DEFINING A RESEARCH AGENDA FOR SLOW-ONSET DISASTER RESEARCH IN THE HUNTER REGION, NSW

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ABSTRACT

The city of Newcastle and the Hunter region within which it resides has been no stranger to disaster events over the last century, with the Maitland floods of 1955 and the Newcastle earthquake of 1989 being of particular note. The intervening periods have been punctuated by less severe, but no less disruptive extreme weather events – particularly floods and bushfires – that have focused the attention of governments and the public alike. Considerably less attention has been paid to the long-term impacts of both climate change and human activities such as mining, intensive irrigation and associated agriculture, and coal seam gas extraction. Indeed these impacts are often very slow to appear, stretching over a period of decades or even spanning generations, with the result that they are often not associated with the term disaster at all, but rather seen as aggravating factors or additional challenges to be overcome through environmental policy or industry regulation. This paper contends that issues of speed to onset mask a fundamental principle, namely that the appearance of hazards to humans and the capacity of those humans to deal with their consequences define disasters and their impact upon society: socio-economic preparedness to overcome hazards define the resilience of society, irrespective of the speed to disaster onset. This paper concludes that the biggest single risk to society in the Hunter region would be the failure to recognise slow-onset hazard and therefore to neglect socio-economic preparedness, outlining a research agenda aimed at overcoming this risk.

Keywords: climate change, environment, mining, slow-onset disaster, vulnerability, Hunter, New South Wales.

INTRODUCTION

The Centre for Research on the Epidemiology of Disasters (CRED) has reported an upward global trend in the occurrence of natural disasters over the last decade, with hydrological disasters such as flood being the most common (Rodriguez et al., 2009). While the concept of identifying hazards that lead to disasters in Australia is widely discussed in government commissioned studies at a national level (Middelmann, 2007;
Nadimpalli, 2009; UNFCCC, 2011) very little has been commissioned at state, regional and local levels. In addition, literature on crisis management generally deals only with slow-onset disasters (Eldridge and Tenkate, 2006) while literature on slow-onset disaster resilience is developing disjointedly in various isolated studies within organisations.

An example of this happening in the Hunter region can be found by looking at the disjointed responses to sea level rises from different councils – Lake Macquarie Council has taken a very pro-active approach (including establishment of an online tool enabling estimation of inundation impacts to individual properties), and received widespread regional media attention, while Newcastle Council’s response is still in development. Their website currently states 'The Newcastle Coastal Zone Hazard and Management Studies are anticipated to be completed in May 2012’. Port Stephens Council submitted a response to the NSW government’s Draft Sea Level Rise Policy Statement in 2009 (NSW Government, 2009), but appears to have taken no further action since.

While it is clear that regional policy and action is not well coordinated, we should recognize that there is an underlying problem in categorizing slow-onset type disasters and in addition, there is little awareness of the term, or of the association between existing hazards in the environment and their slow-onset disaster potential.

There appears to be no integrative framework proposed for organizational resilience in relation to current hazards and vulnerability to slow-onset disasters in the region. In the Hunter region, the separation between federal and local governments manifests itself in divergent and fragmented policy and reporting. This research has the possibility to introduce new theoretical propositions as to how all sections of society engage with the often misunderstood concept of slow-onset disaster, emphasizing the heightened sensitivity toward awareness of existing hazards in the Hunter Region in Australia and increased research knowledge of pre-disaster organization.

