

Natural Disaster Conflicts¹

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Abstract

This paper explores the effect of natural disasters on conflict. Disasters disrupt daily lives and social systems and call into question prevailing social and political arrangements. Directly and indirectly they create the conditions for instability and conflict by exacerbating social grievances and resource scarcities, and accelerating changes in social systems. Despite a plethora of studies in the disaster realm, however, negligible attention has been devoted to the study of conflict in the aftermath of a natural disaster. This study takes a preliminary step in that direction, analyzing the wide range of environmental, social, spatial, political, and psychological effects of natural disasters in both conflict-ridden and conflict-free areas of the world. Building on the findings and conclusions of disaster and conflict scholarship, together with natural disaster and event data covering the period of 1991-1999, the linkages between natural disasters and conflict are tested statistically within a multivariate model. This paper finds that natural disasters are important factors in explaining social conflict. The analysis both validates the traditional determinants of conflict and indicates the importance of incorporating system shocks such as natural disasters.

1. Introduction

Natural disasters are much more than environmental events. They have profound political, environmental, social, spatial, and psychological consequences. A natural disaster unearths and challenges the power structure of an affected society, disrupting livelihood strategies and deconstructing social arrangements. Researchers and scholars have long hinted to the “good” and “bad” behavior that emerges during catastrophes or other periods of great stress. P. A. Sorokin in *Man and Society in Calamity* was perhaps the first sociologist to explicitly describe the polarizing effects of calamities while Frederick Cuny detailed how natural disasters catalyze political and social change by bringing to the fore the social struggles and inequities inherent in a society. (Sorokin, 1942; Cuny, 1983). Cuny argued for linkages between natural disasters and development, and anecdotally suggested governmental destabilization in the years immediately following a disaster. Despite anecdotal and case study analysis, however, there persists a lack of emphasis on the specifics relating natural disasters and conflict and research that clearly examines, evaluates, and discusses the relationship.

This paper introduces a structural framework for investigations into the conflict aspects of disaster, exploring the parallels—and disjunctures—between natural disasters and conflict. The following questions are posed: what are the long- and short-term economic, social, environmental, and political consequences of natural disasters? How does disaster onset affect existing conflicts and environmental and social problems? Do natural disasters induce new conflicts? And finally, can the relationship between natural disasters and conflict be tested empirically?

The creation of a theory of natural disasters and conflict is a strategy for

addressing important yet largely unexplored questions about complex emergencies. My hypothesis is that sudden changes brought on by natural disasters exacerbate problems that people face on a daily basis, heightening conditions for conflict such as grievances, political opportunity, and mobilization. Disasters create grievances that lead to conflict by causing mass disruption, impacting individual behavior, community and political organizations, and the power relationships between individuals, groups, and the organizations that serve them. In the immediate aftermath of a disaster, a country's physical infrastructure is affected often preventing the adequate distribution of food and medical supplies. Crops are destroyed, giving rise to food shortages, famines, and localized conflicts over resources. As a disaster destroys many key social and political institutions, it threatens political stability and creates a power vacuum and opportunity for warlords and criminal gangs to usurp power. In Guatemala, the 1976 earthquake caused a wave of destruction in the rural mid-section of the country that eventually brought an abrupt and violent change of leadership from the twenty- year-old military government. Similarly, the country of Bangladesh was formed after angered victims of the 1970 typhoon instigated civil war in East Pakistan. A natural disaster has the propensity to reshape society and along with it, its ability to manage risk, grievances, and political change.

Using multivariate linear regression analysis, this study quantitatively tests the proposition that the degree of conflict is positively related to the incidence of disaster, and that the correlation between conflict during one period and a natural disaster is positive and strong.

The emphasis of this study is on the social, political, environmental, and

economic consequences of natural disasters rather than on causes, disaster policy prescriptions, or geological aspects. A general definition of a natural disaster is a sudden or progressive event that causes considerable destruction, overwhelming local capacity, and necessitating national or international assistance.² Natural disasters can be divided into sudden disasters like earthquakes, hurricanes, and floods and slowly developing disasters such as droughts, epidemics, and desertification. Their common characteristic is their human impact, expressed in terms of injury or property destruction.

In this study, conflict refers to situations arising from mutually incompatible goals between two or more parties where an effective coordinating or mediating mechanism does not exist. This covers a whole range of inter- and intra-state human relationships, from total war to genocide, regime change and coups. However, the primary focus is group or collective violence and these terms are therefore used interchangeably throughout. Similarly, mass and group responses to disaster are the primary interest. Examples of conflicts covered include riots, pogroms, ethnic fights, coups, assassinations, violent protest, lynching, genocide, terrorist attacks, gang assaults, and other hybrid forms.

The relevance for the study of the nexus of natural disasters and conflicts is three-fold: 1) To develop a comprehensive conceptual framework for analyzing the relationship between natural disasters and conflict in an area that is presently not well developed; 2) to operationalize the framework; and 3) to anticipate points of tension in countries currently experiencing natural disasters and lessen post-disaster conflict vulnerability. This study lays the foundation for continuing efforts towards achieving all three goals.

The following section begins by reviewing theoretical perspectives emanating

² <http://www.cred.be/emdat/Guide/glossary.htm>

from literature from a range of disciplinary backgrounds on natural disasters and conflict to develop a generalized basis of understanding of the role of natural disasters and conflict. Empirically testable hypotheses are then put forth and operationalized in the study of 115 countries during the period 1991-1999. The concluding section of this study discusses the limitations of the approach proposed and implemented and outlines methods that could be used to model the relationship between natural disasters and conflict even more precisely. More importantly, the research and policy implications of the study findings that suggest that natural disasters impact conflict outcomes are addressed and elaborated upon.

2. Background

Disasters have varying impact according to their classification (rapid on-set, long-term, or continuing), type (i.e., flood, tsunami, earthquake, and hurricane), location (developed versus developing country), scale, and intensity. There are many different types of natural disasters which occur in the world including: droughts, earthquakes, famine, floods, hurricanes, landslides, tsunamis, volcanic eruptions, and windstorms, etc. Some regions of the world are more prone to certain types of disasters. For example, famine and drought are most common in Sub-Saharan African while floods are most common in North America, Asia, and Latin America. Figure 1 illustrates the growing frequency of disasters during the period from 1975-2004.

