Disaster-STS Workshop

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Hidden Vulnerabilities:
Disaster and Expertise in an Age of Complexity

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Introduction: What transpired in Fukushima?

When the 9.0 magnitude undersea earthquake was shaking the Tohoku area of northeast Japan, the operator of the Fukushima Daiichi nuclear power station, TEPCO, stayed calm. TEPCO engineers were confident that the earthquake would not damage four nuclear power reactors installed in the facility. They had a good reason not to panic because all four reactors automatically shut down when the sensor attached to each reactor detected a high level of vibration ignited by the megathrust earthquake. But it took no time for the situation to turn upside down. One hour later, a giant tsunami wiped out the entire northeast coast of Japan. It washed away everything in the coast and inundated a total area of 561 km^2. The massive flow of seawater into the inland part of Tohoku area devastated a great number of infrastructures, most critically electricity lines. The loss of power ought not be a concern for TEPCO. The nuclear power station was equipped with an emergency diesel generator (see Figure 1) that was supposed to function as back-up power. Unfortunately, the emergency diesel failed to save the day. The generator sat in the basement of the facility, about 3 meters below the ground. When tsunami struck the power station, seawater entered into the facility and submerged everything in the basement, including the emergency diesel. As a result, the facility was caught in a situation called SBO, standing for Station Black Out. This is a nightmare for any nuclear power station because even though the nuclear reactor will shut down automatically in the event of earthquake, it still requires a supply of electricity to run the cooling system, which releases the heat inside the reactor. As noted in the investigation accounts of the disaster, it is the failure of emergency diesel that triggered the prolonged crisis in the Fukuhisma nuclear meltdown, which makes one of the worst nuclear disasters the world has ever seen.

Figure 1. Emergency diesel generator of
Fukushima Daiichi nuclear power station (source: TEPCO)

What caused the failure of Fukushima Daiichi in coping with the crisis? Had the operator have foreseen the likelihood of such a failure to emerge? Why did the

operator fail to identify the potential risk in the way the emergency diesel was located? How could such negligence occur? Is this simply an organizational inability? Or is it something deeply rooted in how the nuclear facility was designed and constructed based on scientific knowledge? These questions are compelling because what transpired in the Fukushima Daiichi nuclear power plant vividly demonstrates how such a strongly defended system built and arranged to withstand massive shocks from outside is likely to collapse due to a small mistake.

Situated in the Fukushima nuclear crisis, this paper aims to examine one critical aspect of modern sociotechnical systems, namely vulnerability. In the case of Fukushima nuclear meltdown, it is clearly seen that a small mistake in the arrangement of the nuclear facility was the source of vulnerability that had profound consequences not only to the system but also to thousands of peoples and a large scope of environment affected by radioactive fallout from the crippled reactors. Rather than showing how vulnerability causes massive impacts in the event of disaster, the objective of this paper is to search for the origins of vulnerability and to characterize vulnerability as a phenomenon deeply embedded in the way complex sociotechnical systems are constructed and operated. The main argument in this paper lies in the way vulnerabilities emerge and change over time due to the dynamics within the system. In addition to that, the paper posits that the development of vulnerabilities is a byproduct of the intersection between the sociotechnical system and the socio-political environment. Each of these will be elaborated in the following sections.

Sociotechnical Vulnerability as a Disaster-STS Focus

What do the 9/11 terrorist attack, the Hurricane Katrina, and the Fukushima nuclear meltdown have in common? Each of these catastrophic events involved massive devastation on physical infrastructures, and caused a tremendous amount of social and economic costs. Despite differing causing agents and the extent of destruction, all of these disasters share one attribute; it is a foray against the socio-technical structure that embodies modern cultures. In the event of any kind of disaster that strikes society, it is the collapse of sociotechnical systems that manifest the impact of disaster.

STS has defined sociotechnical system as a hybrid entity comprising of social organization and physical/material arrangement designed to accomplish a set of goals. Both social and technical elements play equally crucial roles in the working of any technological system. By this definition, sociotechnical systems are ubiquitous and everywhere. They exist at every level of human activity, from micro and meso, to macro and global. Our modern culture essentially runs on an assemblage of large-scale sociotechnical systems that include an array of physical infrastructures such as electricity, water supply, telecommunication, and mass rapid transportation, as well as social infrastructures such as schools, markets, businesses, governmental offices, community groups, emergency organizations, etc. Having aid this, the continued functioning of socio-technical systems is of great importance because our modern life is heavily dependent on how sociotechnical systems support everyday activities. As modern society becomes more advanced, the complexity of socio-technical systems inevitably increases due to integration and interconnectedness of physical and social infrastructures, a process prompted by rapid socio-economic advancement especially for the past century. Consequently, it entails increasing interdependencies

between large-scale sociotechnical systems, which renders modern society vulnerable to calamity.

As sociotechnical system is the core of technological cultures to which STS scholars have studied, this paper suggests a direction for a Disaster-STS to illuminate the processes in which vulnerabilities develop within sociotechnical systems. As disaster is defined as an undesired event that involves disruption on social systems (Dynes, De Marchi, and Pelanda 1987), it is safe to conclude that the impact of disaster is determined by to what extent the disastrous event causes disruption on sociotechnical systems. This is because sociotechnical systems are the heartbeat of people's everyday life. If any of these systems experiences breakdown, the entire society will be greatly affected. That is exactly what we see in any disastrous event in which social and economic activities cease to function properly due to the disturbance on sociotechnical systems. Yet, every sociotechnical system has different capacity in coping with crisis engendered by external shocks or internal failures. If examined further, sociotechnical systems bear proclivities to fall into crisis when shock is introduced to the system. It is this proclivity that constitutes *sociotechnical vulnerability*.

In one way, vulnerability is defined as "the manifestation of the inherent states of the system (e.g., physical, technical, organizational, cultural) that can be exploited to adversely affect (cause harm or damage to) that system" (Haimes 2006). Framed within this definition, modern disasters are not merely the result of the causing agent such as earthquake or terrorist attack. More fundamentally, they indicate the failure of sociotechnical system to cope with extreme events. And the failure is an innate by- product of vulnerability embedded in the system. The logic of this argument is illustrated in the diagram below:

Figure 1. Vulnerability, Shock, and Disaster.

The diagram shows that when a shock, e.g. hurricane or terrorist attack, is introduced to the system the outcomes of disturbance are determined by the shock scale but also by the degree of pre-existing vulnerability. From this vantage point, *it is important to identify and to understand how vulnerability develops over time in the sociotechnical system because it constitutes the key factor that renders the system to malfunction, break down, and collapse, in the event of man-made or natural disaster*.

Characterizing Sociotechnical Vulnerability

Sociotechnical vulnerability is a condition that characterizes the presence of life-threatening risk at any time. But it is not risk itself, for vulnerability is regarded as a systemic production of risk. Engineers have conducted ample study on vulnerability, which is focused more on system strength in absorbing shocks. In this perspective, a system is vulnerable when any part of it can be exploited to cause harm and danger. The bottom line is that vulnerability lies in physical and material structures that make the heart of the system.

In a different way, sociologists examine vulnerability as something inherently embedded in the system. Charles Perrow's elaborate explanation on what he calls as "normal accidents" illuminates the source of vulnerability as inevitably resulting from complex interconnections in the system. According to Perrow, two features of complex sociotechnical systems are identified that spawn vulnerabilities. One is tight-coupling mechanism; the other is interactive complexity. In sum, Perrow argues that any modern system such as nuclear power station, jet airplane, and chemical plant are inherently vulnerable to accident and disaster because the complexity of the structure and organization. In other words, vulnerability originates from complex structures.

In a slight different approach, Wiebe Bijker proposes an explanation that seems to take a "positive" stance toward vulnerability. Bijker refers vulnerability to "a system's condition—to its ability to anticipate, resist, cope with, and possibly recover from events that could reduce the system functional integrity." Using the constructivist view, Bijker then moves to link system vulnerability to a broader scope of analysis in which culture and values are the fundamental aspects in the origins of vulnerability. In this light, sociotechnical vulnerability varies across cultures and societies.

While this paper incorporates the concept of vulnerability briefly discussed above, it is meant to extend the understanding of vulnerability by emphasizing three major features based on the empirical observation of the Fukushima nuclear crisis. First, vulnerability is a sociotechnical phenomenon whose degree is not constant in presence. It is an emergent process as an attribute of complex systems. Consequently, vulnerability follows the patterns of complex interactions between system components, both social and technical. This means that vulnerability develops and undevelops over time. It is never a fixed condition. At certain times vulnerabilities expand, at other times they shrink. The second characteristic of sociotechnical vulnerability comes from an observation that vulnerability lies in structures and cultures that embodies the system. The implication is that vulnerability is a result of not only internal conditions but also external influences coming from socio-political environment that governs the system.

Now we get to the major point that I would like to emphasize. The difficulties in governing sociotechnical vulnerability are caused by tendency not to be seen by system operators. The Fukushima nuclear meltdown clearly exemplifies this case in which the location of emergency diesel in the basement constitutes a vulnerability that the operator failed to identify, resulting in profound consequences. The question is how vulnerability becomes hidden from risk analysis. This compelling question requires delving into the assumptions that underlie the way the facility was designed and constructed. Scrutinizing epistemological contents guiding system design and

construction is necessary to unpack the mechanism allowing vulnerability to be hidden and unseen. Following Diane Vaughn, also important to examine is organizational cultures that discourage efforts to raise constant alert of any areas that have potential vulnerabilities. Certain vulnerabilities may appear by individuals but they become hidden due to the lack of organizational mechanisms to translate the awareness of vulnerability into concerted actions. This can be extended even further to include socio-political environments in which external influences from regulators, policy-makers, and corporate businesses whose interests may go contradictory to safety concerns.

Conclusion

The invisibility of vulnerability is of a great importance to study for a Disaster-STS. As disaster impacts are not only caused by the level of shock, but also by pre-existing vulnerabilities, one of the major challenges for Disaster-STS is to develop analytical framework to understand how and why vulnerabilities become hidden in the complexity of sociotechnical systems that surround us. Two factors must be taken into account in revealing the mechanisms of hidden vulnerabilities. The first lies in epistemological contents marked by tendency to omit certain aspects from risk analysis. The second is influenced by structures and cultures of sociotechnical system in which both internal and external conditions work together to allow vulnerability to stay undetected until a shock comes to translate it into an unexpected disaster.

Rendering the world neoliberal: Vulnerability as a Cold War discourse?

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It is now a broadly accepted fact that we live in an increasingly hazardous world; disaster has become for most of humanity a frequent life experience and seems destined to affect even those populations in the more industrially developed societies that previously have been largely immune to these repeated afflictions. It seems an opportune moment, therefore, from the vantage point of the second decade of the twenty first century to review the terms and concepts we have employed to assess risk and measure people's exposure to such events. In particular, it may be useful to examine "vulnerability", the principal theoretical concept that came to dominate post-World War II disaster studies, from an historical perspective and to ask whether vulnerability was more a discourse of its age. That time, of course, was the Cold War, an ideological contest that sought to explain societies and their environments from the stance of competing conceptual frameworks. The more recent emphasis on resilience and adaptation by scholars and practitioners alike, and their near universal adoption of disaster risk reduction (DRR) as the guiding principle of disaster risk management (DRM) may suggest just such an intellectual shift. If vulnerability helped explain why, so to speak, the world was rendered unsafe in the second-half of the twentieth century, to what extent is it a meaningful approach 40-plus years?

Vulnerability as a Cold War discourse

There is no denying that the historical context was highly significant to the emergence of vulnerability. The term gained validity during the 1970s, a time when the Cold War was heating up again. Its chief proponents were men highly motivated by concern with the plight of the newly recognised and denominated citizens of the Third World who shared a growing suspicion of the development policies pursued by Western governments and transnational corporations (O'Keefe et al 1976). By demonstrating that there was nothing "natural" about natural disasters and that people were put at risk as much by the social structures of the societies in which they lived as by any physical hazard, they began to question the hitherto unchallenged assumption that the growing incidence of disasters was due to a rising number of purely natural physical phenomena. In the process, these scholars offered a searing critique of both the means and the intent behind Western-led development and investment policies. Rather than lifting people out of poverty, the result of such programmes was too often to make of their life a "permanent emergency" (Wisner 1993:131-133). The emphasis, instead, was placed on what rendered communities unsafe, a condition that depended primarily on a society's social order and the relative position of advantage or disadvantage that a particular group occupied within it (Hewitt 1997:141). The term coined to assess the nature and extent of this daily risk was "vulnerability" where the latter is not only a gauge of people's exposure to hazard but also a measure of its of its capacity to recover from loss.

The purpose here is not to assess the relative merits of the term in relation to any other but simply to examine it historically as a product of its age. The Cold War origins of the term begin with its definition or, rather, the way vulnerability is applied in practice. Everybody, of course, is made vulnerable to some extent by a combination of variables that affects their entitlement to command basic necessities

and their empowerment to enjoy fundamental rights (Watts 1993:118-120). While the term does embrace a wide spectrum of who is vulnerable, in practice the focus is primarily on those with the highest degree of constant exposure to risk who overwhelmingly live in developing countries. The relative vulnerability of these populations is usually defined either in terms of mortality or magnitude. This message was made clear in the most complete model proposed to explain how risk is generated and disasters come about. In *At Risk* first published in 1994, the authors presented a pseudo-formula (risk = hazard + vulnerability) to show the measure of a community's risk. At the same time as offering a framework for linking the impact of hazards on people with a series of social factors and processes that generate vulnerability, the Pressure and Release model exposed the processes that transformed post-World War II colonial possessions and newly emergent states into the Third World. The lesson was clear: historical development and the role of globalisation were making some communities less able to deal with crises.

Whether intentionally or not, vulnerability offered a critique of developmentalism and the untrammelled pursuit of material prosperity that became the dominant model of economic progress after 1945. Nations were increasingly assessed in terms of their development or lack of it and some societies began to be regarded (and regard themselves) as underdeveloped, a state seen as synonymous with backwardness, poverty and, implicitly, vulnerability (Escobar 1995:5). This Third World was not only disease-ridden and poverty-stricken but it was also increasingly disaster-prone. It also formed an integral part of a generalising cultural discourse that denigrated large regions of world as dangerous (Bankoff 2001). Of course, development was supposed to ameliorate the unsafe conditions and dynamic pressures that put people at risk. If it largely failed to do so, it was because development was too much a part of the root causes that underlay those societies' vulnerability in the first place.

The rise of neoliberalism and the battle over resilience

The link between development and disasters, the Cold War and vulnerability was not immediately apparent. However, with the end of the Cold War in 1991 (and incidentally the demise of the Third World), the emphasis in how society should be viewed began to shift. Gradually, it was suggested that the issue of vulnerability should be turned around and approached from a more positive viewpoint. Societies began to be viewed as no longer simply vulnerable with all its associated negative connotations but people were seen as primarily resilient; they had capacities to organise, resist, learn, change and adapt (Handmer 2003). It was also politically expedient to change the discourse in the new international climate. As the anti-Communist agenda receded in the 1980s and 1990s, foreign direct investment and private capital flows began to replace overseas development aid as the favoured development paradigm. At the heart of the new approach was an emphasis on the importance of macroeconomic stability and integration into the international economy. If anything neoliberalism was a throwback, at least in principle, to the nineteenth century in terms of its heavy reliance on free market mechanisms and the conditionality of funding made dependent on fiscal discipline, tax reform, trade liberalisation, privatisation, deregulation and a reduced role for the state (Veltmeyer 2005) The resultant privatization of public services and infrastructure and sell-off of state assets have commonly taken place in the absence of proper regulatory safeguards, placing many services beyond the reach of the poor, leaving others at the

mercy of substantial rises in utility charges, and rendering them all more vulnerable to the impact and effect of natural hazards and disasters (Hilary 2004).

In this new political climate, it was expedient to stress what made people resilient rather than what made them vulnerable. This resilience was often referred to in terms of a community's social capital (Woolcock 2001). If vulnerability was a product of the Cold War and the conceptual framework that created the Third World, to what extent is resilience an "invention" of a way of thought that promotes and condones neoliberalism? The uncomfortable truth is that the two discourses have much in common and share many policy approaches even if for different reasons. The neoliberal agenda envisages a state where human well-being is best advanced "by the maximisation of entrepreneurial freedoms within an institutional framework characterised by private property rights, individual liberty, unencumbered markets, and free trade" (Harvey 2007:22). To achieve these ends, the state has only one primary responsibility and that is to create the conditions that permit a fully functioning market. The state effectively devolves public safety to civil society and then expects the market to meet the social needs of the population. This "hollowing out" of the state, however, cannot be achieved without the voluntary contribution of non-state actors.

As regards disaster management, the state increasingly depends on NGOs to fulfil the public safety roles it has largely divested itself of, if not in the immediate short-term in respect to the provision of emergency services, then certainly in the longer term as regards preparedness, mitigation, recovery and reconstruction. From the neoliberal perspective, divesting humanitarian assistance to NGOs is seen as a salutary alternative to funding corrupt governments among less-developed nations. Reframing the state's responsibilities in this manner now casts poverty largely as a voluntarily choice: the poor choose to be poor and only have themselves to blame for being poor (Nickel and Eikenberry 2007:536-537). Likewise, those who are vulnerable choose to be vulnerable and have only themselves to blame for being vulnerable. Echoing the harsh sentence of nineteenth century Social Darwinists, proponents of neoliberalism regard social responsibility as optional and vulnerability as voluntary. Resilience has become a core constituent of the neoliberal economic agenda now expressed in terms of sustainable development and its prescriptions for institutional reform. The commonalities in practice between a neoliberal agenda and the shift from vulnerability to resilience in DRM brought to the fore a new rhetoric that emphasises DRR and focuses on CBDRM. DRR began to emerge in the 1980s and has gradually become the most dynamic discourse in the global policy field of disasters even if it still remains "marginal" to mainstream international development and has only really gained public traction through its association with proponents of climate change adaptation (Hannigan 2012: 130-145).

Although by different routes and for very different intentions, neoliberalism and resilience end up advocating much the same approach by much the same methods. They both emphasise an active citizenship whereby people take responsibility for their own social and economic well-being, and they both share a general distrust of centralised state systems and a desire to decentralise responsibilities. The emphasis is on local capacity, local decision-making, local responsibility and, of course, local funding. To one, however, this championing of civil society is a way to disguise the imposition of market discipline, part of a state-building agenda and exercising "governance from a distance" (Joseph 2013). To others, however, resilience is a continuing critique of existing international development and aid that far from

shedding its Cold War agenda only found new vitality in the policies and programmes associated with the Washington Consensus.

