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What Lies Beneath: the BP Oil Spill and the Need for New Response Models

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Abstract The response to the Deepwater Horizon Disaster, the worst oil spill in maritime history, focused on determining the fate and the marine biological effects of the oil spill with little effort on assessing the emotional well-being of people directly harmed by the spill. The mental anguish experienced by the people, many who were still recovering from earlier destruction of Hurricanes Katrina and Rita, remains poorly addressed. The extent of the psychological effects is still not fully known arguably because the Oil Pollution Act of 1990 (OPA) requires no analogous assessment by federal agencies. Many of the challenges relate to the legal requirements and standards imposed under OPA that lead to more focus on environmental than on societal and individual impacts. The academic community has much to contribute to undertake studies to understand the unknowns in both natural and social science realms, yet federal and state governments have difficulty in using academe to its full effect. We posit that a Human Resource Damage Assessment (HRDA) model be incorporated to leave us better prepared to assess damage beyond the natural resource side and to engage academic researchers in the science of disasters, to help people to cope and locate services, and to promote a connective bridge between natural and social scientists, practitioners and agencies for improved mental health and systemic preparation. Implementation of an HRDA model would require substantial legislative changes in OPA.

Keywords BP oil spill and mental health · Disaster mental health · Research on disaster science

Introduction

The authors of this paper are colleagues at Louisiana State University who come from very different backgrounds and disciplines. The first author is a social worker who has extensive experience as a practitioner dealing with emotional and mental health needs of people, particularly with older adults and their families. The second author is a natural scientist with a background in oceanography and marine pollution who has years of experience in dealing with scientific aspects of disasters. In discussions about recent disasters that have befallen coastal communities along the U.S. Gulf of Mexico, we realized that stark differences exist in the way our respective disciplines assess and respond to natural and man-made/human instigated, or technological disasters. We also realized that there are similarities in assessments and responses as well, but that they may be misguided, incomplete, or ineffective. So, too, we recognized that there are also mechanisms and approaches by which governments at all levels assess damages and respond to the environmental and social challenges presented, but we concluded that the relief tendered is often in the form of some sort of remuneration rather than any palliative or remedial action. In each case, the focus of attention and action is often on surficial and more obvious facets, yet rarely on the less obvious and more challenging ones that lie deep beneath the surface. As a social worker and coastal scientist, both authors felt disenfranchised by the legal system to apply expertise to address the problems brought about by the BP oil spill. It is clear that the larger issue of disaster

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response that has very different objectives than engaging the academic and practice community to address mental health and other issues with the logical imperative to preserve human lives and to contain the spill.

Thus, in an oil spill, there is much public focus on removing spilled oil or enumerating affected fauna rather than trying to understand more esoteric effects that will determine the long-term "health" of an ecosystem. Indeed, given the unusual and obscure nature of the BP oil spill deep beneath the Gulf's surface, "what lies beneath" is the metaphor for our purposes here.

We also realize that while imperfect, governments seem much better able to cope with the natural science - especially environmental - aspects of disasters than with their social science dimensions, and particularly those affecting the mental health of local residents and their communities. In fact, the notion occurred independently to each author that pelicans oiled by the BP spill seemed to get more focused and responsive remedial attention than did humans who suffered severe emotional consequences typically being left to fend for themselves, while perhaps receiving small financial settlements to claims against the Responsible Party, BP. That observation led to this collaboration which seeks to contrast and assess differences in responses and understand why they occur.

We present three aims in this article:

- First, to compare and contrast the perspectives of natural and social sciences in the way they assess the effects of disasters, and in doing so, we recommend the development of better mechanisms to engage both the natural and social sciences to work collaboratively to interpret and address problems stemming from catastrophes, both manmade and natural.
- Second, to urge for defining a clearer role in disaster response for the broader academic community where the expertise needed to accomplish the first aim can often be found.
- Third, in keeping with the primary subject matter of this journal, to pay particular attention to addressing critically neglected community and individual mental health issues, particularly anxiety, PTSD, depression, suicide, and substance abuse that stem from disasters. Such issues not only profoundly affect disaster victims but also emergency responders, clean-up crews, health workers, and relatives and friends of those injured or killed by the disaster.

Finally, based on our observations and exploration on past and best practices, we recommend the establishment of a Human Resource Damage Assessment (HRDA) model, comparable to the Natural Resource Damage Assessment (NRDA) now prescribed by federal law. The following describes this model and reflects on some of the constructive concerns we have with federal programs that fail in the societal dimension.