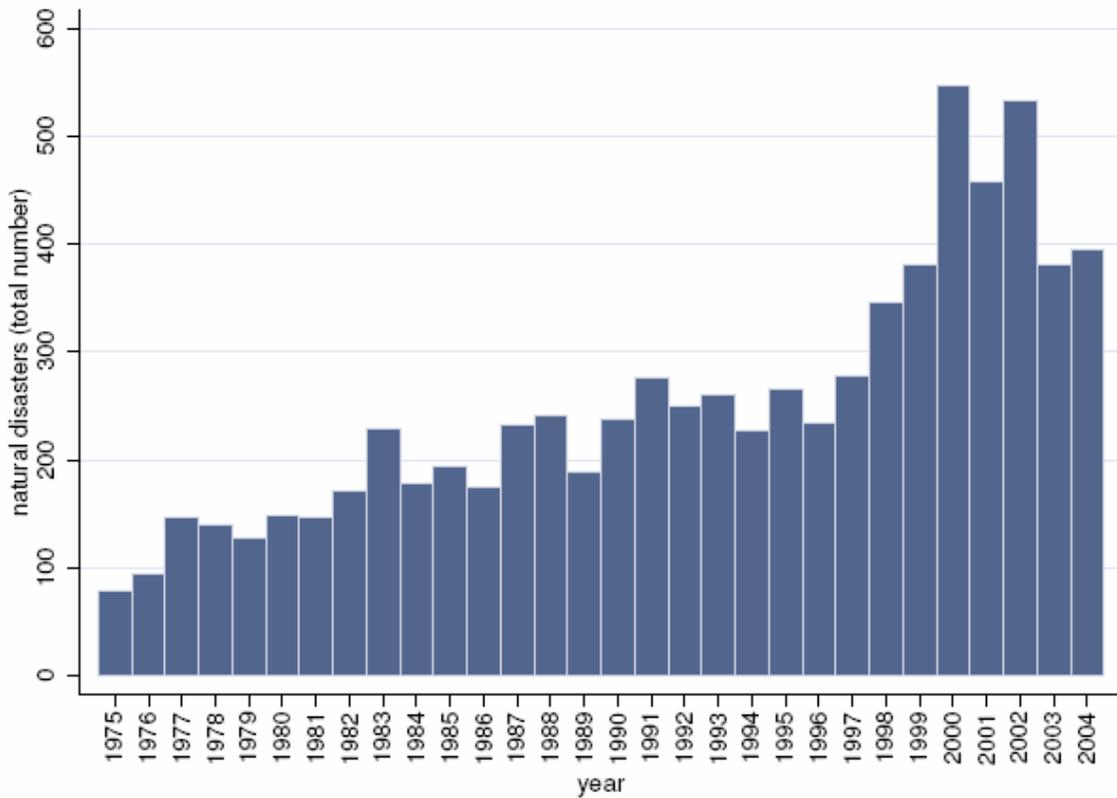


Figure 1. Number of Natural Disasters (1975-2004)

Natural disasters tend to have more severe consequences in developing countries as opposed to developed countries. Developing countries tend to experience more deaths, greater economic impact, property damages, resource shortages, and social and political impacts. The total number of disasters experienced by countries in the world from 1975-2004 is shown in Figure 2.

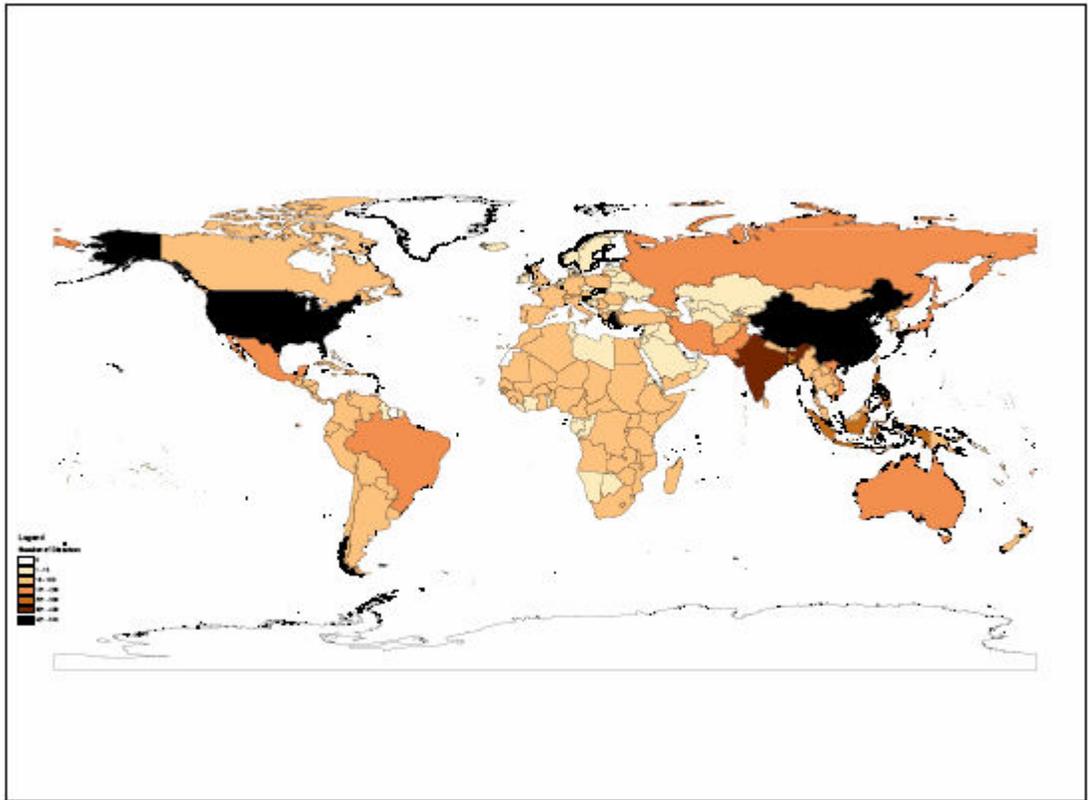


Figure 2. Number of Natural Disasters by Country

3. Argument

The existing literature on natural disasters and conflict largely suggests that natural disasters dampen conflicts (Kelman, 2003; Quarantelli and Dynes, 1976). Quarantelli and Dynes contend the growth of a “therapeutic” or “altruistic” community in the immediate aftermath of a natural disaster with the emergence of new norms. They argue that the emergency phase of a disaster is characterized by high levels of agreement over disaster tasks and goals and the means to achieving them. Conflict is not completely absent but occurs less frequently as compared with other time periods and settings.

Many relief organizations also claim that natural disasters reduce intra-state

conflicts. According to the Worldwatch Institute, “new opportunities for peace and reconciliation may emerge as suffering cuts across the divides of conflict, prompting common relief needs.”³ Ian Kelman’s (2003) theory of disaster diplomacy also states that disasters create opportunity to facilitate better cooperation and relations amongst states in conflict. This is generated from common efforts to deal with the disaster which override pre-existing prejudices and help breakdown barriers that may have hardened with events and time. A full rapprochement is not necessary as efforts from civil society alone can influence bilateral and multilateral relations in areas such as trade, environmental management, and cultural exchange. Kelman suggests that post-disaster altruistic and humanitarian imperatives could be used to move hostile governments towards greater reconciliation.

Natural disasters may also dampen intra-state conflicts as the physical devastation wrought by a disaster makes conflict difficult to conduct. Disasters cause immense destruction to infrastructure, ammunition, and weapons supply. Natural disasters also kill important political leaders of warring factions such as in Aceh, Indonesia during the 2005 Indian-ocean tsunami. Governmental action to regain control and decision-making, in addition to the restoration of essential services can temporarily suspend competitive struggle over goods, however, this is only temporary. In most situations, natural disasters do not dampen conflict but increase them by diminishing state capacity, and placing greater demands on the state to return to previous standards of living.

To understand how disasters impact conflict, an analysis is required that goes beyond the emergency period to look at root causes of vulnerability, inequality, grievances, and resource scarcities.

³ <http://www.worldwatch.org/features/disasters/overview/>

Pre-disaster Vulnerability

Vulnerability to natural disasters is the group of characteristics of a person or group that influences capacity to anticipate, cope with, resist, and recover from the impact of a disaster. Factors that influence vulnerability are race and ethnicity, class, gender, household structure, and poverty. The roots of vulnerability parallel the roots of poverty: being at risk of a natural disaster usually means that there is a high probability that the characteristics generated by political-economic conditions coincide in time and space with an extreme event to which they have been made vulnerable. While the poor are often most affected by natural disasters, they are not always the sole perpetrators, as a disaster affecting one group is often caused by another in a different place or time. The following schema shows the progression of a natural hazard to a natural disaster and conflict.

