# 1. Introduction

In 2010, massive flooding during monsoon season inundated the country of Pakistan, displacing more than two million people, placing more than one-fifth of the country under water, destroying more than $4 billion (usd) of infrastructure and more than $500 million in crop damage. The humanitarian consequences of the flood have been devastating, sickening more than two million people from food-related illnesses, malaria, diarrhea and snake bites. More than $600 million was pledged in humanitarian assistance by countries, organizations and individuals worldwide. However, this aid was not distributed equally. According to human rights reports, people lacking proper identification and religious minorities in Pakistan were denied relief aid and even targeted for violence in the flood's aftermath.

Just a few years earlier in August 2006 along the Gulf Coast in the United States, residents braced themselves for the impact of Hurricane Katrina. Some people fled ahead of the storm's impact, relocating briefly to other cities, staying with friends, family and strangers, and still others moved to temporary community shelters, while and some moved away permanently. Many who were unwilling or unable to leave their homes and neighborhoods stayed behind to face Katrina head-on. In the post-storm recovery, allegations of criminal activity in New Orleans as well as civil and human rights abuses of the storm's survivors were widespread. Several people were shot and killed by police as they fled the city along the Danziger Bridge; these officers were subsequently tried and found guilty of murder nearly five years later to the day.

Protecting the human rights of people affected by natural disasters can be a daunting task for states. When natural disasters like floods or droughts happen, people experience their wrath, losing lives, livelihoods, homes and security. Natural disasters disrupt the status quo, and create social, humanitarian and political needs. In most cases, people turn to their governments to meet these needs. However, governments vary widely in their ability and willingness to provide for their citizens, both in times of disaster and

prosperity. Under the duress of natural disasters, governments are tasked with providing relief and compensation to victims. Often, the most vulnerable members of society are those most affected by and vulnerable to natural disasters - those with the most precarious housing, fragile food supply and tenuous financial safety nets.

Natural disasters stretch the institutional capacity of states and localities. Even the most democratic states have trouble eradicating human rights abuses since they can be perpetrated on an individual level by rogue agents acting beyond the letter of the state's laws or outside the authority of the state. States that already struggle to protect human rights under normal circumstances may have even greater difficulty doing so under the increased social, economic and political pressure resulting from natural disasters. Moreover, states that are disinclined to protect human rights may find increased opportunities under the pretext of natural disasters to oppress marginalized populations. In dealing with the effects of natural disasters, governments can select from a range of policy tools and options, and the policy choice depends most on whether the government is democratic or not. Citizens then may evaluate the outcomes of the government's actions in response to their needs arising from the effects of the natural disaster.

Governments are often pressed to prepare for and respond to natural disasters. Climate variability is bound to affect all societies, as it has throughout history. The accelerated pace of occurrences of natural disasters is cause for concern, given the rise in human populations and the increase in the number of people likely to be affected. Not all societies will be able to respond adequately to the challenges posed by increasingly unpredictable weather patterns. The most important factor in determining the policy choices for managing climate problems is government type, as illustrated by the following examples.

Natural disasters present a unique problem for governments which is that they are held accountable for events beyond their control. Unlike war events or economic shocks, which

can be attributed to individual leaders, political systems or specific policies, the exogeneity of natural disasters does not exempt leaders and states from responsibility for their effects. The central question of this project is as follows: under what conditions do states violate human rights? The scholarship on human rights practices relating to natural disasters is as yet under-developed, and this project attempts to understand the relationship between disaster events and states' propensities to violate their citizens' physical integrity rights.

Both climatological and geological natural disasters provide an opportunity for governments to perpetrate human rights abuses. Disasters disrupt the status quo, they provide an opportunity to persecute an already aggrieved population or minorities. Natural disasters can also create grievances and encourage popular dissent, which governments may meet with repression. States with weak domestic institutions lack the capacity to absorb the disaster shocks and legitimately meet the needs of their citizens, so they resort to repression.

This paper will proceed as follows: first, I will discuss the dynamics of natural disasters and review the literature covering the relationship between natural disasters, conflict and governance; next, I will discuss the effect of natural disasters on states' human rights practices; I then turn to the empirical portion of this project and test the effects of natural disaster on human rights practices; finally, I discuss the results and provide some theoretical conclusions for the empirical findings.

## 2. The Effects of Natural Disasters

Davis and Seitz (1982) noted that, *"Disasters are more than extraordinary physical events; they attain human significance through the sociopolitical contexts in which they occur."* Their research assessed the relationship between governance and effects of natural disasters, questioning whether natural disasters happen more often in underdeveloped countries, and if their consequences are more severe than in developed countries. They looked

to domestic institutions to explain the impacts of natural disasters, but stop short of drawing conclusions about the consequences thereof. These consequences, like human rights practices, are a logical next stop in understanding how climate and natural disasters affect societies.