Vulnerability and adaptation

The Cold War and its aftermath are over and the world faces new challenges that require a new vocabulary and a new set of concepts to find expression. The discourse is now about climate variability and how best to adapt to its consequences in the future. The key term is adaptation or the needed "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects" (IPCC 2008). Vulnerability is not ignored but understated in the new repertoire of terms. To what extent is this because vulnerability has lost its relevance as a critique of the way things are done or does it still command respect and consideration in the debates about global warming and rising sea levels?

Among the most common characteristics that continue to make vulnerability important to DRR and climate adaptation are:

- the stress placed on the importance of process and how disasters are constructed in both spatial and temporal senses;
- the dynamic and multifaceted nature of the term that emphasises the interconnections between societal and environmental factors;
- the related ability to reveal the underlying drivers of risk (explosive population growth, the development of new coastal settlements, corruption, environmental degradation, etc.);
- its rootedness in entrenched power structures and the need for political reform that is largely beyond the grasp of those most at risk;
- the attention paid to the voices of the most exposed and the consequent necessity of transformative social agendas;
- and the insights it offers into the negative as well as the positive aspects of people's actions and so the importance of better understanding culture as a factor in risk reduction.

Forty years ago, vulnerability offered a needed critique of the manner in which development was pursued during the Cold War by emphasising how disasters are socially constructed by human actions that emphasised growth rather than "purposeful development" (Cannon & Müller-Mahn 2010:623-626). The increasing stress placed on resilience as a discourse after 1991 began the shift away from how socio-economic systems exposed people to different levels of risk by adopting a more natural science perspective that emphasises instead the degree to which human actions make it possible for social-ecological systems to survive. The neo-liberalism that came to dominate the decades following the collapse of the Iron Curtain was able to suborn certainly the public and partly the academic discourses surrounding resilience by emphasising individual choice and personal responsibility. In the process, vulnerability was rendered an almost voluntary condition, one that was mainly the result of poor individual decisions. The present focus on anthropogenic climate change and the need for adaptation likewise runs the same risk of reducing adaptation to a choice freely made. The scene is set for history to repeat itself and only a continuing focus on what renders people vulnerable may prevent a similar outcome. Climate change, like all disasters, is still ultimately about the power relations in society and so is socially constructed (in the same way as vulnerability

and resilience). Only the discourse of vulnerability, whose credentials, so to speak, were forged in the fires of Cold War debates about the need for a safer and juster world still has the conceptual armoury to remind us what DRR is really all about.

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Fielding Disaster: Ethnographic and Conceptual Reflections on the BP Oil Spill

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A strange situation: the anthropologist arrives in the field only to witness an army of experts arriving alongside him charged with delineating that very field. During the BP Oil Spill, I was not the only one worried about locating the field within which the disaster could finally be properly seen. Yet attention to these parallel efforts gave my own methods pause: What is the right perspective to take on disaster? What exactly does 'fieldwork' consist of at the scene of a crime? What does it mean to work in a field being actively cordoned off by the powers that be? Drawing on my own ethnographic research during the BP Oil Spill, here I am interested how 'the field' can operate as a technology of spatial and temporal certainty in the face of experiential and ecological uncertainty. Yet as this field took shape it did not so much resolve popular anxieties as stigmatize them. As this enacted field laid the groundwork for the objectification of the disaster it also worked to sort out who could have effective knowledge of the disaster and who could not.

In the history of research, 'the field' has often been opposed to 'the laboratory' (with 'the archive' occupying a charged middle ground). A few keywords cohere to each: 'the field' connotes the uninhibited real, the world alive and innocent of our concept of it while 'the laboratory' confers mechanical certainty, the object isolated and aligned with our concept of it. During the BP Oil Spill, this division made no sense. The technologies of the laboratory were put to work in the mess of the disaster to pin down the real disruption. Disaster was not something to be encountered or even described experientially; it was something to be dissected scientifically. Most of the 'fieldwork' I observed during and after the BP Oil Spill – fieldwork conducted by federal officials, university professors, progressive NGOs, and corporate hacks – consisted of one of two analytical practices: either capturing bits of the damaged ocean for laboratory analysis or the formatting of the ocean itself as a kind of laboratory within which the full scale of the destruction could finally be mastered. As an actual place and as a useful form, the laboratory was the field in which the disaster itself came into clear focus.

How a disaster become knowable indelibly shapes the material outlines of what is known. In my own work, I observed the tremendous labor of science as it transformed the BP Oil Spill from a sprawling mess into a measureable problem. Much was accomplished in this shift but much was also left out. The profound uncertainty of the oil spill was finally tamed by the technical certainty of the laboratory. Crucially, this taming did not mean a full accounting of the cascading disruptions of a deepwater blowout. No, this taming consisted in coordinating ground-rules, calibrating sampling devices, and establishing the baseline that could finally bring the disruption into objective relief. All of these techniques, it should be noted, were invented after the fact of disruption (but before the disruption achieved the status of a 'fact'). Here, a historically ignorant but mechanically stable field of inquiry worked to materialize the temporal and spatial density of the disaster. This narrowed the focus of legitimate concern and widened the scope of acceptable disregard. As the laboratory came to pinpoint the legibility of destruction, the growing voices of suffering fell to the wayside.

Understanding the laboratory as a field technology for mastering disaster allows me to sidestep some of the more entrenched positions on citizens and experts in STS. Among other things, I don't think the injustice implied in this dualism is necessarily something that more truth will solve. Instead, I'd like to turn my attention to the constructed epistemology of a disaster. The labored conditions of objectivity in and after a disaster often work to pull apart opposing positions by building a contrived neutrality between them, holding their conflicting claims at bay and attempting to rationally order their relations. This contrived neutrality, in turn, gives rise to its own forms of expertise. Within such a field, the problems of a disaster like the BP Oil Spill are to be resolved not by a direct confrontation between aggrieved citizens and harmful industries but in accordance with how each make their position intelligible within the constructed middle ground. In my own work, I'd like to begin charting out what might be required to allow for more direct forms of confrontation, both in critical analysis and in political practice.

The Intergovernmental Oceanic Commission (IOC) and Disaster Diplomacy

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This piece is a first attempt to think through my next project which examines the Intergovernmental Oceanic Commission (IOC), a UNESCO-based and UN body for ocean science, ocean observatories, ocean data and information exchange and ocean services such as tsunami warning systems. As stated in its mission, the body promotes "international cooperation and [coordinates[programs in research, services, and capacity building to learn more about the nature and resources of the oceans and coastal areas, and to apply this knowledge to improved management, sustainable development, and protection of the marine environment and the visions making processes of States" (http://www.unesco.org/new/en/natural-sciences/ioc-oceans/high-level-objectives/marine-hazards/#c95755)

Without having done much research (read: no fieldwork), in very much preliminary and tentative terms, I aim to focus on the tsunami warning systems being established by the IOC and its regional groups (the oceans are divided up regionally — I am inclined to look at the Indian Ocean Tsunami Warning System, but may find myself at the Pacific Tsunami Warning Center, which, until recently supplied technological data and support the world over). As an *interoceanic* group, I am fundamentally interested in first, considering the ocean as an analytic tool to think through social relations. Examining watery life, which entails, a "'70 percent of our bodies is water'' (Helmreich 2003: 352) imagination, is not to understand kinship as a natural relation, but to understand how kinship works to produce a natural relationship, calling attention to how life itself has been enabled by artifice rather than nature. Following this thought on kinship (see also: Haraway 1997 and Strathern 1992), I am compelled to think through the social, political and economic *relations* that operate in the conceptualization and management of the ocean and ocean-related disasters. The "intergovernmental" aspect of the commission itself already suggests that the ocean gains articulation through dense social and environmental webs, generating categories, laws, knowledges and infrastructures that are, recalling Laet and Mol's "metaphorics of fluid," mutable. This oceanic approach is an attempt to move away from the territorialisms that prefigure political formations. The world's oceans attest to such practices of worldly division, not only in the ways in which oceans are divided, but also as they blend imperceptibly into shorelines and are imagined as vast expanses of space separating the world into territories, continents and nation-states. And yet, just as the ocean supports our territorial divides, it also offers modes of connection, allowing for a continuity of social relations through historical renderings of places and times. In tracing the ocean's historical currents, it becomes an active place-maker, a space that lends to

connection and complexity. Such outward looking serves to widen insulated discourses restricted by introverted territorial perspectives.

"Disaster diplomacy" is a concept that has been applied in the political sciences and examines how disaster and disaster-related activities may catalyze diplomacy between communities and/or countries in conflict, but does not *create* diplomacy, especially in the long-term (Kelman 2007; 2012; see also disasterdiplomacy.org). Further, this political scientific approach attempts to show is that disaster and disaster-related activities generally *fail* to produce diplomacy. But I wonder if we might consider "diplomacy" in a different register. Rather than consider diplomacy as a pre-defined political achievement or goal, between pre-figured political forms such as nation-states or ethnic or racial communities, perhaps following Isabelle Stengers (2005), we might approach the IOC and the creation of interoceanic tsunami warning systems as a set of partial and unequal relations — perhaps even an "ecology of practices" — that require diplomacy. Here, diplomacy is a mode of continual engagement, a way of understanding how various attachments — scientific, economic, political — however divergent, cohere in the IOC. Thus, I am interested in diplomacy as it constructs — dynamically and through different topologies and temporalities — the ocean and ocean-related disasters as a matter of care (Puig de la Bellacasa 2010).

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What Can Disaster STS Be? Insights from the Anthropocene Debates

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DRAFT

A few months ago I attended a talk on my campus titled "Pedosphere evidence for cumulative human impacts on earth systems: Cases from South America."[1] The lecture was given by Dr. Melissa Goodman Elgar, an archeologist whose research focuses on human landscape modification in the Andean Highlands of Bolivia and Peru. Her research addresses how the modification of alpine landscapes – field terracing, irrigation systems, and buildings – altered behaviors of the early farming communities that first populated this region around four thousand years ago. To find evidence of these long-ago cultural changes, Goodman Elgar's team excavates small pits within larger communal sites collecting dirt, clay, sand and other materials layered below. Back in her lab, she uses techniques from micromorphology (called "thin section" analysis) and geochemistry (X-ray fluorescence) to identify changes in the composition and structure of the materials that early farmers used to construct earthen buildings and landforms. Its needle-in-haystack work: small changes in the historical soil record that indicate substantial but slow-to-develop shifts in ancient Andean society from egalitarian to hierarchical forms of political organization.

Goodman Elgar framed her talk in terms of the "pedosphere", but one of her underlying interests is the Anthropocene – what it is (a newly recognized geological era? an informal periodization? a newsworthy frame for climate activists?), when it began (150 years ago? Or 10,000?), and where (industrializing Europe? agrarian Asia or the Middle East?). Her terminological choice was a nod to the sensitivities of her audience – geologists from WSU's School of the Environment. "Pedosphere" refers simply to the earth's soil layer and carries none of the political freight that "Anthropocene" carries in current debates among geologists and other earth scientists, climate policy experts, and environmentalists.[2] Only toward the end of the talk and in the discussion that followed did the implications of her research in relation to those disciplinary and political arguments gain more specific focus. As I heard it, the conversation contained interesting analogies with Disaster STS and held important implications for those of us interested in developing it. My rough distillation of some of these ideas follows.

Claiming the Anthropocene

The Anthropocene thesis centers on the claim that human societies are responsible for large-scale bio-geo-physical changes in earth's systems and that these changes are increasingly evident in the geological and climatological record. Yet a full

[1] Melissa Goodman Elgar, "Pedosphere evidence for cumulative human impacts on earth systems: Cases from South America," School of Earth Sciences Seminar Series, Washington State University (January 30, 2014).

[2] Two views that frame some of the debate in geology are Paul J. Crutzen. 2002. "The Geology of Mankind." *Nature* 415(3 January): 23; William F. Ruddiman. 2013. "The Anthropocene" *Annual Review of Earth and Planetary Sciences* 41:45–68.

characterization of the Anthropocene also requires evidence from the social sciences, and archeology is the one social science equipped to bring knowledge of pre-literate human societies and an appreciation for longue durée socio-environmental change processes into the conversation. Social science is integral to understanding not only the temporal and geographic scope of human-induced change, but also for identifying the specific mechanisms of that change and the forms of social organization that made such change possible. Thus, any serious investigation of large-scale anthropogenic change from the distant or more recent past must be interdisciplinary and that interdisciplinarity should include the social sciences, not least archeology. All well and good except that, as Dr. Goodman Elgar observed, significant challenges lie behind the kind of knowledge integration that the Anthropocene thesis seems to demand.

Importantly, these challenges have relatively less to do with differences in disciplinary standards and terminology, which can be major impediments to interdisciplinary collaboration. (Indeed, Dr. Goodman Elgar's own work is evidence that social scientists can successfully adapt the methodological techniques and theories of the natural sciences to build social science knowledge that feeds back to inform a broader body of work.) Instead, a more intractable set of differences may lie in the *material scales* at which climate science and archeology tend to collect and organize data.

Paleo-climate data is generated from many sources, including glacial ice core and terrestrial bore hole samples, tree rings, ocean coral, lake sediment, and moraine sediment, among others.[3] These materials are not easy to collect but they can be stored indefinitely and, because they offer a historical record of long-term changes in a particular location, the data also have spatial and temporal comparability. Ice core data from different glaciers can be usefully compared, but so can data from lake sediment and tree rings. In this way, scientists generate evidence from different sources to corroborate findings and develop hypotheses about changes in atmospheric composition, ocean chemistry, or terrestrial ecosystems. Evidence that has accumulated from these data has been integral to helping convince nearly every living climate scientist that we occupy a planet that is warming because of us.

Archeology lies at the other end of the data scale. It takes months if not years to fully excavate a single field site. The excavated materials are fragile such that how they are removed and how their removal is recorded determines what can be known about them. The data derived from those efforts are place- and culture-specific; they are not straightforwardly comparable and do not aggregate in the same way that CO2 trapped in glacial ice or microorganisms trapped in lake sediments. And even if they did, archeological data remain thinly scattered across most of the planet, concentrating in just a few regions, mostly in Europe. In short, climate data and archeological data are rendered at scales that are not easily or obviously compatible. This data scale incompatibility is institutionalized in a non-reciprocal exchange: While climate data is often "essential" for interpreting archeological findings, geoscientists seldom use archeological data to explain or provide context for their findings.[4]

[3] The National Climate Data Center maintains a clearinghouse for such data. See http://www.ncdc.noaa.gov/data-access/paleoclimatology-data/datasets.
[4] Melissa Elgar Goodman, personal communication (16 April, 2014).

Organizational and economic differences between geosciences and archeology compound these material data incompatibilities. The geosciences are booming, with US federal obligations for basic research totaling nearly $4.2 billion in the past decade (2002-2011). Federal research obligations for anthropology, which includes cultural and biological anthropology as well as archeology, is about $1.8 million over the same time period.[5] Measured this way geoscience outguns anthropology 23 to 1. With this level of economic inequality, the scalar incompatibility of climate data and archeological data is likely to intensify over time. And with that growing inequality a deeper social understanding of the early Anthropocene is likely to recede even as knowledge investments increase. The irony in this is not subtle: a geological era defined by the cumulative impact of human actions, one whose origins at least gains little understanding from the human sciences.

So, what does any of this have to do with Disaster STS?

A Demarcation Problem

STSers will recognize the Anthropocene debates as a professional boundary contest. At issue is whether geology needs a revised periodization and, if so, when the new geological era properly begins, and what role social science should play in answering these questions. As students of such boundary struggles we can study the technical practices used to generate evidence supporting one position or another and follow arguments about what kinds of data is made to count for that purpose. In this case, the contest turns on the problem of scale: geoscientists can detect changes in, say, concentrations of atmospheric carbon dioxide suggest a (hypothesized) link to the rise of rice cultivation in Asia about 7,000 years ago. But should this regionally specific practice "count" as a measure of global-scale anthropogenic change? And what about the scale of the effect itself? The ancient uptick in CO2 is large enough to be detected with today's sophisticated technologies but the magnitude of change pales in comparison with the changes occurring since the 1800s. Does any change "count" as globally significant if it is globally measurable?

These sorts of questions have implications for what we mean when we say we study "disaster." How big, how sudden, how impactful do events need to be to "count" as proper objects for analysis? We all know about Santa Barbara (1969), Exxon Valdez (1989), and BP (2010) but what about the hundreds of smaller oil spills which occur in US coastal waters every year, but escape public attention? Or what about impacts that are suspected but that remain unconfirmed because the science is left undone or because regulatory standards don't recognize measured impacts as problematic? Here I'm thinking about declining honey bee populations, pesticide drift, or the potential for hydraulic fracturing to trigger earth quakes. Do disasters require known or at least identifiable impacts to be disasters? Or maybe it's the response that signifies the occurrence of disaster. But then at what point do "slow moving disasters" fade into the daily static of routinized activities? We too have a demarcation problem.

[5] NSF Survey of Federal Funds for Research and Development, Basic Research Obligations by Academic Discipline, 1951-2011 (Webcaspar data tool, by author; https://ncsesdata.nsf.gov/webcaspar/).

Now, STS is very good at challenging *a priori* boundaries. The field's strong cultural inclination is to invert standard social science narratives of cause and effect. The characteristics that make one thing a disaster and another thing an accident is not typically where we start, but where we end, with explanations of causes. So I suspect that many of the card-carrying STSers in the room may have little interest in a group exercise to define disasters one way or another. But the risk of not doing so and instead falling back into our familiar role as deconstructors of established objects of study is that it can undermine our efforts to institutionalize "Disaster STS" as an emergent field of inquiry meaningfully different from STS writ large. Efforts to build Disaster STS will benefit from some general agreement among us that certain phenomena exists that share basic characteristics which warrant the label "disaster." We have to know what is it we claim to study. Of course, whatever definitional parameters we come up with can change (and should, as our understanding of disaster develops), but it seems to me wise to stake out some common conceptual ground as we begin this project.

Robust Interdisciplinarity

Another implication that emerges from Dr. Goodman Elgar's observations about archeology's potential contributions to the Anthropocene debates has to do with interdisciplinarity. She describes an emerging topic of inquiry that demands interdisciplinarity but lacks the institutional conditions for mending the epistemic gaps separating her science from geology. Disaster STS faces similar challenges.