In a disaster such as an oil spill, the obvious manifestations demand most of our direct attention, but disaster has effects and ramifications at many different levels, some of which are not obvious. In many cases, we are prone to using the "out of sight and out of mind," perspective and focus instead on surficial aspects that do not adequately address the real problem. Accordingly, pernicious and long term effects of a disaster are harder to identify and reconcile. In an ironic sense, in the case of the BP oil spill, the response seems more concerned with damages to the shrimp than the shrimpers – despite decades-old findings that adverse effects are as detrimental to the psychological and psychosocial environment as to the physical environment (Palinkas et al. 1993).

While the BP oil spill affected multiple Gulf of Mexico states, the focus of this paper is Louisiana, a state intimately familiar with disaster. In the last decade alone, there have been 28 tropical and subtropical storms including epic Hurricane Katrina in 2005 that caused an estimated 1836 deaths, approximately 135 billion in property damages and resulted in untold human suffering and misery (Plyer 2014). Louisiana is also a region of the U.S. that often falls into the bottom rung of many social indicators, i.e., education, infant mortality, health, single family households, higher levels of poverty, institutionalization of persons with developmental and cognitive conditions and lower governmental initiatives to assist a disenfranchised state, which leaves it even more vulnerable to disaster. Globally, disasters are more and more prevalent increasing five-fold in the last decade (Kessler and Wittchen 2008).

The BP Deepwater Horizon explosion occurred only 5 years after the worst hurricane and flooding in New Orleans' history. The statistics and facts of the BP Deepwater Horizon explosion are well established. The disaster killed 11, injured a minimum of 17, and ultimately led to the devastation of the businesses and occupations of thousands who make a living from and around the Gulf (Koottungal 2010; Mong et al. 2012).

Federal Response to Oil Spills

Response to oil spill disasters are clearly prescribed by federal law, specifically the Oil Pollution Act (OPA) of 1990, legislation that was passed as a result of the Exxon Valdez tanker spill in Prince William Sound, Alaska. OPA focuses on fines and financial liability as well as containment. The U.S. Coast Guard is designated by OPA as the lead federal agency charged with coordinating a multi-agency response consistent with what is called the National Contingency Plan. First and foremost, the object is to control and contain the spill, and when possible, to remove or remediate its visible effects. Secondarily, for purposes of assessing liability and setting penalties and fines, it seeks to quantify, in numbers and in economic terms, damages to natural Resource using a Natural Resource Damage Assessment (NRDA) model. The Coast Guard additionally is charged with working with the

"Responsible Party," in this case BP, to develop a "detailed containment and cleanup plan." Thus the immediate legal objective is first to stop or contain the spill and second to clean up the oil. Virtually no attention is focused on understanding through research, the changes in function that an affected ecosystem might sustain – these aspects "lie beneath" OPA. In many ways with OPA, oil and marine organisms (mainly economically important or charismatic fauna) are primary concerns, while people are all but forgotten other that they may be compensated for losses, perhaps because the societal task is so very complex and unwieldy.

The delay in both research and human service funding led to what we refer to as a "fog of research," analogous to what a military commander in battle has to deal with: very incomplete information on the enemies' strength, movements and position. This fog of research has multiple societal and psychological implications that have been less well elucidated. More challenging, perhaps, has been understanding the broader societal effects of the spill on the residents of the Gulf coast. Despite the obvious and established negative impact of the Deep Water Horizon Disaster on the environment, much less investigation has occurred in terms of the its effect on the sociological, economic, health and other societal concerns. While the National Institutes of Health and National Institute of Environmental Health Sciences did eventually fund a research network to explore oil spill health effects (Kang 2011) this was not provided for by OPA, and only came to be because of a large outcry by the public health community. In our view, much more information should have been obtained in the immediate aftermath of the spill about the well-being and mental health of the occupants, residents, workers and responders to the disaster. Fortunately, after initial delay, funding resources were allocated to social and health sciences. A small core of research is beginning to emerge, showing that disasters from the result of human error, intention, or improper planning to buffer or prevent catastrophe can be even more destructive to the human spirit than a disaster of natural etiology (Reeves 2010).

