

Understanding the 2011 Grampians Natural Disaster, addressing the risk and resilience

Executive Summary

Prepared by:

Alison Ollerenshaw, Dr Peter Dahlhaus, Kelsey McDonald, Assoc Prof Jerry Courvisanos, Dr Michelle Graymore, Dr Helen Thompson, Dr Helen Sheil, Anthony Miner, Jennifer Corbett.

Centre for eCommerce and Communications, Federation University Australia

Date: 31/3/2014

Acknowledgements

The Federation University Australia research team would like to acknowledge the support received from individuals and agencies during this project.

Financial support for this project was granted from the Victorian Department of Justice; project partner organisations also provided financial and in-kind support to make this project possible.

Thanks is extended to members of the project steering group and representatives of the project partner organisations for their support of this project, their participation in project steering meetings and interviews, and assistance with promoting the research through their networks.

We would like to acknowledge the commitment of the lead project partner organisation, Northern Grampians Shire Council, and extend particular thanks to the following staff for their commitment and support throughout this project: David Todd, Jim Nolan, Debbie Bach, Greg Little and Kathleen Gosden. Jim Nolan also provided generous statistical support with the use of REMPLAN in the economic impacts analysis.

Finally, we wish to thank everyone who participated in the research and shared insights into the events in the Grampians region in January 2011. This input provides a stronger understanding of the event and subsequent recovery from a personal, community and organisational perspective which will enable the learnings of this event to be recorded and new directions for future planning to be considered.

Federation University Research Team
March 2014

Important Disclaimer

This document has been prepared for the Northern Grampians Shire and project partners by Federation University Australia and has been compiled using the organisation's expert knowledge, due care and professional expertise. Some of the interpretations within the report are based on public domain data and documents that have not been independently verified or anecdotal observations that have not been evidently tested. Federation University Australia does not guarantee that this publication is without flaw of any kind or is wholly appropriate for every purpose for which it may be used and therefore disclaim all liability for any error, loss, damage or other consequence whatsoever which may arise from the use of or reliance on the information contained in this publication.

Executive summary

In January 2011, an intense rainfall event in Western Victoria triggered over 200 landslides in the Grampians National Park and caused widespread regional flooding. This event had significant impacts on the environment and communities both in and surrounding the Park. The Northern Grampians Shire Council together with project partner organisations commissioned research into this event to better understand the impact of this natural disaster, with a specific focus on addressing risk and resilience. Co-funding for this project was secured via a grant from the Victorian Department of Justice (Natural Disaster Resilience Grant Scheme).

The overall aim of this study was to investigate the social, economic and environmental impacts of the 2011 landslides and floods in and around the Grampians National Park. Specific objectives included identifying the impacts of the natural disaster on communities within the region from a range of perspectives including residents, businesses, and from local and regional government and non-government agencies and providing recommendations on future emergency management for the region. This was achieved through a comprehensive post-assessment of the impacts of the 2011 events, and capturing information from across the community and from emergency services and infrastructure organisations involved in the response to, and recovery from, the Grampians natural disaster.

Although this research is focussed on the social, economic and environmental impacts of landslides, it quickly became apparent during the study that the community, including the local government and emergency service personnel, were unable to clearly distinguish the landslide impacts from those of the floods. Understandably, the two contemporaneous hazards were inextricably intertwined and it is impossible to determine the impacts of one from the other. Hence, the evaluation presented in this report inevitably includes the impacts of landslides and the simultaneous floods.

Research methods

A review of current national and international literature into the social, environmental and economic impacts for communities affected by natural disasters was undertaken. Current local, state and national strategies and policies were also reviewed and current best practice for emergency services and management for communities following disaster were identified.

Two online surveys were conducted with (a) individuals and residents and (b) businesses and community organisations to gauge the social, economic and environmental impacts of the 2011 events. Survey questions also examined the roles of emergency and recovery responses. A total of 20 individuals/residents and 17 businesses/community organisations completed the surveys. The data was then analysed to capture the impacts on the community during the emergency and the recovery.

Further, a total of 20 interviews across 15 agencies were conducted with representatives from emergency and recovery services organisations and community/health/tourism organisations. Interview transcripts were thematically analysed to gauge insights into the impact of the disaster at the time of the event and during recovery.

Parallel to this study, research was also conducted to determine the landslide distribution and processes of the January 2011 event. This research was completed by James Cameron, a Bachelor of Applied Science (Honours) student from Federation University Australia. Landslide distribution was analysed in relation to geology, geomorphology, vegetation and rainfall using Geographical Information System (GIS) techniques which further informed components of this research project.

