

Abstract

Effective animal evacuation strategies are imperative for comprehensive emergency management in rural and isolated communities. Community resilience significantly influences the success of these strategies. This research examined the critical role of social resilience networks to improve evacuation of livestock and community resilience in rural and isolated communities. The study took a qualitative approach to studied community members and animal emergency management stakeholders during 3 focus group discussions and workshops. These workshops were conducted in Moorland, Whittingham and the MidCoast Council area of the Hunter Region in New South Wales. The research confirmed that communities with strong and cohesive networks and relationships often deal with emergencies safely and supportive environments when emergencies arise and evacuation is required. The themes from community-led initiatives encompass social connections, communication management, preparedness, sensitisation and situational awareness. Establishing networks for mutual aid, involving the community in planning, promoting animal welfare and improving preparedness through education are recommended. These recommendations facilitate smooth animal evacuation and safeguard animals and the community. Creating an inclusive, participatory evacuation plan that takes into consideration community networks enhances emergency preparedness and evacuation.

THIS PAPER WAS PRESENTED AT THE GLOBAL ANIMALS IN DISASTER MANAGEMENT CONFERENCE IN JULY 2023.

Social resilient networks for improving animal evacuation in emergencies: rural/isolated community perspectives

Peer-reviewed
 Preprint
 1. Nitop...
 O. Isay...
 ORCID: 0000-0002-8091-4608

1. University of Newcastle,
 Newcastle, New South
 Wales.

SUBMITTED
 13 October 2023

ACCEPTED
 1 March 2024

DOI
www.doi.org/10.47389/39.2.14



© 2024 by the authors.
 License Australian Institute
 for Disaster Resilience,
 Melbourne, Australia. This
 is an open source article
 distributed under the terms
 and conditions of the Creative
 Commons Attribution
 (CC BY) licence (<https://creativecommons.org/licenses/by/4.0>). Information
 and links to references in this
 paper are current at the time
 of publication.

Emergencies and disasters have affected human and animal populations and often reshaped ecosystems and disrupted societal structures. During 2019 and 2020, the world experienced extreme bushfires, particularly in Australia, where over 3 billion animals were estimated to have perished or been displaced due to the ferocious blaze (Trigg *et al.* 2020). Subsequent years have been marked by severe floods that attributed to the deaths of hundreds of thousands of animals, according to Haque *et al.* (2021). In Australia, particularly in New South Wales, the loss had significant economic and environmental implications, including damage to farm buildings and equipment, loss of income, reduction in farmland values (estimated at \$2 billion to \$3 billion), loss of crops and more than 100,000 livestock deaths (about \$2 billion) and health effects from smoke inhalation by farmers and other food workers (at least \$279 million). As documented by Commonwealth of Australia (2020), nearly 3 billion animals were lost to bushfires, resulting in substantial economic hardships for farmers and affecting the overall agricultural sector while raising concerns about land degradation and environmental recovery efforts.

While disaster management strategies prioritise human safety, animals, particularly livestock, introduce challenges such as the lack of designated shelters or sanctuaries for evacuation as well as the logistical requirements and availability of transport to initiate evacuation. Unlike companion animals (pets), which can be evacuated along with their owners, large livestock animals present challenges due to their size, transportation requirements and care needs (Gurtner and Parison 2021). Consequently, farmers, especially those who manage large livestock operations, require a different approach to manage their stock safely and efficiently.

Community networks are important to facilitate evacuation management, especially for evacuating large livestock animals. This includes the ability to prepare for, respond, withstand and recover from adverse events while maintaining essential functions and social structures. In addition, it extends to livestock emergency evacuation, where the success hinges on the community's overall resilience. A community's capacity to coordinate, communicate and respond effectively influences the safety of human and animal populations (Adamson 2021). Understanding the interplay between livestock evacuation and community resilience is essential to develop evacuation management plans that safeguard the wellbeing of animals.