OPA was enacted a year after the Exxon Valdez oil spill in 1989. At that time, no one envisioned a spill anywhere near the magnitude of the BP Macondo submarine gusher. The most likely serious spill, it was thought, would result from a surface tanker accident or pipeline break, not from a deep-sea well blow out. According to the scenarios most everyone envisioned, a spill would be a relatively short duration event, not a nightmarish 3-month ordeal that would never seem to leave the headlines. Thereafter, federal agencies like the National Oceanic and Atmospheric Administration (NOAA) and Fish and Wildlife assess the environmental impact of the spill through the provisions of the NRDA process that is essentially focused on enumerating loses of birds, mammals, fish and the like for purposes of establishing losses and levying fines on the Responsible Party. The July 2, 2015 legal settlement of this case was, of course, in keeping with OPA provisions (United States District Court Eastern District of Louisiana Case 2:10-md-02179-CJB-SS, Document 14801, July 2, 2015). The agreement in principle to resolve claims asserted against BP had the following terms: the total settlement was $18.732 billion, of which $5.5 billion will be paid to the United States to resolve Clean Water Act civil penalties with a certain portion of the penalties being directed to the Gulf States pursuant to the RESTORE Act; $8.1 billion will be paid to the Gulf States to resolve natural resources damages; $4.9 billion will be paid to resolve the Gulf States' economic claims; up to $1 billion paid to resolve economic claims of the vast majority of local governmental entities located in the States of Texas, Louisiana, Mississippi, Alabama, and Florida; and $350 million to cover outstanding natural resource damage assessments and $250 million to cover the full settlement of outstanding response costs, False Claims Act claims, and royalties owed for the Macondo well. No mention is made in OPA or the settlement of assessing the toll a spill takes on the human victims' mental and physical health. We emphasize here that the U.S. Coast Guard's charge was neither to ensure that scientific studies of the spill were undertaken, nor was it legally given the responsibility to assess the impact of the spill on human beings. We are careful to acknowledge that the Coast Guard and other federal agencies discharged their statutory responsibilities effectively and in accordance with their legislative obligations. Any criticism herein reflects only our concerns about deficiencies in the legal and institutional constraints that govern oil spill responses in the view that opportunities to partner can strengthen institutional-federal ties as well as community and individual needs linked to emotional and psychological wellbeing and overall functioning.

Disaster and Mental Health: Proximity, Time, and Strain

There is no question that any disaster can cause or exacerbate complex mental health problems including depression, post-traumatic stress disorder (PTSD), anxiety, increased substance use, and increased risk of suicide (Lee and Blanchard 2012; Neria et al. 2008; Norris and Elrod 2006; Palinkas et al. 1993; Ursano et al. 2008), particularly for those with higher risk factors, including a preexisting mental health condition (Lowe et al. 2015; Webster 2010; Werner and Locke 2014). Timing is a critical variable used to assess dimensions of mental health – recognizing this, some have conducted research during the BP oil spill finding that stress, anxiety and depression were at their worst during disaster (Cope et al. 2012; Mong et al. 2012). Others (Cherry et al. 2015) have questioned if time dissipates the anguish of disaster and find that long range effects can be as detrimental as short term. Cherry et al. (2015) conducted extensive interviews with coastal and comparison non-coastal and non-disaster exposed

residents following BP and Katrina and found diminished social support, linkage to fishing as an occupation and non-organized religiosity were factors of heightened psychological distress. Many, including Cherry and her team explore Hobfoll's Conservation of Resource Theory (1989), i.e., the manner in which people place value on their resources, whether tangible or intangible and loss of these resources can cause degrees of stress. People vary in their ability to store up and/or access a repository of protective factors and support can explain how some people bounce back sooner and more robustly, and others who anticipate and experience losses can endure particularly stressful circumstances. Conservation of Resources is particularly useful in disaster to explain how those more prone to experience threat, or perceived threat, are typically more stressed than those who endure a chronic status of diminished resources. Those most adversely impacted by the BP disaster, the coastal fishers, experienced the highest depression rates (Cherry et al. 2015), demonstrating the immediate and enduring depletion of both environmental and financial sustenance (see also Cherry et al., this issue).

Time in and of itself does not rid of emotional distress and adverse health, but time coupled with stronger community ties and support helps to reduce negative mental health outcomes including depression (Cope et al. 2013; Sultan et al. 2014). Gill et al. (2012) compared psychological reactions of coastal residents exposed to the Exxon Valdez spill and to the BP spill and found victims to experience highest worry particularly about health, finances, and family in the early stages after the spill and if they had financial ties to the corporations causing the spill.

Other research investigating the long term effects of technological disaster, include Arata et al. (2000), where surveys were sent to fisherman 6 years after the oil spill and demonstrated enduring psychological distress. Authors Ginexi et al. (2000) conducted pre and post surveys with over 1735 residents affected by a flood and found that rising depression and diagnosis of mental health issues were especially high for those who were at lower SES levels and in more impoverished areas (Sultan et al. 2014). Ginexi et al. (2000) convey the construct of disasters imposing a disrupted equilibrium in functioning, including regulation, social support, economic realities, all compounded by structural inequalities, such as access, class, and ethnic/racial realities.