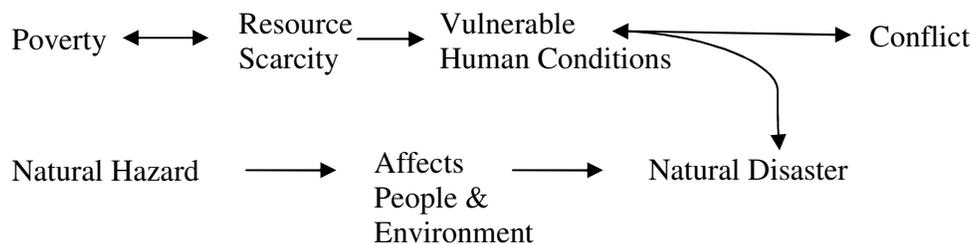


Figure 3: Progression of Hazard to Disaster and Conflict

Pre-disaster Inequality

Pre-disaster trends are likely to be the best indicators of post-disaster trends with poor groups, disenfranchised by a system of inequality likely to find themselves even

further marginalized after a disaster. Minorities also suffer higher death and injury rates and disaster aid is also often disproportionately appropriated based on group or class (Albala-Bertrand, 1993). The relationship between disasters and pre-disaster equality can be explained in the following way:

An existing social structure characterized by *inequality* and *conflict* (Xa) experiences social *disruption* (Xb) which upsets the monopoly previously enjoyed by the state in controlling allocation-distributions, create a *power struggle* (Xci) between official and unofficial decision-makers; disaster response activities are the effort of the state to regain the upper hand, and soon the temporary *common* interests (Xcii) among formerly opposing segments of the community give way to not only the reestablishment but also the further elaboration of the previous *structure of inequality and conflict* (Stallings, 572, 1988).

Therefore, disasters exacerbate inequality for marginalized groups but neither poverty alone nor worsening economic trends predictably produce conflict; conflict can often break out or intensify among the middle strata in a society or in the context of improving economic circumstances. The study of the perceptions of fairness, expectations of improvement, resource mobilization, and state repression, provides a better understanding of the role of disasters in the growth of conflict.

Disasters and Grievances

Disasters can have a significant impact in exacerbating grievances that contribute to conflict. As a group's level of relative deprivation rises, the level of grievances usually rises as well. Ted Gurr's (1970) three forms of relative deprivation - decremental, aspirational, and progressive - are relevant to this study. The first type of deprivation occurs when a group's expectations remain constant while their value capability declines. This may occur when people are upset over the loss of what they once had or could have

had. As natural disasters hinder wealth production, some groups become increasingly frustrated by the widening gap between their actual level of economic achievement and the level they feel they deserve leading to grievances.

Aspirational relative deprivation occurs when a group's capabilities remain constant while their aspirations increase and people are unable to attain new expectations. In post-disaster situations, rising expectations about redevelopment in addition to the expectation of aid, and the actual distribution of aid can contribute to relative deprivation and increased potential for conflict. Progressive relative deprivation occurs when there is a long-run and gradual improvement in a person's value position that leads them to expect continued improvement while value capabilities either stabilize or decline. The perception of relative deprivation can be in relation to other peoples' as well as one's own standard of living.

Natural disasters can also be viewed as extreme events caused by a culmination of various environmental scarcities. Literature on resource scarcity and violence posits the growth of grievances and intra- and inter-state conflict due to the degradation and scarcity of both renewable and non-renewable resources (Homer-Dixon, 1999; Kahl, 1998; Reuveny, 2002). While there does not exist any research that directly discusses the linkages between natural disasters and environmental security, a strong need exists for broadening the definition and scope of existing literature. Figure 4 captures the possible ways that natural disasters can be analyzed in an environmental scarcity and violence framework:

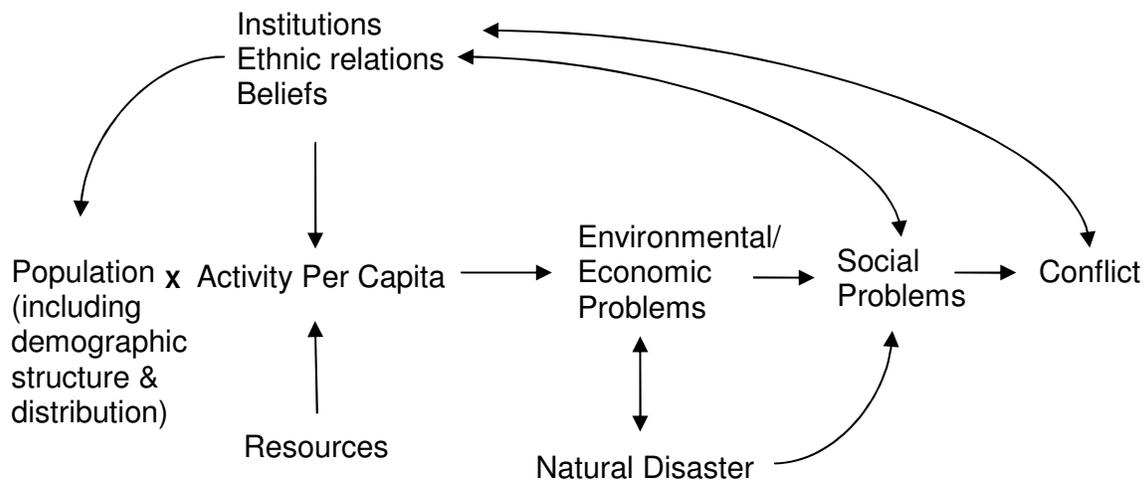


Figure 4. Natural Disasters and Conflict in the Context of Environmental Security.
(Source: The author, based on Homer-Dixon, 1999)

Figure 4 provides the basis for a causal analysis and, as shown, there are a number of feedback loops where the dependant variable is positively correlated with the causal variables labeled “Institutions, Ethnic relations, Beliefs.” In addition, natural disasters influence, and are influenced by, existing environmental problems and both indirectly and directly cause social problems.

Homer-Dixon (1999) classifies three distinct but interrelated components of environmental scarcity: supply-induced scarcity (degradation or depletion of resources), demand-induced scarcity (over consumption or overuse of resources), and structural scarcity (unequal distribution of resources). Supply-induced scarcity causes a decrease in the total availability of a resource and a prominent example is deforestation, which leads to other phenomena such as soil erosion, siltification, and a decrease in the productivity of fisheries. Natural disasters can be thought of as the triggering event inducing this

supply-side scarcity with the decrease in production of essential goods and delivery of services. The significance of a natural disaster on supply-induced environmental scarcity and degradation is a function of an ecosystem's pre-disaster sensitivity and vulnerability.

Similarly, natural disasters impact structural scarcity – the inequitable distribution of resources – exacerbating existing inequalities and resource shortages for various communities. The main social effects of both structural and supply-induced scarcity are constrained agricultural and economic productivity, migration, social segmentation, and a disruption of institutions. Environmental scarcity interacts with economic, cultural, and political factors to weaken state capacity and boost grievances and the structure of opportunities facing challenger groups. Homer-Dixon argues that this conjunction of grievances and opportunity increases the probability of major civil violence such as insurgencies, ethnic clashes, and coups d'état.

Finally, disasters exacerbate demand-induced scarcity with the increase in consumption in the post-disaster environment. In the short term, the state acts to provide emergency aid, shelter, and basic services. In the longer-term, however, recovery entails returning affected populations to pre-disaster levels of development (or better), which requires resources. Such scarcity, coupled with an increased degree of integration, urgency on the part of various social units, and competing arenas and processes for allocating resources, yield greater opportunity for widespread and deeper conflicts than exist in normal periods.