Key findings

The key themes identified from the surveys and interviews include:

Preparedness and response to the Grampians Natural Disaster

Those interviewed from emergency and recovery services organisations consistently remarked on the magnitude of the January 2011 events as presenting numerous challenges to adequately respond. Comments received from the community closely mirrored this view with the nature and scale of the

events – both of the flooding and of the landslides – being wholly unexpected and therefore difficult to prepare for and respond to. Although unexpected for the residents and emergency response organisations, there is known to have been two similar landslide events in 1916 and 1934.

- *Catalysts for effective preparation and response to the Grampians Natural Disaster*
Three main facilitators were identified that assisted in creating effective preparation and response outcomes:
 - Past experience and local knowledge;
 - Communication and coordination;
 - The value of key community contacts and community ‘hubs’.
- *Challenges experienced in the preparation and response to the disaster event:* Seven major challenges were identified by the majority of participants during interviews about the emergency response during the floods and landslides. These are summarised below:
 - Blurring of agency roles during the response;
 - Concerns involved with pre-existing flood warning systems;
 - Issues with communication between agencies and between agencies and the community;
 - Difficulties presented by the complexities of the community response;
 - Issues relating to staff training and/or knowledge of natural disaster event management;
 - Concerns for short term tourism reductions to businesses at the time when recovery programs were being conducted by various agencies;
 - Very limited effort in recognising the ‘benefits’ – especially to visitors – gained following this event via short term recovery activities and longer-term legacy building opportunities.

Impacts of the Grampians Natural Disaster: Social, economic and environmental

The events of January 2011 directly and/or indirectly impacted on all the participants in this research, including agencies involved in the emergency response and recovery, business and community organisations and individuals/residents. While some participants reported varying levels of hardship and stress (socially and economically) both during the initial flooding and in the months following, it became apparent that for most participants, the magnitude of these impacts appeared to be largely dependent on the scale of damage to property and business and of their ‘experiences’ during and after the events in 2011.

- **Social impacts**

While it is important to acknowledge that the events of January 2011 did not lead to any loss of life or major injuries (a positive outcome which was acknowledged by some emergency services and infrastructure organisations staff) the reported impacts to health and wellbeing of those agency staff members involved in the response and recovery phases was an area of some concern.

Social impacts on infrastructure and emergency services organisations

For emergency and recovery staff the main impacts included fatigue, frustration, fear for self and family, stress, anxiety. This in part has been attributed to being assigned new roles and duties within their organisations in response to the disaster, a lack of training in landslide response, going above and beyond the call of duty, and some workplace OHS issues.

Social impacts on individuals and residents

More than half of all individuals/residents indicated little or no impact following the natural disaster event in the Grampians. However, some had suffered damage to buildings and fences, and many were impacted by the road closures. Similar to the emergency workers some people felt personal stress and anxiety, which may be an ongoing health issue for some in the community. There was also a positive impact on the respondents’ ability to cope with future disasters and on their relationships with friends and families.

Social impacts on businesses and community organisations.

Businesses in particular felt a large impact, with loss in customers and income and business due to the reduced number of tourists to the area for some time after the event due to road closures

and infrastructure repairs. Again, they also reported some personal stress and anxiety as a result of the event and the impact on their business.

The minimal social impact of this event suggests that the community is quite adaptable and resilient to natural disasters. For example, respondents appear to be well connected and supported in their community with 'the support of friends, family and community' being mentioned as important during the event.

- **Economic impacts**

Costs to emergency management and infrastructure organisations

Total construction costs of approximately \$140 million by all agencies, plus operating budgets stretched in order to place more resources in the Grampians, resulted in significant costs in agency relief and recovery programs. Adding a layer of complexity that makes addressing resilience even more problematic were intangible costs. Notably, these intangibles are management stress due to *ad hoc* governance, staff 'burn out' from long hours of work and agency officials dealing with legal obligations such as insurance and occupational health and safety. Further, there was no portfolio responsibility for landslides allocated to any agencies, unlike with bushfires.

Costs to individuals and residents

Impacts on individuals and residents in terms of their finances suggest minimal to moderate costs were incurred. In identifying the impact of costs during the recovery of the flood/landslide event, almost all respondents indicated that there was no, or very little, financial impact to them and one respondent even indicated that employment opportunities were created during the recovery. The intangible cost that frustrated residents, to the extent that local councils assumed responsibility, was insurance covering private property.

Costs to business and community organisations

In contrast to residents, the majority of businesses and community organisations responding were negatively or very negatively financially impacted. The financial costs incurred by these organisations and businesses primarily related to loss of income through reduced tourist activities. In describing the economic impacts at the time of the event and during recovery, businesses and organisations identified the greatest impact being the loss of earnings/no earnings, none or few 'sales', and loss of normal trading. However, all respondents reported no negative income issues two years after the event which suggests resilience in recovery to prior status. Also intangible costs were reported by businesses in terms of bureaucracy, confined movement and anxiety related health issues, which indicate non-market resilience problems.