**Slow-onset disaster, attributing hazards and mitigation response**

Slow-onset disasters, as opposed to sudden onset disasters, are characterised by the slow development of a hazard over a long period of time to become fatal. The impact of slow-onset disasters such as a flash flood is immediately fatal. Drought is a frequently cited slow-onset disaster that can take months or years for the impact to become disastrous- in the form of severe water and food shortages and, ultimately, famine (Moe and Pathranarakul, 2006). Other forms of hazards such as riverine erosion, coral bleaching and environmental pollution, including increasing soil and water salination, can be considered to be slow-onset disasters, particularly in cases of growing concentrations of toxic wastes, which may build up over many years (IRIN, 2012).
Sometimes, slow-onset disasters are not categorized as such but referred to as ‘aggravating factors’ – or ‘challenges’ that will exacerbate quick-onset disasters. Red Cross – “There are a range of challenges, such as climate change, unplanned-urbanization, under-development/poverty as well as the threat of pandemics, that will shape humanitarian assistance in the future. These aggravating factors will result in increased frequency, complexity and severity of disasters.” The cumulative impact of slow-onset hazards may not be felt for many years, but it should be noted that environments with building risk from slow-onset factors are more likely to experience slow-onset disasters (Warner, 2010). In addition, people exposed to the conditions of slow-onset disaster are more likely to develop long-term health and psychological problems (Caruana, 2010). Reporting the damages/impacts associated to slow-onset disasters is more challenging of raid-onset disasters, due to the prolonged nature of impacts of the latter.

However, Twigg (2004) suggests that ‘To some extent, the distinction between slow- and slow-onset disasters is artificial.... Disasters, on the other hand, are the product of hazards and human vulnerability to them. The socio-economic forces that make people vulnerable may act quickly or slowly, but in most disasters it is likely that long-term trends will be more influential. When viewed in this light, it could be argued that all disasters are slow-onset.’

The standard concerns for rapid response, aid etc. do not apply in the case of slow-onset, and many situations are allowed to develop into disasters which might have been prevented with the right early intervention (Moe and Pathranarakul, 2006). A significant difference between slow-onset and slow-onset hazards is the particular type of responding agency. In slow-onset, humanitarian aid agencies are called upon, whereas in most slow-onset scenarios, development agencies are central to the process.

The main concern of governments worldwide with slow-onset disaster scenarios is early intervention and prevention, requiring innovative mechanisms for early action. For example, livestock purchasing schemes in drought that deliver a fair market price, in turn stopping families becoming destitute, which in turn prevents the need for much bigger and more expensive emergency interventions. A major challenge for governments in managing slow-onset disasters is implementing policy responses across large, diverse areas often with aggressive protests from industry or property holders with vested interests in maintaining a ‘status quo’.

Slow-onset disasters offer more time to plan and implement appropriate responses (Mude et al., 2009). However a lack of learning, the repetition
of mistakes, and a lack of interventions prior to the crisis stage are all indicators of ineffective and delayed strategic/operational response to slow-onset disasters (Wassenhove, 2006). Such an outcome is attributed to the fact that although some impacts are assessable (e.g. the water availability, crop and livestock production and prices in a drought case) – it is difficult to predict how well people will respond to and manage slowly developing situations (ALNAP, 2013)

It should be noted that most of the literature surrounding slow-onset disasters is humanitarian organization generated and concerns developing countries. There is a lack of research on developed countries like Australia and particularly in the contexts of semi-rural and urban demography. Studies undertaken for developed countries such as Australia typically concern the science or technicalities associated with slow-onset disasters. Government responses to such studies in developed countries are highly political; as such responses have potentially large implications for groups with heavy political influence, such as mining and agricultural industries, and large property holders. Government responses in developed countries have therefore, to-date, proven to be overly cautious and influenced more by politics and popularity, than actual scientific, social or economic need.

This paper begins to explore the relevance of slow-onset disasters in the Hunter region and particularly the vulnerabilities associated with biological, nuclear or chemical contamination; and climate-change-related disasters – more volatile hydrological cycle, increased flooding and water shortages.

**Hunter Region and Industry Landscape**

The Hunter region of New South Wales extends from Hallidays Point at the northern limit of the Great Lakes Shire south to Catherine Hill Bay, covering 29,600 sq.km. and 11 local government areas (LGAs). It encompasses the Hunter/Central Coast Emergency Management District (EMD) (excluding the Central Coast LGA), and the Gloucester and Great Lakes LGA portion of the Mid North Coast EMD. The region incorporates 150 km of coastline, including 10 significant estuaries and coastal lakes, while the north-west is bounded by the Liverpool Ranges and abuts the New England Tablelands.