The vulnerability of farmers and challenges surrounding the evacuation of their animals has been growing in the academic discourse (Ogunmakinde, Egbelakin and Henderson 2023; Trigg *et al.* 2020). One aspect that exacerbates the predicament of livestock during disasters is the lack of safe places suited to evacuated animals and the predicted vulnerability to flooding and bushfires has been an issue (Ogunmakinde, Egbelakin and Henderson 2023). The Royal Commission into National Natural Disaster Arrangements recommended that evacuation plans be reviewed periodically and updated to account for the existence and standard of evacuation centres and safer places (Commonwealth of Australia 2020). Despite the growing recognition of the challenges associated with livestock evacuation, a paucity of research addresses this issue. While studies have examined specific components such as animal behaviour during evacuations and logistical challenges in moving livestock (Ogunmakinde, Egbelakin and Henderson 2023), few have explored the intricate relationship between livestock evacuation and community resilience. Understanding this connection will help to design evacuation plans that consider the needs of animals and communities.

Community networks in rural and isolated communities

Rural and isolated communities face events like flooding and bushfires that usually necessitate livestock evacuation. The impracticality of swiftly evacuating large animals exposes vulnerabilities of logistics, including transportation limitations and the specialised care required for animals during emergencies (Green 2019). The primary focus of farmers during emergencies is often to safeguard their animals and facilities before that of their homes. The emphasis on this can be traced to economic factors and cultural beliefs that prioritise safeguarding one's means of living and legacy (Green 2019; Ogunmakinde, Egbelakin and Henderson 2023). Further compounding these challenges is the lack of preparedness planning that could assist farmers navigate the complexities of evacuation (Heath and Linnabary 2015). Inadequate provisions for essentials such as livestock feed, water and access to emergency contact information all hinder timely and efficient response. The absence of support mechanisms that address farmers' mental health and fatigue also amplifies the dynamics of livestock evacuation.

Effective communication is crucial in disaster situations, particularly during livestock evacuation (Heath and Linnabary 2015). This is tied to community networks that are pivotal in remote communities to enhance preparedness, response and recovery efforts. These networks are vital channels to disseminate information, raise awareness and coordinate responses (Sufri *et al.* 2020). Community networks facilitate information dissemination and early warning systems, providing timely access to accurate data (Ahsan and Khatun 2020). Also, community networks can effectively identify local hazards, develop tailored mitigation strategies and nurture resilience



People and pets share a makeshift evacuation space during wild weather.

Image: Allison Thomson

(Kwok *et al.* 2019). Challenges such as social exclusion, resource disparities and communication barriers persist despite their importance (Lombardi *et al.* 2020). Addressing these challenges is imperative to harness the potential of community networks to safeguard isolated communities during disasters.

Social capital, encompassing resources within community relationships (Fraser, Aldrich and Small 2021), is a component of community networks. In addition, community connections and effective communication play important roles in preparedness and response (Johnston, Taylor and Ryan 2020). Community connections rooted in social capital foster cooperation and mutual assistance among community members. According to Fraser, Aldrich and Small (2021), when effectively interlinked, these elements enhance a community's capacity to withstand and recover from disasters. This integrated approach, supported by empirical research and practical experiences (Taylor, Johnston and Ryan 2022), strengthens the resilience of community networks and promotes effective risk reduction.

In isolated communities, the influence of prior disaster experience, severity and frequency on community connections and the priority of preparedness planning is evident. These communities, sharing similar socio-economic backgrounds, draw resilience from their historical exposure to hazards. Influenced by income levels and resource access, they foster grassroots initiatives and collaborative responses to address disaster challenges. Research shows that the recurrence and severity of past disasters influence community resilience (Tennakoon *et al.* 2023). The recentness of the event, coupled with a remote community's size and geographical distribution, significantly shapes the adaptive capacity for future events (Dhar *et al.* 2023).