Oil spills impose the highest psychological strain on people who require the water to sustain and nourish (literally and figuratively) their lives and livelihood (Lee and Blanchard 2012; Plaisance and McGill 2014; Reeves 2010; Sultan et al. 2014) and working on cleanup can be especially psychologically costly (Lowe et al. 2015; Plaisance and McGill 2014). The highest levels of depression were experienced by those who worked on cleanup at any level, demonstrating 30 % higher levels of major depression than those who did not (Plaisance and McGill 2014). The compounded reality is that those who are the most likely to show up are the very people who use the Gulf to sustain their income through fishing, and tourism. The people participate in the oil spill cleanup often to make up for the loss of income (Plaisance and McGill 2014). Handling the devastation in the wake of the spill has larger issues than just seeing first-hand the horror of the impact. It takes a serious toll on people's physical and mental health, and in many cases appears to threaten the fabric holding families and communities together. In general, there has been an approximate 25 % increase in reported depression linked to the BP oil spill (Reeves 2010). A tragic reminder of the toll that took place in Alabama was when William Allen Kruse, a charter boat captain shot himself as a result of the devastation. He had taken a position with BP to assist in the cleanup prior to committing suicide (CNN 2010). Such an event exemplifies what Morita et al. (1999) researched related to the acute and severe psychological damage related to human involvement with oil spill cleanup.

The silver lining of disaster is the potential to engage resilience, coping, and unification among residents (Norris and Elrod 2006; see also Cherry et al., this issue). Disaster can also prompt what is known as post disaster growth coined by Tedeschi and Calhoun (1996) loosely based on the Nietzschean premise of "what doesn't kill you makes you stronger." Post disaster growth has been explored by authors examining the role of religiousness in relation to post disaster psychological distress (Chan and Rhodes 2013).

Disaster scientists studying resilience, however, remind that psychological recovery is slower and harder in communities where cohesion and support is lacking (Norris et al. 2007). Therefore, communities that feel they have been left behind from the larger federal response are often those with the most threats to support and the rift creates far higher psychological problems than those where response is met sooner and with more diligence. Community linkage is a complex arena, however, and community attachment can serve as an added threat to individual functioning when the community has been decimated or disrupted by technological disaster particularly for those reliant on the environment to sustain their lives and livelihood (Lee and Blanchard 2012).

Despite the many sound and informative studies, however, no federally mandated systematic process currently exists to assess the psychological burden following technological disaster, and variations between researchers abound (Kessler et al. 2008). Although there should not and cannot be a one-size-fits-all approach in research, training and first responder activities were viewed as uneven and problematic. Recognizing the varied approaches assessing and meeting the problems of disaster victims, the U.S. Substance Abuse and Mental Health Services Administration (SAMHSA) assembled a task force in 2004. Currently SAMHSA coordinates response efforts, including training professionals to anticipate and respond to disaster needs and to fund services,

however, well-meaning efforts are still often disjointed between federal and state responses (Guterman 2005). All research yields that both short term and long term effects are necessary to investigate and to inform practitioners and policy makers about the very real symptomology that goes along with oil spills. It also unearths a multitude of factors involved with coping, resilience, and strength.

Enlisting the Human Resource Damage Assessment Model

As noted, we recommend incorporating what we refer to as a *Human Resource Damage Assessment* into a response partnership to assess, buffer and mitigate psychological detriments. In our view such an activity would be institutionalized and immediate. While we feel all elements of human capacity and resources are essential to understand, and are intertwined, the focal point of our HRDA focuses on emotions as we believe that emotions drive the way people feel about themselves, other people, events, social and environmental factors, as well as the interplay of economic forces, work, debt, and responsibility. An HRDA model would seek to do more than analyze what is happening. Rather it would help direct mental health professionals and other responders to areas of need. Since psychologists are often key experts in assessing mental health, what better audience is there to consider both the broad disaster aspects as well as policy implications that directly intersect with practice at the individual, family, and community level?

NRDA Model Meets HRDA Model

The Natural Resource Damage Assessment model includes 3 steps 1/Preliminary Assessment; 2/Injury Assessment/ Restoration Planning and 3/Restoration Implementation. All relate to assess what is needed to help the environment return to normalcy or balance and to identify responsibility for restoration. We suggest a similar trajectory to assist people in the wake of oil spill disasters.