Recovery phase outcomes

The approximate \$140 million construction work undertaken in the recovery phase produced employment and skill enhancement not available prior to the event. The output benefits from this work were modelled to multiply out to \$304 million, outweighing the tourism losses calculated by ten times. Yet only a small amount of this assisted the tourism sector economy, which was significantly, negatively impacted. Construction benefits were spread widely and were therefore less obvious to the immediate stakeholders. Also, it is important to note that once the recovery phase ended, so too did the short term jobs and output. Nevertheless it enabled the region to have some output gains immediately after the event that most certainly added to resilience. Finally, there is only limited evidence of the legacy of this emergency being recognised, honoured and commemorated. The exception was the work undertaken by the Northern Grampians Shire Council in showcasing recovery efforts to locals. However, this did not extend into the broader community. This indicates that there is a particular type of tourism opportunity that has not been taken advantage of, which may indicate a lack of dynamic resilience.

- **Environmental impacts**

The impacts on the natural environment were generally not documented at the time of the event, and very little information has been found on the subject. The extent of the landslides was mapped by VicRoads and Parks Victoria (or their consultants) immediately following the event, largely from aerial and satellite imagery. It is estimated that more than 200 landslides occurred throughout the Park as a result of the January 2011 rainfall event, causing major structural damage to private and public assets, including the environment. Anecdotal reports and the extensive photograph collections confirm that the scouring of riparian vegetation along the gullies was severe in places where fast-moving debris flows occurred. Cultural heritage sites were assessed after the event, including 67 Indigenous sites and at least six European sites. Most sites had escaped significant damage.

The Honours research project conducted in parallel with this project mapped and analysed a total of 176 landslides using the same imagery. The vast majority were on the steeper east facing scarp of the Serra-Wonderland/Mount Difficult Range and the Mount William Range, with only minor incidences on west facing slopes. Some of the debris from these landslides flowed into Lake Bellfield, which is the major source of water supply for many towns and farms in the Wimmera region. This has caused on-going water quality issues including high levels of turbidity, colour, and high concentrations of suspended chemical compounds attached to silt particles such as heavy metals (iron, manganese and aluminium). This meant that water remained unsuitable for drinking for a considerable period of time, causing ongoing issues for Grampians Wimmera Mallee Water (GMMWater) and their customers who rely on this water supply.

Resilience and recovery from the Grampians Natural Disaster

Recovery from the Grampians Natural Disaster remains ongoing, with some infrastructure repairs and future flooding and landslide preventative measures still to be completed. As organisations wind down and/or finalise their recovery activities from the 2011 disaster (and now, focus recovery efforts on the 2014 bushfires in the region), staff from emergency services and infrastructure organisations have reflected on the learnings from this disaster and have implemented new protocols, plans and procedures within their workplaces to better respond to future natural disaster events. These include:

- Improved agency-community communication and interaction;
- Improved inter-agency communication and coordination;
- Recognising the need for closure and a clear way forward;
- The importance of building resilient communities.

A dedicated-project website has been developed for this research project, entitled Grampians Natural Disaster Research (www.gndr.org.au). The website was initially established to provide the public with information about the project, timelines, project partners, and deliverables. During data collection, the website was used to provide public access to the online surveys. The website has recently been updated and now includes a sophisticated online spatial mapping resource capturing the landslide data relevant to this project. A knowledge management resource of documents, reports and literature pertaining to natural disasters that was accessed during the research has also been included on the website.

Recommendations

Research recommendations are based on an analysis of the findings and resultant discussion. They also consolidate and build on the large amount of work, including reports and planning documents, which the emergency response organisations have undertaken since the January 2011 event. A number of the recommendations echo those outlined in the Comrie (2011) report into the review of the 2010-11 flood warnings and response. The aim of these recommendations is to inform and enhance future response to emergency and recovery for the region in the areas of:

- Emergency response and recovery to landslides and natural disasters in the Grampians now and in the future (including the recent fires in the Grampians National Park in early 2014);

- Social, economic and environmental costs to the region of the landslide and the natural disaster event;
- Recovery processes still required;
- Building resilience in the Grampians communities;
- Building and strengthening relationships between communities and the emergency and recovery agencies.