Research interest in Disaster STS, like the Anthropocene, is fueled by moral and political urgency as much as by intellectual curiosity. Indeed, climate change looms large as a backdrop to both projects, as do questions of scientists' social responsibility to inform policy-makers and assist affected groups in the heightened context of ecological crisis. By training our own expertise on the many ways that expert systems and expert knowledge are implicated in disaster, Disaster STS presents an opportunity to make a unique difference. But to achieve this we will need to embrace a robust form of interdisciplinarity.

A key dimension of what I am calling "robust" Interdisciplinarity involves working intensively with disaster experts from other fields, especially in emergency situations. Here I'm imagining team-based, rapid response efforts that pairs STS scholars with earthquake engineers, epidemiologists, ecologists (etc.), and also with disaster research social scientists from sociology, anthropology, and policy studies. Of course, a model of rapid response research is already well established at NSF, at the Hazards Research Center in Boulder, and elsewhere. But I believe that for the most part the teams deployed through these funding mechanisms are discipline-specific. Geotechnical engineering teams deployed to earthquake zones do not often include anthropologists, for example. Such efforts contribute to disciplinary knowledge and maybe also to policy, but it does not offer the kind of socially contextualized knowledge that can develop through interdisciplinary collaboration.

As an example of this potential, recall Brian Wynne's classic study of lay/expert knowledge in the aftermath of the Chernobyl disaster.[6] Published a decade after the

[6] Wynne, Brian. 1996. "May the Sheep Safely Graze? A Reflexive View of the Expert-Lay Knowledge Divide." In S. Lash, B. Szerszynski and B. Wynne (eds), *Risk, Environment and Modernity*, Thousand Oaks, California: Sage Publications, 44-83.

disaster, Wynne's ex post analysis has proven to be very impactful within STS, helping to launch a subfield in "pubic understanding of science." But imagine the broader impact that might have been possible had Wynne been "embedded" with the regulatory scientists who helicoptered in to northwestern England to assess radiation risk and if Wynne had collaborated with those scientists, perhaps acting as a liaison between the experts, the sheep farmers and the politicians. The cultural gaps Wynne's study describes might instead have been bridged and the social and economic damage resulting from the scientists' inability to competently read Cumbria's cultural landscape might have been lessened. A robust interdisciplinary approach that puts STS on the ground with other disaster scientists might create new conditions of possibility to forestall the deterioration of public trust in science that Wynne's study famously reported after the fact.

Conclusion: What Disaster STS Can Do

What Disaster STS can be depends on what Disaster STS does. The challenges in building this field are daunting, and analogous in many ways to the challenges that archeology faces in its bid for respectability among the geosciences. We would do well to think seriously about our own current and future encounters with the problems of data scale, resource differentials and other organizational tensions and epistemic gaps revealed by the Anthropocene debates.

At the same time, the dual challenges of boundary contests and robust interdisciplinarity also represent closely linked *opportunities* for shaping the field we want to build. Robust interdisciplinarity will require a level of access to the disaster research community that STS does not currently enjoy. To gain it, we will need to make a convincing case that Disaster STS offers something new and useful. And, we will have to demonstrate in practice that our areas of expertise complement rather than threaten the ongoing work of seasoned disaster researcher scholars.

In making the case for redrawing the boundaries, we can offer the broader field a strategic advantage. Disaster social science's primary subjects are the communities hit by disaster. Baseline social data is notoriously difficult to come insofar as it often requires predicting when and where the next disaster will strike and getting there before it happens. By contrast, the primary subjects of Disaster STS are the geographically distributed expert communities whose work both conditions and responds to catastrophe. These expert communities are not anchored by geography the way disasters themselves are and so we are better able to study them under "normal" and "crisis" conditions and take stock of the differences. Our ability to measure change means that our work need not be hampered by the absence of baseline social data and it means that we should have a high quality product to offer.

As revealed in Dr. Goodman Elgar's lecture, the Anthropocene is a subject of research impoverished for want of archeological knowledge. I find a close analogy with Disaster STS. In a world increasingly governed by expert systems, disaster research is similarly impoverished to the extent that it ignores the study of expert communities and the systems they build and – after each new catastrophe – build again.

Lessons are Still Unlearned: Post-Fukushima Accident Investigation Activities in Japan and Continued "Structural Disaster"

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Introduction

It is believed that official investigation for terrible accident is essentially important. It was also the case in Post-Fukushima Japan. Four major investigation commissions carried out accident investigations and published their final report by the mid of 2012.

However, this fact does not necessarily mean that the processes, causes, backgrounds and impacts of the Fukushima Nuclear Accident have been learned well. In this brief paper, the author would try to shed light on this problem – failure of learning from the disaster – from the point of view of relationship between contents of the reports themselves and their socio-political contributions towards the improvement of nuclear risk governance in Japan.

"Manmade" and "Made in Japan" Disaster: Where is the Locus of Responsibility?

It was the most authoritative one that the National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission (NAIIC). NAIIC was established on December 8, 2011, with the legal basis by an ad hoc act.

Their report was published on July 5, 2012 and some statements attracted the strongest public attention and even encouraged public anger. The author would take two examples from their provocative theories here: 1) "manmade" and "Made in Japan" disaster theories on the root cause of the accident and 2) "regulatory capture" criticism against the corruption of the past nuclear regulation.

The first case, "manmade" and "Made in Japan" disaster theory was suggested in the "Message from the Chairman" page of the Executive Summery written

by Chairman Kurokawa, not in the full report1. That page was original in English version and no counterpart in Japanese version of the report. The word "manmade" attracted rapid and positive attention mainly in Japanese domestic public opinion. It has been pointed out that Japanese society tends to seek criminal responsibility of and societal punishment against victimizer strongly when large-scale accident happens2. "Manmade" theory was consistent with this tradition. Actually, the criminal prosecution process was virtually started on August 2, 2012, after the NAIIC's report published.

However, Kurokawa suggested another message at the same time – the theory of "Made in Japan" disaster with "Japanese Culture" explanation. It was spread all over the world very quickly, as wells as in Japan. This could obscure our understanding on the locus of responsibility and root cause of the accident and there were negative responses on this point from foreign major journalism3. It also seemed odd because this was contradictive to the individual prosecution strategy supported by his own "manmade" theory. These keywords are often cited simultaneously without any inconvenience, and considered those as the most important messages of the NAIIC report.

Introduction of "Regulatory Capture" Concept as a Rhetoric

Similar thing was also found in the body text of the report. It strictly pointed out the deficits of past nuclear regulatory system, then proposed a fascinating keyword again – "regulatory capture."

Shuya Nomura, a member of the NAIIC, a jurist and the proponent of this concept described its outline correctly: "Regulatory capture is a theory posited by George Stigler in The Theory of Economic Regulation. It refers to a condition in which regulators are "taken over" by the operators due to their lack of expertise and information, which results in the regulations becoming ineffective."4

However, this Nobel Prize awarded concept was not used as an analytical framework in the report. It just exemplified the historical process of collusive regulatory practices as a case of "regulatory capture."

This was interpreted as just a strict criticism against the corruption and

1 NAIIC (2012a: 9).
2 See Ikeda (1995) and Science Council of Japan (2005), for example.
3 For example, Bloomberg (2012) and Dickie (2012).
4 NAIIC (2012b: 10).

became very popular. But, causal relationship between any particular factors and the result (=corruption) has not been demonstrated by this concept yet.

Regulatory Reform Before the Final Reports Published

However, it may not be so important that the discussion extended above in this paper, because the actual design of nuclear regulatory reform was carried out before NAIIC and other major final reports were published.

Japanese Government established a new nuclear regulatory body "Nuclear Regulatory Authority" (NRA) in September 19, 2012, three month after the Act was approved on June 20, 2012 [5]. It was chronologically impossible to reflect the recommendation of NAIIC report on this institutional reformation formally.

Actually, NRA themselves don't include the NAIIC report as a part of the background of their establishment, according to their website [6]. It was quite unreasonable that the Diet didn't wait for their own commission's conclusion and recommendation, as well as those of other major reports, though their final reports had almost been finished.

Concluding Remark: "Structural Disaster" Still Continued

The issues discussed in this paper can be seen as a critical failure of social learning process from the disaster through the official "accident investigation." It suggests that the strong possibility of the reproduction of "structural disaster," which was articulated by Miwao Matsumoto[7], to analyze the serious failure among socio-technical interface such as serious nuclear accident. The author's illustration here implies that it was not solved by the investigations, but reproduced or even enforced by them. This faulty chain has to be cut off to prevent next Fukushima scale accident. To do so, we have to answer this question: can STS / Disaster Studies scholarship cut off such chain of the "structural disaster?" The author would like to discuss this with international colleagues
at the workshop.

5 NRA (2014).
6 NRA (2014).
7 Matsumoto (2002=2012), (2012) and (2013

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Spaces of Care, Everywhere: Negotiating Environmental Health Amid the Ordinary

Ali Kenner

Asthma is a chronic condition that demands daily attention to environmental surroundings and embodied signals. Environmental objects – including dust, pollen, mold, ozone, tobacco smoke, and toxic chemicals, for example – have the potential to trigger symptoms and full-blown attacks in asthmatics. These triggers are common objects, found in spaces where people live, work, and travel. Like many environmental health conditions, asthma organizes daily life, and at times, disrupts life in ways that cannot be planned for, even as disease management regimes work to control uncertain risks. By analyzing the experiences and practices of asthmatics – both the regimented activities designed to prevent symptoms, as well as responses that emerge during asthmatic events – this paper asks how care for environmental health conditions could shift from individualized burden to collective problem.

Feminist scholars have long debated the politics of care, in many cases understood as labor performed for those in vulnerable positions. As De la Bella Casa has pointed out, care is always about some form of asymmetry, a difference of power and place within material assemblages (2011). Care is often performed in relation to people, places, and things marginalized. Breathing problems, like asthma, get marginalized for a number of reasons – as a condition that impacts vulnerable populations hardest, as a condition produced by the environment, and as a condition that most people can live with. Contemporary modes of asthma care individualize and privatize environmental health problems, drawing (of course) on biomedical approaches to public health problems. Yet asthma is undeniably imbricated with space, shared places and collective ecologies. Asthma, as a condition and epidemic, can be understood as dispersed suffering, what Elizabeth Povinelli describes as "ordinary, chronic, and cruddy rather than catastrophic, crisis-laden, and sublime" (2011: 3). Triggers are potentially present everywhere, daily life is organized around uncertainty, yet all the while, we need to keep breathing. Following Povinelli, this paper asks, what kinds of ethics are needed to address environmental health problems, like asthma?

Drawing on three years of ethnographic fieldwork in asthma care contexts, including more than forty interviews with asthmatics, this paper argues that increased attention to spatial conditions and contexts can help shift the politics of care towards collective engagement.

"Explaining Disaster Policy Challenges"
Scott Gabriel Knowles and Howard C. Kunreuther

(Excerpt from "Troubled Waters: The National Flood Insurance Program in Historical Perspective," forthcoming in *The Journal of Policy History*, Vol. 26, No. 3, 2014).

The National Flood Insurance Program (NFIP)—an effort to provide government-backed insurance protection to Americans living in flood-prone areas—was championed by Lyndon B. Johnson and established by Congress through passage of the National Flood Insurance Act of 1968.[7] Private flood insurers had retreated from the market following the great 1927 Mississippi River flood; and serious attempts to create a flood insurance program only began again in the 1950s, with actions by both the Truman and Eisenhower administrations that eventually stalled.[8] The impetus to pass the NFIP finally came in reaction to the escalating costs of ad hoc post-disaster relief legislation, triggered initially by the Alaska earthquake of 1964, and followed by severe flooding and damage from Hurricane Betsy in 1965, America's first billion dollar hurricane.[9]
. . .

Beyond the politics, the expertise around flood hazard had grown over the previous generation into a remarkably sophisticated, interdisciplinary project, with geographer Gilbert White as a clear intellectual leader. White—and the hazards researchers with whom he worked—were busily trying to understand what may be called the emergence of the "second environmental crisis." The first crisis was that of pollution, and from Rachel Carson (1962) forward the nation was increasingly aware of the environmental legacies of urban industrialization.[10] White's floodplain hazard research was describing something different, a process that we see today much more clearly than he could then: the impact of unbridled suburbanization and land development in hazardous terrains would lead to vast increases in disaster losses, particularly from floods. Earthquake, fire, and flood protection legislation of this era marks out the first policy responses to the second environmental crisis. It should be noted as well that Gilbert White serves as a paradigmatic case of a disaster expert who also succeeded as a public policy entrepreneur—he could speak with equal facility to academics and to public officials. All of these factors taken together help us see why the program finally got its moment in the waning days of the Johnson Administration.

The policymaking influence of the flood control task force, chaired by Gilbert White in 1966, fits in within a larger historical context: the move for land use planning and controls was steadily picking up legislative steam across the nation at just this time. Traceable back to Lewis Mumford and the regional planning efforts of the 1930s, planners like Ian McHarg, Edmund Bacon, and geographers in Gilbert White's circle were articulating the need for coordinating urban planning with "open space" planning, and controls on vulnerable environments like wetlands, hillsides, and flood plains.

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[7] The National Flood Insurance Program was created through the National Flood Insurance Act of 1968, Public Law 90-448, 90th Congress, 2nd Session, 1968.

[8] Alfred Manes, *Insurance: Facts and Problems; Selected Lectures on Business Administration and Economics*, (New York: Harper and Brothers, 1938), xx.

[9] Douglas C. Dacy and Howard Kunreuther, *The Economics of Natural Disasters: Implications for Federal Policy* (New York: The Free Press, 1969), 37-47.

[10] See: Rachel Carson, *Silent Spring* (Boston: Houghton Mifflin, 1962).

Historian Adam Rome has argued that this movement came to its peak with the Clean Air Act and the Clean Water Act—a National Land Use Policy Act was proposed (not enacted) in 1970.[11]

The NFIP's rapid growth and evolution from 1973 onward took place against the backdrop of a remarkably active era for environmental protection—the Environmental Protection Agency was created in 1970. Researchers and government were waking up to the second environmental crisis—a crisis of development in hazard-prone areas borne out of the postwar successes of the American economy: suburbanization, exurbanization, coastal development, and geographical mobility. It was also the heyday for federally-funded disaster research, and extraordinary ferment in disaster policy: from fire to environmental pollution, to emergency management—best exemplified by the myriad conservation and flood control measures discussed above, as well as the creation of the Environmental Protection Agency in 1970, the Earthquake Hazard Reduction Act in 1977, and the founding of FEMA in 1979. Hazard and disaster research centers also emerged rapidly in this period, driven by National Science Foundation funding, perhaps most significantly Gilbert White's Natural Hazards Center at the University of Colorado (1975). And, from the public's perspective, by the 1970s disaster relief in the United States had emerged as "implicit public insurance," according to historian David A. Moss. "Although private property-and-casualty insurance continued to play a critical role . . . the federal government was increasingly emerging as an insurer of last resort."[12]

It is critical to note that in policy terms (and despite its early home at HUD) the NFIP was never a welfare program. David A. Moss notes that although "disaster relief looked very much like an entitlement, it did not technically qualify as one. Unlike mandated AFDC or Medicaid programs, federal disaster assistance depended almost entirely on discretionary year-to-year and emergency congressional appropriations."[13]The NFIP has been described as a "quid pro quo" program, wherein "relief from the impacts of flood damages in the form of federally-backed flood insurance became available to participating communities contingent on flood loss reduction measures embodied in state and local floodplain management regulations."[14] Moss, again, points out that "Policymakers emphasized the self-financing nature of such programs and their potential to curb expensive supplemental relief allocations each time a disaster struck."[15] In effect, the NFIP promised coverage to homeowners who would otherwise be entirely out of luck or reliant on public assistance if they suffered flood-related damage. In exchange for this peace of mind and financial security, the NFIP also aspired to bring a measure of sanity to coastal development, only allowing policies to be written where risks could be rationally assessed through floodplain mapping, and managed by land use regulations and building codes in flood-prone areas. However, the history shows that state legislatures and planning authorities, and county/municipal land use regulators struggled to place the principles of flood mitigation above the politically vital ethos of development.[16] Reflecting on

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[11] Adam Rome, *The Bulldozer in the Countryside: Suburban Sprawl and the Rise of American Environmentalism* (Cambridge: Cambridge University Press, 2001).

[12] David A. Moss, *When All Else Fails: Government as the Ultimate Risk Manager* (Cambridge: Harvard University Press, 2002), 256-257.

[13]David A. Moss, "Courting Disaster? The Transformation of Federal Disaster Policy Since 1803," in Kenneth A. Froot, ed., *The Financing of Catastrophe Risk* (Chicago: University of Chicago Press, 1999), 307-55, 318.

[14]Wright, 34;

[15] Moss, 1999, 318.

[16]New Jersey Governor Tom Kean famously attempted to restrict coastal land development in 1980s and was unable to accomplish the goal, major lobbying effort by home builders carried the day. A New Jersey state law passed in 1994 established that washed out properties could be rebuilt in the same location. Chris Kirkham and John Rudolf, "Jersey

the NFIP in 1997, Gilbert White lamented that "we do not have a sense of what has happened on the land, locally, as a result of this program."[17]

A key critique of NFIP has plagued the program (and public disaster relief and mitigation spending more generally) over the years: the so-called "moral hazard" argument. From this argument comes a view that federal disaster relief programs do not promote risk-averse behavior, but instead entice people to take risks they shouldn't (like living on a flood-prone coastline)—and reward them even when their luck (inevitably) runs out. Tempting as it may be to buy into the moral hazard view, close review of trends in NFIP policy holding reveals something much more complex and startling. Coastal New Jersey residents by 2010, for example, were not universally covered. Despite the regularity of severe weather, some coastal New Jersey zip codes had less than 15% of their property owners purchasing insurance while others averaged between 50-75%. Coastal Long Island, NY displayed a similarly variable pattern in its rates of flood coverage, but much lower than New Jersey overall, tending towards 5-15% coverage.[18] Low take-up rates, as we have seen, have been a constant with the NFIP. Explanations range from inadequacies in NFIP mapping and floodplain management advising, to lack of enforcement against lax insurers and community floodplain policies, to local political pressure against adopting NFIP land use guidelines from homeowners, the construction industry, and cost-fearful homeowners themselves.