The HRDA will include the same 3 steps with 1/ Preliminary Assessment at the forefront of identifying health and mental health conditions, considering those most at risk, i.e., under the care and treatment of mental health professionals deployed to address disaster impacted areas will have experience in surveying and interviewing participant and especially be able to address trauma and establish expedited rapport and empathic responses. It would also assess the loss of mental health services in a disaster stricken region.

2/Injury Assessment will establish baseline standards assessing what changes have occurred and what losses have been sustained – in this vein, case management is what restoration planning entails. Clearly, an immediate focus is to identify any imminent danger to people who have sustained injury or who feel threatened, anxious, or distressed. In this level, screens for depression and suicide as well as coping will be conducted. On a practical basis, a case management model is activated, looking at each person's social and environmental context and addressing the most pressing needs first – i.e., material needs and instrumental needs, such as medical services, access, linkage to services, relationships and external support as well as counseling a therapeutic exchange. Often, in trauma work the technique of *partializing* - the process in which the entirety of stress is broken into more manageable components is useful when people may be experiencing shock, overwhelm and anxiety (Bach 2015).

3/Restoration Implementation is targeted to assisting survivors to return to a level of equilibrium or stability, and in many cases requires further intervention with agencies and institutions and programs suited to meet the needs of persons experiencing stress, post trauma, anxiety and any expressions of suicide. Cognitive restructuring and crisis support, individual and group intervention may useful components to integrate of the final HRDA stage.

The techniques of implementing such a response model, particularly in stage 2 of the HRDA would subsequently follow and respond to the CDC's Emergency Risk Communication Branch (ERCB) timeline to collect data and link integration and case management to those most directly affected by oil spills before the fog of research sets in. Werner and Locke's Project Rebound identified five stages of response (viz., safety, calming/stabilization, support, efficacy, hope). The authors call the response "psychological first aid" (Werner & Locke, p. 67). First and foremost in the assessment stage is to assess safety, this would include conducting assessments – through research, paired with practitioners – particularly to assess when referral is necessary on suicide as a primary concern - and depressive symptomology, then calming, followed by support and efficacy. Hope, our final and 3rd stage of response, parallels NOAA's Restoration where growth is integrated into a new schema. Why a technological disaster such as an oil spill uniquely requires a tailored response model is related to the enduring aspect of the event. A tornado or hurricane may hit in 1 day, but an oil spill, such as the BP catastrophe, can endure for months. Therefore, emotional responses are different.

The expectation that this discussion details all methods and contours of psychological response is perhaps naïve, as there are enormous variations economic and community factors to consider, stress responses, social support, reaction to perceived and actual risk, psychological and social work interventions, but the premise is to streamline the assessment to gather time sensitive data on mental health in particular and to activate given sources of support. SAMSHA and NIH have invested in meeting post disaster mental health needs offering funding for programs for example related to crisis intervention, with state agencies organized to deploy workers and assessment teams, the logical, mode to establish and utilize

the HRDA is to bridge OPA with enlisted federal entities handling mental health aspects and to close the circle with state implementation. It is also to use the model in response techniques with the people identified as most at risk. Through the literature, and logic, it is clear that persons who reside near and rely on the coast are of particular interest to identify, assess, and restore.

Post-Hoc Response

After some initial delay, BP recognizing the limitations of OPA and NRDA, on its own initiative funded a $500 million grant program, the Gulf of Mexico Research Initiative or "GoMRI" and thus a major decade-long scientific study is underway to unravel and investigate its environmental effects. Yet we know from previous oil spills that it may take two decades to realize fully the full extent of such an environmental disaster. While BP did work fairly quickly to establish the GoMRI, there was nonetheless a lag time between the beginning of the spill in late April and the beginning of studies several months later. While the National Science Foundation was able to make RAPID funding available, and NOAA was able to make small amounts of Sea Grant funding available, there was not sufficient funding available to support expensive ship time during the critical first few months of the spill. Efforts undertaken by the U.S. Coast Guard, which has the legal authority and obligation to coordinate the spill response, were quite properly focused on removing oil at the surface and stopping the spill, and not understanding the processes occurring beneath the surface relating to the fate and transport of spilled hydrocarbons. Here, again, the "what lies beneath" metaphor applies. Between the OPA-prescribed spill response and the OPA-prescribed NRDA process is an enormous gap.