Disasters, the Construction of Meaning, and Emergent Norms

In many ways, the impact of a disaster is a mental construct imposed upon experience, with people feeling a sense of vulnerability and attempting to create a sense of meaning. Each community has knowledge of its local natural environment, a set of ideas about its physical vulnerability, and explanations for the causes of natural disasters. This includes ideas of who is responsible for disaster preparedness, recovery behavior, and accountability for inadequate disaster response. The subsequent variation in conflict outcomes can be explained as a function of the following propositions:

An interruption in social routines (Xa) triggers a process of collective redefinition (Xb) which produces an emergent normative structure (Xc) orienting interaction around themes that affect the likelihood of community conflict (Y). (Stallings, 1988: 572)

The interruption (Xa) is the natural disaster that gives rise to emergent norms (Xc) that can be either cooperative or conflictual, impacting the likelihood of conflict (Y). In the process of collective redefinition, individuals employ various “coping strategies” to overcome problems of disaster recovery. This entails acting within the limits of existing resources to achieve one’s ends. In adverse circumstances, such as disasters, survival is the highest priority, and implicit is a graduated rank of dearth, difficulty, destitution, and perhaps death. Coping strategies center on peoples’ agency, ingenuity, and ability to overcome dire situations. However, the problems that disasters pose require an incredible amount of ingenuity that may be beyond the capacity of the individual, household, or community. In addition, in disaster situations, human needs such as self-respect and self-regard become less significant; in “normal” situations, these needs, in addition to others such as giving and receiving love, affection, and respect place high in the hierarchy of

needs. Anthony Oliver-Smith (1986) describes how the suppression of “core” human needs can later fester and emerge as violent demonstrations against authority (Y). The durability of emergent norms and behaviors is thus problematic as the very coping strategy that gives rise to a consensus on the hierarchy of values in the short term may cause the suppression of other sentiments and interests that later fester and emerge as violent demonstrations and conflict.

Disasters, Resources, Opportunity, and Mobilization

Disasters also provide a “window of opportunity” with new resources being introduced in the post-disaster phases that require political negotiations with an array of actors (Tierney, 1989). External assistance involving the injection of resources is likely to have a distorting effect on economies and become a principal goal to be fought over by warring factions. Aid can also hinder development by increasing dependence, distorting indigenous support mechanisms, and undermining pre-disaster development initiatives. Donor countries that use aid selectively as a means of undermining unfavorable governments – with or without formal embargoes or blockades – may inadvertently increase the number of resource-rich political organizations, as well as resources available for conflict, further reinforcing instability.

Problems in the post-disaster period also generate new agendas and demands, empowering some groups and debilitating others. Typical groups active in the emergency period include religious and interfaith welfare agencies, local community organizations, and temporary coordinating groups. However, a disaster can also bring in third-party contentious supporters who are neither directly affected by the disaster nor benignly

attempting to aid the victim population (Shefner, 1999). This category of actors represents previously mobilized groups who either view the disaster as another social injustice and who attempt to expose the government's ineptness and corruption through political movements. They maneuver to fulfill their interests and realign the balance of power.

Role of the State

In the aftermath of a disaster, the state usually intervenes to provide services to help society return to how it was before, even if that entails reinstating previous structures of inequality and conflict. There may be conflict in authority over disaster-recovery priorities and plans, with politically aligned organizations uniting together to provide services to the victim communities, seriously altering political structures. Such was the case in the aftermath of the 2004 tsunami in Sri Lanka, with the Liberation Tigers of Tamil Eelam (LTTE) vying for disaster aid and allegiance. Local politically aligned organizations compete to provide services to help victim communities reconstruct their lives, many with their own long-term political agendas.

Natural disasters in developing countries also offer a once-in-a-lifetime opportunity for opposition parties or warlords to attack power while the government deals with recovery and a number of internal and external pressures. The government's ability to assist the disaster-afflicted may be severely constrained and thus political leaders, beset by opposition and seeking to rally support for their continued rule may use the disasters as a basis for inciting conflict, diverting attention away from domestic problems or to prevent the government from becoming a scapegoat for problems beyond its control.

What ensues is political destabilization, especially if this is accompanied by a collapse of public confidence.

Compound Disasters

Violent conflict can occur in the short, medium, and long-term aftermath, creating a “compound disaster.” A natural disaster can also occur in the middle of conflict, providing little time for adequate recovery or the development of sustainable coping mechanisms. Given the structure of civil protection structures, the army is most likely to play a key role when a natural disaster strikes and in civil-conflict environments, this can produce a lack of trust in the government and protection of civilians, which leads to further insecurity and social problems (Alexander, 175).

Interstate Conflict

When natural disasters occur, they can have a significant impact on neighboring states, regional stability, and the international community. A natural disaster becomes “internationalized” when it poses a threat to the stability not only of the state but of neighboring countries, or potentially, entire regions. Natural disasters impact the international system in many ways: First, when a disaster occurs, it disrupts trade, finance, transportation systems, communication, and access to raw materials and great powers and bordering nation states quickly get involved. A natural disaster can disrupt the close economic ties that neighboring states have, changing patterns of production, trade, and consumption and lead to intervention for opportunistic reasons. A neighboring state may take advantage of the strain in a country and use that to its advantage to gain

regional dominance while the affected government is preoccupied with disaster activities.

Evidence from disaster research indicates that the relocation of entire communities can also create problems and contribute to vulnerability and conflict. Natural disasters directly and indirectly trigger migration and create new support links. If the host country has weak political structures and difficulties providing for its own citizens, incoming refugees, now in extreme economic hardship will further constrain its ability to provide services. Migration also changes the ethnic distribution in a country, and in the mid to long term, the ethnic distribution of power.

4. Data and Measurement

To explore this issue, I test the effect of natural disasters on the occurrence of conflict over the period 1991-1999, drawing on various different databases on disasters and conflict.

Hypotheses

The primary hypothesis is that the sudden changes brought on by natural disasters exacerbate problems that people face on a daily basis, heightening conditions for conflict such as grievances, political opportunity, and mobilization. As most communities prove extraordinarily resilient in the face of catastrophe, individual case analysis should also show increased levels of cooperation in the immediate aftermath of a disaster.

The following subset of hypotheses is derived from this primary hypothesis by expansion and qualification:

Hypothesis 1: The greater the level of severity of a disaster, the greater the grievance and potential for conflict;

Hypothesis 2: States with preexisting conflicts are more likely to experience post-disaster conflict;

Hypothesis 3: Countries with bordering states experiencing major violent internal conflicts are more likely to experience post-disaster conflict;

Hypothesis 4: The higher the levels of democracy, the less likelihood of conflict;

Hypothesis 5: Developing nations are more likely to experience post-disaster instability than developed nations;

Research Design

This study takes the form of a large-N quantitative survey. Included in the analysis are 115 countries for the period 1991-1999, yielding 1791 disaster events and 11,365 data points. The selection of countries was done solely on the basis of data availability, matching data availability for the independent, dependant, and intervening variables. The country set, combined with the nine-year time period provides a large enough period to constitute a representative sample of cases, with the only limitation on the number of cases available for analysis being the absolute number of disasters occurring in the study decade, and data availability. The impacted countries in the sample selection vary significantly in the numbers and severities of disasters that affect them.

Country Coverage Issues

A total of 115 countries are included in this study (see Appendix 1 for entire list).

Table 1 below provides a summary of the nations included:

Continent/Region	Number	Percentage
Africa	38	33.0
Central Africa	5	4.3
East Africa	11	9.6
North Africa	4	3.5
Southern Africa	5	4.3
West Africa	13	11.3
Americas	22	19.1
Caribbean	3	2.6
Central America	7	6.1
North America	1	0.9
South America	11	9.6
Asia	29	25.2
East Asia	5	4.3
Russian Federation	7	6.1
South Asia	6	5.2
South-east Asia	5	4.3
West Asia	6	5.2
Europe	22	19.1
European Union	10	8.7
Rest of Europe	7	6.1
Russian Federation	5	4.3
Oceania	4	3.5
Total	115	100

Table 1. Summary of Countries in Empirical Study.