To take this a step further we might ask: why would home and business owners take the risk of being washed out by a flood onto themselves when highly subsidized flood insurance was available to them? The principal reason for their lack of interest in buying coverage is their treating the flood risk as below their threshold level of concern. Support for this view comes from a laboratory experiment on purchasing insurance where many individuals bid zero for insurance coverage against low-probability events, apparently viewing the probability of a loss as so small that they were not interested in protecting themselves against it.[19] Furthermore, homeowners allow their policies to lapse even when required to purchase coverage as a condition for a federally insured mortgage. An in-depth analysis of the NFIP revealed that the median tenure of flood insurance was between two and four years while the average length of time in a residence was seven years.[20] Some banks and financial institutions have not enforced this regulation because they are unlikely to be fined, and/or the mortgages are transferred to financial institutions in non-flood-prone regions of the country that have not focused on either the flood hazard risk or the requirement that homeowners may have to purchase this coverage.[21]

The knowledge base required to enact, and maintain the NFIP is formidable—and to keep the program going with such needs puts it in the same difficult position as other disaster reduction efforts in modern American history. Building and maintaining interdisciplinary disaster science research takes time and a steady commitment from the private sector and public funding agencies to develop the requisite mapping and enforcement of risk reduction measures. A commitment to coastal and riverine flooding research was central to the NFIP; in fact the continuous update of

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Shore Development Failures Exposed by Hurricane Sandy," Huffington Post, 12 December 2012: http://www.huffingtonpost.com/2012/12/11/jersey-shore-development_n_2267557.html.

[17]White, Gilbert F., Looking Toward the Horizon: Prospects for Floodplain Managers, (Association of State Floodplain Managers Annual Conference, Little Rock, AK, 1997), quoted in Wright, 41.

[18] Carolyn Kousky and Erwann O. Michel-Kerjan, "Informed Decisions on Catastrophe Risk: Hurricane Sandy's Storm Surge and the NFIP," November, 2012.

[19] McClelland et al 1993.

[20] Michel-Kerjan et al 2012.

[21] (Kriesl and Landry 2004) Dixon et al (2006).

flood hazard maps provides the technical underpinning of everything the program strives to do. Without the updated maps, it is impossible to sustain the knowledge required to set insurance premiums that reflect risk, or to establish floodplain development rules, building codes, and other tools of flood mitigation. The result has been a history of haphazard technical updates and a mismatch between the ambitions of the policy and the supply of knowledge to carry it to success.

Moreover, the costly flood plain mapping, so critical to risk calculations, has been badly under-funded and deferred over the years. According to the National Association of Floodplain Managers, from the beginning, inadequate funding, limited capabilities of federal agencies that traditionally mapped floodplains, and the sheer enormity of trying to identify the nation's floodplains on a sound scientific and credible basis greatly hindered . . . [the] ability to carry out studies and keep pace with community enrollment."[22] In 1999 FEMA issued a report calling for "map modernization" at a cost of $750 million over a 7-year period. This ambitious plan proceeded in fits and starts as the homeland security era unfolded. And as much as the NFIP might have desired more accurate maps, the technology of mapping was itself changing throughout the 2000s—making heavy investments in "old fashioned" modernization questionable in the midst of the development of new methodologies.

Bringing the findings of risk research into policy has itself proven to be a consistently difficult process in American history—we might describe it as a *disaster science-policy action gap*. The nature of risk research is interdisciplinary, and often reactively funded. These conditions have historically made it difficult for researchers to operate within normal professional boundaries, using established funding networks to tackle the sweeping risks of fire, nuclear threat, industrial pollution, flood, and climate change. And when researchers do reach plateaus of risk knowledge, history has shown it to be difficult to build policy around it. In brief this might be best explained with the fact that risk experts quantify their results based on known hazards and disaster cases. As such, their advice tends towards operating within the demonstrated weaknesses of built systems and technologies—and their advice tends towards recommending investment in protective measures such as insurance and making ones property more disaster-resistant. Clearly this approach is at odds with a bipartisan American political tradition favoring land development and technological risk taking that can be profitable until the next flood or hurricane strikes.

The history of fire hazard provides a context within which risk knowledge could be moved successfully into protective programs that were implemented. Even facing city-leveling blazes, municipal and state authorities in the late 19th and early 20th centuries were reluctant to exercise control over the built environment—the threat of fire was, of course, tied directly to the rapidity of construction and the crowding of the industrializing metropolis. Eventually, the fire insurance industry nurtured risk research and standard-setting bodies like Underwriters Laboratories and the National Fire Protection Association. These science-based non-profits were seen as objective and authoritative spokesmen for fire safety, and over a period of half a century they enabled municipal and state fire service, building, and planning officials to legislate fire protection into the built environment—in the case of urban fire the disaster science-policy action gap was bridged, and urban conflagrations ended by the 1920s.[23]

The clustering of disasters in the short time interval between 1964 and 1965 led to the passage of NFIP legislation in 1968 and ensured public support. But, the need for severe disasters to spur legislation has made it difficult to sustain policy implementation when nature is not creating havoc via floods, hurricanes, earthquake ands tornados. Effective mitigation—taking steps

[22] Wright, 36.

[23] Scott Gabriel Knowles, *The Disaster Experts: Mastering Risk in Modern America* (Philadelphia: University of Pennsylvania Press, 2011), chapters 1-3.

to lower risk and lessen the impact of a disaster—must happen well prior rather than after a disaster. But the political appetite for funding mitigation in the absence of a crisis is often weak—reflecting a persistent *relief mindset* among elected officials. This proved true with NFIP in a number of ways, from minimal funding for mapping to lack of effective tools for monitoring homeowner and municipal compliance with NFIP guidelines. Recent scholarship demonstrates that elected officials are largely unwilling to support disaster mitigation, while they are quite eager to champion post-disaster relief and recovery spending.[24]

The relief mindset helps us understand why so many policies aimed at mitigating hazards have been passed in the immediate aftermath of disasters, fall into quasi-funded status, and then again receive attention in the midst of a crisis. Successful disaster preparedness, over the long term, generally involves risk management tools like insurance, as well as infrastructure and anti-poverty spending. As the history of NFIP demonstrates, the political will to remove subsidies for risky "grandfathered" properties, or to allow premiums to reflect risk is shaky at best. These are the necessary steps, though, towards fostering land use in line with NFIP standards and achieving the larger goal of flood loss reduction and sustainable coastal development.

[24] Andrew Healy and Neil Malhotra, "Myopic Voters and Natural Disaster Policy," *American Political Science Review* 101:3 (August, 2009): 387-406.

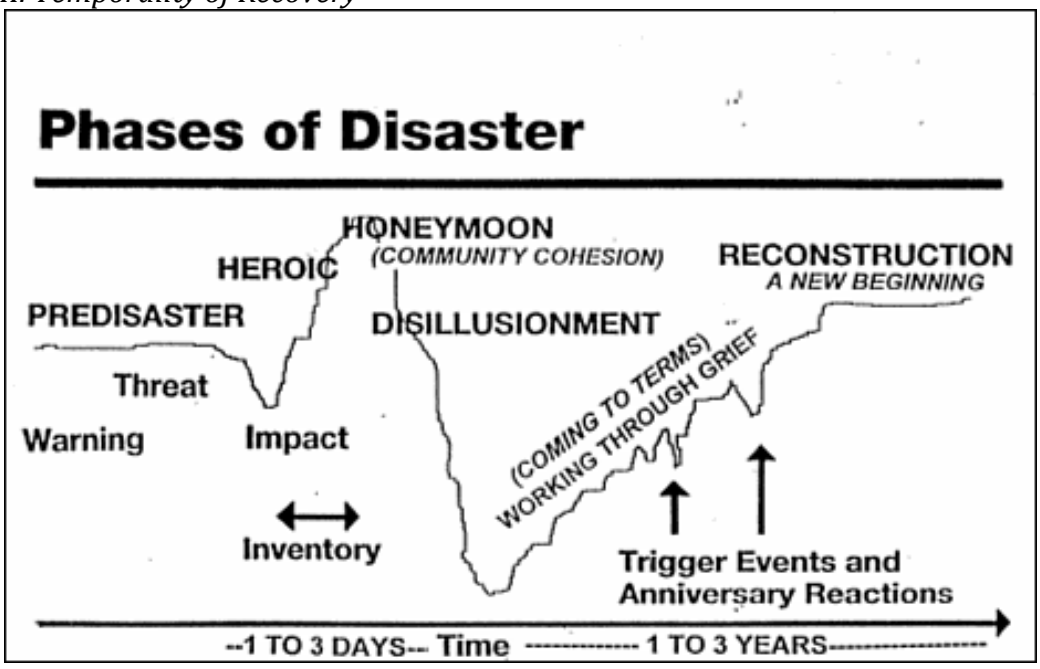
Temporality
Max Liboiron

There are at least two popular notions of temporalities of disaster that can be addressed by critical disaster studies: the increasing number of slow moving, long-term disasters that do not fit an event framework, and the notion that disaster recovery is a unifying, teleological climb back to some version of a status quo.

I. Slow & Chronic Disaster
Kai Erikson and Rob Nixon, among others, have ben urging scholars to consider "slow violence," structural oppression, and "any event or condition that could be shown to produce trauma on a large scale" a form of disaster regardless of timeline (20). These disasters, from ubiquitous endocrine disruptors to chronic homelessness, are characterized by their roots in everyday systems and an extreme latency of effect.

These temporalities present a unique but reversed parallel to the definition of disaster as a period of time where society cannot reproduce itself, because it is precisely the reproduction of certain segments of society, namely industrial capitalism and governance systems that maintain uneven power relations. The advantage of thinking about disasters as long term, slow-moving phenomena is how Perrow's concept of the "normal accident" becomes the "normal disaster:" the structural conditions of wider social and economic systems that not only enable, but guarentee, large scale trauma and physical/social destruction. This allows disaster scholars to bring their studies, critiques, and recommendations to bear on systemic, rather than technical or managerial, problems.

II. Temporality of Recovery



The image above is was first published in a *Training Manual for Mental Health and Human Service Workers in Major Disasters* (2000), and is still used by agencies such as the Center for Disease Control and various crisis counseling services for disaster survivors. Yet, rather than a teleological climb back to normalcy with a few bumps due to trigger events, there are two ways that research

on on-the-ground experiences of disaster exhibit a different temporal pattern. First, people who were relatively resilient and able to deal with adversity before the storm are now vulnerable—disease, debt, homelessness, trauma, and grief have ensured that their former standard of living is out of their reach, possibly permanently (SRL 2012). Rather than a climb back to the status quo, they now exist somewhere below their former point on the x axis. Secondly, for populations that were already vulnerable due to poverty, a lack or precarious access to health care, education, employment and housing, not only are they in increasingly dire situations, but a return to "predisaster" normalcy can hardly be called a recovery. In both cases, one large disaster begets many smaller ones. Disaster recovery itself can cause a return to disaster conditions, such as in post-Sandy Staten Island where slow government aid for rebuilding has lead to serial foreclosures in formerly stable middle class neighborhoods. As in postcolonial studies, there are "multiple temporalities" in disaster, without a unified or unifying timeline of progressively climbing back to the status quo. What does this mean for concepts of recovery, resiliency, and vulnerability, the current buzzwords of disaster management?

Note:
At the AAG this year, there was a panel on Disaster Time: Critical perspectives on crisis informatics and the temporal aspects of disasters
Mapping Disaster In/Over Time by Katrina Petersen - UCSD
Time as an information infrastructure by Megan Finn - Microsoft Research
USGS iCoast Crowdsourcing System: Merging Geologic Time with the Disaster Lifecycle to Analyze Coastal Changes after Extreme Storms by Sophia B. Liu, PhD - US Geological Survey
Discussant: Ryan Burns - University of Washington

Category 2: Modes of Practice & Category 3: Modes of Engagement
Mutual Aid in Disaster Research
Max Liboiron

Mutual aid is characterized by solidarity (fellowship arising from common responsibilities and interests) and reciprocity (mutual, though not necessarily symmetrical, exchange). A mutual aid model of research is particularly important for disaster research because traditional Belmont ethics (IRB ethics) are inadequate for the unique vulnerabilities of research subjects in disaster situations, whether those subjects are survivors, relief workers, or others. A mutual aid model does not only seek to "do no harm," it also strives to reciprocate, to respond, and to cooperate. It takes the processes and practices of research, not only the results, as a place to do meaningful normative work.

Outside of academia, mutual aid groups have different organizational structures, but there are several elements they tend to share: they are non-hierarchical, non-bureaucratic, non-profit organizations; activities are voluntary and all members contribute to some aspect of the group's maintenance; and "[t]hey are egalitarian in nature, and designed to support participatory democracy, equality of member status and power, and shared leadership and cooperative decision-making. Members' external societal status is considered irrelevant inside the group: status in the group is conferred by participation" (Francis 2005). Mutual aid research brings these values into research relationships, both within academia and between academia and disaster community partnerships. Thus, mutual aid research is explicitly against an extractive or "safari" model where researchers come in, collect data, and leave.

Because mutual aid research is oriented towards normative action and participation, it can manifest in a range of pre-existing academic methodologies, including:

- **Community-based Participatory Research (CBPR) or Participatory Action Research (PAR),** both of which make research subjects into research participants, usually by including disaster survivors or first responders in defining research questions, helping gather and analyze data, choosing the venues and forms of data dissemination, and even co-writing. At the very least, researchers verify data with research participants and ensure it is useful to their needs.
- **Activist/advocacy research** is also a broad term that refers to doing and leveraging research to meet the needs of disaster survivors or relief workers; research is designed to be useful to a specific set of problems faced by stakeholder groups. Thus, the affected community defines validity and success in addition to peer review or other academic protocols.
- **Reciprocal relationships** are possible even when the research itself may not be of immediate use to research subjects. Researchers can do relief work, or leverage the unique capital and skills academics possess for the relief effort, such as helping create, conduct, or analyze surveys or canvassing efforts or making space available at universities for community meetings. At the very least, they can muck out, make peanut butter and jelly sandwiches, support help lines, or do other basic work of disaster relief or long term recovery.

Disaster is an ideal place to move research into a mutual aid model because mutual aid is already a characteristic of many post-disaster communities, and has even become standard language in

official disaster preparedness. The United State's EMAC, or Emergency Management Assistance Compact, for example, is "an interstate mutual aid agreement that allows states to assist one another in responding to all kinds of natural and man-made disasters." California has an official Emergency Managers Mutual Aid Plan developed after the 1994 Northridge earthquake. When Hurricane Sandy hit New York City in 2012, the largest single relief effort was coordinated by Occupy Sandy, whose various mottos included: “mutual aid, not charity.” Thus, there are many of models and resources for transforming research ethics, methodologies, and methods for mutual aid.

Questions for the group:
Pre-existing models: Superstorm Research Lab. Are there others, disaster or otherwise, ie. feminist research groups?
Question: This applies mostly to field research. How or should this be extended to other forms of research that is not proximal in time or space to moments of disaster, such as history or big-data driven projects?

Template of Memorandum of Understanding for Mutual Aid Research in Disasters
Superstorm Research Lab & Disaster Collaboratory

Send suggestions, edits, etc, to : Max Liboiron m.liboiron@neu.edu

Introduction

There are many reasons to use a Memorandum of Understanding (MOU). It may be used to indicate good will on the part of both parties, to clarify the relationship between two organizations, to make responsibilities of each party explicit, and to keep track of what they've agreed on.

When deciding what to include in an MOU, keep in mind the purposes of the agreement. The MOU should be detailed and comprehensive enough that each partner has a clear understanding of the collaboration, their role in it, what is expected of them, and what they can expect from the rest of the group. It should also be broad and simple enough to support a nimble, adaptable collaborative effort; the MOU should support the work of the collaboration, not get in the way. Crucially, the MOU is a framework for ethics; the research ethics supported by academic Institutional Review Boards (IRBs) do not cover many sorts of challenges encountered in innovative research, collaborations, and unique populations or situations.

This MOU is a template and resource designed with mutual aid researcher-community or academic-activist partnerships in mind. It can cover a range of collaborations and partnerships and aims to highlight issues that might need discussion. It is neither a mandatory nor comprehensive list of ingredients, but is meant as a starting point for discussion about the types of things you might consider in a mutual aid partnership so partners can craft their own MOU. It draws heavily on Tribal Research Ethic Codes, community-based participatory research (CBPR) and participatory action research (PAR) models, including the following documents:

- The Canadian Aboriginal AIDS Network MOU on Principles of Research Collaboration
- The Memorandum of Understanding for the Community Organizing Part of Community Action Against Asthma (Between: University of Michigan School of Public Health, Detroiters's Working for Environmental Justice (DWEJ), the Detroit Hispanic Development Corporation (DHDC) and Warren Conner Development Coalition (WCDC)).
- Healthy African American Families Community Participatory Research Collaboration Agreement
- Language Revitalization In Vancouver Island Salish Communities project (http://www.docstoc.com/docs/135504197/Memorandum-of-Understanding)
- Collaboration Toolkit: Creating an MOU, from Colorado Collaboration Award (http://www.growourregion.ca/images/file/Collaboration%20Toolkit%20-Creating%20an%20MOU.pdf)
- Indigenous Research Protection Act by Indigenous Peoples Council on Biocolonialism
- Model Tribal Research Code by the American Indian Law Center

Memorandum of Understanding

This Memorandum of Understanding made on and effective from
the _____ day of _____, 20__

between
[community group]
and
[researcher or research institution]

I. Background

- Describe the parties
- Liaison Officials: First and Second Points of Contact for each organization and their contact information. and/or full list of participants
- Describe the project

II. Shared Goals and Objectives

The Parties have entered into a collaborative research project to work towards the following goals and objectives:

- The project seeks to enhance the community's welfare through empowering the community to address its own issues.
- The project will be designed to increase community knowledge of the issue.
- The project will be designed in ways which enhance research capacity or other capacities of the community-based participants in the process.
- The research questions must not only reflect academic interests but strive to ensure that the research is also relevant and beneficial to local communities.
- Community and academic participants will be involved in all project phases, including planning, implementation, research and evaluation, analysis, interpretation, and dissemination, the burden under this code being on the researcher to show that tribal, community, or individual input would be inappropriate rather than the reverse.
    - All participating members (academic and community participants) are acknowledged as having expertise and commitment that is relevant to the scope of the project.
    - Interested members of the community and community agencies will be provided opportunities to participate in the research process.
    - Project membership is considered to be open or inclusive of those who wish to join and are willing to participate actively, rather than closed or exclusive in membership.
    - Community participants will be partnered with academic participants in analytic issues, including interpretation, synthesis, and verification of conclusions, and supported as needed in the research and scientific methodology.