The failings of OPA notwithstanding, circumstances existed to mitigate this gap in developing true scientific understanding of the spill. In addition to the establishment of the BP GoMRI program, it was particularly fortunate that three of the involved agency heads were highly regarded scientists drawn from the university research community, namely Jane Lubchenco (NOAA), Marcia McNutt (USGS) and Steve Chu (USDOE). All three are members of the National Academy of Sciences, and Chu is a Nobel laureate. Together, these individuals formed a strong coalition to undertake extremely important agency-initiated research that was critically important in understanding the spill (see Lubchenco et al. 2012 and McNutt et al. 2012a, b).

Likewise, on the human services side, BP responded to multiple pleas from state officials for mental health funding, mostly due to the heavy responsibility on the Department of Health and Hospitals and other providers. Eventually, but only after state officials, including the Governor combined forces to urge the company to fund mental health services through settlement grants. Louisiana Spirit was one of those initiatives that came from the funding – LA asked twice for $10 million from BP – $52 million was finally offered to fund services and programs and to contract with states to provide treatment. BP offered $15 million to Louisiana Department of Health and Hospitals as well as $10 million to SAMSHA (Schleifstein 2012). These are standard response organizations that are likely to be activated whenever disaster strikes given SAMSHA's interest in helping people with substance abuse conditions and other mental health conditions, and DHH's responsibility to meet the often burgeoning mental health needs of the state. SAMSHA now has an established Disaster Technical Assistance Program (SAMSHA 2015).

Response Reaction Recommendation

Scientists have observed typical responses to disaster on an individual and community level that are applicable to this study. The Centers for Disease Control and Prevention (CDC) provides a range of 1–3 days for the onset of reactions including insomnia, worry and distress, with moderate and persistent anxiety then depression and PTSD following into years later. PTSD is the most pressing psychological condition presented after experiencing the disaster, with the worst presenting symptoms appearing within 2 years of the event (Arata et al. 2000). What is critical, yet often ignored due to the sheer factor of time and personnel, are the early stages of when people exhibit behavioral changes such as anxiety, edginess, sleeplessness, headaches, eating changes, heart palpitations (Werner and Locke 2014). What is problematic is that the event of disaster often interferes with the collection and response to key behavioral features. Some have suggested that there are too many constraints including possible rifts between the professional's ethical guidelines that keep well-meaning professionals and other volunteers from helping victims in a disaster (English 2011).

The Centers for Disease Control and Prevention provide Resource and models to gauge disaster and recovery. In addition to disaster research which deals more with the psychological effects of disaster on an individual level, there are patterns and phases of disaster which depict a broader based reaction from anticipating the event to accepting it to a new schema.

The CDC Phases are described in a sequence of events (Fig. 1) beginning with *Impact*, reflecting the timing of the event, but having relevance to immediate and long range effects. Impact may vary depending on whether the event was anticipated or without warning. Technological and human instigated disaster can arrive entirely without warning of impact, which may lend to a heightened sense of distress, depression, and anxiety.

The second stage of *Rescue or Heroic Efforts* reflects when/how people come together and assist others to make sense and to have an alliance or meaning with the event. The Inventory stage is crucial to assess initial impact of

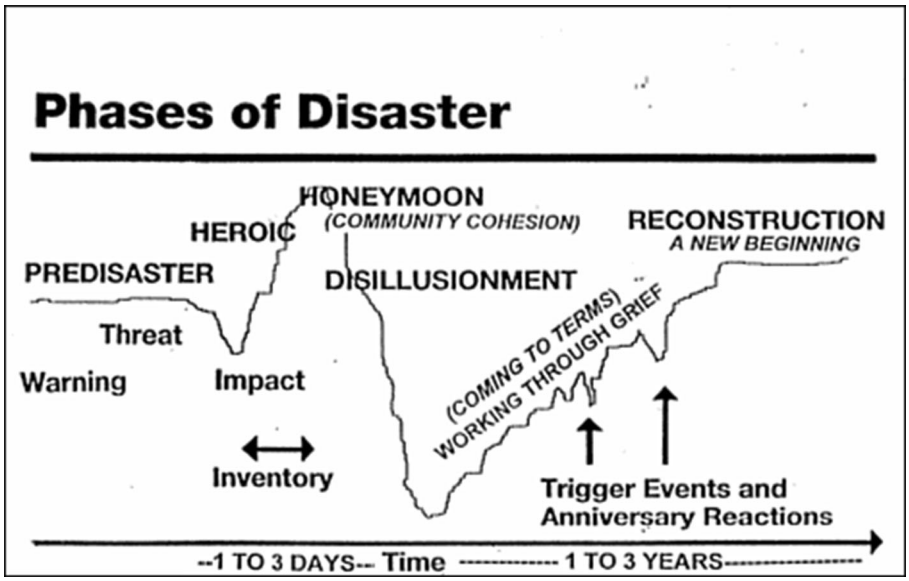

Fig. 1 Disaster Mental Health: Key Phases of a Disaster. Centers for Disease Control and Prevention (2012)