Natural disasters have many important differences, including type, location, onset and impact. For the purposes of this project, I distinguish between climate-related and geological natural disasters. The former category includes extreme hot and cold temperatures, floods, droughts, insect infestations, mass movements of earth and substances, i.e. snow, mud, and rocks, epidemics, storms and wildfires. The latter category includes volcanoes and earthquakes. While these two types of natural disaster categories have been considered comprehensively in their effects on conflict processes (Nel & Righarts 2008), there is reason to believe that there are categorical differences in the outcomes in question in this project.

I begin this exploration of natural disaster variables by examining which types are the most frequent. Figure 1 shows the number of natural disasters by type between 1981 and 2010, the years empirically analyzed in this project. Excepting the Eyjafjallajökull eruption of 2010 in Iceland, volcanoes have relatively little impact on people and governments in the past thirty years and account for less than 10% of the total natural disasters during this period. Floods and storms, on the other hand, account for almost two-thirds of the natural disasters. The effect of droughts may be underrepresented as they are counted on the start year alone and not the duration thereof.

Figure 2 shows the number (1000s) of people affected by natural disasters. Floods, droughts and storms account for the vast majority of those affected. These figures do not include the number of people killed by natural disasters. Theoretically this is important because the central argument of this project is that natural disasters increase opportunities for government repression, which would only affect those surviving the natural disaster. Additionally, only survivors of the disasters would seek government assistance

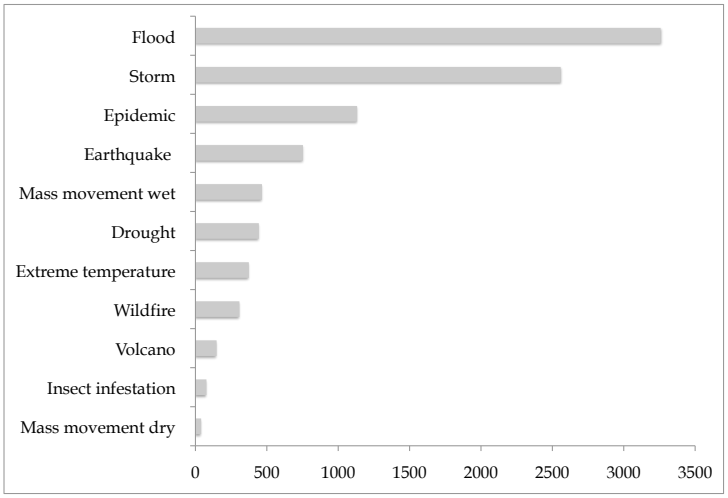


FIGURE 1. Number of natural disasters by event type, 1981-2010 (Source: CRED)

in dealing with the effects of the natural disaster, and those same people would also subsequently evaluate the government's performance in addressing their needs.

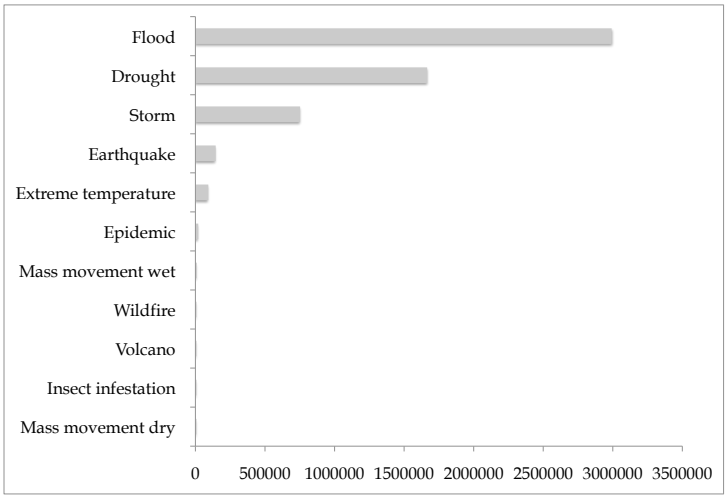


FIGURE 2. Number of people (1000s) affected by natural disasters by event type, 1981-2010 (Source: CRED)

Storms, floods and earthquakes, in that order, account for the costliest natural disasters during this time period. However, the effects of natural disasters, both in human lives affected and in cost, are not felt evenly across countries. While earthquakes do most of their damage to infrastructure in urban centers, climate-related natural disasters affect

both urban and rural locations. It follows that natural disasters affect different sectors of states' economies. Droughts, floods, storms and wildfires affect rural areas more than urban ones, damaging states' agricultural sectors. Earthquakes and extreme temperatures, like the heat waves in Pakistan in 1990, in France in 2003 and in Russia in 2010, are likely to be felt strongly amongst urban populations.

Natural disasters also differ in their consequences based on their onset duration. Some disasters, like floods, storms and earthquakes, strike with little or no warning, giving citizens comparatively little time to prepare, evacuate or otherwise mitigate the effects of the disaster. Other natural disasters, like extreme temperatures and droughts, have a much slower onset. However, slow-onset natural disasters are not "safer" or less destructive than are rapid-onset natural disasters, because of the uncertainty of their duration. While citizens may know to prepare for a storm or monsoon season, or for the onset of summer or winter temperatures, the variation in intensity and duration of these events can create anxiety amongst citizens and governments who struggle to cope with their effects.