There are several industries of importance in the Hunter region. The largest industry is coal mining, with Newcastle port being the largest coal-exporting hub in the world. However, this industry creates problems for other industries in the region through air quality impacts, impacts to water resources, water and ground contamination, overload of transport and utility services and destruction or disruption of agricultural land. In addition to environmental damage, the impacts of mining extend beyond the environment. As Franks et al. (2010) argue, while the investment in local economies and the creation of jobs cannot be disputed, the
cumulative impacts of multiple mining operations have stretched environmental, social, human and economic systems in the region.

Other industries that thrive in the region are agriculture, wine making, horse breeding and, of course, tourism. This paper investigates the significant risks facing these industries in the coming years through both natural and man-made hazards. The primary drivers of increased risk in the Hunter region are a) climate change and b) impacts of mining. Each of these drivers represent long-term groups of hazards and as a consequence, the significant possibility of slow-onset disasters occurring in the region must be recognised.

Natural Hazards in the Hunter Region
The Hunter Region experiences recurring, costly and significant natural hazards potentially impacting upon public safety, private property, infrastructure integrity and the insurance sector. While such natural recurring hazards are predicted to continue, the two exacerbating factors of climate change and environmental hazards linked to the mining industry have escalated to become major concerns for the Hunter.

The DECCW predicts that in the Hunter Region over the period to 2050 that climate change will increase the severity of hazards leading to an intensified frequency of disastrous events (DECCW, 2010), including frequent large fires, flash flooding and shoreline recession. The effects of human activity on the climate and environment, considered alongside growing resource consumption and pollution, means that both developed and developing countries face slow-onset disaster challenges.

Man-made industry led slow-onset hazards in the Hunter Region
In addition to natural hazards (some of which are attributed to human activity, and some of which are enhanced through human activity), the Hunter region is exposed a number of man-made industry induced hazards. Table 1 identifies man made hazards impacting the Hunter Region.

Table 1 Principal hazards due to industry in the Hunter region

<table>
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<tr>
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<th>Main hazard the industry causes</th>
<th>Other hazards</th>
<th>LGAs most vulnerable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal mining</td>
<td>Airborne dust pollution &amp; salination, depressurisation of regional groundwater aquifers.</td>
<td>Subsidence due to longwall mining, leaching into water table of pollutants, open cut mining environmental damage, impact of mining industry on agriculture, loss of biodiversity, social disruption, disruption to transport and utility networks</td>
<td>All except Great Lakes</td>
</tr>
<tr>
<td>Coal Seam Gas Extraction</td>
<td>Ground water contamination, air pollution, migration of gases and hydraulic fracturing chemicals to surface</td>
<td>Methane leaks, CO2 emissions, emissions from industrial equipment, diversion of water from other human use, pollution of aquifers, toxic wastewater discharge to surface streams, induced seismicity</td>
<td>All except Great Lakes</td>
</tr>
</tbody>
</table>
Agriculture (under threat from mining) | Chemical pesticides & fertilizers  
Regional groundwater impacts | Fire fuel management, soil health & fertility, salinity, water supply & drought, pest & weeds management  
Loss of biodiversity | All except Newcastle

Cattle and dairy farming | Nitrogen pollution - fertiliser & animal waste into waterways | Greenhouse gases  
Loss of biodiversity | Singleton, Muswellbrook, Dungog, Gloucester, Upper Hunter

The main man-made slow-onset hazards in the Hunter Region emanate from mining, agriculture and cattle farming. Hazards originating from one industry can also impact other industries. For example the mining/energy industries threaten other industries such as horse breeding, dairy and cattle farming. Open cut mining (the primary method in the Hunter region) can have a profound effect on water resources. It would appear that the new government is intent on taking action to enable widespread coal seam fracturing in the near future, which will induce further environmental impacts upon the region (Mitchell, 2013). Fracturing of the hard rock layers that contain groundwater results in depressurisation of regional groundwater aquifers. There is the potential of connectivity between surface and groundwater and movement of saline groundwater into the alluvial aquifers or surface waters, or draining of surface waters into underground aquifers (Smith, 2009).

**Slow-onset Disaster Planning and Environmental Risk Assessment: The challenges**

Disaster and emergency planning and preparedness in the region at present appear to be disjointed at best. Local councils and authorities have developed divergent strategies to deal with disasters and demonstrate a limited level of awareness regarding hazards prevalent in the region through environmental reporting and policy.

