner & Jones framework of punctuated equilibrium and policy change. When shocks or changes are introduced in this system via focusing events, they may lead to new points of stability as the system settles down at a point radically different from the original (Baumgartner and Jones 2009). As attention shifts from one dimension to another, different policymakers become interested, different media outlets and journalists within them begin to generate different types of stories in a processes that link all these venues together, which can contribute to rapid changes in policy outcomes.

While there are several different kinds of climate shocks, this study focused on tropical storms (hurricanes, cyclones, and typhoons), due to them being sudden, destructive, and dramatic in nature, which fits best into the punctuated equilibrium framework. There also is the spatial and temporal element — tropical storms affect specific geographic areas for relatively short periods of time, but can inflict significant damage. Other more long-term climate shocks such as droughts also merit future study, but may not fit as well into the punctuated equilibrium framework. In theory, climate shocks should open policy windows that policy resilient states will use to create and implement policies aimed at promoting climate change mitigation and adaptation; increased veto points may decrease this policy resilience; and increased ICT may increase it.

This study focused heavily on institutional veto points because these are the easiest to measure, and are the most responsible for whether or not policy change occurs. The literature defines policy responsiveness as when government action responds to the preferences of its citizens. However, as we saw in the United States case study, Hurricane Sandy did not lead to a sudden change in public opinion that called for climate change action. In this way, the United States political system may actually have been policy responsive to its citizens' wishes without being policy resilient to climate shocks. In other word: had Hurricane Sandy led to a dramatic change in public opinion to taking action to protect against climate change, the high level of veto points in the United States may have been overcome.

Why didn't the Hurricane Sandy climate shock lead to a change in public opinion on the threat of climate change? It is possible informal veto players in the United States

had a role in this by downplaying the event's significance and providing officials and the public with alternative explanations of the meaning and significance of the event. As previously mentioned, policies aimed at mitigating and adapting to climate change could threaten the status quo for powerful special interests, such as the fossil fuel industry, which incentivizes them to argue that an event is not as important as claimed by opposing groups, that existing policy is able to deal with any problems, or that if new policy is needed, the policy proposed by the contending groups would be ineffective or counterproductive. Likewise, there could be a Downsian element at play — climate shocks may create a state of alarmed discovery and euphoria that generates much attention, but is followed by a realization of the costs of solving the problem and a gradual decline in public interest (Downs, 1972).

The chief role of ICT in improving policy resilience is helping to increase the volume and flow of information, which both creates new policy options for mitigation and adaptation and new avenues for public participation in demanding such policies be created and implemented. ICT, including remote sensing satellites, GIS, sensors, mobile phones, and smartphones, among others, may improve policy resilience to climate shocks by advancing the speed of politics, thus undermining deliberation and consolidating the trend toward government-by-public-opinion poll (Abramson, Arterton, and Orren, 1988). Dahl writes that ICT may provide important remedies for political inequality by making political information more universally accessible (Dahl, 1989). However, as we saw in the case of the United States, public opinion over climate change did not change much after Hurricane Sandy, meaning that ICT's potential for overcoming veto points could not be realized.

The purpose of this study was not to answer definitively the question of how ICT and veto points interact to yield policy resilience in different political systems, but to illustrate through these four case studies some fascinating trends. With scientists predicting an increasing number of extreme weather events in the future, and with ICT increasingly taking root into countries around the world, there will be plenty of opportunities down the road for future research to explore how these relationships affect policy change in different political systems.

There are limitations inherent with this study's design — beyond veto players, each political system analyzed has many other contextual, cultural, political, economic, historical and other factors which may impact a state's policy resilience. Some of these variables could impact the institutional veto points discussed, either making it easier or more difficult for policy entrepreneurs to overcome them when climate shocks create policy windows. To truly understand how different political systems function and respond to focusing events would require specialized knowledge of these specific systems. In order to help remedy this, it would have been beneficial for to interview political scientists specializing in U.S., Filipino, Indian, and Cuban politics. Even then, it may be beyond the scope of this research to capture every potentially intervening variable.

It also is difficult to directly observe ICT's impact on policy change because it is impossible to know for sure what would have happened in each case study had high or lower levels of ICT been present. In the Hurricane Sandy and United States case study, for example, we cannot know for sure if a lack of ICT would have made a difference in policy resilience. Similarly, we cannot know what would have happened if Cuba had a

high level of ICT during Hurricane Dennis. However, we can observe ICT's contribution to helping informal groups organize to call for policy resilience on a global scale. Climate shocks around the world, along with the growing body of scientific evidence of climate change posing an existential threat to human civilization, led to the People's Climate March in September 2014, which was formed in response to the UN Climate Summit in New York City. Loosely organized through social media tools such as Twitter and Facebook, more than 300,000 participants marched through the streets of New York City to call for international climate change action. While it is yet to be seen if this will transform into a permanent movement, the rapidity with which such a large number of people were able to self-organize shows how the application of ICT allow new players to entire the game — which could have a hand in bringing about policy change. The People's Climate March may have helped influence policymakers around the world that the people are demanding global policies aimed at climate change mitigation and adaptation. The following year, the United Nations Climate Change Conference in Paris, COP21, resulted in the first international climate change agreement, possibly signaling a global shift to increased policy resilience around the world.

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