Slow- and rapid-onset disasters have both local and global implications. Much of the existing research on environmental conditions, climate change and conflict have isolated the effects of natural disasters to those occurring within the borders of each country. However, there is reason to suspect that countries demonstrate sensitivity to natural disasters that happen in other hemispheres. For example, wildfires in Australia in 2009 and in Russia in 2010 drove up the global prices of wheat, which affects not only citizens of those countries, but those throughout the world. Country-specific natural disasters affect the global food supply, affecting commodity prices and creating problems in seemingly unrelated locations. Some governments and countries are more price-sensitive, especially low-income and developing countries, and have greater difficulties adjusting to increased commodity costs.

Natural disasters also differ in their inevitability and in the contingency plans made by governments. The boundaries of geological fault lines are well-known, and most countries are cognizant of the eventuality of an earthquake happening within their borders. However, the readiness of countries to deal with the aftermath of natural disasters varies widely. While the 2011 Christchurch earthquake in New Zealand and the 2011 earthquake and tsunami in Japan wrought tremendous structural and financial damage to both economies, and with terrible humanitarian consequences in the latter, the people and infrastructure of both societies were prepared. Modern buildings are constructed to withstand the effects of strong earthquakes, and evacuation plans and services function generally as they are intended. However, countries with weaker national infrastructure, like the recent Turkish earthquake in the under-served Kurdish region of the country, may be less likely to recover so quickly and with the same high-level respect for human rights. Figure 3 shows the total costs in thousands of dollars (usd) from the various types of natural disasters assessed in this project.

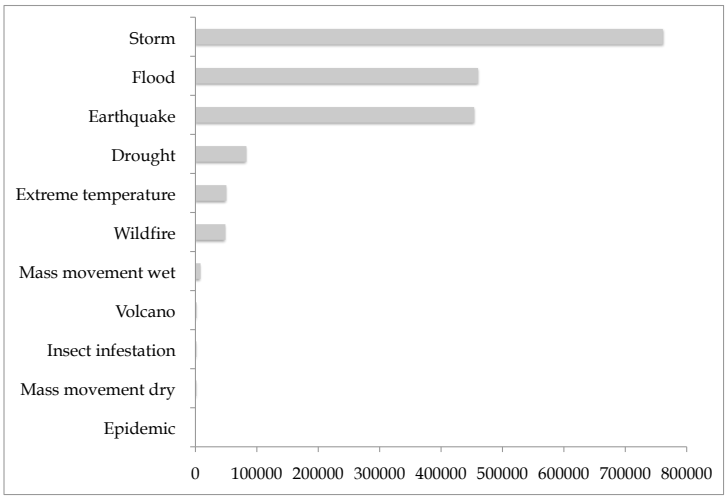


FIGURE 3. Cost (usd) of natural disasters by event type, 1981-2010 (Source: CRED)

Brancati (2007) examines the effects of earthquakes on interstate conflict and finds that they do increase a country's risk of civil war. She asserts that earthquakes increase competition for scarce resources, that they exacerbate existing conflicts and that they can

provide resources and opportunities for mobilizing groups to conflict since the influx of humanitarian aid is a lootable revenue source. Her empirical models find statistical significance with earthquakes exclusively, but it seems that other rapid-onset natural disasters could follow a similar logic and also achieve statistical significance under rigorous empirical testing. The deleterious effects of natural disasters, in terms of increasing competition for scarce resources, supplying lootable resources to rebel groups, and exacerbating existing conflicts, are not unique to earthquakes.

Earthquakes and volcanoes serve as useful econometric variables since they are purely exogenous events, whereas the effects of climate-related natural disasters remain somewhat endogenous. For example, while rainfall, temperature and wildfires are not instruments of governments, the effects thereof are conditioned on the behavior and policies that governments undertake, like deforestation, irrigation and infrastructure.

But earthquakes are not a foolproof exogenous variable. It seems plausible that the effects of earthquakes which hit major urban areas could be mitigated by existing contingency plans drawn up in advance to ensure the smooth, uninterrupted functioning of government and economic activity. On the other hand, natural disasters like floods, storms, droughts, wildfires and extreme temperatures are not inevitabilities that governments can plan in advance for. Rather, governments and citizens are more likely to implement tentative strategies of "wait and see," since climate-related natural disasters are often tied to natural cycles and regular, seasonal weather patterns. A government may bide its time in responding to a drought or other slow-onset event under the logic that on average, extreme disaster events are not the norm and the weather is expected to change eventually.