III. Process

Roles, duties, and responsibilities of each organization:

<u>Meetings</u>

- Parties will meet a minimum of [number of times per time period].
- [The PI or project coordinator or rotating member drawn from either party] will provide each member of the research team with notes of meetings, including decisions made, within [a reasonable time frame].

<u>Project Design</u>

- Outline roles of each party and/or roles of individuals or groups within those parties
- Parties will seek to combine traditional and innovative forms of research.
- The project will periodically assess the experience of participating for community and academic participants and attend to their concerns.

Data

Informed Consent

- The (purpose of) research project will be explained to all stakeholders (participants and community members) in a language that is appropriate to the community. This is part of a wider community consent.
- It is requested that each participating community partner have at least one participating member (i.e., the Council representative) complete a certification of training for human subjects research through the lead academic partner's Internal Review Board (IRB) website.
- The research team will explain potential risks and benefits in a manner that is appropriate to the community. This includes not only risks of the research to individual participants, but also to the wider community and third parties (see Underkuffler 2007).
- Since researchers can not always anticipate risks of research to the wider community, particularly if they are not familiar with the community, at least one member of the research subject population must be involved to speak to the risks of particular types of research done in that area.
- The informed consent of individual community members must be secured in writing before they participate in research or recordings, including any restrictions the individual community members might wish to attach to the use of this information or recordings. Written informed consent is evidenced by the signature of the individual community member on the Participant Consent Form.

Confidentiality Statement

- Unless the respondent waives confidentiality for specified uses, we shall hold as privileged and confidential all information that might identify a respondent with his or her responses. We shall also not disclose or use the names of respondents for non-research purposes unless the respondent grants us permission to do so.
- All data will be used in a form that will make it impossible to determine the identity of the individual responses. That is, responses will not be integrated, analyzed, or reported in any way in which the confidentiality of the responses is not absolutely guaranteed.

Data Ownership

- Originals of all audio/visual recordings (in digital and/or analog formats) and copies of all notes, transcripts, photographs, and other records of the research will be kept by [List parties].
- [List parties] will retain a copy of the full data file, de-identified appropriately.
- Any site owning data, or participating in collecting data for the project, must review its participation and role through their internal IRB and/or sign a certificate of compliance with the lead academic IRB for the project.
- All participating sites/partners will receive a summary of the data even if their involvement is minimal and they are not entitled to the de-identified, full data file.
- The Parties will ensure that a final, permanent repository for the research materials, to be created by the researchers, will be utilized. Additionally, the researchers will make

as a condition of the deposition that the repository will provide access to community members. Further, the repository will adhere to any confidentiality or use restrictions made by the individual community members.

Community and Academic Validity

- During the life of the project, submitted research papers and abstracts for presentations will be circulated to all parties via lead participants at least one week and preferably two weeks prior to their submission for review and comment. There will be a 5-10 day turn around time for comments to the lead author.
- Each project deliverable will have one or two lead individuals to permit accountability, preferably a representative from each party.
- It is expected that the first or senior author of each project will review comments from partners, discuss major differences of opinion with the partners involved, and circulate the final version to partners. If substantial disagreements over interpretation remain, then the lead author (first and/or senior) will include a statement in the discussion section, clarifying the nature of the disagreement.
- Products for community release and presentation will be circulated for comments to community and academic partners, providing a one-to-two week turn around time.
- Given that all members of the research team will be provided the opportunity to review and comment on findings prior to publication or presentation, any one member of the research team may not, particularly once initial dissemination has occurred, further analyze, publish or present findings resulting from the above mentioned research project unless the entire research team reaches a consensus.

Dissemination

- Communication strategies to present aggregate data to the community at large shall be described, with in-progress up dates where appropriate
- Dissemination of the research results will be the responsibility of all project participants, and academic and community partners will have opportunities for presentations and publications.
- Research projects will produce, interpret, and disseminate the findings to community members in clear language respectful to the community and in ways which will be useful for developing plans that will benefit the community.
- Research shalll be disseminated for public benefit, either freely (including open access) or at nominal charge to cover distribution/processing fees.
- The researchers will ensure that two copies of all publications, conference papers and other educational and scholarly materials produced in the course of the project be deposited with the [community group, institution, etc].

Publication

- Criteria outlined by Huth (1986) will be used as guidelines for authorship of publication based on the findings of the research. The criteria recommend that: (1) all authors must make a substantial contribution to the conception, design, analysis, or interpretation of data; (2) authors must be involved in writing and revising the manuscript for intellectual content; and (3) authors must approve the final draft and be able to defend the published work. Those who have made other contributions to the work (e.g. data collection without interpretation, etc.) or only parts of the above criteria should be credited in the acknowledgements, but not receive authorship.
- -or- Due to the fundamentally collaborative nature of this partnership, party affiliations, rather than author names will be used to designate authorship of publications.

- -or- Due to the fundamentally collaborative nature of this partnership, (1) All participants who made this research possible through conception, design, analysis, collection, provision or interpretation of data will be listed as an author, even when these contributions do not include writing; and (2) authors must approve the final draft and be able to defend the published work.
- The explicit permission of an individual or organization must be sought prior to acknowledging their contribution in a paper or presentation.
- A research team member or a partner may chose to include a disclaimer if they do not agree with the content or views presented in a publication.

IV. Communication

- Include any standard or shared terminology, including consistent ways that partners are identified in written and verbal communication
- Processes for reaching out to – or receiving calls from – the press
- General communications policies (social media policies, communications calendar, branding, graphic standards, etc. as applicable)

V. Resource Allocation

Payment, fees, and funding

- Both parties shall contribute in kind, including the following funding, labor, equipment, and space [list]
- [List partner] will handle all financial transactions on behalf of the collaboration. The following [reports, procedures, or financial controls] are required of [the partner]
- Expenses inclusive of [list types] will be handled by [outline procedure & responsibilities]

Also consider:

- Gift acceptance policies: these should describe how gifts are accepted, recorded, and acknowledged. In addition, the MOU should describe the circumstances under which a gift would be declined.
- Policies around sharing fundraising information externally and among partners, and responsibility of fundraising
- Payment. Which partners or individuals will be paid and from what source?

Include budget, if appropriate. Note that when money exchanges hand, a contract, rather than a memorandum of understanding, is likely more appropriate.

- when to use a contract vs MOU/MOA: http://ctb.ku.edu/en//tablecontents/sub_section_main_1873.htm

VI. Decision Making Processes

- Things to specify:
  - Whether the collaboration uses a consensus model, majority vote, or another system.
  - What constitutes a quorum, and what types of discussions or decisions may or may not take place without a quorum.
  - How partners will be informed in advance about decision-making discussions & what alternative voting systems may be used (voting via email, sending a proxy to a meeting, etc)

VII. Risk

- The MOU should address key areas of risk for the collaboration. Partners may be expected to maintain certain types or levels of insurance coverage, conduct background checks on employees and volunteers, maintain security of electronic data, etc.

VIII. Terms of Agreement

- This agreement may be amended at any time by signature approval of the parties' signatories or their respective designees.
- The term of this Memorandum of Understanding is from _____, 20__ to _____ , 20__ , and may be renewed. The Parties will review this agreement [annually].

IX. Termination

- In case of a dispute arising from the implementation of this Memorandum of Understanding, the Parties shall exhaust alternative dispute resolution models such as negotiation and mediation before employing other forms of dispute resolution such as arbitration or adjudication. Parties shall act in good faith to resolve the dispute.
- Any Party may withdraw at any time from this MOU by transmitting a signed statement to that effect to the other Parties. This MOU and the partnership created thereby will be considered terminated thirty (30) days from the date the non-withdrawing Party receives the notice of withdrawal from the withdrawing Party.

X. Execution and Approval

- The persons executing this MOU on behalf of their respective entities hereby represent and warrant that they have the right, power, legal capacity, and appropriate authority to enter into this MOU on behalf of the entity for which they sign.
- Signatures _____
- Date _____

Huth, E. (1985). Guidelines on authorship of medical papers. American College of Physicians. Annals of Medicine, 104, 269-274.

Underkuffler, Laura S. 2007. "Human Genetics Studies: The Case for Group Rights." *The Journal of Law, Medicine & Ethics* 35(3):383–95.

SHOREline: A Youth Empowerment and Post-Disaster Recovery Program*

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Research on the effects of disasters on children and youth suggest three persistent themes: First, that the children and youth of the Gulf Coast have been *exposed* to more disasters over the past decade than any other group of young people in the United States. Second, that exposure to multiple disasters and other chronic stressors associated with poverty and environmental degradation has led to an *accumulation* of mental and physical health issues and educational and social challenges (Abramson, Park, Stehling-Ariza, and Redlener, 2010). Third, although they are among the most affected in disasters, children and youth are often *excluded* from the decisions and actions that can influence their health and recovery (Anderson, 2005; Peek, 2008).

SHOREline—which stands for "Skills, Hope, Opportunities, Recovery, and Engagement"—is a recently established youth empowerment program that seeks to provide an opportunity to make fundamental changes in the lives of disaster-affected youth, their families, their communities, and beyond. Our teams at Columbia University, Colorado State University, and the Children's Health Fund created SHOREline with the support of the Baton Rouge Area Foundation to give youth a voice, and a platform, for encouraging their own recovery and the recovery of those around them.

The program, which is currently funded for the 2013-14 and 2014-15 academic years, will support SHOREline chapters in five high schools in communities across three Gulf Coast states. (It is worth noting that one of our long-term goals is to help these chapters become sustainable at each high school, so that the program will continue even after our initial two years of funding has ended. We also hope to work with additional schools in other disaster prone and/or disaster affected communities to help them build new chapters.) The present five focal communities are places where our survey research showed that parents expressed the greatest concerns about disaster impacts on their children (Abramson, Peek, Redlener, Beedasy, Aguilar, Sury, Banister, and May, 2012). The initial selected schools include South Lafourche High School, Grand Isle High School, and Benjamin Franklin High School in Louisiana; Gulfport High School in Mississippi; and Bryant High School in Alabama.

In the spring of 2013, after identifying the five focal schools, we began working closely with school administrators to find one to two qualified "teacher-sponsors" at each school. In the late summer of 2013, we met with the selected teacher-sponsors to orient them to the program and to present them with the SHOREline curriculum book. Also during this time period, we began recruiting students for the inaugural SHOREline chapters. We distributed a recruitment video and other written materials to interested students, who were then required to complete a four-question on-line application. In August of 2013, our team, in collaboration with the teacher-sponsors, reviewed the applications and ultimately selected 16

students at each high school for participation in that respective SHOREline chapter. Thus, a final total of 80 SHORELiners were drawn from all grades from freshman to senior; they include a nearly equal number of boys of girls; and they generally represent the racial and ethnic composition of the school from which they were selected.

The specific objectives of each SHOREline chapter are to engage in projects and activities that address the following:

(1) Learn what it takes for youth and their communities to recover from a disaster.
(2) Build the tools and resources to help other youth and communities recover from a disaster.
(3) Create a youth action network that can be activated when disaster strikes, in order to help and support youth in other communities. The types of assistance that SHOREline youth might provide could include (as illustrations, since each chapter will develop its own projects):
    a. Mobilizing communication and information platforms, built around social media and internet technologies;
    b. Developing the means and methods for mobilizing and distributing resources;
    c. Supporting the emotional needs of disaster-affected youth by providing connections and sharing stories of disaster resilience; and
    d. Serving as a voice for disaster-affected youth through creating a space for youth advocacy.

The SHOREline chapters at the five high schools began meeting in September of 2013. We brought them all together in mid-October 2013 for a regional Kick Off Summit held at the University of Southern Mississippi-Long Beach. This Summit, which was designed to serve as a fun working meeting for all the students, featured a variety of speakers experienced in project-based learning and youth empowerment. It also gave the students, for the first time, the opportunity to begin developing their own project ideas.

Over the remainder of this academic year, the SHOREline students completed a series of project-based, service learning activities. The SHOREline curriculum is designed to foster an environment where the youth can focus their projects around four core themes: *Identity* ("Who am I?"), *Community* ("Who are we as youth in this place?"), *Post-Disaster Challenges and Opportunities* ("What challenges have we faced and how have we shown resilience?"), and *Engagement* ("How can we share our strengths?").

This curriculum, as well as many other project-based learning activities, have helped the students to move forward with a project plan, where they are learning how to conceptualize, design, and build a project from the ground up. The five chapters will present their final projects at a May 2013 Capstone Summit to be held at Loyola University in New Orleans. These projects will be evaluated based on, among other criteria, their feasibility, scalability, and sustainability.

Beyond the IRB: An Ethical Toolkit for Long-Term Disaster Research*

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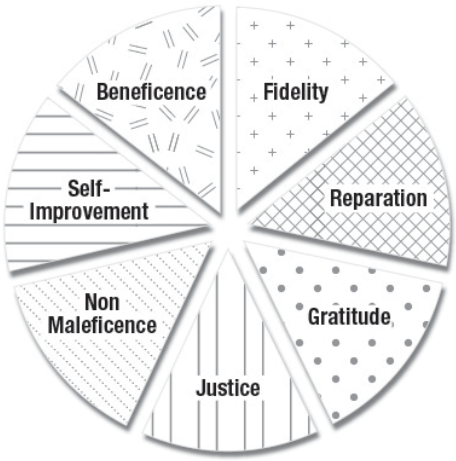
Our work argues for expanding the ethical frame of concern in disaster research from the early phases of site access to longer-term issues that may arise in the field. Drawing on ethical theory, these arguments are developed in five parts.

First, we identify the philosophical roots of ethical principles used in social science research. Specifically, we review two distinct, and in fact, fundamentally opposed philosophical traditions—"utilitarian" ethics and "Kantian" ethics. Each of these ethical traditions involves countless variations. However, our interest here is not to present esoteric philosophical debates, but rather to locate a "normative" moral construct with broad value for guiding us in moments of ethical need.

Second, we discuss how ethical concerns span the entire lifecycle of disaster-related research projects but are not fully addressed in the initial protocols for gaining Institutional Research Board (IRB) approval. Indeed, from our perspective as researchers engaged in long-term disaster studies, the range of possible ethical encounters and problems that are covered in an IRB protocol represent a limited set of concerns. Yet because these delimited concerns are well understood and explicitly reviewed by university IRBs, it is easy to imagine that the universe of ethical problems one will confront is covered by the protocol process. The stakes for recognizing hidden *ethical landmines*--here defined as the potentially explosive moments in which a poor ethical choice may produce detrimental effects on participants, our relationships with participants, and on the research project as a whole-- in long-term research are growing. Today, there are increasing numbers of disaster scholars and ethnographers who are studying long-term trajectories of individual- and community-level recovery and resilience. For these researchers, it is important to become aware of the inevitability of encountering such ethical landmines that may not have been anticipated in an IRB review.

Third, we introduce the idea of the philosophically-informed "ethical toolkit", established to help build awareness of moral obligations and to provide ways to navigate ethical confusion to reach sound research decisions. Specifically, we use the work of W. D. Ross (2002 [1930]) to introduce a template of moral considerations that include *fidelity, reparation, gratitude, justice, beneficence, self-improvement,* and *non-maleficence* (see Figure 1). We suggest that in the absence of a clear framework that researchers can use to think through ethical dilemmas as they arise, Ross' pluralist approach to ethical problem-solving offers flexibility and clarity and, at the same time, leaves space to apply our own understanding of the context in question.

Figure 1. Key Moral Considerations Identified by W.D. Ross



Fourth, we draw on examples from our research studies conducted following Hurricane Katrina. Using these examples, we discuss how, in retrospect, we can apply Ross' moral considerations to the ethical issues raised including: (1) shifting vulnerability among disaster survivors, (2) the expectations of participants, and (3) concerns about reciprocity in long-term fieldwork.

Fifth, we consider how the ethical toolkit we are proposing may improve the quality of research and research relationships. With that in mind, we fully acknowledge that our proposed ethical toolkit will not make dilemmas disappear. Instead, the toolkit we describe can help sharpen critical awareness and help us recognize when there are competing moral considerations at play. Ultimately, the toolkit can help us make *better* decisions that align more clearly with our values and make room for the respect we intend to show all parties involved in post-disaster ethnographic research.

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Members of the SHOREline National Advisory Board and Youth Advisory Board will provide feedback and advice to the students after the Capstone Summit, with the ultimate intent of launching the projects in communities freshly impacted by disaster or recovering in the aftermath of a major event.

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Resilience as An Outcome

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The term resilience is ubiquitous in scholarship and practice. Many of its proponents classify the term as an activity, but it is best understood as an outcome that is the result of several activities. There is no shortage of initiatives invoking the term: the Rockefeller Foundation has pledged $100M to support the creation of Chief Resilience Officers in 100 cities around the world. The National Security Council gave its preparedness portfolio to a new resilience directorate. In academia, journals regularly devote special issues to the study of resilience. The cottage industry of resilience efforts begs the question of what resilience means.

Many efforts at improving resilience assume that resilient communities and organizations are able to bounce back from a crisis. For instance, a region might be resilient if its population returns to normal after a hurricane and flood. By that measure, New Orleans is not resilient because it has not returned to its pre-Katrina population levels. In many other domains beyond population, however, New Orleans might be considered resilient because some of its cultural, educational and job opportunities have grown since the storm. Engineers and economists describe resilient systems in terms of their ability to return to equilibrium, which means a steady state of operations. The possible types of operations and outcomes are numerous, and these equilibria extend beyond population levels. A full understanding of resilience takes into account outcomes for a host of social systems that sustain a community.

Perhaps the key to resilience is the ability to return to a level of performance in a variety of social systems in a space with multiple and changing equilibria. Cities have equilibria, but so do organizations, neighborhoods, businesses, infrastructure networks, associations, and nations. If resilience is to be valuable in the study of disaster, it can be used to identify a desired level of performance in a particular system, and then help structure activities that contribute to that performance, even in the face of a shock. As we know from the sociology of disasters, natural disasters do not create new vulnerabilities as much as they expose already fragile human structures and social vulnerabilities during an acute event.