Rural and isolated areas often have limited communication connectivity and have poor infrastructure that can hinder information dissemination and coordination in emergencies. This emphasises the need for tailored disaster management planning. This study explored the contributions of community networks to the successful evacuation of animals in emergencies and the role of community-led initiatives to achieve this goal.

Methods

This study used a qualitative research methodology to explore the perspectives of people in rural and isolated areas in New South Wales. Participants were invited via community Facebook pages, LinkedIn and by community leaders using their networks. Workshops, facilitated by the Lead Investigator from the University of Newcastle, lasted 2.5 hours and followed a semi-structured format based on pre-drafted questions. A purposive sampling approach provided diversity by incorporating livestock farmers, community members and emergency management stakeholders from 3 rural communities in the Hunter Region of New South Wales. The workshops were held at the Moorland Cottage, Whittingham Public Hall and in the MidCoast Council area. There were 79 participants in total who were involved in guided discussions and participatory activities to explore community resilience, communication strategies and evacuation approaches.

Data collection involved obtaining consent for audio recordings, with subsequent transcription essential for accuracy. Thematic analysis revealed recurring patterns and emerging themes, with a triangulation approach ensuring credibility. Member

Table 1: Community-led initiatives that enhances animal evacuation.

Themes	Workshop 1	Workshop 2	Workshop 3
Improving Social Capital/Community Connections	Develop hubs with 10 households/farmers each. Create alternative milking stations/evacuation places.	Designate contact persons to communicate with emergency services.	Appoint caretakers within hubs to ensure safety, food, feeds and water.
Communication Management	Understand situation awareness of events, including high grounds, monitoring river water levels, rising river basins.	Direct/designate contact persons for emergency services. Hold daily briefings to keep the community informed.	Use alternative communication methods such as satellite radio and UHF radios.
Community Preparedness	Plan ahead by strengthening community networks.	Conduct community audits and plan for preparedness resources.	Undertake adaptation measures, including local grassing/burning systems for livestock. Empower landowners with information and tools.
Sensitisation Program	Raise awareness of the benefits of risk reduction. Provide training for farm emergency planning, development and implementation.	Increase awareness among new entrants to the areas.	Conduct outreach programs to continually educate residents about disaster preparedness.

checking was employed to allow participants to provide input on preliminary findings and improve alignment with their lived experiences. Informed consent was obtained from all participants. Measures were employed to uphold anonymity and confidentiality so that the collected data was used exclusively for research purposes and in adherence to ethical guidelines.

There were limitations in this study. The sample size does not fully capture rural community diversity, however, the purposive sampling provided representation across demographics to enrich insights. The self-reported data reliance may introduce bias, but the workshops fostered openness and members checking improved alignment with reality. The 2.5-hour workshops limited topic exploration. As such, extending or conducting follow-up interviews could enhance data depth. While a diverse group of participants was involved, including other groups would add to a comprehensive understanding of resilience and response efforts.

The study received ethics approval from the Human Research Ethics Committee of the University of Newcastle (H-2023-0323).

Findings and discussions

This discourse examines the outcomes of the workshops into animal evacuation strategies during emergencies to foster social capital development, fortify community connections and implement effective communication. The findings show the methods derived from community engagement approach in relation to community networks. Table 1 shows the community-led initiatives discussed at the workshops that enhanced livestock evacuation.

The participants identified initiatives that address rural and isolated community challenges in emergency planning for pets and livestock. The initiatives include social capital/community connections, communication management, community preparedness and sensitisation as well as situation awareness. The workshop participants indicated that maintaining infrastructure, relying on oneself and working together, effective communication methods, community consultation and education, proactive hazard control and having a plan were highly important. The participants also recognised that specific approaches, such as reliance on authorities or technology, may not be effective during emergencies.

Social capital/community connections

The workshop's outcomes call for harnessing the potential of social capital and community connections as fundamental elements in effective animal evacuation. Central to these findings is establishing localised hubs encompassing 10 households or farmers, wherein a designated contact person coordinates emergency services and information dissemination. One of the participants in the workshop, from Whittingham community, said:

... the team or the commander of Singleton SES will get in touch with Whittingham Coordinator, then the Whittingham Coordinator will then send bulk SMS or email out to all our residents that have opted into the system... WP11.