Furthermore, both slow- and rapid-onset climate events are likely to affect different economic sectors of society than do earthquakes. Natural disasters that affect the agricultural sectors have potentially farther-reaching effects than do earthquakes, since the former are

tied to both local and global food production. Wildfires in Australia and Russia decreased the global wheat supply as well as increased the commodity's price. Natural disasters that disrupt the growth and supply of food are especially troublesome for subsistence economies and in states which have weak infrastructure for mitigating and compensating agricultural losses. The effects of natural disasters are also conditional on government policies like land use, deforestation, irrigation, levees and other infrastructure.

Regardless of the pure exogeneity of either geological or climatological natural disasters, they both remain a problem for governments in that citizens expect that governments will provide relief, compensation and redress for the negative effects of natural disasters. Natural disasters differ from other economic or political shocks in a fundamental way: that economic and political policies reflect specific, deliberate government policies for which citizens rightfully and logically can hold their leaders accountable. Governments do not determine the amount of rain that will fall, nor extreme temperature conditions, nor seismic activity. They are, however, held responsible for their effects.

## 3. Neo-Malthusian, Environmental, Resource and Climate Approaches

The literature on natural disasters has not always defined the problem as one of disaster events. Initial research pursued a neo-Malthusian approach, contending that as population pressures increased, there would be increased civil conflict due to competition for scarce resources (Tir & Diehl 1998, Collier & Hoeffler 2002, Kahl 2002, Murshed 2002, Regan & Norton 2005). A subset of the neo-Malthusian scarcity scholarship focuses on food riots and subnational contentious behavior (Moran & Auyero 2007, Bush 2010, Patel & McMichael 2009, Taylor 1996, Thompson, Berrang-Ford & Ford 2010). Subsequent research examined the effects of natural resources on the onset, duration, and financing of interstate and civil wars (Buhaug & Gates 2002, De Soysa 2002, Ross 2004, Besançon 2005, Humphreys 2005, Collier & Hoeffler 2005, Ron 2005). Another strand of research focused on specific environmental aspects of conflict and contributed heavily to the theoretical discussion of defining environmental conflict (Homer-Dixon 1991, Gleick

1993, Uitto & Wolf 2002, Libiszewski & Bage 1992, Homer-Dixon 1994, Midlarsky 1998, Wolf 1999, Gleditsch 1998, Hauge & Ellingsen 1998, Schwartz & Singh 1999).

More recently, scholars have reframed the dialogue about the environment and conflict in terms of natural disasters and climate change focusing on diplomacy and adaptation (Comfort 2000), on the economic effects of natural disasters (Noy 2009, Cavallo & Noy 2009), on the implications for armed conflict (Buhaug, Gleditsch & Theisen 2010), on constructing frameworks for evaluating the comprehensive effects of disasters on societies (Olson & Gawronski 2010), and on possibilities for peacemaking (Nelson 2010, Akcinaroglu, DiCicco & Radziszewski 2011). Complementary research on climate change has examined various threads that contribute to social problems, like infectious diseases (Patz, Epstein, Burke & Balbus 1996), refugees (Salehyan 2005) and involuntary migration (Feng, Krueger & Oppenheimer 2010), subsistence agriculture (Morton 2007), environmental degradation (Raleigh & Urdal 2007), subnational contentious behavior (Buhaug & Urdal 2009, Nardulli & Leetaru 2010, Hsiang, Meng & Cane 2011), and climate exacerbating existing population and development problems in the developing world (Buhaug, Falcha, Gleditscha & Wischnatha 2010).

Two studies in particular develop theoretically and empirically compelling arguments by taking a long cycles approach to climate and conflict. One study (Zhang, Zhang, Lee & He 2007) examines climate patterns between 1000-1911 A.D. in Northern and Southern China, using Chinese historical archives and climate data derived from tree-ring, coral, ice-core, borehole and historic documentary data. They find a strong association between cooling phases and dynastic changes. A similar study led by the same researcher, David D. Zhang, extended the analysis to include patterns of climate and warfare on the European continent with similar conclusions (Zhang, Brecke, Lee, He & Zhang 2007). These two studies are particularly informative given the recent attention paid to climate science and the effects of climate change.

These findings indicate that climate change has affected human populations for many hundreds of years, that indeed this is not a new problem but one that existed in the pre-industrial era and the pre-Westphalian concept of nation-states as well as prior to contemporary definitions of states and governance. These studies establish that climate affects humans and lays an empirical and theoretical foundation for contemporary studies of similar phenomena, with the obvious difference of modern forms of governance.