Many efforts at promoting resilience fall short, however. The traditional functions of emergency management—mitigation, preparation, response, and recovery—are key activities in promoting resilient outcomes, and yet they are left out of some resilience programs. Furthermore, some efforts at resilience departments and resilience officers assume the worst elements of the politics-administration dichotomy. The dichotomy assumes that politics and administration are two inherently different activities, and should be approached separately and by distinct individuals and organizations.

The resilience efforts that assume the dichotomy of politics and administration also assume that a resilience program—an activity—can achieve resilient outcomes. In reality, resilient outcomes require good emergency management activities when preparing for disasters. These activities incorporate administrative expertise, and they must be conducted in a way that serves politicians' interests if they are to promote resilient outcomes over the long term. James Lee Witt's often-

quoted remark that disasters are political events recognizes the need for aligning activities that promote resilience with the interests of politicians and powerful social groups.

Grasping Realities and Issues: the 3.11 Japanese Triple Disasters

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1. Introduction

On March 11th in 2011, a huge earthquake and tsunami struck Japan and resulted in many victims. The earthquake and tsunami caused severe accidents at the Fukushima first and second nuclear power plants (NPPs). The impact and damages of these triple disasters, called "Higashi-Nihon-Daishinsai" or "3.11," continue to this day.

To consider various issues resulting from the 3.11 disasters, we must understand the continuing damages and social structural issues behind the devastated areas. Understanding this situation comes from more description and focus on "realities." In response to this need for understanding, we conducted a variety of investigations: collecting narratives, analysis of resident's attitudes toward the 3.11-related issues, analysis of social conditions of devastated areas, and quantitative media analysis.

The aim of this paper is to share descriptions of the 3.11 disasters. For this purpose, we take description-oriented. Through a variety of analyses, we try to look at basic situations of 3.11 multilaterally and re-construct "realities" of the disasters.

2. Basic description of the 3.11 disasters

For this horrible disaster, there were over 20,000 deaths and 290,000 people evacuated from their homes in Japan. Three prefectures in particular—Miyagi, Iwate, and Fukushima—were the most affected (for example, deaths in the Miyagi prefecture reached over 10,000). We summarize the number of victims, focusing on these three prefectures, in Table 1. We present pictures of devastated areas in Figure 1 and Figure 2. The tsunami wiped out several hundred kilometers of coastline in towns. Concerning causes of death, over 90 percent were caused by drowning, and about 65 percent of the victims were over the age of 60 (Cabinet Office, 2011). Evacuation zones were set up after the NPP accident and many people were forced to leave their towns, particularly in the Futaba-area. Figure 3 and Figure 4 show the current situation of the Namie-town, which was established as a mandatory evacuation zone after the NPP accidents. The town became available for short-time stays. The level of damage varied among the affected regions.

		Iwate	Miyagi	Fukushima
Human damage	Death toll	5085	10452	3355
	Disappeared	1145	1297	5
	Evacuee (Evacuee to other prefecture)	37852 (1540)	97715 (7538)	91998 (52277)
Collapse of buildings/houses	Complete or Half	25023	237989	94226

Table.1 Breakdown of damage

Fig.1: Picture of flooded area (a maritime area of the South-Soma city)（April 16, 2011）

Fig.2: Collapsed building by tsunami in the Onagawa town（November 18, 2011）

Fig.3: Namie-town collapsed by earthquake and isolated for NPP accident（April 11, 2013）

Fig.4: House collapsed by earthquake and isolated for NPP accident in Namie（April 11, 2013）

3. Diversity of damages, social conditions of areas, and resident's attitudes concerning 3.11

Although damaged areas of 3.11 are often regarded with the phrase "Tohoku" like a monolith, residents actually faced different realities from these disasters. Table 2 shows a breakdown of damage and social conditions in 37 target municipalities. This shows that the local towns which were seriously injured by the 3.11 disasters were aging populations, farming and fisheries workers, and generally poorer populations than metropolitan areas such as Sendai, which is the biggest city in the Tohoku area. Although it does not suggest a direct relationship between social conditions and damages, it does show that local areas with those populations became victimized areas of 3.11. For those social conditions, the coefficient of Internet use in Tohoku has been generally low compared to metropolitan areas (e.g. SOUMU 2011).

In addition to the diversity of damages and social conditions of each area, we also have to focus on the diversity of interests among damaged areas. To draw this diversity of interests, we conducted an internet-based questionnaire and collected 712 valid responses. In this survey, we compared the average of relative strength of interests of each area.[25] Figures 5 through 8 show examples of the responses. As the result, we found that there are different interests according to area. In Miyagi and Iwate areas, interest in "earthquake" and "tsunami" were relatively higher with significant difference than other areas. The high score of "Kansai Area" in topics related to earthquake and tsunami can be interpreted as the effect of the "Hanshin-Awaji Great Earthquake"

[25] We defined nine areas. In this paper, we show results of Iwate, Miyagi, Fukushima, Tokyo Area, and Kansai Area. In addition, we calculated the relative strength of interests, defined as the subtraction of interested score of individual topics from the average score of the respondent for all topics.

in 1995. On the other hand, "Fukushima" marked significantly higher score in topics related to the NPP accidents and radiation.

4. The stories of the two: what occurred and changed after 3.11.

In the former section, we found differences in damages, social conditions, and resident's interests in the 3.11 disaster issues according to areas. With recognition of these diversities, we would like to illustrate some realities of the damaged areas. We conducted semi-structured interviews of key persons in the Miyagi and Fukushima prefectures to extract narratives. As a result, we will summarize their stories and share their experiences, thoughts, lessons, and ongoing trials and errors.

The first story is from Mr. Toru Suto, who was the Director of Ishinomaki High School (IHS). Ishinomaki was the most injured area on 3.11. There were over 3,000 deaths and large amount of people remain missing. Soon after the disaster, IHS became an evacuation site and Mr. Suto, his colleagues, students, and local residents faced many difficulties. They never imagined that they would have to play an important role in operating an evacuation site before the 3.11 disasters.

What occurred at that time? We created a timeline charts for the IHS based on our interview and records offered by Mr. Suto (Table. 3). This is a representation of difficulties that IHS suddenly faced during and after the disasters.

In this section, we will focus on education. After 3.11, the Miyagi prefecture established new prevention measures and human resources in public school for disasters. They made new education and training systems about disaster prevention. In regards to education, Mr. Suto said:

> "Postpone the fading of the memory, emotion, and lessons as long as possible. –if we could postpone it for a decade or even for another year… "

> "I think our school disaster drills were mere formality [before the 3.11] though there were good reasons and intentions behind the drills. If we fail to convey these [meanings etc.] behind the drills, they would become just annual exercises. Furthermore I hope these children -those who experienced this disaster- would pass them [meanings, etc] to their children when they become parents in the future."

The second story is from Dr. Arifumi Hasegawa, vice-director of the Radiation Emergency Medical Center of the Fukushima Medical University (FMU). Soon after the earthquake and tsunami, many injured people were taken to FMU because hospitals in coastal areas reached maximum capacity immediately due to the large amount of victims. The NPP accidents made the situation much more serious. Dr. Hasegawa recanted the time:

> "I was so scared…. We didn't have [sufficient and accurate] information and knowledge for the situations at that time. We remained at our hospital, thinking that we might die there… it would have been much easier if God told us 'you don't need to do it.'"

In all of the panic, FMU was required to play a center for emergency radiation medical care and was regarded as a secondary medical center for radiation medicine, with the primary medical center being the network of hospitals in coastal areas near the NPP sites. However, the network of hospitals did not work well because hospitals that were regarded as emergency radiation medical

care sites were only 20 km from the NPP sites (Hasegawa 2013, p22).[26] What we should emphasize here is that medical care required after the disasters was a combination of medical care for radioactive disaster and natural disaster. FMU had little experience with emergency radiation medical cares.

To deal with the difficulties of that time, FMU created a new education course for emergency radiation medical care. In 2012, clinical exercises about emergency radiation medical care were designated as a mandatory course for fifth-year medical students. Regarding the new course, Dr. Hasegawa expressed:

> "…it's impossible to expect all risks. We will be in an unexpected situation at the disaster time…so it's essential for us to preliminarily think about what we should do when unexpected event occurred… it's difficult, but we always think about it…."

He hoped students would consider those unexpected situations. However, there is a gap of conscious about the disaster between students according to their experiences on the 3.11. At the same time, he mentioned difficulties in sharing some context and motivations to learn and practice emergency radiation medical care. Some students cannot have the motivation to learn emergency radiation medical care actively. The difficulty of education can be seen in the story from Mr. Suto. It is possible to say that this difficulty is a kind of "reality" of education in that devastated area. However, those situations at the site are not shared commonly in other areas.

5. Gap of attentions among variety of media

In this section, we present issues concerning media attentions. Through our comparison, it will be shown that there is a gap of interest among a variety of media such as national newspapers, local newspapers, and social media.

Figure 9 shows the timeline change of appearance ratio of three keywords of *Asahi newspaper*, *Yomiuri newspaper*, *Kahoku-Shinpo*, and *Fukushima-Minpo*. *Asahi* and *Yomiuri* are the most famous newspapers with a large circulation in Japan. *Asahi* has a liberal-pole, on the other hand, *Yomiuri* has conservative-pole. *Kahoku-Shinpoi* is the most famous and important block newspaper in the Miyagi Prefecture. *Fukushima-Minpo* is a key local newspaper in the Fukushima Prefecture. It is clear that different trends exist among those newspapers. In national newspapers (*Asahi* and *Yomiuri*), the appearance ratio of "earthquake" gradually decreased and on the other hand, the ratio of "NPP" increased. At the same time, "tsunami" marked a lower score than "NPP." The papers *Kahoku-Shinpo* and *Fukushima-Minpo* had a rather different trend. In *Kahoku-Shinpo*, the appearance ratio of "tsunami" was equal to "NPP." And in *Fukushima-Minpo*, the appearance ration of "NPP" was much higher than the other three newspapers.

Figure 10 shows the comparison of topic trends between newspapers and Web news. Compared to newspapers, Web news showed a rapid decrease in topics on the 3.11 disasters, but there were simultaneous increases in topics regarding "entertainment," "sports," "economics," and so on. Although this shift of center in topics is common for media, the difference of degree between media is illustrated. This result can be interpreted as newspapers continuing to take up 3.11 issues

[26] Hasegawa, A. (2013) "What occurred at that time", FMU Radiation Emergency Medical Center Radiation Emergency Medical Center (Eds) Message from Medical Doctors- Face to the Radiation Disaster, pp.9-61, Life-Science Press. Approximately 40 percent of the emergency radiation medical center was placed within 20km from NPPs (Hasegawa 2013).

more actively than Web news and underpin public interests on the 3.11 disasters. However, we should not dismiss that topics of 3.11 in newspapers have also been dominated by topics regarding "NPP," and the topics of "earthquake and tsunami" were covered with them.[27] In summary, our analysis indicates that the "NPP" accident played a strong role in setting topics and engulfed interests on "earthquake and tsunami." At the same time, the return to daily life occurred. On Twitter, the rapid decrease of interest in NPP was found (Figure 11). In the analysis of Twitter, we categorized a variety of topics like "NPP," such as "NPP accident," "Nuclear power policy," etc. In the aftermath of the NPP accidents, tweets regarding "NPP" occupied over 10 percent of all tweets, however, by the third month after the disasters, the coverage decreased to less than 2 percent.

The rapid decrease of interest concerning 3.11 occurred in national and social media, while local media continued to face their "realities" at each site.

6. Conclusion: "Variety of Gaps" & "Center and Periphery"

We examined various data concerning 3.11. As summary of our analysis shows, there were two important points. First, there was a diversity of damages and social conditions among devastated areas. This means that this disaster that struck so broad an area brought many kinds of "realities" to different areas. Therefore, we cannot treat them uniformly. The second point is related to this first point: there are clear differences of people's interests according to areas and gaps of attention between national, social, and local media. The current status of each devastated site and other activities at the site, such as education trials, have not been shared in Japanese society.

Here, we would like to quote Mr. Suto. He expressed the situation three years after 3.11:

"Already three years, still three years, only three years"

This may sound different for each person. However, the disaster continues. Disaster struck local sites but the reconstruction process is influenced by agenda-setting at the national level. There are gaps of interests between metropolitan areas and devastated rural areas. There are gaps of attentions between national/social media and local media. Through our group-interview like dialogue (Lesson-learning), local journalists often said that they felt weak to set the agenda process at the national level. Briefly, the locals were made "periferized" and agenda-setting was developed in the "center" without enough care for local contexts and diversity of "realities". While the situation continues, the gap of reconstructions have been spread gradually according to gaps of damages and social conditions of areas. However, attentions continues to decrease.

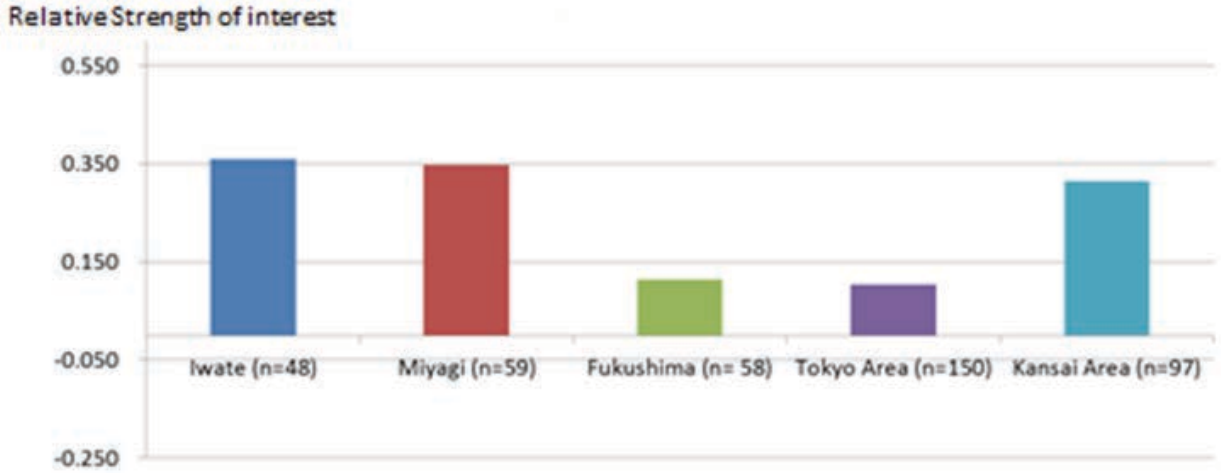
[27] In addition to Figure 9, we also conducted other analyses. As the result of our co-word network analysis, we found that there were strong and dense connections between keywords clusters "earthquake and tsunami" and "NPP." In addition, results from a timeline analysis of the change of contents uploaded in blog entries showed that the contents "earthquake" and "tsunami" rapidly decreased. After the decrease of "earthquake" and "tsunami," "radiation exposure," and "NPP accident" rapidly increased but interests in them was not sustained. The remaining and stable interest was about "low radiation exposure" and "internal exposure."

45903	530660	13.4	68.7	15.5	0.1	11.7	88.2	784
0704	64870	14.2	64.7	25.2	1.9	25.4	72.7	556
6490	23250	13.3	67.0	24.7	0.6	23.7	75.8	18
3494	25670	14.2	63.4	28.5	2.4	26.3	71.4	333
3140	25820	15.0	62.4	16.2	0.1	21.5	78.4	100
2979	26810	15.6	68.8	15.2	0.0	18.9	81.1	20
4198	17010	15.2	66.6	17.4	0.3	25.6	74.1	61
2908	15450	15.3	64.8	20.6	1.6	22.7	75.7	102
4846	11520	14.3	65.8	20.7	1.6	38.2	60.2	73
6711	5310	11.8	64.8	29.4	1.2	39.5	59.3	64
5089	5560	12.2	66.2	28.6	0.7	12.7	86.6	54
0419	6650	16.1	68.2	19.8	1.5	24.6	73.9	13
4000	11420	16.7	65.0	13.1	0.0	29.5	70.5	45
0051	–	12.7	62.0	32.0	2.1	34.3	63.6	66
7431	5540	15.0	62.4	29.5	3.4	32.7	63.9	164
3302	8550	14.0	59.7	32.3	3.0	29.3	67.6	232
0738	16580	14.6	62.7	28.8	2.7	27.2	70.2	323
9578	18420	13.2	61.5	33.9	1.7	28.8	69.4	441
5277	6130	14.1	63.2	30.8	2.4	34.1	63.5	201
8625	7950	15.1	62.7	30.3	2.5	34.1	63.3	263
9442	25010	14.2	63.7	29.1	3.7	24.0	72.2	1260
0804	–	12.9	59.5	37.8	10.4	25.7	63.9	993
843	–	15.0	62.2	33.2	4.2	34.4	61.4	156
088	–	13.6	64.8	30.3	8.6	26.4	64.9	70
632	–	15.6	63.7	29.0	10.8	20.1	69.1	81
6875	15810	16.7	64.2	25.2	3.1	28.3	68.6	623
7910	6650	15.3	64.7	29.1	8.2	27.7	64.0	303
7796	15030	15.2	62.7	24.4	1.2	38.2	60.6	198
0895	25050	14.6	62.9	25.2	1.6	30.7	67.6	399
418	–	15.5	63.7	23.0	1.0	41.4	57.6	58
701	–	16.1	64.4	25.7	1.9	36.4	61.7	103
5996	6880	15.7	63.5	19.7	1.4	28.7	69.9	68
1511	–	15.3	60.8	19.4	1.3	32.3	66.4	79
932	–	14.7	63.4	25.3	0.4	42.0	57.6	51
0908	7830	14.9	63.5	24.9	1.2	30.4	68.4	223
218	–	15.1	62.7	26.6	3.7	38.4	57.9	46
2198	147740	15.2	65.0	23.2	0.9	27.2	71.8	1231