This approach capitalises on existing social networks and fosters communication and collaboration during crises. This finding aligns with the theoretical underpinnings of collective efficacy, wherein communities with strong social ties are more likely to collaborate and mobilise resources during adverse situations (Wilkin, Biggs and Tatem 2019).

Communication management

Insights from the workshops underscore the pivotal role of communication and highlight that email and SMS are regarded as the most efficient tools to send timely, accurate information. However, it is crucial to acknowledge that this reliance on email and SMS communication hinges entirely on individuals having access to the internet, suitable devices and reliable connectivity. These factors are prone to failure and can significantly reduce the effectiveness of communication strategies. While this technology can deliver a sense of unity for residents and can provide people with access to the latest real-time updates, it relies on people's access to communication infrastructure and that infrastructure being available. This is not always assured in disaster events. However, one participant said:

We have found that during this time, email and SMS is the most efficient and effective form of communication, residents all receiving information at exactly the same time. And it also allows us to keep the phone lines open in case there's an emergency or something else we need to realise, will also send out notifications on flood level warnings that have not been advised yet. So, the residents know that they're all accessing the same information and they know that it's the most recent update as well. We're covering a sphere with the phone tree with all the time before the information passed down the chain. The new information was filtering through and will give you the right information at the right time. WP2.

Apart from designating specific individuals as points of contact, using alternative communication methods such as satellite radio and UHF radios were recommended to ensure information flow in case of loss of landline and mobile phone service. Daily briefings were also considered essential to keep people updated of the evolving situation.

These findings align with Sharma *et al.* (2021) and emphasise that community engagement, fortified by social networks and effective communication, is pivotal to improve animal evacuation planning and to foster resilience. Integrating local knowledge and preparedness measures also enhances the community's capacity to respond.

Community preparedness

The workshop's outcomes show the importance of proactive community preparedness activities. Strengthening community networks and providing landowners with knowledge and tools were strong recommendations. Community audits to assess resources and capacities and implement adaptation measures, such as introducing controlled burning systems for managing

vegetation in livestock grazing areas, were suggested to mitigate hazards and enhance preparedness. One workshop participant said:

... as a farmer and landholder, I've come to realise the true value of being proactive in safeguarding our community and our livelihoods. We didn't wait for emergencies to strike; we planned ahead by strengthening our community networks, conducting thorough community audits to assess our resources, and meticulously planning for the worst. WP3.

To acknowledge the relevance of community preparedness, another participant from the perspective of their rural/isolated community said:

...we knew we had to take concrete action to protect our livestock and our land. So, we undertook adaptation measures, including implementing local grassing and burning systems tailored to our specific needs. These measures weren't just about mitigating hazards; they were about preserving our way of life. WP6.

These findings resonate with the concept of resilience theory, which underscores the significance of adaptive capacities within communities (Cafer, Green and Goreham 2022). The implications highlight that proactive community preparedness is crucial and involves network strengthening and empowerment. Community audits and adaptation measures identify local risks and hazards so they can be mitigated. This approach aligns with fostering the adaptive capacities of communities to address vulnerabilities and risks.

Sensitisation program

Raising awareness was a critical aspect of the workshop's outcomes. Participants stressed that sensitising long-term residents and newcomers about risk reduction activities would help prepare communities for (hopefully) rare disaster events. Using consultations and specialised training programs for farm emergency planning was considered vital to integrate local knowledge into response and recovery planning (Government of New South Wales 2021; Shmueli, Ozawa and Kaufman 2021). One participant said:

... as a dedicated landholder in our community, I have witnessed firsthand the transformative power of raising awareness about the benefits of risk reduction. We did not just keep this knowledge to ourselves; we shared it far and wide. We further trained fellow landholders on the intricacies of farm emergency planning, from development to implementation. It was gratifying to see how this training increased awareness, especially among newcomers to our area. We welcomed them with open arms and ensured they were well-prepared for whatever challenges lay ahead. WP12

This resonates with participatory approaches to risk reduction and emphasises the local perspectives in decision-making processes (Islam, Abd Wahab and Benson 2020).