Study Period Trends and Statistics

According to the World Disaster Report (IFRC, 2001), between the period 1991-1999, approximately 2.9 million people lost their lives to conflict and both natural and technological disasters. Conflict killed over three times the number by natural disasters. However, the number affected by disasters is six times more than the average of 32

million annually affected by conflict. The number affected by natural disasters also rose from 147 million per year in the previous decade to 206 million between 1991 and 1999, while the average killed decreased from 86,328 to 72,841. The direct cost was reportedly US\$86.8 billion per annum (2000 prices).

Both natural disasters and conflict also tend to affect developing countries much more than developed countries. Of the 2.2 million people killed by conflict, over three-quarters were from nations of low human development and of the 655,571 reported killed by natural disasters, two-thirds were from nations of low human development. Eighty percent of deaths from both natural and non-natural disasters occurred in Asia, while 77% of deaths from conflict occurred in Africa.

When statistics over the study period are totaled up, an average of 254 million people per year are killed and affected by disasters and conflicts. For all three categories of nations – low, medium, and high human development – the total killed and affected by natural disasters is higher than the total killed and affected by conflict. Nations with low human development also account for over two-thirds of killed and affected by natural disasters and conflict.

Data

Dependant Variable

The dependant variable, conflict, is measured on a twenty-point conflict and cooperation continuum before and after a natural disaster. The data is drawn from the Integrated Data for Events Analysis (IDEA) dataset (Bond et al., 2003). IDEA is a

typology for international event analysis. Events are machine-coded in near-real time into 249 categories to include information on events, actors, and targets in a four-level event hierarchy. This means that at higher levels, events are parsed independent of specific actors and targets, making the framework more flexible. News reports can be considered a semantic rendition of reality and the events of cooperation and conflict that occur around the world.

After evaluating a number of conflict datasets such as PRIO run by the Peace Research Institute in Oslo, the State Failure Project run by the University of Maryland, and the Human Security database by Andrew Mack, a decision was made to use events data, specifically the IDEA dataset. This decision was based on four key factors. First, the IDEA dataset represents an extremely rich data source of conflict and cooperation around the world and offers perhaps the most detailed account of interactions between actors (King and Lowe, 2003). The other sources evaluated looked at annual, quarterly, or sometimes monthly observations of the international system. Second, the State Failure dataset was used to find the numbers of bordering conflicts but was not used as the starting point for identifying all the conflicts used to make up the independent variable as state failure data is structural, almost constant while events data is dynamic. Third, while it was acknowledged that interesting research could be produced from aggregated observations, in comparison with events data, these datasets cannot help but miss a good deal of the structure of the international system since IDEA data examines international events as they occur, providing much more accurate and granular data. Finally, events data are one of the most common types of information used in quantitative international relations research. KEDS/TABARI (The Kansas Event Data System and Text Analysis

By Augmented Replacement Instructions) is probably the most commonly used dataset in the field of international affairs in part because of its availability in the public domain. Like KEDS/TABARI, IDEA starts with a World Events Interaction Survey (WEIS) framework. Unlike KEDS/TABARI, however, IDEA builds on WEIS adding nearly 200 additional events. IDEA's parsing technology, the VRA Reader) is also different from the KEDS/TABARI, using full-syntax frame parsing, representing the next generation of parsing.

In terms of processing, news reports from Reuters and other sources are parsed by VRA Reader to gather relevant information by breaking up lead sentences to determine the codable event, source actors, and target actor. For example, here is a sentence with the source (S), event (E), and target (T):

Russia^S *cut off economic aid*^E to Estonia^T on Friday in what could be the first retaliation to a new Estonian citizenship law passed this week.

Reuters leads, in what is known as “the pyramid structure,” are written to provide a summary of the news story. Thus, VRA Reader will specify the source (S) as Russia, economic aid as the event (E), and Estonia as the target (T). The event will be mapped to IDEA category 1931, “reduce or stop economic assistance,” and record the termination of aid as the outcome of the interaction.

In order to utilize event data in a statistical model, individual events need to be aggregated in a meaningful measure, with numerical codes rather than categorical data. This model will apply cooperation and conflict scaling called “base codes” from the 2002

IDEA Delphi Study. Virtual Research Associates (VRA), the developers of the IDEA protocol, assembled thirty-two academics and policy practitioners for the task of rating 114 events across five indicators: locus, affective character of the action, mechanism, and outcome of the action in terms of any associated physical injury and material damage (IDEA, 2005). The scaling that will be utilized in this model is from a sub-survey involving a smaller group of the expert panelists who formulated “base codes” that are the sum of four “base code indicators.” The twenty point scale from -13 to 7 rates the overall level of conflict and cooperation for each event recorded between 1991 and 1999, then aggregated monthly into indices of conflict and cooperation.⁴

In terms of reliability, King and Lowe (2003) rate the IDEA machine coding at 70% to 85% accurate in identifying events. In another study by Craig Jenkins et al. (2002), events in the *World Handbook* derived from the IDEA dataset were found to have a 50% to 80% recall rate, no false positives, and a 3% false negative rate. Scaling reliability is determined by the degree of agreement among the panelists for the events they considered (Zaninovich, 1963). The base codes were unanimously agreed upon.

Some challenges in using events data include duplication, with small differences in grammar, causing “near duplicates.” World news is also disproportionately concentrated on Western countries, or large developing countries such as India, China, and Mexico.

⁴ Visit <http://vranet.com/IDEAHistograms/IDEAScaleSurvey.htm> for complete IDEA event codes and scaling.

Independent Variables

The first variable measures disaster severity and represents Hypothesis 1. The impact of a natural disaster in an area is felt in the effects primarily on inhabitants and thus disaster impact is expressed as the sum of injuries, affected, killed, and homeless. Disasters during the time period of 1991-1999 are included, along with their locations in space and time. This figure is then aggregated in a given month for a given country. The data is derived from the *EM-DAT International Disaster Database* maintained by the Centre for Research on the Epidemiology of Disasters (CRED) in cooperation with the United States Office for Foreign Disaster Assistance (OFDA). A disaster is included in the database if it meets one of the following criteria: ten or more deaths, 2000 affected for droughts and famines or 100 for other disasters, government disaster declaration, or plea for international assistance.

While CRED statistics are one of the most widely cited in disaster-related research, they come with specific limitations. The quality of the disaster data is only as good as the reporting system. Currently, there exists a lack of generally accepted standards of disaster reporting, collection methodologies, and definitions. Inaccurate estimations of number killed and affected, unreported injuries and deaths, poor monitoring of vital statistics in pre-disaster environments, and deliberate understatements or exaggeration of casualties by governments are a few of the problems with reporting. Moreover, in EM-DAT, not all 2524 records have complete information, with some disasters missing data, indicated by zeros for both number affected and number killed (Guha-Sapir and Below, ND). The degree of completion varies mainly with the country

of occurrence, with developing country disaster records less accurate than those of developed countries, causing structural regional differences in the numbers reported.

Dates can also be a source of ambiguity with inaccurate declared dates for slow onset disasters such as famines, which are often indeterminable. Furthermore, the timing of reporting can be problematic as not all disaster-related deaths or injuries occur immediately after the disaster strikes and the risk of morbidity and other health problems may remain high if hazard risk persists, influencing calculations of disaster severity.