Table.2 Table of damage and social conditions of damaged areas

	(1000yen)							
0.86	2786	704	68920	0.07	13.0	52	6.6	2.9
0.51	2108	3160	22603	1.97	34.8	73	13.1	69.9
0.54	2218	20	3466	0.04	14.9	6	33.3	33.1
0.43	1982	1007	10846	1.37	42.3	18	5.4	54.9
0.75	2491	911	3719	1.25	14.4	27	27.0	16.6
0.74	2627	188	4693	0.30	17.5	6	30.0	27.2
0.8	2548	183	2301	0.41	13.5	29	47.5	18.2
0.45	2114	1045	10833	2.44	70.1	37	36.3	79.3
0.59	2153	257	3501	0.74	30.4	35	48.0	40.4
0.41	1964	670	3256	4.01	61.3	24	37.5	53.8
0.53	2068	2	1637	0.01	29.4	2	3.7	26.9
0.61	2371	66	1189	0.32	17.9	5	38.5	44.8
0.85	2820	49	637	0.14	5.6	1	2.2	1.6
1.41	2228	547	3276	5.44	–	3	4.6	80.1
0.31	1829	551	3299	3.16	59.5	10	6.1	80.1
0.28	1766	1549	3341	6.65	39.1	13	5.6	82.5
0.43	2023	337	3629	0.83	21.9	8	2.5	46.8
0.51	2409	883	3723	2.23	20.2	7	1.6	33.3
0.32	1737	800	3677	5.24	60.0	4	2.0	78.0
0.28	1698	600	3184	3.22	40.1	5	1.9	61.3
0.36	2297	420	4675	0.71	18.7	10	0.8	30.9
0.15	1645	7	197	0.06	–	1	0.1	10.5
0.14	1510	14	270	0.36	–	1	0.6	41.2
0.14	1816	0	0	0.00	–	1	1.4	36.1
0.18	1676	38	478	0.82	–	2	2.5	68.6
0.39	2140	2	274	0.01	1.7	4	0.6	19.4
0.23	1616	0	26	0.00	0.4	1	0.3	15.3
0.56	2721	454	1692	1.20	11.3	29	14.7	27.6
0.65	2612	640	5657	0.90	22.6	39	9.8	18.9
1.25	5641	2	–	0.04	–	2	3.5	25.6
1.12	4555	11	50	0.14	–	3	2.9	22.7
0.92	3939	19	–	0.12	–	1	1.5	8.8
1.5	4835	76	30	0.66	–	2	2.5	9.8
0.78	4608	30	63	0.43	–	3	5.9	18.4
0.47	2557	144	–	0.69	–	6	2.7	16.1
0.86	2845	108	548	1.31	–	11	23.9	56.8
0.7	2711	309	21044	0.09	14.2	15	1.2	9.5

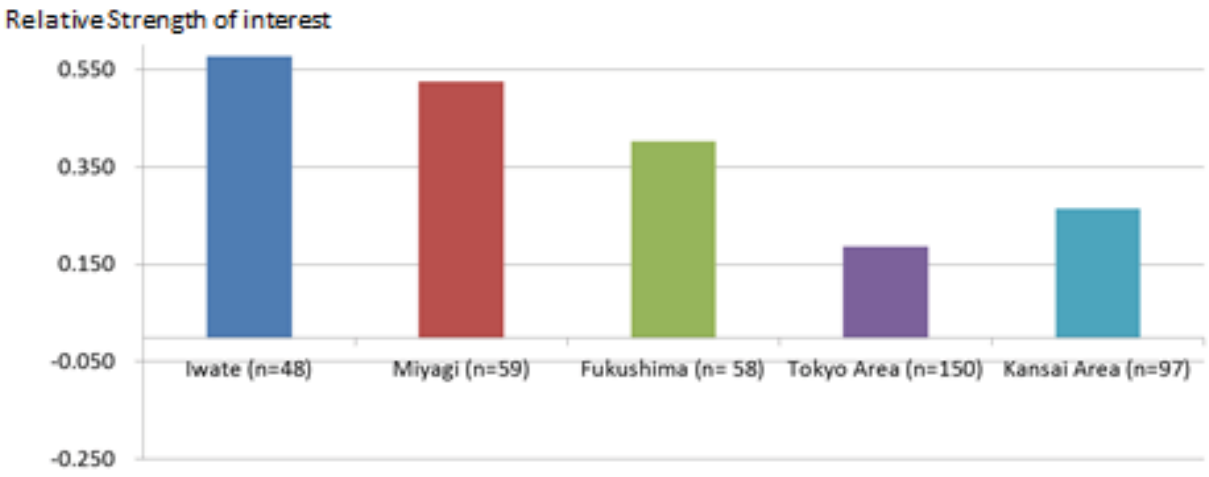
Table.2 Table of damage and social conditions of damaged areas



	Iwate	Miyagi	Fukushima	Tokyo area	Kansai area
Iwate			†	*	
Miyagi			†	*	
Fukushima					†
Tokyo area					*
Kansai area					

** < 0.01; * < 0.05; † < 0.10

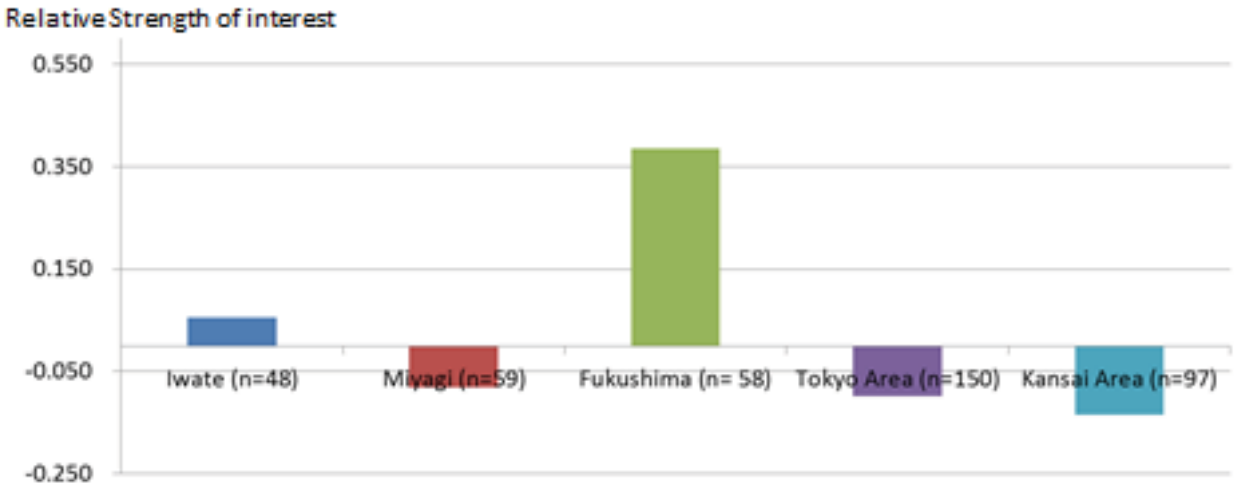
Fig.5: Monitor's interests in damages by earthquake & tsunami



	Iwate	Miyagi	Fukushima	Tokyo area	Kansai area
Iwate				**	**
Miyagi				**	*
Fukushima				†	
Tokyo area					
Kansai area					

** < 0.01; * < 0.05; † < 0.10

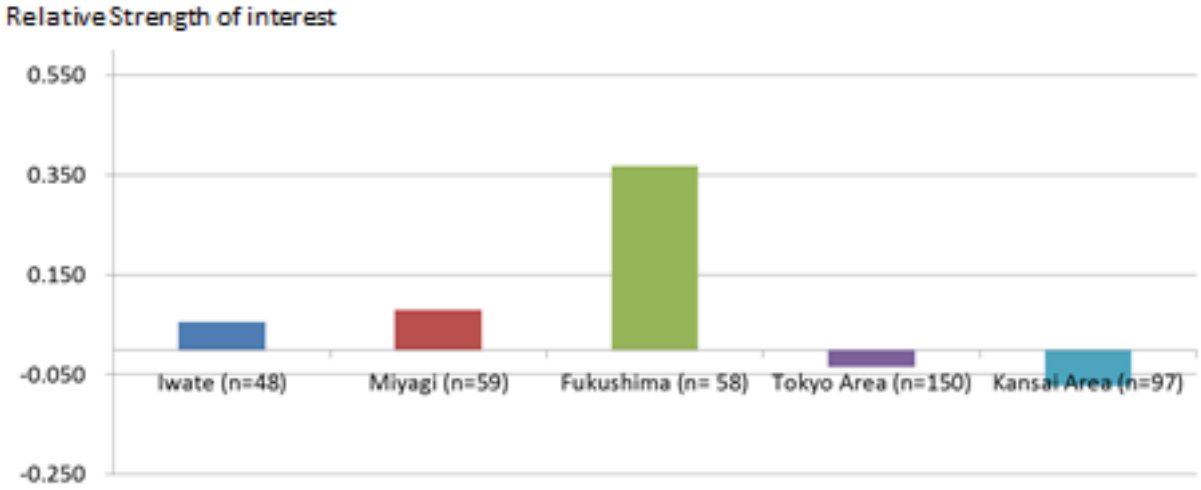
Fig.6: Monitor's interests in the recovery from earthquake & tsunami



	Iwate	Miyagi	Fukushima	Tokyo area	Kansai area
Iwate			**		*
Miyagi			**		
Fukushima				**	**
Tokyo area					
Kansai area					

** < 0.01; * < 0.05; † < 0.10

Fig.7: Monitor's interests in compensation of the NPP accident



	Iwate	Miyagi	Fukushima	Tokyo area	Kansai area
Iwate			*		
Miyagi			*		
Fukushima				**	**
Tokyo area					
Kansai area					

** < 0.01; * < 0.05; † <0.10

Fig.8: Monitor's interests in low/internal dose

Mar. 11	
PM 2:46	Ocurence of earthquake during the 6th class. Direction for students to take cover under a desk, and open doors of classroom. Waiting for calm down of quake.
PM 2:52	School announcement for evacuation toward the outside. Although all life-lines were destroyed by the strong earthquake, this annnouncement can be done with emergent battery. Confirmation of damage of buildings by teachers. Beginning to collect information through radio.
PM 3:00	Complete of students' evacuation to school yard. Snowing became heavier and heavier. It was difficult to identify coast line by snow.
PM 3:10	All staffs who checked school buildings came back to the office. A brief account about damage was reported. A siren from the community wireless system, something was spoken, but it was impossible to catch the contents (maybe "warning of huge tsunami"?).
PM 3:20	Residents near IHS startd evacuation toward the hill, following to the evacuation directive from the community wireless system.
PM 3:25	Direction for students who evacued school yard to back to second and third floor of the west-building. Direction for teachers to instruct students, confirm bumber of students, and handling class room.
PM 3:30	Tsunami strcuk Ishinomaki city and Higahi-Matsushima city.
PM 3:35	Confirmation of safety and evacuation of students.

PM 3:40	Confiration of conditions of going-home of students: parents come to pick students up directly at the school.
Time is unknown	Radio informed that 6m height tsunami struck Ayukawa area.
PM 4:05	Start of acceptance of evacuees to Judo-arena, training room, and alumni house. (Give-up of use of first gym as evacuation site because of risk of dropping)
PM 4:16	Radio informed that 10m hight tsunami struck Sendai New Port.
PM 5:00	Students, teachers, and staffs of Kadowaki elementary school was introduced to meeting room, dividing from other evacuees. Collecting space heaters for each evacuation room. Decision of arrangement of heaters. As the result, training room, the broadest space, used three heaters for the limitation of number of heater,
PM 9:00	Stand-up meeting with all teachers and staffs in the office. Confiration of conditions of going-home of students: parents come to pick students up directly at the school. Thus, as a general rule, students was kept inside IHS. Decision of sharing roles during the night: homeroom teachers response students, other teachers and staffs response evacuees. Making up the next meeting at the AM 6:00 at the office for talking about tasks and directions hereafter. Taking a rest by rotation.
PM 9:40	Complete of counting number of evacuees (total 1048 persons)
Mar. 12	
AM 6:00	Teachers and officers got together. Confirmation and decision of policies for actions hereafter and response to students.
AM 7:00	Meeting of teachers and staffs. Report of collected information by teachers.
AM 10:00	First food aid arrived and provided to evacuees and students (amount was a bit..). Carie and rice, Juice.
AM 12:00	Meeting of teachers and staffs. Report of collected information by teachers. All streets around hill where IHS placed were flooded and impassable.
PM 1:45	Request from orthopedics hospital which were damaged to accept patient with mild disease. Allowing of acceptance with condition that one nurse come together. A teacher carried the patient on his back in the sludge. Counseling room next to dispensary was used for the patient. As the result, this action became a triger to start the IHS medical office since the follwing day.
PM 2:45	Meeting with chiefs. For the increase of evacuees, movement of students to other rooms was conducted. Large lecture room of the first-floor was opened for evacuees.
PM 4:00	Meeting of teachers and staffs.
Before the sunset	An emergency medical helicopter landed on the school ground. One dialysis patient were lifted. Rapid increase of evacuees who told thier ill-health: hypothermia, hypoglycemia, need of nursing care, dementia, pregnant women, etc. The nursing teacher worked all day for those. Restless situation contined. Fires were not controled, fire spread in some places. In the midnight, staffs fed oils to heaters. The nursing teacher called for doctors at the hospitals next to IHS for the patient with sudden change of his/her condition.
Mar. 13	

AM 6:00	Meeting of teachers and staffs after the meeting with city officers.
AM 9:00	Meeting with teachers and staffs. Detailed reporting about streets from techers who went out to collect information. They confirmed whether each street were passable or not by walking actually. Decision of next directions according to those information. Allowing for students who lives in old city to go back thier home. Concerning other ares, if contact with parents were gained, it allowed to go back to home. Priority belonged to parent's thoughts. Concerning outside of the city, decision would be made according to investigations hereafter.
AM 10:15	Two secretary of the Ishinomaki-city education board came to IHS.
AM 12:00	Meeting of teachers and staffs
Afternoon	Medical doctors whose hospitals were destroyed by tsunami assembled. They started "IHS medical center", using half space of the counseling room next to the dispensary. Drugs and staffs were offered from devastated pharmacy. Since 14th Mar, continual offeres of drugs were acheived by the Pharmacists Association as the help. This "IHS medical center" contined by the 4th May. (Mr. Suto spoke that he was very encouraged by what medical experts stayed inside the school, as a charge of the evacuation site.)
PM 4:00	Meeting of teachers and staffs
PM 5:00	The chief clerk who went back to his house reported the latest situation to the education devision office by phone communication from the office of joint building of the Osaki city.
PM 7:00	Meeting of chiefs. Number of evacuees reached over 1500.

Table.3: Time-series table of IHS for three days after the 3.11.

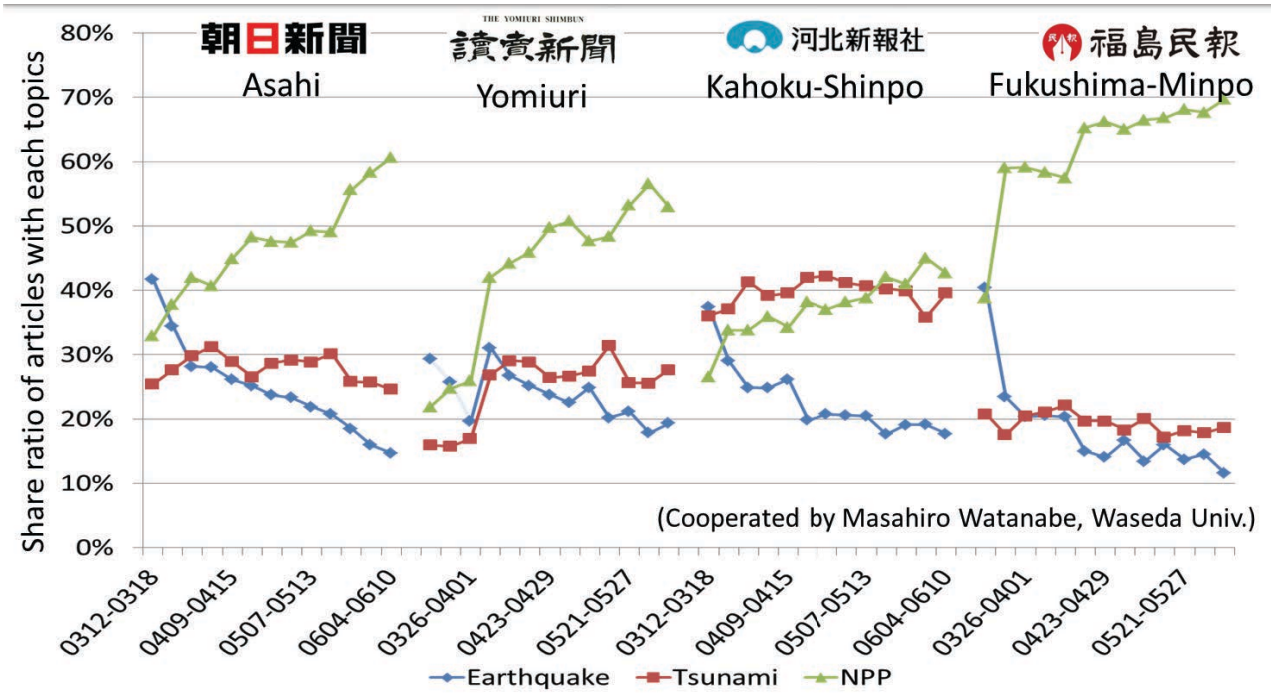


Fig.9: Comparison between national and local newspaper: time-lined change of appearance ratio of keywords during first 3 months