Key recommendations include:

1. Emergency and recovery services organisations review their plans and procedures for future natural disasters (including the Emergency Management Manual Victoria) and finalise draft plans, using the findings of this study to maintain and enhance activities that worked well and review activities that did not.
2. Emergency and recovery services organisations regularly conduct reviews with all staff about the plans and procedures for responding to major natural disasters.
3. Emergency and recovery services organisations consider developing a work plan for staff outlining disaster management responses. The plan should include considerations for:
 - Staffing roles during a natural disaster including staff rotations and staff overtime;
 - Staff residing in the area of the disaster;
 - Supporting staff wellbeing during times of high stress. This may include additional provisions for counselling, debriefing and psychological support etc;
 - Ensuring occupational health and safety during an emergency.
4. That staff from emergency and recovery services organisations who are nominated to roles within their organisation's disaster management team are provided with appropriate disaster management training including landslide mitigation, response and recovery.
5. Emergency and recovery services organisations continue to build and strengthen their interagency partnerships to complement their response to major natural disasters for the future. This could include regular meetings and exchange of information including staff information (contact details and roles), organisational protocols and procedures during a natural disaster.
6. That each emergency and recovery service organisation reviews protocols for communication during a natural disaster and in recovery. This should include a review of protocols for communication with other key agencies at crucial time points before, during and after a natural disaster.
7. Emergency and recovery services should ensure their communication plans for future disasters include steps for clear and timely information that is disseminated to the community via a range of media including social media, radio, public meetings, etc. This could include developing a list of key community contacts to help distribute information; spatial mapping technologies (with limited public access) could be of valuable. The communication plan should outline steps to ensure anxiety in the community is reduced by strengthening relationships between the community and agencies before and during events, such as small group or one-on-one conversations about people's experiences with the disaster and empowering the community to provide local knowledge and feedback on how the recovery process should proceed.
8. In conjunction with key emergency and recovery agencies, ensure that external funding is sought to (a) develop better predictive models for disasters in the Grampians region and (b) continue to establish better weather and flood warning systems for the Grampians region.
9. Infrastructure organisations (particularly local councils) to increase the involvement of key members of the community in the preparation and planning for future disasters. This should include the involvement of community members and community leaders from key areas in the Grampians (particularly Halls Gap) in planning for a whole-of-community response for future natural disaster events.
10. Councils, in partnership with other agencies, to develop a register of people located in high risk areas to facilitate the early identification of people and places most likely to be affected by future landslides or other disasters and better enable a timely response to help the most vulnerable. Spatial mapping of this information (not for public access) may be valuable.
11. Affected communities continue to prepare and plan for all natural disasters, including major natural disasters, to reduce their vulnerability to future disaster events. Preparation should include public education programs about all natural disasters including landslides, development of individual emergency plans for residents and business owners similar to, but not confined to, bushfire preparation plans. This will need the support of emergency and recovery organisations.

12. To support local businesses within the Grampians region to undertake greater planning for major natural disasters to better protect local business and ensure the safety of staff and customers during future natural disasters.
13. Tourism and business associations work together to promote the region and encourage visitors in the recovery phase of future disasters once the area is safe for visitors, to reduce the impact of lower visitor numbers on businesses.
14. Agencies involved in areas of potential landslides need to be very aware, informative and inclusive in their dealings with the local community (both residents and business). This can be achieved through strengthening partnerships between public agencies and private businesses and residents. Such public-private partnerships can build inclusiveness prior to any disaster by providing better information for more effective complexity modelling, and also allow the community and businesses to be better involved in response and recovery during the disaster and its aftermath.
15. There needs to be strong post-emergency legacy opportunities created through the generation of this information and using new technologies (via websites) and other media outlets. This needs to recognise the strong relief efforts during the disaster, but even more importantly, recognise the vastly improved and more extensive infrastructure through the Park for residents, tourists and professionals who value ecological and economic resilience.
16. Stronger economic resilience comes from diversifying from existing businesses and community activities by broadening what tourism represents in the region and to bringing in different business activity such as knowledge-based industries that value the ecological environment (e.g. geospatial mapping).
17. Need to measure how intangible costs are measured and risk assessments are conducted in a coherent, coordinated manner that is accepted by all stakeholders in potential areas of flooding and landslides. Financial stresses in governmental arrangements and in insurance claims stem from the lack of appreciation of landslides as disasters that have cumulative effects and build from initial minor events to quite significant economic outcomes. A risk assessment and resilience building officer should be employed across the major stakeholders to co-ordinate this activity.
18. That the current Erosion Management Overlay (EMO) be extended to include statutory planning controls for the landslide susceptible regions of the municipality. The EMO should adopt the methods of the Australian Geomechanics Society National Landslide Risk Management Framework.
19. That longer-term research projects into the likelihood of future landslide events and the consequences of these events on the natural environment are undertaken. These projects should be considered as collaborative opportunities with land managers, government agencies, emergency services and research institutions.
20. That the community continues to celebrate and mark the final recovery efforts following the 2011 natural disaster event and that a final celebration of all recovery efforts is organised to reflect the end of the complete recovery period.
21. That health and community organisations providing services to communities that have been affected by the Grampians natural disaster continue to monitor and regularly review mental and physical health indicators for ongoing social impacts from this disaster.
22. Continue to build resilience in the Grampians region by the emergency and infrastructure organisations and the community working together to achieve the recommendations from the Victorian Floods Review (Comrie, 2011) and from this report.