A specialization within the recent scholarship on climate change and conflict is the particularized study of how climate change is affecting Sub-Saharan Africa. Scholars have been focused on the deleterious consequences of climate change in the Sahel, like the effects on African crops (Burke, Lobell & Guarino 2009, Mller, Cramer, Hare & Lotze-Campen 2011), and the risk of civil war (Burke, Miguel, Satyanath, Dykema & Lobell 2009, Raleigh 2010, Buhaug 2010, Hendrix & Salehyan 2010). While abundant, this strand of research faces selection problems given the overrepresentation of civil wars, human rights violations and domestic conflicts within African states, the relative homogeneity of post-colonial leadership styles and non-democratic regime types, and the fragility of environmental conditions in the region. Africa's under-development in terms of infrastructure and undiversified economies beyond agricultural subsistence and oil wealth, as well as massive poverty and rampant human rights abuses make this a limited choice for studying the wide variety of potential outcomes for conflict and governance as they relate to climate change and natural disasters. In other words, it is important to look beyond Africa for evidence of the effects of climate change, given the prevalence of civil wars and climate-related natural disasters.

In the next section, I will address the ways in which governments differ in their policies and responses to natural disasters.

## 4. Government Type and Political Opportunity Structures

Governments vary in their provision of public goods. Because leaders of democratic states are accountable to a large constituency, they have an incentive to distribute public goods widely (Boix 2001). These public goods may take many forms, like investment in infrastructure, social services and security. Security as a public good can be understood as protection from foreign and domestic threats, as well as the protection of human rights and respect for the physical integrity of citizens. Democratic governments have stronger domestic institutions than do non-democracies which encourage the protection of human rights.

Flexible and responsive domestic institutions allow democracies to weather the effects of natural disasters without incurring a systemic breakdown. Collier and Hoeffler (2005) specifically argue that government type matters to a state's strategy for dealing with resource conflicts through domestic accountability to its constituents. In a democracy, legitimate governance is ratified through widespread political participation, through active and competitive recruitment of the executive officeholder, official term limits, and the presence of open elections.

Gleditsch and Ward (1997) note that democracies are marked by active citizen participation, regular and meaningful electoral competition, protection of civil and legal rights, liberal economies and focus on human rights. Governments calculate their disaster responses giving consideration to their audience costs. Broad domestic audience costs like those characteristic of democracies dissuade governments from pursuing policies that lead to human rights violations.

Bueno de Mesquita et al. (1995, 1999, 2003) and Clarke (2008) describe the composition of governmental coalitions in terms of the selectorate and winning coalition. Bueno de Mesquita explains these terms as follows:

> *"Nested within the residents of all polities is a selectorate and within that there is a winning coalition. Leaders...maintain their coalitions of supporters by taxing and spending in ways that allocate mixes of public and private goods."*

In democracies, the size of the selectorate is roughly equal to the size of the winning coalition. This means that popular vote installs leaders and removes them from office, and that leaders can earn favor with their constituents by providing public goods to as many citizens as possible. In non-democracies, the winning coalition is much smaller than the selectorate. While many people may have the ability to participate in elections, the leader's true power is maintained by privileging a small group of supporters with private benefits. In non-democracies, leaders have a disincentive to widely distribute public goods, since their tenure is contingent upon a much smaller subset of individuals.

Recent scholarship on natural disasters and voter mobilization has shown that in the case of the Elbe River flood of 2002 in Germany, effective government disaster response effectively increased votes for the incumbent party by 7% (Bechtel & Hainmüller 2010). Similarly, Achen and Bartels (2004) demonstrate that voters *"routinely punish governments for acts of God, including droughts, floods and shark attacks."* Democratic governments, therefore, have some incentive to address the needs of their constituents given the potential vote return on their public investment in infrastructure or compensation. In non-democratic governments, on the other hand, leaders are not dependent on votes for their tenure and therefore have a lower incentive for providing public goods to their constituents present or absent natural disasters.

Non-democratic governments and political elites who are threatened by mass political mobilization through legal institutional mechanisms or through contentious behavior are likely to use repression (Anderson, Regan & Ostergard 2002). Since natural disasters create needs that citizens feel should be met by their governments, citizen mobilization

is likely to increase following natural disasters. It follows that states that are not consolidated democracies will be more likely to use repression against their citizens because of the threatening nature of citizen mobilization, and because citizens are made more vulnerable and susceptible to human rights abuses as a result of the natural disasters themselves.

Along the lines of Eisinger (1973) and Francisco (1996), Fein (1995) assert a non-linear relationship between social unrest and regime type. Fein innovates a useful term - More Murder in the Middle - to describe where social unrest is likely to happen. The theory predicts that semi-democratic states are more susceptible to social unrest because of unconsolidated democratic practices. States that have not achieved the rank of full, consolidated democracy may exhibit some of the attributes of democracies, but lack their consistent application. Paul Collier describes the problems of this situation as an imbalance between instant elections and weak checks and balances. When rules are applied inconsistently in democratizing states, social unrest is more likely and citizens' rights are more likely to be violated.