trauma, and to assist survivors to prioritize areas that they feel they have control over, as this is when victims are assessing where they are in their post traumatic readjustment. This time is ideal for researchers to assess strategies and to assess the impact condition prior to moving to the *Honeymoon period*, where people can idealize the conditions of both research and recovery as well as efforts made. Later, the *Inventory stage* comes into play - this may be where federal workers as well as the researchers and practitioners assess what is needed to address the effects of the disaster. It also may reflect an individual or family response to the longer range implications of the disaster. Inventory will provide real use of rates under treatment in various areas, i.e., calls to crisis lines, hospitalizations, use of existing programs. *The Disillusionment* stage is coming to terms with what resources are offered and what was expected to have occurred, perhaps, this stage represents evaluating what could have happened and what may have been more ideal, a type of reckoning. Lastly, is *Reconstruction or Recovery*, similar to acceptance in other stages of grief or loss when one accepts loss and moves toward a new paradigm.

We emphasize here that early phases of response to plan, arm and activate researchers with assessment tools also have key policy and practice implications. Without planning to activate potential funding sources, to accommodate bureaucratic delays with peer review, necessary IRB protocols and other procedural matters, crucial information is forever lost, and lives may be further burdened.

Institutional Responses to Disaster Research

Governmental institutions at all levels were immediately overwhelmed by the massive dimensions and scope of the BP Macondo gusher. Given that the wellhead was some 1700 m beneath the Gulf's surface – a cold (4 °C), completely dark and relatively inaccessible place. Thus, the rate of oil discharge was uncertain. BP quite naturally tried to protect its own interests and downplay the rate of spillage. The federal government relying on its agencies National Oceanic and Atmospheric Administration (NOAA), The United States Geological Survey (USGS), The United States Environmental Protection Agency (USEPA) began to use what information it had to estimate the rate of discharge. The anxiety provoking nature of the spill was an alarming feature of this disaster. The event dominated national news. Fear mounted in the public as the monster kept growing. As the estimates grew exponentially – for example in the 3 months following April 20th, the spill rate estimate steadily was revised up from 1050 barrels per day up to 62,000 barrels per day (Henry 2010; Hoch 2010). The academic science community was witnessing the devastation and on point to act, but unable to undertake studies to lend expertise to understanding the unknowns.

The anxiety levels of coastal residents, not only in Louisiana, but in other Gulf States grew along with the images and reality of a condition out of control. There were collateral effects of this anxiety on tourism and the seafood industries being among the early ones to be affected. Both of these factors resulted in substantial economic losses (Petrolia 2014).

Many calls for federal emergency research funding to begin studying the spill and its effects went unheeded, e.g., Gagosian and D'Elia (2010). The almost idiosyncratic nature of the Oil Pollution Act meant that the federal government focused most of its efforts on stemming the rate of spillage and cleanup, which are clearly priorities, but not the sole ones. As we noted, the Oil Pollution Act was born out of the Exxon Valdez tanker spill two decades ago.

One group of individuals was initially very frustrated: the academic research community, which was in essence sidelined because of insufficient funding. While the National Science Foundation was able to scrape together some Resource for its RAPID award process, and NOAA Sea Grant did allocate some funds for spill study, neither the Administration nor Congress acted to provide the needed Resource to involve university-based researchers. When academics are engaged and able to respond, high levels of cohesion, morale and efficacy are demonstrated (Frohlich et al. 2006) this often happens independent of federal prompting, however. Therefore, enhanced partnerships between the academic research community and the federal response in anticipating disaster science, is viewed as beneficial on many fronts.

Discrepancies of Disaster and Coastal Louisiana

There is often a mythical image of Louisianians as naturally resilient, stoic, and self-sufficient. However, such views in any region can be a means of ignoring the very real needs that people have. The "noble savage" image that reality television in the U. S. often portrays of coastal Louisianians exploits an unfortunate myth and severely underestimates the complex, commonsensical and warm characteristics of people from this region. Also exaggerating the stoicism of people can be detrimental in disaster. Bei et al. (2013) display revealing findings about stoicism and PTSD, perhaps not surprising to people who study wartime disaster. Individuals who report higher levels of stoicism are far more likely to experience PTSD.

