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Responding to Disasters: Diversity of Bureaucrats, Technocrats and Local People.

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The relations between disaster experts, governments, and local people have often been considered problematic in disaster situations. The idea that disasters caused by natural hazards are the ultimate terrain of experts and managers has been discredited by approaches focusing on the capacities and coping practices of local people, while the role of governments in the interplay between experts and local people is often left unclear. This paper reviews some recent insights into the complexity of these relations by introducing the notion of social domains of disaster responses. Social domains are areas of social life where ideas and practices concerning risk and disaster are exchanged, shared and more or less organized because of a certain proximity, physically or discursively, in the ways references are made to disaster and risk. The study of social domains allows one to focus on the everyday practices and movements of actors negotiating the conditions and effects of vulnerability and disaster. The paper first discusses how experts and local people are represented in different subsequent paradigms of disaster studies; elaborates on the importance of social domains for studying disaster response; after which the three domains of disaster science, governance and local people will be discussed.

Disaster paradigms

Disaster studies are often presented as constituting two competing paradigms: the behavioral and the structural paradigms (Smith 1999;

Oliver-Smith 1996). Heralded by the work of Gilbert White, the first came to dominate disaster studies in the 1950s. It coupled a hazard-centered interest in the geo-physical processes underlying disaster with the conviction that people had to be taught to anticipate disaster. It is a technocratic paradigm dominated by geologists, seismologists, meteorologists and other scientists who can monitor and predict the hazards, while social scientists are brought in to explain people's behavior in response to risk and disaster and develop early warning mechanisms and disaster preparedness schemes (Oliver-Smith, 1996).

Towards the 1980s, anthropologists, sociologists and geographers increasingly began to challenge the technocratic, hazard-centred approach to disaster. This culminated in the 1983 landmark publication of "Interpretations of Calamity from the Viewpoint of Human Ecology" by Kenneth Hewitt. He postulated that disasters were not primarily the outcome of geographical processes. Especially in developing countries, structural factors such as increasing poverty and related social processes accounted for people and societies' vulnerability to disaster. The introduction of social vulnerability touched at the heart of understanding disaster. Whereas disasters used to be practically equated to natural hazards, they now became understood as the interaction between hazard and vulnerability, graphically expressed by Blaikie et al (1994) in the pseudo-formula of Risk = Hazard + Vulnerability. The solution proposed in this paradigm would be the transformation of social and political structures that breed poverty and the social dynamics that serve to perpetuate it, while local people are accorded central importance as carriers of local knowledge and representing the beneficiaries of disaster mitigation and preparedness programs.

Upon scrutiny, this familiar distinction of paradigms is becoming outdated. Although both paradigms continue to be used, increased attention to environmental processes and human-induced climate change has marked the advent of another disaster studies paradigm in the 1990s. This paradigm emphasises the mutuality of hazard and vulnerability to disaster due to complex interactions between nature and society. The mutuality or complexity paradigm takes the structural analysis of disaster a step further. While structural theory mainly looked at society to explain people's vulnerability to disaster, the mutuality paradigm looks at the mutual constitution of society and environment. People, in this view, are not just vulnerable to hazards, but hazards are increasingly the result of human activity. This is particularly clear in the cases of the meteorological and hydrological processes producing high winds and floods. These hazards have become more frequent and more devastat-

ing due to environmental degradation and under the influence of human-induced climate change. This has the important implication that vulnerability might not just be understood as how people are susceptible to hazards, but can also be considered as a measure of how well the environment fares around society (Oliver-Smith 1999a, p. 31).

The mutuality idea is a new paradigm and not just an elaboration of structuralism, because it rests (explicitly or implicitly) on different notions of causal effects, social change and possible responses to disaster vulnerability. The structural paradigm is based on the idea that causes of disaster vulnerability can be deduced from a limited number of root causes. In order to overcome disaster vulnerability, these root causes must be addressed. Even though there are many practical and political obstacles, at least there is a clear political agenda for the required radical changes. The mutuality idea on the other hand has much more affinity with complexity theories. These theories are characterised by the complexity of interactions between society and nature, the unpredictability of causal chains and social change. They are far less clear about the required policies to overcome vulnerability (Green and Warner 1999).