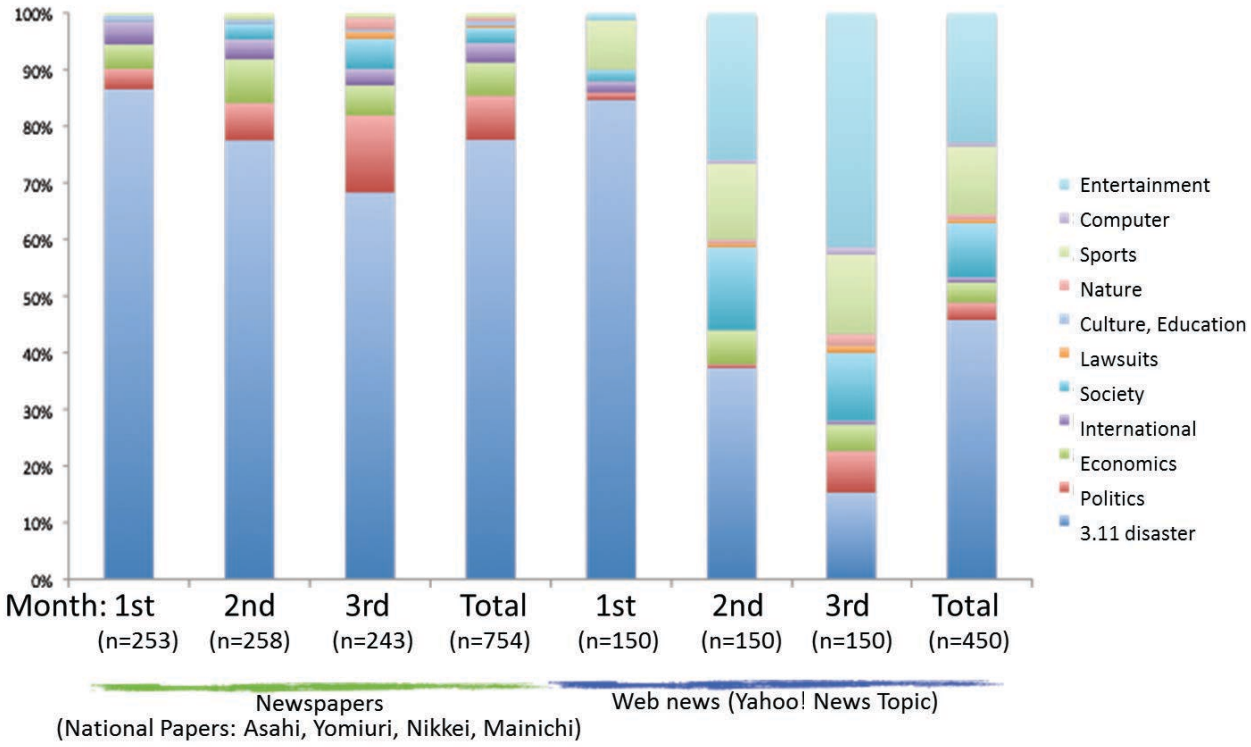
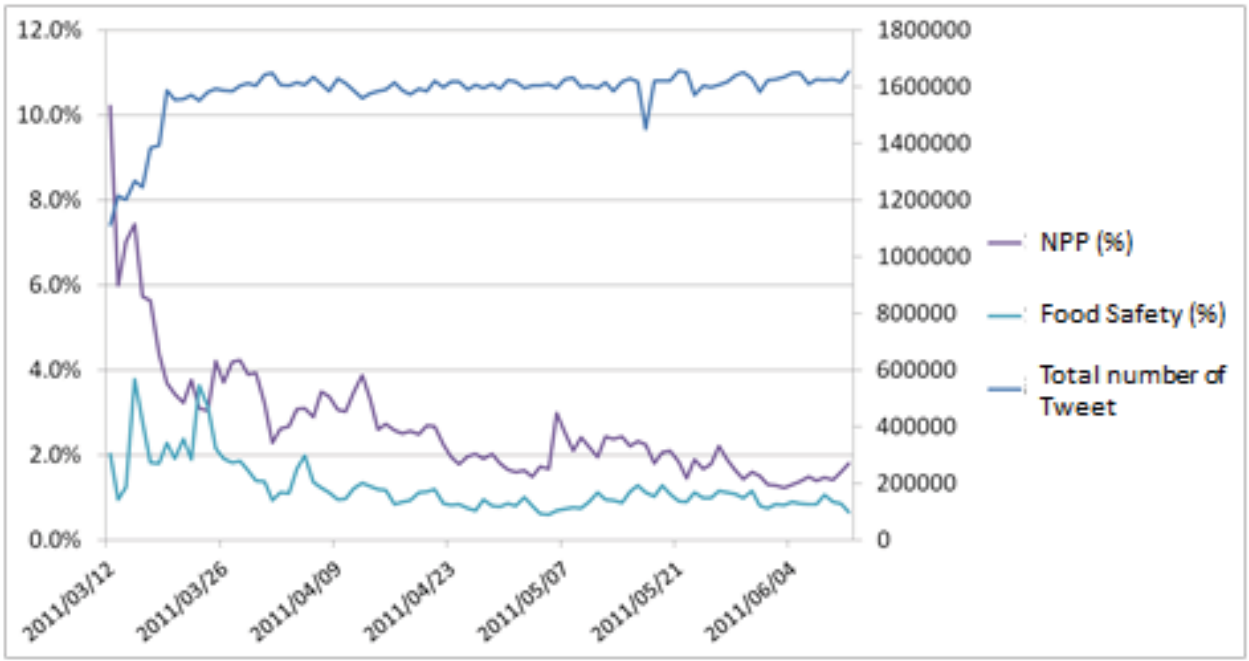


Fig.10: Comparison between medias: time-lined change of appearance ratio of topics during first 3 months



※Cooperated by Dr. Eiji Aramaki & Dr. Mai Miyabe, the University of Tokyo
Approximately 1.4 billion tweets from 3.11 to 6.11 (equivalent to 20% of the total) were analyzed.

Fig.11: Time-lined change of appearance ratio of tweets on NPP accident in Twitter

Approaching STS-disaster research from a history of knowledge perspective: possible contributions to a collaborative research network

Cécile Stephanie Stehrenberger, University of Zurich (Switzerland)

What can a historical perspective contribute to STS-disaster research?
I'd like to suggest that the historian's job is first and foremost – as Paul Veyne has put it – to "wonder" about whatever seems self-evident. Her or his role is to destabilize (social) structures, practices and truths by pointing out that they were not always there, and by tracing their genealogy in a way that allows for radically questioning their legitimacy and thus opening them up for change.
A historical perspective can make a contribution to STS-disaster research by exposing the historicity of how disasters are produced, perceived and dealt with. In particular, it offers insight into how scientists, technicians and engineers generated, circulated and contested disaster knowledge in the past and therefore helps to understand current practices more clearly.
What a historical approach to STS-disaster studies also can do, however, is to analyze the ways in which anthropologists, historians, and other STS-disaster scholars have turned disasters into their research object. In other words, it allows us to study the history of our own field, and thus to question our own research questions, methods and general assumptions by pointing out their multiple origins in specific historical constellations.
Let me propose four foci of a history of knowledge perspective that could potentially be applied in such a study:
1. A history of knowledge perspective is interested in situating knowledge production within broader historical contexts – broader 'scientific', but also social, political and cultural contexts. 2. Among its principal research objects are the very processes, battles, and contingencies, along which research goals were negotiated and forms of knowledge either became truth or failed to do so. 3. When studying the production and circulation of knowledge, it analyses not only discourses but also practices. 4. Most importantly: it is interested in relations of power, domination, and inequality – e.g. those distributed along such categories as ethnicity, class, gender and able-bodiedness. It reveals how these relations were constitutive in defining research goals, methods and findings. Moreover it demonstrates how knowledge production either proved stabilizing to power relations, e.g. by naturalizing such categories, or how--on the contrary--it was disruptive or even subversive.

The decades after World War II were decisive in the development of certain paradigms, within the human sciences, which are still of great importance to STS-disaster scholars today. One of these paradigms was the ideal of multidisciplinary research, whose benefits and limitations need to be carefully evaluated in the new social and political context within which we strive to use it today. Disaster research has one of its most important origins in the broader context of the Cold War, whose intellectual inheritance in our research needs to be acknowledged. One of disaster research's most important research goals during the second half of the twentieth century was to produce knowledge of immediate usefulness in governing populations. We should keep this in mind when reflecting our current day knowledge production practices, as well as the fact that already the 1950s and 60s social science disaster researchers shared information and set their research agendas not only behind their desks but also during conferences and at informal reunions over dinner. It is crucial to meditate on the past and present accessibility of such loci of doing science for such groups as non-western or non-heterosexual researchers, or for researchers with disabilities. One of the most disruptive traits of early sociological and anthropological disaster research is to have begun to point out ways in which disasters affected--and were affected by--categories like gender and ethnicity, and to have addressed the fact that these categories influenced the research itself. I propose that current disaster studies scholars follow their example of self-reflection. Doing so implies careful study of the limitations of their critique, its effects, and its underlying reasons/structures, and interrogation of the ways in which they might be connected to possible blind spots within our own research. Among other things, this should lead us to question how we, as scholars, are produced by and reproduce global and local power relations and inequalities.

A historical perspective in general, and more specifically a history of knowledge perspective, may thus contribute to a interdisciplinary network of STS-disaster studies by inviting an exercise in radical 'wondering' about what now seems self-evident: not only in terms of the disasters we study, but also in regard to why, how, and with what effect we do so.

Concept essay | DisasterSTS Workshop | Drexel University, April 30, 2014

Towards a material-oriented approach to politics and disasters

Manuel Tironi, PUC | CIGIDEN | Goldsmiths

Introduction

At a time when disasters – natural, technological, slow and eventful alike – are everywhere, it seems to me that a fundamental question is how to approach the relation between politics and disasters from a more material-oriented sensibility. This sensibility is related to the way we understand the materiality of politics, but also to how we include rocks, water bodies, winds and chemicals into the public sphere. I believe that such sensibility can give us (a) a better depiction of what type of political challenges emerge in situations of radical uncertainty, and (b) a more sophisticated toolbox to face the policy and theoretical challenges arising from disasters in the perspective of the Anthropocene: in times when politics and geology cannot be easily separated, we need theories and methodologies recognizing the incommensurability and recalcitrance of natural forces.

Politics and disasters

Considerable ink as been spilled on the mutual effects between disasters and politics. Crudely, six ways of thinking the disaster ↔ politics relation could be identified. First, we know that politics manipulates disasters: the latter are often tapped as opportunities to be capitalized by states to either (or both) unfold aggressive neoliberal adjustments (Klein, Rozario) and/or to enact states of emergency in which citizen entitlements are delimited in the name of stateness and sovereignty (Agamben, Tilly). It is also usually the case that politics ends up absorbing disasters (or politics as usual): on the one hand, disasters are usually caused by 'normal' ways of doing things (Perrow); on the other, in spite of their breaching capacity, catastrophes become a way of preserving this normality and reinforcing hegemonic politics (Kreps, Rajan). Third, politics mediates the meaning of disasters. Disasters and risks are cultural products (Douglas). And the mass media – with its political agendas – shapes the way they are perceived and acted upon (Stallings). On the other hand, disasters create political conflicts: they reveal the precarious architecture of political stability, uncovering institutional dysfunctions, governmental weaknesses and representational unbalances (Davies, Erikson). Disasters also unleash latent conflicts. Structural problems that are often marginalized from the public sphere – socioeconomic inequalities, ethnic conflicts, citizen unbalances – are brought to the fore by disasters (Oliver-Smith). Finally, disasters have also the capacity to create new political conflicts, often not related to the disaster itself (Petryna).

A material-oriented approach to politics and disasters

These approaches have been (and are) highly productive. But they mobilize an idea of both disasters and politics that neglects their material conditions and affordances. Politics – and democracy – often appears as a discursive practice, and what is relevant from disasters are commonly their effects on different social systems, but not their sheer thingness – a theme that has been relegated to the natural sciences. STS and speculative-realist philosophies have been key unsettling these assumptions: STS by challenging the nature of politics and speculative realism by questioning the ontology of objects and materials. First, STS scholars have claimed that political actors are not always

humans and that entities such as oil (Barry), mosquitos (Mitchell) and bacteria (Latour) should be granted with full political entitlements. Second, we know from STS and post-Foucauldian students that politics is done materially: 'Whether in the public demonstrations of scientific experts at public inquiries, or the televisual form of the studio debate or the investigative documentary, or the "virtual architecture" of discussion groups on the Internet, there is always a technology to the public sphere' (Barry 2002, 9-10). Third, STS scholars have insisted that these technical apparatuses, devices and architectures do not limit themselves at containing politics; they perform it as well (Braun and Schultz 2010, Lezaun and Soneryd 2007, Marres 2012).

Finally, speculative realism-inspired scholars have stressed that objects and natural entities are forces in spite of ourselves. I believe this is crucial to any attempt at materializing the disaster ↔ politics relation: tsunamis, earthquakes or stellar storms are recalcitrant, incommensurable and independent (Clark 2011). In fact, we will never get to fully know them: their ontology lays outside our institutions and cultures. The claim is not that there are objective elements that we can positively know and therefore act upon them. It is rather that objects are autonomous from our human will, action and understanding – and that therefore the full reality of these objects is always hidden from us (Bryant 2011; Harman 2012). This incommensurability is enhanced by the fact that, in the case of disasters, we are confronted to forces that do not respect our operational reach, temporal scales and material capacities (Morton 2013).

Conclusions: experimental politics

An important shift occurs when the role of things, technologies, meteorological forces, minerals and chemicals in the constitution of politics and disasters is acknowledged – a shift, I claim, towards experimental politics. Here 'experimental' has two meanings. First, experimentality as a practice of exploratory tinkering: a careful inquiry in which what we are looking for is to be defined by the inquiry itself. When the Earth moves or the oceans overflow, when nature demonstrates its recalcitrant energy, both politics and disasters become entities 'to think with' (Stengers 2005) – rather than defined phenomena ready to be intervened upon. Second, experiments as settings in which things are provoked into being: when incommensurable forces disrupt human life and therefore ontological securities are dissolved, politics is involved in the material production of actors, communities, values and citizenships – rather than simply facilitating spaces of debate and governance.

From this perspective, the study of disasters expands way beyond the limits of 'disaster studies', shedding light on key sociological, anthropological and historic discussions. A closer look at the experimental politics sparked by disasters allows an understanding of the nature-society entanglement in which nature is not just recognized but also granted with full existential powers. It also allows the recognition of the active capacity of materials in the production of political agents and structures. This should, in turn, inform the design of pre- and post-disaster policies more attentive to the inventive and heterarchic nature of both politics and catastrophes.

David vs. Goliath:
Making Structural Engineers Assume Responsibility for Fire Safety

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Discussion Paper

Every form of construction requires the involvement of structural engineering, the more complex the building the more difficult is to use predefined solutions and therefore the involvement of a structural engineer becomes more explicit. Practicing structural engineers can be counted in the millions, they are educated in every leading University in the world and they operate under strict professional frameworks. Therefore the value given to competence is very high. Historically, structural engineers have been considered the brain surgeons of engineering and history is filled with mythical figures like Felix Candela, Ove Arup and Falzur Khan. Only Architecture can be paralleled to structural engineering when discussing achievements in the built environment, but while Architecture rewards uncompromised aesthetics structural engineering rewards technical achievement. Structural Engineering is a true professional Goliath.

In a similar manner, every form of construction requires the involvement of Fire Safety Engineering, the more complex the building the more difficult is to use predefined solutions and therefore the involvement of a fire safety engineer becomes more explicit. Nevertheless, fire safety engineering does not operate in a professional framework and while there are professional organizations, they cannot exercise the professional right to monopoly. Anyone can be a fire safety engineer therefore the value of competence is not clear. Universities do not see the need to educate professionals in this discipline resulting in less than half a dozen Universities worldwide delivering recognized degrees in this field. Needless to say, none will appear in any ranking in the top 20. Therefore, it can be said that there are very few fire safety engineers operating in the field and in most cases they are self-anointed. The heroes of fire safety are the fire fighters, who are recognized not for their technical competence but for their capacity to sacrifice for the wellbeing of others. The respect we have for firefighting makes us believe in them as the competent authority. Fire Safety Engineers are therefore the bottom feeders among the engineering disciplines. Fire Safety Engineering is a true professional David.

Since the industrial revolution structural engineers have designed and build infrastructure by using scientifically based tools. These tools have evolved in time acquiring greater precision and robustness allowing structural engineers to move away from large factors of safety and towards optimization. Buildings are becoming leaner every day but structural engineering has managed to evolve in a manner consistent with the challenge.
Structural engineers will take every form of load under consideration (wind, snow, weight, live, earthquakes, etc.) when designing a building with the exception of fire. Fire loads are treated differently by relying on thermal barriers that are intended to prevent heat to reach the structure. Thus, when designing, the structural engineer will assume the structure will

remain cold. Why structural engineering does not include fire loads is not clear, nevertheless it is somehow linked to the fact that the integral problem is of great complexity, that the outcome of a solution is not verified (unless there is a fire) and that historically both disciplines were born at the same time. Since 1906, with the creation of the "standard fire" the separation of the two disciplines was legislated and the bridging between structures and fire was attributed to a "standard test." The implementation of "fire resistance" of structures fell in the hands of the architect and the structural engineer was released from any responsibility concerning life safety in the event of a fire. The thermal barrier provided sufficient delay to the heating, to argue that everyone will be evacuated before the structure begun its heating. Indeed, form many buildings this is the case. Low rise housing, shopping centres, industrial premises, etc. can all be evacuated in a few minutes while heating of a structure occurs in the time scale of an hour. Thus, David had never met Goliath.

Modern architecture and optimization of structural systems are decreasing the time that is required for the heat to have a negative effect in a structure. Building size, height and complexity are increasing resulting in longer times required for evacuation. Therefore, egress times are beginning to approach structural failure times. When this happens, structural performance in fire becomes relevant to life safety and quantitative performance becomes necessary.

Architects can formulate prescriptive egress strategies and maybe with some specialized training be able to quantify egress times, nevertheless, quantitative evaluation of fire growth and structural performance are not among the skills of an architect. Quantitative evaluation of the evolution of a fire and the thermal load imposed on the structure are within the realm of the fire safety engineer, while performance assessment of the structure is within the remit of the structural engineer. So David finally meets Goliath.
Research in structural behaviour in fire conducted in the last two decades has clearly demonstrated that designing structures to effectively perform in fire requires a dramatic shift in design philosophy. Furthermore, it requires the integration of fire dynamics with structural behaviour. Without understanding fire behaviour it is impossible to optimize building design because building design influences fire behaviour and fire behaviour influences building performance. Therefore, fire safety expertise needs to penetrate structural engineering.

Even at the highest level of structural engineering research, the structural engineering community studies the behaviour of structures at pre-defined temperatures but never couples fires with structures. The structural engineering community deems this unnecessary. Furthermore, when applying this knowledge to design, the approval's process still directs the designer towards the use of the "standard fire" or other equivalent formulations. By nature, this process decouples the structure from the fire.
Despite many efforts of a few, David has still not found the means to make Goliath notice that he can help him do a more effective, but most importantly, safer job. Is it going to be necessary for David to find the means to throw the rock that brings Goliath down? The sad part of this story is associated to the unnecessary cost that both the rock and Goliath will have to society.