## 5. Human Rights and Natural Disasters

Human rights, codified under the Universal Declaration of Human Rights in 1948, enjoy different protection in democratic and non-democratic societies. These rights include but are not limited to protection of life, liberty, security, legal recognition, and non-discrimination; freedom of movement, religion, expression, political participation, as well as freedom from slavery and torture, arbitrary imprisonment or exile. Davenport (1999) established that democracies are less likely to use repression than are non-democracies, and that democratization also decreases the rate of repression within states. Democracies are better than autocracies at protecting human rights than are autocracies for many reasons, including regular, free and fair elections, a strong rule of law, redress of grievances through formal legal channels, and a broad base of citizen support and participation for these institutions (Fein 1995, Davenport 1999, Cingranelli & Richards 1999, Davenport,

Armstrong & David 2004, Richards & Gelleny 2007b).

Why do states violate human rights? At the most basic level, states violate human rights when this option is less costly than other options, or when they lack the institutional capacity or incentives to protect them. Davis and Seitz (1982) note that, *"While societies generally possess adjustive mechanisms to absorb disturbances that arise within or without their boundaries, disaster situations are so radical that they cannot readily be handled by their usual means."* State with the institutional or economic means to absorb the humanitarian, political and social shocks caused by natural disasters are less likely to violate human rights. States lacking the institutional capacity to cope with these shocks are more likely to violate human rights.

Hypothesis 1:*Democracies will be less likely to violate human rights following natural disasters than non-democracies.*

States with high audience costs for political repression are less likely to use repressive measures. States with democratic constraints like legitimate elections, rule of law, and protected freedoms of expression, press and assembly, have institutional disincentives to utilize tools of repression. Furthermore, democracies protect the rights of ethnic, religious, and political minorities. Leaders of democracies cannot reasonably attempt to remain in power by utilizing repressive measures, since the transfer of power is a national, public political process that leverages the power of an attentive and participatory electorate. Likewise, citizens with grievances in democracies can seek redress through democratic institutions like the courts or ritualized protest behavior which is constitutionally protected.

Non-democracies and democratizing states are more likely to violate human rights, but for different reasons. Democratizing states may violate human rights because of more widely available political opportunity structures in society. As democratization occurs, the political space for airing grievances grows larger through media activity, public awareness,

and increased political participation through campaigns and elections. However, newly democratizing states may lack the necessary institutional protections for such political activity, so early democratic entrepreneurs and their followers and supporters may face increased threats to their personal security until such behavior becomes protected by strong institutions and rule of law.

In strong autocracies, human rights violations may be more difficult to identify. Under the repressive regime of Kim Jong Il, farmers preferred to suffer death under a crippling famine in the 1990s that reportedly killed more than one million people, rather than lobby the government for assistance (Foster 2011). Certainly this scenario counts as an instance of human rights abuse, but the government plays a passive role in the repression as compared to the death squads mobilized by some Central American governments in the 1980s to silence dissent.

Cingrinelli and Richards (1999) examine the specific forms, patterns and sequences of human rights abuses, including torture, physical imprisonment, extrajudicial killings and disappearances. They found that torture and political imprisonment were the most common forms of human rights abuses practiced by states including consolidated democracies, and that extrajudicial killings and disappearances are more costly for governments and thus less frequently practiced.

Many studies assume a linear and negative relationship between democracy and human rights. Like previous studies which posit a nonlinear, inverted-U relationship between government type and protest, Davenport and Armstrong (1999) test the assumption that government and human rights follows a nonlinear path. They find that amongst democracies, those that measure lowest on the Polity IV scale (0 to 7) have no effect on discouraging human rights violations, those in the 8-9 range have a moderate effect, and only the highest value, 10, has a strong negative effect on discouraging human rights abuses.

Subsequent work by Bueno de Mesquita, Downs and Smith (2005) supports this finding. Their research shows the positive effects of multi-party competition in reducing human rights abuses. They also find that short of full, consolidated democracy, states do not promote and protect human rights. They note that accountability, similar to Collier's assertion, is the critical element in protecting human rights. Democratic processes, like national presidential and legislative elections, are found to be strong predictors of support for human rights. Richards and Gelleny (2007a) find that among democratic states, lower-house elections predict improved respect for human rights, whereas in the year following presidential elections, respect for human rights decreases. Conversely, strong and stable autocracies may also be less likely to violate human rights since state-sponsored repression could weaken the regime, giving opportunistic challengers grounds for opposing the regime. The strongest autocracies should not need to openly violate human rights to maintain power; any evidence thereof may indicate regime instability.

Hypothesis 2: *Democracies and autocracies are less likely to violate human rights than are countries in the middle.*

Many of these studies note the mitigating effects of economic power on human rights violations and protection. States with larger economies and higher GDP per capita are less likely to violate human rights, presumably because there is a strong correlation between wealth and democracy, or possibly because wealth affords citizens more opportunities for political participation.

Given the variation in the humanitarian and economic costs of natural disasters, we can expect to find variation amongst the types of natural disasters and their consequences for human rights practices. Natural disasters affecting more people are likely to create a larger set of aggrieved citizens, as will costlier disasters.