Complex thinking can, I believe, have a major impact on the study of disasters caused by natural hazards. In the first place, the approaches enable the study of environmental and societal impact on disasters in a symmetrical fashion. Disaster could be portrayed as resulting from interactions between subsystems in the geo-physical and climatological environment on the one hand and subsystems of society, such as science systems and local knowledge systems, on the other. In the second place, complexity approaches remind us of the profound impact of disaster risks on society and environmental relations. All too often, disasters are still considered aberrations from the normal situation, or a temporary interruption of development. A major disaster like the 2000 floods in Mozambique are invariably followed by statements of politicians and experts outbidding each other on television with estimates of the number of years the country was "set back" in development. These comments disregard that disasters may result from, rather than impinge upon, development (Oliver Smith 1999b, Comfort et al 1999). They also fall back on a notion of linear development as the norm of temporal change, disregarding the multi-directional ways in which societies evolve. Hence, complexity can provide an alternative for erroneously putting disasters in a linear timeframe of development.

Acknowledging complexity in disasters also implies that the relation between different categories of actors and knowledge has to be

revisited, which is the focus of this paper. It introduces the concept of social domains of disaster response accommodating complexity while taking into account diversity and human agency in responding to risk and disaster. Although the notion of social domains implies a shared repertoire of practices and languages, it is emphasized that contradictions, conflict and negotiation take place within the domain as much as in interactions with other domains. Although a focus on social domains makes the analysis of disaster response increasingly complex, I hope to make clear that this can lead to a number of practical considerations for dealing with vulnerability and disaster.

Social domains of disaster response

Proponents of mutuality or complexity thinking often represent the relation between nature and society as one between systems and sub-systems. However, as I will argue in this paper, the notion of systems or sub-systems does no justice to the dynamics of societies' disaster response. The very idea of a system presupposes that the elements of the system relate in functional and predictable ways. This runs against the notions of agency and diversity. People are social actors that do not merely react to what happens around them, they have the capacity to process social experience and respond accordingly (Long 1992). Because people and institutions, acting from diverse histories and life worlds, have different interpretations of situations and events, they develop differential responses to similar conditions and processes thereby changing the meaning of institutions and the course of events in unpredictable and multi-directional ways. This property of especially human systems has to some extent been acknowledged in systems theories and has resulted in qualifications like open, adaptive or soft systems.

However, the more open systems remain problematic because of the implicit assumption that elements or people belong to one particular (sub) system. This overlooks that actors may belong to different systems at the same time, and relate with each other in different capacities, and that they have the ability to integrate and rework knowledge derived from different systems. As a result, even the softest system thinkers risk overestimating the commonalities within systems and underestimating the differences between them. The difference this can make to our understanding of disaster is so substantial, that I rather avoid the concept of systems altogether. Instead, I prefer to work with the notion of social domains.

Social domains can be defined as areas of social life that are organized by reference to a series of interlocking practices and values (Villarreal 1994, 58-63). Social domains of response to risk and disaster are areas of social life where ideas and practices concerning risk and disaster are exchanged, shared and more or less organized because of a certain proximity, physically or discursively, in the ways references are made to disaster and risk. The concept of social domains explicitly departs from the idea that they would be composed of functionally related elements. Although domains imply a shared repertoire of practices and languages, it is emphasized that contradictions, conflict and negotiation take place within the domain as much as in interactions with other domains. Differential interpretations are often concealed because people use the same language. "Domains represent for people some shared values that absolve them from the need to explain themselves to each other—[but] leaves them free to attach their own meanings to them." (Cohen 1985, p. 16).

Working with the concept of social domains, rather than systems, may redirect our gaze and lead to a different way of analyzing disaster. It can make the analysis more sensitive to social change within domains. Domains are not just changing in response to interaction with, or penetration of, other systems. Due to ongoing negotiations over the meanings of, and responses to, everything happening within and around these domains, they are subject to social change from within. It will also tune the analysis better to the fluidity of domain boundaries. Although a notion like open systems takes into account the softness of the boundaries of systems, the concept of social domains gives more central attention to the travelling of people, resources and ideas between domains.

The three main domains of response to risk and disaster are the domain of science and disaster management; the domain of disaster governance; and the domain of local responses. They are the respective domains of scientists and managers; bureaucrats and politicians; and local producers and vulnerable people. As will be elaborated, each of these domains of knowledge and action represent notions and relations of nature-society interaction, vulnerability, risk, and disaster response. They are associated with particular discourses through which meaning is given to phenomena. They are, for instance, characterised by different ways of experiencing and producing nature (Escobar 1999, p. 5). On closer scrutiny, however, these domains turn out to be differentiated and constituting multiple realities. At the same time, there are more common aspects in different domains than are apparent at first sight. As will be elaborated, this property of domains leads to more

complexity, but may also hold the key to developing alternative ways of policing about disaster.