In terms of disaster aggregation in EM-DAT, in some cases, multiple separate events are aggregated into one single record and classification problems occur with the assignment of disaster types. For example, a landslide may be triggered by a flood but categorized as a single landslide. In addition, extreme events that take only a few lives and affect local economies may go unreported.

An overview of the analyzed data and the number of available records for different selection criteria is given in Table 2.

Subset of total dataset	Number of records	Universe Proportions (Sample Proportions)
All natural disasters in EM-DAT 1991-1999	2524	100
Drought	141	5.59
Earthquake	220	8.72
Epidemic	331	13.11
Extreme temperature	81	3.21
Famine	44	1.74
Flood	743	29.44
Insect infestation	11	0.44
Slides	144	5.71
Volcano	50	1.98
Wave/Surge	10	0.40
Wildfires	96	3.80

Subset of total dataset	Number of records	Universe Proportions (Sample Proportions)
Windstorm	649	25.71
Non-country set data removed	620	24.56
Total dataset	1900	75.28
Records with number of deaths reported (>0)	1356	53.72 (71.37)
Records of total affected reported (>0) ⁵	1376	54.52 (72.42)
Records with both deaths or total affected reported (at least one >0)	1791	70.96 (94.26)

Table 2. Overview of Disaster Data by Type and Availability of Records.

Table 2 shows that 27.6% of the total dataset (after the removal of non-relevant country data) lacking reports of figures of total affected. In terms of misleading values because of underreporting, the absence of affected data is quantitatively the same as a partial absence of data (Brooks and Adger, ND). If this analysis is applied to CRED data prior to 1990 for countries associated with no missing data, this produces a very small country set that is of little value. Post-1990 data, however, shows that events that are associated with high mortality and severe impacts contain estimates of numbers killed as reasonable levels of estimated records of affected. Therefore, it is believed that the treatment of missing entries as zeros is unlikely to misrepresent disaster events, and although the total number of analyzed events is smaller than the original database, it is believed to form a representative sample.

⁵ “Total Affected” is defined by CRED as the sum of number injured, affected, and homeless. Records of the “Total Number Affected” are calculated as the total number of records minus events with a zero for total number of affected. A zero for affected is not valid as an event is not a disaster if no one is affected.

Control Variables

For all the intervening variables, the country year serves as the unit of analysis, with one record for each country that exists for each year during the period 1991-1999.

Hypothesis Two is represented by a scoring of “previous upheaval” from the State Failure Task Force problem set (State Failure Task Force, 2005). It indicates whether or not a country has experienced any state failure in the previous fifteen years. It is calculated as a sum of such previous events.

Hypothesis Three is represented by two variables: the number of bordering states experiencing major violent internal conflicts, and number of bordering states experiencing major armed conflict of any kind, factored together (0.99 correlation). The data comes from Monty Marshall at the Center for International Development and Conflict Management (CIDCM), University of Maryland in the State Failure Task Force problem set.

Hypothesis Four involves levels of democracy and freedom using the political rights and civil liberty indices from Freedom House (2005), factored together (0.87 correlation). Finally, four variables gauge the state of development in Hypothesis Five: annual Gross Domestic Product (GDP) per capita, trade as a percentage of GDP, population (log transformation), and infant mortality. The first two variables come from the World Bank’s World Development Indicators (2001) and the latter from the United Nations’ World Population Prospects 1950-2050 (1996).

Table 3 contains a summary of the variables used in this study and their descriptive statistics:

Variable	What the variable measures	Data sources
Dependent variable		
Conflict	Mass conflict measured on a 20-point conflict-cooperation scale	Integrated Data for Events Analysis (IDEA)
Independent variables		
Number killed	Count of the number of people confirmed as dead and persons missing and presumed dead in a disaster. A measure of disaster severity	Centre for Research on the Epidemiology of Disasters (CRED)
Number injured	Count of the number of people suffering from physical injuries, trauma or an illness requiring medical treatment as a direct result of a disaster.	Centre for Research on the Epidemiology of Disasters (CRED)
Number affected	Count of the number of people requiring immediate assistance during a period of emergency, i.e. requiring basic survival needs such as food, water, shelter, sanitation and immediate medical assistance. A measure of disaster severity.	Centre for Research on the Epidemiology of Disasters (CRED)
Number homeless	Count of the number of people needing immediate assistance in the form of shelter after a disaster. A measure of disaster severity.	Centre for Research on the Epidemiology of Disasters (CRED)
Intervening variables		
Previous upheaval	Indicates whether or not a country has experienced any state failure in the previous 15 years.	State Failure Project
Bordering civil conflicts	The number of bordering states with major violent internal conflict; The number of bordering states with any type of major-armed conflict.	State Failure Project
Political Rights and Civil Liberties	Measures of political rights and civil liberty from Freedom House.	Freedom House
GDP per Capita	Real gross domestic product per capita, measured in current international terms. Measures country carrying capacity and stability.	World Bank World Development Indicators (WDI)
Trade as a Percentage of GDP	Exports plus imports divided by gross domestic product. Measures trade openness and a country's level of development.	World Bank World Development Indicators (WDI)
Population (log transformation)	Country population	United Nations' World Population Prospects 1950-2050
Infant Mortality	Number of deaths of infants under one year of age	United Nations'

Variable	What the variable measures	Data sources
	per 1,000 live births, logged and normalized. A sensitive indicator of the quality of life for a country's general population.	World Population Prospects 1950-2050

Table 3. Summary of Variables and Their Sources.

Table 4 displays the dependant and independent variables and their descriptive statistics.

Variable	Mean	Minimum	First Quartile	Third Quartile	Maximum
Conflict	0.4065	-13.0	-0.3119	1.4889	7.0
Total Affected	10170.0	0	0	785.5	1270000.0
Population	4.562e+07	6.940e+05	4.566e+06	3.518e+07	1.215e+09
Political and Civil Rights	3.626	1.0	2.0	5.0	7.0
GDP Per Capita	4572.6	305.7	1232.2	5651.4	20862.3
Infant Mortality	46.98	4.30	14.50	72.90	149.00
Bordering Conflicts	1.260	0	0	2.0	6.0
Previous Upheaval	7.978	0.0	0.0	11.0	58.0
Trade as a Percentage of GDP	69.43	13.75	43.38	86.41	227.93

Table 4. Independent and Dependant Variables and Their Descriptive Statistics.

5. Analysis

Empirical quantitative tools will be used. A multivariate linear regression model is chosen as statistical method, and multiple imputation of missing data. Multivariate linear regression allows the fitting of a single model while taking into consideration the (usually positive) impact of other socio-economic and political variables on conflict. The Statistical Package for the Social Sciences (SPSS version 13.0) will be used to analyze the relationship between the independent variable and dependant variable.

One year before a given disaster captures a country's prior level of conflict and other respective indicators. The decay function is calculated by averaging the weighted disaster values according to the days from the "event data" date. The follow weighting is applied,

$$\exp(-(DE-DD)/300) \text{ if } (DE-DD) > 100 \text{ and } < 365$$

where, DE is the date of the event data and DD is the date of the disaster. This exponential function is also referred to as the "memory decay" function.

Empirical Results

Table 6 tests the effect of natural disasters on conflict propensity in a model containing the most important control variables for all countries in the study. The results clearly support a hypothesis that natural disasters increase the risk of conflict on a global basis. An increase in the severity of a natural disaster by 100 persons affected is associated with an increased likelihood of conflict of around 2.31%, supporting Hypothesis 1 that the greater the severity of the disaster, the greater the potential for conflict.