Conclusion

This study provided insights into the role of community-centric strategies that can help improve outcomes for animal evacuation. Communities can fortify their resilience and response capacities by leveraging social capital, refining communication management, bolstering community preparedness and increasing awareness. This contributes to the ongoing discourse on community engagement and participatory approaches in disaster management and serves as a bridge between theory and practical implementation. The study revealed that community-led initiatives have demonstrated their potential to enhance animal evacuation. Effective response strategies, communication management, community preparedness and sensitisation efforts are vital to this success. These findings reinforce the need for integrated approaches that combine community resilience with effective animal evacuation planning.

There are some practical recommendations from the analysis of data collected in this study. These include establishing social networks to identify and mitigate vulnerabilities and to foster mutual assistance. Community participation in resilience planning and recovery processes is also essential and builds a collaborative environment. Prioritising animal-related awareness campaigns, effective engagement methods and education can enhance preparedness. In addition, effort should focus on protecting animal health and welfare in rural contexts to align with broader resilience goals. Lastly, strengthening information dissemination and awareness is recommended to bolster overall preparedness to help communities manage livestock evacuation and disaster response.

Acknowledgment

This research is part of a larger project funded by the Australian Government. The authors express special thanks to project team members and individuals who contributed to this data collection process, the Hunter Local Land Services team as well as the 2 anonymous peer reviewers for their insights and suggestions.

References

- Adamson C (2021) *Synergies between social work, disaster management and animal inclusive practice*. *Australian Journal of Emergency Management*, 36(3):26–27. <https://doi.org/10.1080/10888700801925612>
- Ahsan MN and Khatun A (2020) *Fostering disaster preparedness through community radio in cyclone-prone coastal Bangladesh*. *International Journal of Disaster Risk Reduction*, 49, 101752.
- Cafer A, Green J and Goreham G (2022) *A community resilience framework for community development practitioners building equity and adaptive capacity*. In *Community Development for Times of Crisis*, pp.56–74. Routledge.