## 6. Data and Methods

Human rights data for this project comes from the Cingranelli-Richards (CIRI) Human Rights Dataset. Data for natural disasters comes from the Center for Research on the Epidemiology of Disasters (CRED), specifically the International Disaster Database. I use the Polity IV dataset for measures of democracy and governance. I obtained data for the control variables from the World Bank World Development Indicators (WB-WDI). This project uses annual panel data covering the years 1981-2009. Values for missing years, i.e. years in which no events were recorded, are not imputed.

In the following models, the dependent variable is an indicator of government respect for human rights, physical integrity. Rather than lagging all of the independent variables, I generate a lead variable for physical integrity. Physical integrity comprises several elements, including torture, extrajudicial killing, political imprisonment and disappearance. This variable is coded 0 if there is no government respect for human rights and 8 where a government demonstrates full respect for these rights. For the regression models, I use an ordered logit since the dependent variable is a categorical as well as robust standard errors. The results from these models are preliminary and in future trials, I plan to explore the data using panel regression techniques and clustered standard errors.

The primary independent variables, derived from the CRED database, include counts of natural disasters, number of people killed and affected by natural disasters. These data are presented in aggregate, disaggregated into climate and geologic categories, and by individual types of disasters. Table 1 shows the mean values for all of the natural disaster events by type.

For the natural disaster data, I generate two dummy variables by event type and year - climatological and geological - that take a value of 1 if in a given year more than two percent of the country's population was affected by either type of disaster, and 0 otherwise. I then interact each of these dummy variables for climate-related and geological

TABLE 1. Mean values for total numbers of people affected annually by natural disasters, 1981-2009 (CRED)

| Variable | Mean | (Std. Err.) |
|---|---|---|
| Cold | 24200.409 | (21647.514) |
| Drought | 174853.505 | (34210.326) |
| Earthquake | 25387.769 | (13550.974) |
| Epidemic | 4411.111 | (1877.983) |
| Flood | 377178.079 | (106605.861) |
| Hot | 1295.070 | (908.247) |
| Insect Infestation | 141.028 | (140.411) |
| MM Dry | 4.190 | (1.873) |
| MM Wet | 1154.381 | (710.656) |
| Storm | 133894.848 | (36592.831) |
| Volcano | 891.941 | (334.722) |
| Wildfire | 1039.698 | (845.133) |

disasters with both Polity and Polity squared terms to control for a potential nonlinear relationship. On average, a given country can expect to experience a climatological disaster affecting more than two percent of its population once every three years. A given country can expect to experience a geological disaster affecting that proportion once every ten years.

The control variables for this project are Polity and Polity squared, global measure of all natural disasters per year, logged values for the total population, the percent of urban and rural population, annual cereal yield in metric tons and an aggregate global cereal yield value, and GDP per capita. I will briefly discuss the rationale for including each of these variables. Polity and Polity squared are included individually to control for government type, and they are each also interacted with the natural disaster variable to assess the conditional effect of government type given natural disasters on human rights practices.

The log of total population is included to control for population size and to standardize the variable of total numbers of people affected by natural disasters. Since disasters are likely to have differing effects on percent rural and urban populations, these variables are included in the model as well. I include both cereal yield per country and an aggregate global cereal yield from all countries to account for the global and local effects

of natural disasters on agriculture, since food security is often a politically and socially contentious issue following natural disasters and can lead to government repression. Both local and global cereal production can affect the availability of food. I also include GDP per capita since states with larger economies are better able to weather the effects of natural disasters without resorting to repression.

## 7. Results and Discussion

This model yields some encouraging and unexpected results which support both hypotheses. The variable indicating annual climate events affecting more than two percent of the population is significant and negative. Its interaction variables with Polity and Polity$^2$ are both significant and the former is negative while the latter is negative.