The Domain of International Science and Disaster Management

The domain of disaster science and management is dominated by a hazard-centered paradigm. This paradigm is embedded in a general discourse of capitalist modernity where nature and society are seen as separated, and nature is considered a commodity that can be appropriated and controlled through expert knowledge and modern administration (Escobar 1999). Disasters seem to pose a challenge to this paradigm since they are constituted of moments where nature clearly escapes human control. Disaster management, however, can bring hazards as much as possible under control. Because disasters mainly happen in developing countries, moreover, Greg Bankoff (2002) stipulates that disasters actually reinforce the dominant paradigm. Disasters are mainly considered phenomena of tropical areas whose insufficiently modernized relationships with nature make their populations vulnerable as a matter of course. Western technology, then, provides the remedy to this vulnerability to the whims of uncontrolled nature.

The modernity discourse can clearly be recognized in the central assumptions, notions and priorities of hazard-centered disaster science and management. Keith Smith (1999) summarizes these as predominantly interested in the geo-physical processes underlying disaster, geared to developing technology for monitoring and predicting these processes, and preferring to contain nature through engineering works such as flood embankments or avalanche sheds. This scientific approach is coupled to modern forms of governing disaster through disaster plans and emergency responses according to a military style organization, often in fact delegated to armed forces (Hewitt 1983). It is modern organizing to the extreme, based on notions of intervention as linear processes, where empirical complexity is divided into a series of independently given realities (Long and van der Ploeg 1989, p. 229).

Although this paradigm may dominate the field of disaster science and management, it forms by no means a hegemonic claim conditioning scientists and disaster managers into predictable and uniform actors. The paradigm is contested by rival approaches, in particular the structural approach as was discussed in the introduction to this paper. This rival approach is invariably presented as critique from the margin, but has in fact made considerable dent. In the case of flood management, for instance, Smith and Ward (1998) consider that a structural devel-

opment paradigm where floods in developing countries are considered as being rooted in civil war, foreign debt, uncontrolled urbanisation and poor building construction, has largely overtaken earlier paradigms in the 1970s and continues to dominate flood theories and practice, where the emphasis has become increasingly on sustainable solutions rather than expensive constructions.

Further differentiation in paradigms would be found when moving into the specific approaches of the numerous disciplines concerned with disaster, estimated to be at least 30 (Alexander 1997). The question is whether these differences are more than variations within the discourse of modern capitalism, since they all continue to rely on expert knowledge and modern interventions. But the extent differs. The development paradigm has brought with it a call for participation, and the reliance on local knowledge, which represents a move away from the so-called dominant paradigm. Likewise, the Netherlands has recently embraced a new paradigm wherein the reliance on dikes is abandoned in favour of a policy to give water space and have water dictate landscape planning rather than the other way around. This is a significant step for a water engineering country *par excellence* towards a more holistic approach to nature normally considered exclusive to people in the South (Rijkswaterstaat 2002).

Portraying the Western hazard paradigm as hegemonic not only dismisses rival, parallel or previous discourses and paradigms, it also ascribes too much consistency and homogeneity to the paradigm. Natural science is in many respects as local, parochial and cultural as folk or local knowledge. Numerous definitions compete over the meaning of concepts like risk, disaster, hazard, vulnerability and mitigation, and work often rests on scientifically ungrounded assumptions. Bruno Latour (1987) showed how making science is a social endeavour where enrolling people into accepting certain truths depends more on the social relations and status of institutions than on the use of scientific methods. Hence, social networks, political rivalry, career considerations and personal characteristics like age and social background may better account for ongoing paradigm schisms than the value of the arguments raised. In other words, we should not derive from the forceful way in which the idea of Western rationality is advocated (or attacked), the expectation that organizations in "the West" (whatever that may be) actually operate according to this image (Herzfeld 1992, p. 47).

These considerations are more than cracks in a hegemonic scientific bastion. They mean that the analysis of empirical situations requires more than a "dominant science versus local perspectives" binary. Rather

than representing some exceptions to a solid rule, they imply that we have to revise our explanatory framework for understanding disaster intervention. Instead of assuming that the field is ruled by a uniform, hegemonic paradigm, we have to base our analysis on the notion of complexity and contradictions within the domain of disaster science and management. They mean that we have to study how actors in this domain make sense of risk, vulnerability and disaster through their everyday practices, how rival scientific narratives are being formulated and through what processes particular narratives gain the status of truth.