The results also suggest that the larger the number of survivors, the greater the grievance and potential for conflict. The variable "Total Disaster Affected" is an aggregation of levels of affected, killed, injured, and homeless, where the number killed represents only 0.03% of the total affected. Affected represents 95.7 %, while homeless represents 4.2%. This could be due to missing data on injured, homeless, and killed but reconfirms real world scenarios where disaster casualty reporting contains figures with

high numbers of affected.

Explanatory Variables	Model 1 All Countries and Dependencies		
	<i>Coefficient</i>	β <i>Standard Error</i>	<i>p-value^a</i>
Total Disaster Affected	-0.023	0.008722	0.0081
Control Variables			
Total Population (log)	0.161	0.01641	< 2.00e-16
GDP Per Capita	9.71e-06	5.290e-06	0.0664
Trade as Percentage of GDP	0.004361	0.0005874	1.20e-13
Political and Civil Rights	-0.1294	0.01353	< 2.00e-16
Infant Mortality	-0.005519	0.0006877	1.11E-15
Bordering Conflicts	-0.03365	0.01588	0.0341
Previous Upheaval	-0.02099	0.001316	< 2.00e-16
Constant	-1.496	0.293	3.34e-07
N	11365		
Pseudo R ²	0.1059		
^a Effects that are significant at 0.05 level in bold.			

Table 5. Risk of Conflict by Natural Disasters, 1991-1999 (Global Model)

As expected, level of development as measured by the infant mortality rate, trade as a percentage of GDP, and population (log transformation) is strongly significant to conflict/cooperation levels in the global model, consistent with previous studies using

economic indicators of development. GDP per capita, however, is not found to be statistically significant.

Levels of democracy measured by political rights and civil liberties also seem to matter for conflict in a pattern consistent with previous studies. Furthermore, previous upheaval is statistically very significant to conflict, and bordering conflicts are also associated with conflict propensity.

How Do Natural Disasters Matter?

If natural disasters increase the likelihood of conflict, can something be said about how and why they matter? In order to predict when a natural disaster may lead to conflict, it is important to look at the interaction between natural disasters and conflict and a number of social, economic, and political variables that also influence conflict outcomes.

The Appendix contains the results of analysis of the effects of the intervening variables, comparing groups with high levels in a variable with the rest of the cases. In essence, the variation on the outcome variable is determined by the causal combination of the interacting independent variables.

Hypothesis 2 – stating that nations with preexisting conflicts are more likely to experience post-disaster conflict – is found to be correct, with countries with high numbers of previous conflict, suffering greater propensity for post-disaster conflict. As expected, democracy also has a significant effect on conflict outcomes, with more democratic states less likely to experience post-disaster unrest (Hypothesis 3).

In terms of levels of development, all by one indicator showed that less developed nations are more likely to experience conflict (Hypothesis 4). The greater the level of income and trade, the lower the level of conflict. Countries with high levels of infant mortality are especially prone to post-disaster conflict. The population variable is found to actually lower levels of conflict, with bigger countries experiencing less conflict. This could be a function of the disaster and conflict data that is aggregated at the national level, such that the effect of a disaster is diffused in countries with larger populations.

Interestingly, Hypothesis 5 which posits that countries with bordering conflicts are more likely to experience post-disaster conflict is not upheld. Table 6 presents the results of the five hypotheses tested:

<u>Hypotheses</u>	<u>Results</u>
Natural disasters exacerbate problems which people face on a daily basis, heightening conditions for conflict	Supported
(1) The greater the level of severity of a disaster, the greater the grievance and potential for conflict	Supported
(2) States with preexisting conflicts are more likely to experience post-disaster conflict	Supported
(3) Countries with bordering states experiencing major violent internal conflicts are more likely to experience post-disaster conflict	Not Supported
(4) The higher the levels of democracy, the less likelihood of conflict	Supported
(5) Developing nations are more likely to experience post-disaster instability than developed nations	Supported

Table 6. Conclusion of Hypothesis Testing

Limitations

The calculated changes represent the outcome of many processes, some that can be modeled and some that cannot. In modeling the relationship between natural disasters and conflict, this study has mainly concerned itself with the direct consequences of disasters and not with the indirect consequences such as the growth of grievances, identity formation, the development of vulnerabilities, and environmental scarcity. Such factors are difficult to accurately operationalize, and the data are very incomplete. In terms of disaster impacts, the variables employed were primarily those that affected people, omitting figures of damage and aid contribution which, if complete and accurate, can often be sensitive proxies of disaster severity. This analysis is also limited to effects of natural disasters on aggregations of individuals not on the individuals themselves and their psychological state, which can be an important factor in the development of conflict.

Due to problems of data availability, some problems of missing value cases could not have been overcome. While the disaster database used in this study has also been criticized for its reliability, nonetheless, it is one of the most complete and reports the highest total figures for affected compared with other leading private databases in studies by Debarati Guha-Sapir and Regina Below.⁶ Once a more up-to-date data-set is available, the empirical research merits replication and further verification.

Finally, a division can be made between disasters where effects are centralized in one area without direct effects on the rest of a country and disasters that have extensive impacts in different regions of the country, not only the affected areas. In order to have a precise analysis of the impact of the former, sub-national disaster and conflict data are

⁶ Guha-Sapir, Below, and WHO Centre for Research on the Epidemiology of Disasters, "The Quality and Accuracy of Disaster Data: A Comparative Analysis of Three Global Data Sets," 12-16.

required. However, due to data availability, only national level data are available although most disasters considered in this period only affected a fraction of national territory. By virtue of the type of data available for analysis, this model is thus better geared for larger-scale “catastrophic” disasters that have widespread or acute effects. This analysis says little of sub-national trends.

In conclusion, this study has underscored the necessity of including the influence of disasters in studies of social conflict. The statistical results are highly reliable having been based on a large dataset. However, linear models may not be the best models to describe the true relationship between the dependent and independent variables, as shown by the small values of R-squared. Future analysis should incorporate more complex models such as Hidden Markov Models (HMMs) and Neural Network Models.

6. Conclusions and Recommendations

Natural disasters are becoming more common with time and given global phenomenon, like the Greenhouse Effect, natural disasters are expected to become even more common in the future. According to the World Bank, already 3.4 billion people live in areas where at least one natural disaster can significantly impact them.⁷ Unfortunately, those countries most vulnerable to natural disasters are also those countries most vulnerable to conflict.

Natural disasters in general contribute to conflict because they create competition for scarce resources, exacerbate inequality with the unequal distribution of aid, change power relationships between individuals, groups, and the organizations that serve them, and can create power vacuums and opportunities for warlords to usurp power.

The quantitative research analysis carried out in this study was used to determine the strength of the disaster-conflict hypothesis by testing it across a cross-national time-series. From the statistics, it has been established that natural disasters are important factors in explaining social conflict. The analysis both validates the traditional determinants of conflict and indicates the importance of incorporating system shocks as well, such as natural disasters. In all social calamities, there are perceived winners and losers and people are as likely to fight over the wreckage of aid, political disarray, and resource scarcity, as in other “man-made” situations.

Recommendations

As interest in natural disasters has perhaps never been greater than it is at present, with NGOs, relief organizations, governments, corporations, and civil society ever more involved in the fight to prevent casualties and catastrophic losses, the growth in understanding of the social and political aspects of disasters presents other new challenges beyond realizing the connections between disasters and conflict. Disaster policies and programs need to be formulated that include conflict as an integral part, and vice versa. This study has attempted to provide these groups a new way to analyze conflict in natural disasters both in terms of post-disaster recovery as well as the process of mitigation. With a sound understanding of the ways that natural disasters impact conflict, disaster response can both be timely and avoid further scenarios in which the effects of a natural disaster are exacerbated by mismanaged policies and decisions. Concrete actions in the post-disaster environment that can minimize vulnerability and mitigate conflict include the creation of codes of conduct, the adequate development of legal standards and urban planning regulations, guidelines for international relief distribution that avoid arbitrary relief assistance, and the avoidance of the rebuilding of inequality and injustice. All lie within our sphere of influence and thus it is no longer sufficient for practitioners to operate in disaster settings without addressing the long-term political and conflictual dimensions of disasters.