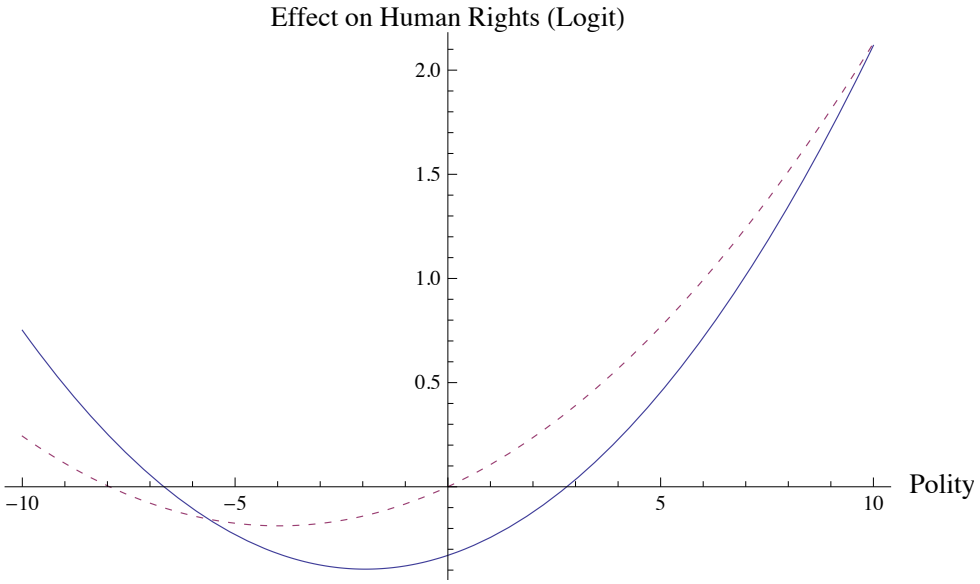


Figure 4. Physical Integrity Log Odds and Democracy

Both the Polity and Polity$^2$ variables themselves are significant, indicating a non-linear relationship between government type and human rights practices. Log of population and percent urban are both significant and negative. GDP per capita, country annual cereal yield and global climate disasters are all positive and significant. The results for country and global cereal yields provide insight into the factors that contribute to the human rights practices of states. Hungry and aggrieved masses may lobby the government for

relief and compensation from the effects of natural disasters like droughts, storms and floods which destroy crops.

TABLE 2. Human rights implications of natural disasters

| **Variable** | Odds Ratio | Std. Err. |
|---|---|---|
| Climate nd > .02 | .719496* | .1048606 |
| Climate nd x Polity | .9743794* | .0121552 |
| Climate nd x Polity$^2$ | 1.005795* | .0026195 |
| Geological nd > .02 | .8400212 | .5916142 |
| Geologic nd x Polity | .9219835 | .064682 |
| Geologic nd x Polity$^2$ | .9924975 | .0143027 |
| Polity | 1.098912*** | .0062108 |
| Polity$^2$ | 1.011935*** | .0014018 |
| Log (population) | .4645422*** | .013155 |
| Percent urban | .9953539* | .0018389 |
| Land area km$^2$ | 1*** | 1.59e-08 |
| GDP per capita | 1.000061*** | 5.37e-06 |
| Country cereal yield | 1.000262*** | .0000255 |
| Global cereal yield | .9999944*** | 5.40e-07 |
| Global climate disasters | 1* | 3.48e-10 |
| Global geological disasters | 1 | 2.94e-09 |

* p<0.05, ** p<0.01, *** p<0.001

Figure 4 shows a line graph of the log odds of physical integrity and democracy. The dotted line indicates the relationship between human rights and democracy absent climate disasters, which were statistically significant in the statistical model. The solid line indicates the relationship between human rights and democracy with the effects of climate disasters. The dotted line indicates that absent natural disasters, democracies have a strong record of protecting human rights, anocracies are likely to violate human rights by means of torture, disappearances, extrajudicial killings and disappearances. Stable autocracies violate human rights less than states in the middle. This fits with the standard "More Murder in the Middle" assumption posited by Fein (1995).

After a climate disaster, most states show less respect for human rights, as shown by the solid line. Paradoxically, states with a polity score of less than -5.6 show an increase in respect for human rights. This could be due to an influx of humanitarian aid that

offsets the incentives governments may have to repress, since citizens' needs are met by external means, or due to the size of the economy of the state experiencing the climate disaster. Interestingly, in a pure democracy, the effects of a climate disaster on human rights is negligible.

## 8. Conclusion

Most research on climate and natural disasters has focused exclusively on civil wars and contentious sub-national behavior. This project takes the scholarship in a new direction to explore the human rights consequences of climate disasters. From this project we can learn several important things. First, disaster type matters to human rights practices. Geological disasters, like earthquakes and volcanoes, do not have statistically significant effects on states' human rights practices. This may be due to their relative infrequency, or to the general preparedness efforts that most states undertake, or due to the fact that they affect relatively fewer people than the other types of natural disaster, creating fewer opportunities for aggrieved citizens to become targets of government repression.

Second, climate natural disasters like floods, droughts and storms, do have a statistically significant effect on governments' human rights practices, albeit nonlinear. Democracies are relatively immune to human rights abuses given climate disasters, whereas states in the middle are more likely to use repressive measures. When a natural disaster occurs, they may use repression opportunistically to repress minority groups, or the deprivation caused by the disaster could create opportunities for citizens to air grievances with the government, identifying individuals and groups as targets for repressive measures.

Finally, other characteristics like population size, urbanization, size of the country, wealth of the country, and access to food (cereal yield) matter to human rights practices as well. There is also evidence to support the idea that global climate change shocks matter to states in terms of their ability to secure food supplies. Anecdotal evidence has pointed toward food price increases as sources of discontent which motivated citizens to participate

in the Arab Spring protests. These protests have demonstrated the repressive measures that governments are willing to take to control public unrest.

Future research will explore the issue of global and local climate shocks further, as well as the role that humanitarian aid plays in mitigating the government repression and the negative effects of natural disasters. In addition, future analyses will explore sub-types of natural disasters as well as sub-types of physical integrity measures to uncover the specific effects of the climate disasters that increase human rights abuses.

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