The Domain of Disaster Governance

The domain of disaster governance is the disaster response domain where society's priorities regarding risk and vulnerability are defined. It is the domain where disaster knowledge and management is mediated and altered through political and bureaucratic governance practices and institutions. In a broader sense, the domain of disaster governance is also the domain where it becomes apparent how disasters affect state-society relations and, vice versa, how state-society relations affect responses to risk and disaster.

The official policies of governance of disaster are often derived from the domain of disaster science and management, but in actual decisions and practices they take on a different nature. In developing countries, where disaster science and management is often imported, the question of how it works in practice and articulates with governance is especially relevant, but such gaps between science and governance occur to some extent in every situation. Politicians and civil servants weave their own narratives explaining the relations between hazards, vulnerability and disaster, picking bits and pieces from science as they deem fit according to their own beliefs. These reflect political interest and motivations, but are also informed by cultural patterns of governance, including the governance of risk. Mary Douglas and Aaron Wildavsky postulated in 1982 that societies selectively choose risks for attention and that this choice reflects beliefs about values, social institutions, nature and moral behavior. As Wildavsky remarked in 1991: "Every survey study of risk perception, including among risk professionals, concludes that knowledge of actual dangers makes no difference whatsoever." It is the "adversarial context" and not whether people are likely to be harmed that matters most.

Writing in the early 1980s, Douglas and Wildavsky thought it was possible to identify particular risk cultures for societies. More recent

work has left intact their basic notion of the socially constructed nature of risk, but started to point to the variability between and within domains of risk regulation. So, leaving aside the search for *the* risk culture of a society, these works have come to analyze how risk regulation is shaped in an amalgam of many possible dimensions (Hood et al 2000). A single government, for instance, can take different attitudes towards different hazards. The same country that would command forced evacuation for prospective victims of a volcano eruption, could be much easier and reactive to for instance the monitoring of brakes on cars even though traffic accidents may be a much larger killer than volcanoes. While some hazards are regulated by the specialized risk bureaucracies and militarily-structured operations, others are regulated by generalist agencies, left to local governments, to people to cope for themselves or dealt with by a multiplicity of agencies.

The complexity of risk and disaster governance becomes more pronounced when taking into account the international dimension of risk governance and when we consider the every day practices of disaster management. The international dimension is important because risks and disasters do not often respect national boundaries and need to be dealt with by international, regional or global bodies of regulation. The resulting governance patterns may be far from coherent. Everyday practices of disaster management may substantially diverge from official policy and reflect more historically grown patterns of bureaucrat-client relationships. For instance, after the floods in Mozambique students of disaster studies found that managers of relocation camps charged contributions from people to get access to the camps, thereby effectively excluding the vulnerable people the camp meant to shelter (Holla and Vonhof, 2001). These practices were probably the effect of years of post-war construction programs where low-income bureaucrats handled foreign funded projects and had grown accustomed to getting paid for services supposed to be given for free. Hence, risk cultures do not form an invisible infrastructure of risk regulation, but patterns of risk governance evolve in the everyday practices of risk and disaster management.

The domain of disaster governance is also important because it opens a venue to analyze the mutual impact of risk and disaster response and state-society relations. When disaster lures or strikes, social actors (local people, bureaucrats and scientist alike) grapple to understand the reality around them. Narratives that people create about risk, vulnerability and disasters are not just statements about nature but also statements about state-society relations. Often, disasters are seen as the implicit breach of a social contract where states should protect their citizens from vul-

nerability to disaster. True or false, the ideas people have of the state in relation to society shape their interpretations of, and responses to, disaster. In Turkey, for instance, the 1999 earthquake shook people's confidence in the state because it strongly brought out the fallacy of the dominant discourse promoted by the State that "father State would take care of everything" (Arkel 2000). Alternatively, vulnerability to disasters may be seen as the delayed outcome of colonial policies or international adjustment programmes. This underlay, for instance, Grace Machel's accusation after the Mozambique floods in 2000 on BBC World (BBC 2000) that international donors failed in their *duty* to deliver adequate humanitarian assistance. Vice versa, responses to risk and disaster also affect state-society relations. Where disaster is frequent, such as in the Philippines, disasters can be seen as one of the ordering elements that over centuries shape state-society relations and the differentiations within societies (Bankoff 1999). Single disaster events can accelerate, reverse or change the way state-society relations evolve. Disaster in Nicaragua hastened the downfall of Dictator Samosa, and the Armenia earthquake in 1988 accelerated Glasnost in the former Soviet Union (Benthall, 1993, p. 108-121). The direction of disaster impact is not always the same: disasters can enhance radical change or bureaucratic reform, bringing about the potential for change by exposing conditions that need alteration (Hoffman and Oliver-Smith 1999, p. 10). However, disasters also often reinforce existing power relations when resourceful people manage to profit from the potential for change over more vulnerable people or provide an opportunity for military factions to strengthen their grip on democratic institutions.