This study has set the stage for a productive leap in research and theory in the realm of natural disasters and conflict, and given the trends found in this study, there are a number of directions that future research should take. Firstly, as the distinction between

⁷ The natural disasters studied in this report are droughts, floods, cyclones, earthquakes, volcanoes, and landslides. World Bank, "Natural Disaster Hotspots" A Global Risk Analysis," Washington, D.C.: World

natural and technological disasters becomes less clear-cut with more victims viewing natural disasters as “unnatural” in origin, a worthwhile continuation of research would be to use this typology for comparative research on the effects of natural disasters and technological hazards. This can provide an even greater understanding of “complex emergencies” and the interconnections between man, environment, technology, social systems, and conflict. A logical extension of such study would be the analysis of natural disasters in aftermath of conflict, with the many ecological disasters that are brought about or exacerbated by conflict. There is a degree of complementarity in both theory and practice that can be further analyzed.

When new data are available, a replication of the empirical model is a worthwhile endeavour as well as its application to an expanded time period to include disasters before 1991, and with units smaller than country to allow for greater precision on the impacts of small- to medium-scale disasters. Finally, as more and more communities experience disaster, research could develop a broader understand of the disaster-conflict continuum with case studies specifically in the African continent where the long-term impacts of disasters in present-day conflicts have been largely overlooked.

In the international policy realm, the role of disasters in peacebuilding needs to be formalized. Currently, disasters and civil emergencies are not regarded as threats to peace under the terms of the UN Charter. The short-term “altruistic” period of a disaster presents a prime opportunity to institute development and peacebuilding initiatives, alleviating the risk of conflict. Guidelines need to go beyond the doctrine of non-intervention for external disaster assistance in conflict areas. Aid should be distributed to

assist the most vulnerable sections of society and mitigate the potential for resentment. This does not imply the equality of provision but the impartiality of it.

Finally, International Governmental Organizations (IGOs) and NGOs need to develop cost-benefit analyses to convince donor countries to invest not only in disaster recovery but also in disaster conflict-prevention. Research on the management of post-disaster conflict risk, strategies for post-disaster conflict prevention, and mechanisms for the promotion of social cohesiveness and inclusion can add further dimension to the subject.

Without a stronger framework of natural disasters and conflict, the gulf between theory and implementation will remain debilitating. Thus, such measures would not only add important research to the disaster field but strengthen the international system for understanding and dealing with the dynamics of a violent and ever-changing world.

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Table 7: **Appendix: Complete Country List**

Algeria	El Salvador	Kuwait	Peru
Argentina	Ethiopia	Kyrgyzstan	Philippines
Armenia	Fiji	Laos	Poland
Australia	France	Lebanon	Portugal
Austria	Gabon	Lesotho	Romania
Azerbaijan	The Gambia	Lithuania	Russia
Bangladesh	Georgia	Madagascar	Rwanda
Belarus	Germany	Malawi	Senegal
Benin	Ghana	Malaysia	South Africa
Bolivia	Greece	Mali	Spain
Botswana	Guatemala	Mauritania	Sri Lanka
Brazil	Guinea	Mauritius	Swaziland
Bulgaria	Guinea-Bissau	Mexico	Syria
Burkina Faso	Guyana	Moldova	Taiwan
Burundi	Haiti	Mongolia	Tajikistan
Cameroon	Honduras	Morocco	Thailand
Canada	Hungary	Mozambique	Togo
Central African Republic	India	Namibia	Tunisia
Chad	Indonesia	Nepal	Turkey
Chile	Iran	Netherlands	Uganda
China	Ireland	New Zealand	Ukraine
Colombia	Israel	Nicaragua	United Kingdom
Congo-Kinshasa	Italy	Niger	Uruguay
Costa Rica	Jamaica	Nigeria	Uzbekistan
Cote d'Ivoire	Japan	Norway	Venezuela
Cyprus	Jordan	Pakistan	Yemen
Dominican Republic	Kazakhstan	Panama	Zambia
Ecuador	Kenya	Papua New Guinea	Zimbabwe
Egypt	South Korea	Paraguay	

Appendix

This appendix presents the complete regression results for the sub-hypotheses presented in the text. The full p-values are presented rather than levels of significance in the models, allowing for the consideration of interesting relationships that do not meet formal criteria for statistical significance. Unless otherwise stated, statistical significance refers throughout this section to p-values below 0.05.

Table 8: Regression Results for Sub-Hypotheses

Models	N	β : Coefficient of Total Disaster Affected	Standard Error of β	p-value of β	Pseudo R ²
Model 2	2365	-0.053	0.018	0.004	0.145
Model 3	8891	0.018	0.01	0.065	0.081
Model 4	2273	-0.006	0.009	0.504	0.282
Model 5	9083	-0.028	0.011	0.014	0.106
Model 6	2271	0.013	0.009	0.167	0.201
Model 7	9085	-0.03	0.01	0.004	0.074
Model 8	2271	-0.007	0.029	0.786	0.082
Model 9	9085	-0.031	0.009	0.001	0.127
Model 10	9226	-0.022	0.01	0.027	0.078
Model 11	2130	-0.015	0.014	0.276	0.041
Model 12	9137	-0.026	0.01	0.01	0.083
Model 13	2219	0.013	0.012	0.272	0.182
Model 14	7355	-0.013	0.011	0.232	0.104
Model 15	4001	-0.038	0.014	0.008	0.109

Model 2: Includes countries with the variable “Previous Upheaval” at the top 0.2 quantile: ≥ 15

Model 3: Includes countries with the variable “Previous Upheaval” that fall in the bottom 0.8 quantile: < 15

Model 4: Includes countries with the variable “Population” at the top 0.2 quantile : ≥ 45.23 million

Model 5: Includes countries with the variable “Population” that fall into the bottom 0.8 quantile : < 45.23 million

Model 6: Includes countries with the variable “GDP Per Capita” at the top 0.2 quantile : $\geq \$1016.17$

Model 7: Includes countries with the variable “GDP Per Capita” that fall into the bottom 0.8 quantile: $< \$1016.17$

Model 8: Includes countries with the variable “Trade as Percentage of GDP” at the top 0.2 quantile: ≥ 93.89

Model 9: Includes countries with the variable “Trade as a Percentage of GDP” that fall into the bottom 0.8 quantile: < 93.89

Model 10: Includes countries with the variable “Political and Civil Liberties” at the bottom of the 0.2 quantile : ≤ 2 , where 1 is the highest level of political and civil rights and 7 is the lowest

Model 11: Includes countries with the variable “Political and Civil Liberties” that fall into the remainder 0.8 quantile > 2 , where 1 is the highest level of political and civil rights and 7 is the lowest

Model 12: Includes countries with the variable “Infant Mortality” at the bottom 0.2 quantile: ≤ 12.5

Model 13: Includes countries with the variable “Infant Mortality” that fall into the remainder 0.8 quantile: > 12.5

Model 14: Includes countries with the variable “Bordering State Conflicts” at the bottom 0.35 quantile: ≤ 1

Model 15: Includes countries with the variable “Bordering State Conflicts” that fall into the remainder top 0.65 quantile: > 1