The ripples of devastation from the BP oil spill – profoundly damaging the ecosystem as well as the quality of air, water, natural habitat for creatures from fowl to fish remind us of the curious dependence we have on oil. Louisiana, particularly coastal Louisiana is a tourism destination and its waters provide shipping, fishing, and recreation. Further, many people in South Louisiana earn an almost contradictory living as part time service workers in the oil industry in the off season and as fishers during shrimp and oyster season, where their boats run on the very oil they helped to produce. We are dependent on oil as a society, particularly for transportation needs, but to access oil, we must disrupt and drill, and when the drilling yields in an uncapped well blowout it is more than just alarming. When the very people who depend economically on both a healthy environment and safe oil industry find neither, not only is their livelihood threatened, but also is their physical and mental health.

Preparation and Response: Mitigating Risk

If we are interested in the psychological effects and wish to buffer, or lessen the impact of disaster through anticipating and planning - we suggest a more systematic approach from the academic/science side as well as the practice side to work with federal agencies to plan for the most pressing stages of disaster. We offer a provocative idea for consideration: OPA be adjusted accordingly, and that the Oil Trust Fund of OPA be adjusted to provide necessary funding for the kinds of immediate and responsive studies we advocate. Many forget that academe in the coastal science and social sciences house persons with capacity and real world experience who often step back into their practice roles after disaster. Social workers, for example, have in their Code of Ethics a requirement to provide relief services after disaster. These resources need to be mobilized more effectively.

Mental health professionals as well as researchers who view the lost opportunity may still be dealing with their own trauma of not being engaged to help and also in watching the destruction as if in slow motion. However, many key researchers – several from LSU identified in this manuscript, were at the front lines even without a systematic prompting. In viewing the stages of disaster and the time where mental health intervention is most pressing, we suggest prevention, preparation and preservation. We also suggest a better bridge be made between federal responders and the academic community. Such a partnership was forged with Katrina in 2005 when LSU took on the largest special needs shelter in history (Allen 2007), the law needs to reflect this reality. LSU was responsive to putting research teams together after Hurricanes Katrina and Rita, in part through the direction of the Office of Research and Development, and informal networks and experts became connected. A disaster repository may be useful in the future to inform persons of existing research, programs and effort related to response.

Scientists respond to, discuss, evaluate and explore funding, research, service, and educational elements to help the citizens in the communities ravaged by technological errors.

A multisystemic approach to disaster response is viewed as the only rational and logical mechanism to buffer the adverse effects for individuals and communities (Walsh 2007). As such, enlisting the academic community particularly the biological/coastal and social sciences as agents both to respond to and to explore the resource and capacity, human and natural disasters providing them the opportunity to activate their skillset of a disaster will buffer further adverse effects. It does two things, engages and activates skills and empowers those with the skills to actively address issues, provides information and resources as well as engages and tends to subjects and victims of disaster in the key early stages, and can follow them as well as work with them to organize their own efforts as time progresses. Two communities will bear less of a psychological burden this way. Those affected and those who can help, assess, research and manage crisis. We understand that our concept of a Human Resources Damage Assessment is in an imperfect developmental stage. Many

details would have to be worked out that would involve the engagement of a variety of professionals communities. Our aim here is not to flesh out this concept, but is rather to introduce it in the hope of initiating a constructive discussion on the general topic of mental health and disaster.

Conclusion

The interplay of scientific or technical aspects and social realities after disaster result in very real hardships for people. Institutional conflicts among private, municipal, parish, state and federal interests were major barriers to framing a coordinated response to the disaster and to understand its full scope and impact, but these conflicts notwithstanding, the dimensions of the BP oil spill were so large that institutional chaos was inevitable. To buffer chaos, there is an essential role for science, and very interdisciplinary science at that. Current legal constraints have made it challenging for the federal government, in particular, to access in a timely way university-based research and funding to plan intervention with the academic and impacted community.

OPA has an important role in dealing with a spill, but as we have suggested, it does suffer from limitations. In our view, it is time to address these limitations legislatively, especially given that oil exploration in the sea is occurring at deeper and deeper localities. First, we would argue that there needs to be a way to fund quickly the essential scientific research not under the purview of the NRDA process. If there is an active wellhead blowout, assessment is merited both the fate and broader ecological effects of the oil, not just on counting dead organisms. Doing so absolutely requires the expertise of the broader scientific community, as federal capabilities are not substantial enough to do that alone. Second, we think it is time to include human beings in the assessment. We would advocate that a "Human Resource Damage Assessment" process be further developed and implemented. As in the case of our first recommendation, this should also have a source of immediate funding for assessing public health, physical and mental, that leads to long-term studies that work to understand, assist, and benefit people as technological disaster is almost certain to strike again.

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