Shackley et al noted that complexity resides especially in the social relationships within and between institutions and agents (Shackley et al 1996, p. 201). The domain of disaster governance is clearly no exception to this rule. It is highly complex because in the interactions within governance institutions, and at the interfaces between these institutions and scientists and managers on the one hand, and vulnerable people on the other, disaster responses get shaped. The domain is particular to local histories, governance patterns and state-society relations and it is hardly possible to define its characteristics, actors and dimensions beyond meso-level analyses at country, region or river basin levels.

Domain of Local Knowledge and Coping Practices

The domain of local disaster response is constituted by the manifold ways in which local people cope with emergency, maximising their own

capacities, resources and social networks. People anticipate disaster and rely on themselves and their community neighbours for survival. It has been estimated that no more than 10% of survival in emergencies can be contributed to external sources of relief aid (Duffield, 1993, p.144). In recent decades several publications have pointed to the extensive knowledge of which people avail themselves to cope with crisis, such as ingenious practices by nomad peoples to regulate the size of herds to overcome periods of drought (Toulmin 1995) (see also Blaikie et al, 1994, pp. 64-9; Curtis, 1993, pp. 4-7; Frerks 2000).

Local knowledge domains are different from the other two because they are rarely self-referential. With the exception of some indigenous movement actors, people refer to their local knowledge as knowledge. It is rendered local because outsiders, in particular intervening experts, label this knowledge as local, a status that—no matter how admiring—is ascribed to them by people from a superior position of universal knowledge. The use of the notion is not homogeneous. Kees Jansen (1998) distinguishes three approaches to local knowledge in development practice that can be recognized as well in disaster management. The first is a utilitarian or instrumental approach that views local knowledge as a barrel of information that can be tapped for disaster management. The second stems from a critique of modernization and stresses the different character of local knowledge. It is assumed that local knowledge overcomes the separation of nature and culture and can thus inspire to "decolonize" our minds (Apffel-Marglin 1996, in Jansen 1998, p. 165; Fairhead 1993). The third approach to local knowledge also criticizes the modernist approach, but stresses local knowledge as a source of political-economic empowerment of local people. It points to the need for an alternative development agenda based on self-reliance, ecological soundness and popular empowerment. This approach can be recognised in structuralist approaches to disaster calling for participatory societal change to structurally address vulnerability.

The three lines of thinking share the same assumptions that there exists a growing body of homogeneous local knowledge that is community-owned and can be separated from extra-community kinds of knowledge. These assumptions are problematic. Firstly, local knowledge cannot be represented as an accumulating and homogeneous community stock. It is often not shared in the sense that everybody possesses the same knowledge, it could even be said that the only one knowing all is the outsider collecting the knowledge taxonomy. In addition, people in communities do not need to have the same ideas about nature, vulnerability and disaster. In the smallest communities alterna-

tive discourses prevail around the same concepts, such as for instance development (Hilhorst 2001). These discourses are partly distributed along gender or other locally relevant categories of people, but people also adhere to conflicting discourses simultaneously and use them according to the contingency of the situation. Hence, the same people may hold on to holistic notions about society-nature relations and to notions that nature can be used and destroyed (Bruun and Kalland, 1995).

Secondly, local knowledge does not emerge in isolation. It gets shaped at interfaces with other domains of knowledge, such as scientific or bureaucratic knowledge (Arce and Long, 1992). Local knowledge is constituted of a blend of bits and pieces of information and insights from different pedigrees. Local producers may thus anticipate extreme weather by reading signs from animal behavior, but may just as likely have heard the forecast on the radio. Following Arce and Long, "rather than premise one's view of knowledge on a binary opposition between Western and non-Western epistemologies and practice, one should attempt to deal with the intricate interplay and joint appropriation and transformation of different bodies of knowledge" (2000, p. 24). This conclusion brings us back to the question how people in situations of complexity make sense of knowledge and select what is relevant to them.