Councils in the Hunter and the relevant State government authority are required to prepare a State of the Environment (SoE) report approximately every year (a comprehensive review is required every 3 years) - this reports on environmental monitoring/issues on a state or local level. Often, it only focuses on Council’s activities and misses issues associated with industries etc. Councils are also required to have a Local Environment Plan (LEP) to regulate development activity. These plans provide land use zonings, which tie-in to long-term disaster management e.g. flood-prone land. Unfortunately the specifications for what these plans need to include is fairly minimal.

A pressing concern that this paper addresses is the lack of awareness as to the potential for slow-onset hazards in the region to heighten exposure in the region to disaster risk in future. There is a perception, visible through policy and planning, that disaster mitigation must deal only with slow-onset environmental hazards. For this reason, the long-term impacts of a) climate change related hazards (Nelson 2002) and b) hazards due to...
the mining industry have been ignored by some, while the active voices of dissent have mainly concentrated on health risks posed by industry in the region. To date very little has been presented linking slow-onset hazards to increased disaster risk in the long-term future of the region.

Slow-onset disaster preparedness offers more time for evaluation and learning, and organisations must make efforts to best utilise this opportunity. Long-term community-based interventions have the potential to carve out new paths away from disaster vulnerability, and build upon community priorities and capacities. *In the Hunter region there are opportunities for disaster mitigation and preparedness activities, building organisational and community capacity, but a research agenda must be outlined and then followed in order to provide an evidence base for policy change.*

**AGENDA FOR RESEARCH**

The industries in the region are comprised of owners and workforce, which both influence the likelihood of slow-onset disasters, and are influenced by them. We must also consider the wider society within which each industry is situated, members of whom may be directly or indirectly impacted by slow-onset disasters. The bodies that have regulatory oversight of the slow-onset disaster trigger industries should be recognised, as well as those with regulatory oversight of the built environment affected by disasters. There must be a platform for both policymakers and users of the built environment to have a voice in these matters, and a burden of accountability placed upon by all stakeholders to respond to the challenges of slow-onset hazards in the coming decades. In light of this, five key research areas have been identified as priorities for investigation in the region from a constructed environment perspective:

1. Hazard definition
2. Organisational Studies
3. Role of the built environment
4. Community Impact
5. Scenario Planning
CONCLUSION
Globally there is every indication that the pace of climate change is accelerating, and that extreme weather events are likely to occur with increasing frequency. At a more local level the economic actions of humans are being found to impact on the natural environment in a range of ways not related to climate. Whilst the effects of these hazards are sometimes not felt for a number of months or years, the consequences can be just as devastating as those arising from slow-onset disasters. For a region such as the Hunter - which is often described as a microcosm of Australia as a whole, encompassing remote, regional, and dense urban areas coexisting with intense mineral extraction and high-quality rural industries - the issue is both of urgent concern and yet curiously under addressed.

This paper has identified the range of industries contributing to the potential for slow-onset disasters and the specific impacts they pose, going on to identify both the stakeholder groups and the mechanisms providing their scope for action. An exploratory research agenda has been proposed, based upon stakeholder engagement and scenario planning, in order to generate an evidence base that will inform future strategies in relation to regional policy and practice. Yet a question mark remains as to its likely effectiveness both in terms of stakeholder buy-in and willingness to take action beyond theoretical exploration.

Such hesitancy finds its roots in the high levels of politicisation of a topic that should be a matter of objective evaluation, but that remains the province of ill-informed opinion. It is hoped that by enacting a highly concentrated research agenda in the local region, which provides a compelling evidence base that is of unimpeachable provenance, meaningful discourse will be initiated between stakeholder groups who are both invested in the success of the Hunter and threatened by the consequences of slow-onset disaster. It should be added that discourse
without action will be worthless: the development of societal resilience should be the ultimate aim of this research agenda. The clear point of difference between this and other resilience-related research is that it is intended to deliver resilience without ever having to experience multiple disaster events, something that has not been attempted before.

REFERENCES


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