- Commonwealth of Australia (2020) *Royal Commission into National Natural Disaster Arrangements - Report*. Retrieved: www.royalcommission.gov.au/natural-disasters, 27th January 2022.
- Dhar T, Bornstein L, Lizarralde G and Nazimuddin S (2023) Risk perception—A lens for understanding adaptive behaviour in the age of climate change? Narratives from the Global South. *International Journal of Disaster Risk Reduction*, 95, 103886.
- Fraser T, Aldrich DP and Small A (2021) Connecting social capital and vulnerability: Citation network analysis of disaster studies. *Natural Hazards Review*, 22(3):04021016.
- Government of New South Wales (2021) *NSW Recovery Plan*. Retrieved: www.nsw.gov.au/sites/default/files/2021-04/Supporting-Plan-Recovery.pdf.
- Green D (2019) *Animals in disasters*. Butterworth-Heinemann an imprint of Elsevier.
- Gurtner Y and Parison S (2021) Promoting owner responsibility for pets in disasters. *Australian Journal of Emergency Management*, 36(3):37–43. Retrieved: <https://knowledge.aidr.org.au/resources/ajem-july-2021-promoting-owner-responsibility-for-pets-in-disasters/>.
- Haque MK, Azad MAK, Hossain MY, Ahmed T, Uddin M and Hossain MM (2021) Wildfire in Australia during 2019–2020, Its impact on Health, Biodiversity and Environment with Some Proposals for Risk Management: A Review. *Journal of Environmental Protection*, 12(6):391–414. <http://dx.doi.org/10.4236/jep.2021.126024>
- Heath S and Linnabary R (2015) Challenges of Managing Animals in Disasters in the U.S. *Animals*, 5(2):173–192. <https://doi.org/10.3390/ani5020173>
- Islam E, Abd Wahab H and Benson OG (2020) Structural and operational factors as determinant of meaningful community participation in sustainable disaster recovery programs: The case of Bangladesh. *International Journal of Disaster Risk Reduction*, 50, 101710.
- Johnston KA, Taylor M and Ryan B (2020) Emergency management communication: The paradox of the positive in public communication for preparedness. *Public Relations Review*, 46(2):101903. <https://doi.org/10.1016/j.pubrev.2020.101903>
- Kwok AH, Becker J, Paton D, Hudson-Doyle E and Johnston D (2019) Stakeholders' perspectives of social capital in informing the development of neighborhood-based disaster resilience measurements. *Journal of Applied Social Science*, 13(1):26–57.
- Lombardi M, Lopolito A, Andriano AM, Prosperi M, Stasi A and Iannuzzi E (2020) Network impact of social innovation initiatives in marginalised rural communities. *Social Networks*, 63:11–20.
- Ogunmakinde OE, Egbelakin T and Henderson R (2023) Evaluation of Animal Safe Places for Emergency Evacuation in the Hunter Region of New South Wales, Australia. *International Journal of Disaster Resilience in the Built Environment*, 14(4):553–576. <https://doi.org/10.1108/IJDRBE-10-2022-0106>
- Sharma K, Anand D, Sabharwal M, Tiwari PK, Cheikhrouhou O and Frikha T (2021) A Disaster Management Framework Using Internet of Things-Based Interconnected Devices. *Mathematical Problems in Engineering*, 2021(5):1–21. <http://dx.doi.org/10.1155/2021/9916440>
- Shmueli DF, Ozawa CP and Kaufman S (2021) Collaborative planning principles for disaster preparedness. *International Journal of Disaster Risk Reduction*, 52, 101981.
- Sufri S, Dwirahmadi F, Phung D and Rutherford S (2020) Enhancing community engagement in disaster early warning system in Aceh, Indonesia: opportunities and challenges. *Natural Hazards*, 103, 2691–2709. <https://doi.org/10.1007/s11069-020-04098-2>
- Taylor M, Johnston KA and Ryan B (2022) A community engagement approach to natural hazard communication. *The Handbook of Crisis Communication*, Chapter 22, pp.327–342. <https://doi.org/10.1002/9781119678953.ch22>
- Tennakoon K, Serrao-Neumann S, Hanna C and Cretney R (2023) Enhancing disaster risk governance for small-scale recurring disasters through pre-determining emergency response and recovery entry points for improved social outcomes. *International Journal of Disaster Risk Reduction*, vol 97, 104022. <https://doi.org/10.1016/j.ijdrr.2023.104022>
- Thompson K, Every D, Rainbird S, Cornell V, Smith B and Trigg J (2014) No Pet or Their Person Left Behind: Increasing the Disaster Resilience of Vulnerable Groups through Animal Attachment, Activities and Networks. *Animals (Basel)*, 4(2):214–240. <https://doi.org/10.3390/ani4020214>
- Trigg J, Taylor M, Mills J and Pearson B (2020) Examining national planning principles for animals in Australian disaster response. *Australian Journal of Emergency Management*, 36(3):49–56. <https://doi.org/10.47389/36.3.49>
- Wilkin J, Biggs E and Tatem AJ (2019) Measurement of social networks for innovation within community disaster resilience. *Sustainability*, 11(7):1943.

About the authors

Temitope Egbelakin is a Professor of Construction Management/Disaster Resilience at the University of Newcastle, Australia. Her research interests include disaster resilience, smart and resilience cities, informatics and maintenance and adaptive reuse of buildings.

Olufisayo Adedokun is a doctoral researcher at the University of Newcastle, Australia. He is a professional quantity surveyor with a passion for disaster management.