It brings me to a third point, regarding the way local knowledge is produced. Using the category of local knowledge implies that it stands apart from non-local or modern and universal knowledge. It would stem from a different mode of thinking: where science seeks (causal) relations, local people would be holistic. However, just as science typically does not obey its ideal norms, local knowledge may likewise be more varied in nature. Agricultural producers do experiment and try to combine information in ways that are often highly rational. Paul Richards (1989) speaks in this respect of "people's science" and points to the capacity for people to improvise. Experimenting and improvising are usually social activities, fed by things heard on the radio or in a shop and discussed with neighbours. This means that knowledge gets constructed in social processes, including the role of social networks and power relations (Long and Villarreal, 1993). In these processes some people become much better positioned to obtain knowledge and make their interpretations of events and processes authoritative in the community (Hilhorst 2001).

Like the other two domains, then, the domain of local knowledge is also diverse and conflictive. As a consequence, what local knowledge constitutes can only be gathered in community studies that

acknowledge the heterogeneity and power differentials in communities and step away from viewing communities as isolated units. Local knowledge is not a stock of knowledge but constantly evolves through the social negotiations, accommodations, exchanges and power struggles of local actors.

Domains and People

The interpenetration and internal diversity of domains of knowledge and action becomes evident when we take into account the multiple identities and movements of people. Domains overlap partly because of the simple reason that some people belong to more than one domain or because they travel between domains. Scientists and bureaucrats are also community members. Even in the most remote communities one might find a retired meteorologist, repatriated migrants with some particular expertise, people with social networks able to mobilise high level government officials or international knowledge centres. Two categories of people and institutions are particularly apt to surf along the different domains: NGOs and the media.

NGOs are often lumped together as one category sharing the same characteristics, value orientation and interests. In reality this is not the case: NGOs are highly diverse in all kinds of features. Some combine different approaches whereas others would fit into one of the aforementioned domains. For instance, the Turkish NGO Arama Kurtama Dernegi (AKUT, Search and Rescue Team) grew from the volunteer rescue work of amateur mountaineers during the 1999 earthquake. The NGO has ever since been active during earthquakes in the world, offering their rescue expertise (Arkel, 2000). Another disaster-oriented NGO is the Philippine Citizen's Disaster Preparedness Center (CDPC). This NGO adopts a participatory approach to identify with community folks the hazards and vulnerabilities they are exposed to in order to work out community preparedness plans. The first NGO would belong to the disaster science and management domain, whereas the second would identify much more with the local domain of knowledge and action. NGOs may be in a very good position to bridge domains of knowledge and action. National Red Cross organizations, for instance, are sometimes considered government and sometimes NGO. They bridge the governance and the scientific domain, and in some countries are also reaching out to the local domains of knowledge and action.

Media can take different positions too. From a content analysis of three Dutch newspaper reports about three disasters, it was found that

reporters normally adhere to the dominant view of natural disasters as caused by nature, a fascination for the hardware of rescue operations, especially the use of helicopters, and a representation of affected people as hapless victims (Belloni et al 2000). However, there was variation in the way reports were made. Background features or analysis would usually take a more structural position on disaster, and the general news clippings would become more sensitive to root causes and vulnerability after some time elapsed. Remarkably, reporting on Mozambique and Honduras would be more likely to adhere to the dominant view and perpetuate disaster myths than reporting on Turkey, which was explained because unlike the other two countries, Turkey is closer to the Netherlands and not considered a developing country. While in the other cases the vulnerability of the countries to "the cruel side of Nature" were taken for granted, in Turkey reporters were instantly speculating about root causes, mismanagement and other social explanations for the disaster. Thus, media too can be associated with the different domains and it could be said that good reporters manage to straddle them all.

Conclusions and Implications

This paper began by identifying the emergence of a new paradigm in disaster theory focusing on the mutuality and complexity of environment-society relations in creating vulnerability and disaster. Complexity theory is a promising field for disaster studies, and its implications for disaster management have only begun to be explored (Comfort 1995; Possekel 1999). This paper has introduced the notion of social domains as one way of accommodating the effects of human agency and actors' movements across systems of disaster response. These domains are obviously different from one another: a university or research centre has other modes of organizing and operating than disaster committees and operational structures. Both are very different and remote from the coping practices of local communities. Yet, the domains are diverse within and may have more in common with each other than meets the eye. One of the reasons why they stand apparently apart may be because they are described and analyzed through different perspectives and accorded different rationale and status. For instance, the universal status of scientific knowledge may blind observers to some of the more mundane dynamics of knowledge production, while romantic notions about the holistic nature of local knowledge may stand in the way of observing the rationality of people's science or conflicts at the community level.

What are the major conclusions to draw from this paper for the conception of social domains of disaster response? Firstly, it will be clear that none of the domains can be privileged for being decisively more trustworthy. The domains, as I argue, are equally tainted by parochial concerns; constrained by historically grown patterns of disaster response; challenged by rival discourses and meanings attached to vulnerability; and riddled by political intricacies. Secondly, if there is more analogy than assumed between the knowledge generated by scientists, bureaucrats or local farmers, this has implications for how we consider the ranking of knowledge. Instead of assuming that scientific knowledge is superior to local knowledge, or the other way around, a more open and critical eye needs to be cast on each approach. Thirdly, and most importantly, it means that the domains can only be understood in relation to each other. Disaster responses come about through the interaction of science, governance and local practices and they are defined and defended in relation to one another.

What does a focus on complexity, agency and social domains imply for the research of disaster response? Firstly, case studies are important. Meso-level analyses at country, region or river basin level may yield the best results for accumulating knowledge on disasters, even when these are global in nature. Secondly, ethnography is important to grasp how actors in different domains attach meaning to disasters and disaster response and how they influence each other. Ethnography should not be limited to local domains but can be equally suitable and insightful when done in and between other domains of disaster response. Recent developments towards multi-sited ethnography and studying-up ethnographies are interesting to take into account (see for instance Burawoy et al, 2000). Finally, we have to find ways of representing the social domains in a meaningful way that provides handles for systematic discussion and possibly action without downplaying the complexity involved. Some promising methods are stakeholder analyses, the use of narratives whereby conflicting notions are outlined in rival narratives without necessarily judging their objective truths (Roe, 1991) and the use of multiple scenarios in projecting risk and disaster response (Possekel, 1999).

Finally, an approach focusing on social domains of disaster response also has practical implications. Such an approach can draw out the relations between actors in different domains. Present stakeholder approaches reinforce the idea that social domains of knowledge and action stand apart from each other and each have different perceptions and interests regarding vulnerability and disaster. By focusing on con-

tradictions within domains and possible analogies between them, it is possible to identify alliances between actors from different domains. For instance, rather than collapsing the collaboration of radical scientists, NGOs and organised local people into a local domain of knowledge and action, such collaboration can be viewed as an alliance between parts of the different domains. Such a view enhances questions of how knowledge and power differentials between the partners evolve, acknowledging that alliances between domains may constrain relations or enlarge gaps between different parties. It also enhances the search for complementarity and win-win situations that alliances can entail. In the latter case, such alliances can be seen as one of the ways to reduce people's vulnerability to disaster.

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Context is All.
A Holistic Reformulation of the Tonkin Gulf Incident

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Incidents and accidents are frequently ascribed to "operator" or "human error." Until recently accident investigators have focused more on the immediate or proximate causes of incidents and accidents than on such underlying or contextual factors as production imperatives, conditioning, expectation, peer pressure, ergonomics or the quality and currency of rules, procedures and training. Some theorists, however, have attempted to sensitize accident investigators to the potential impact on human perception and behavior of contextual factors. As a consequence of the work of Job (1996), Reason (1995; 1997), Snook (2000) and others accident investigators now have the opportunity to apply a systems approach to accident investigation. The primary purpose of this paper is to illustrate and then test the systems or "context" approach with reference to a major incident with significant outcomes. To this end the work of Job, Reason, Snook and others is used to frame, analyze and draw conclusions from a major incident—the clash between US and North Vietnamese naval forces in the Gulf of Tonkin during the early stages of the Vietnam War. The paper's secondary purpose is to deconstruct, illuminate and explain the incident with a view to adding to (if not correcting a part of) the historical record of the Vietnam War. 2004 marks the 40th anniversary of the Tonkin Gulf incident, described by Wise (1968) as "The Pearl Harbor of the Vietnam War." Following the alleged second attack on US naval forces by North Vietnamese warships President Johnson ordered a major escalation of the war against the Viet Cong. Today most analysts