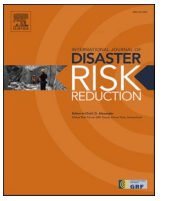
International Journal of Disaster Risk Reduction 105 (2024) 104366

Contents lists available at ScienceDirect

International Journal of Disaster Risk Reduction

journal homepage: www.elsevier.com/locate/ijdrr



Innovation and deadlock in governing disasters and climate change collaboratively - Lessons from the Northern Rivers region of New South Wales, Australia

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ARTICLE INFO

Keywords:
Disaster governance
Collaborative governance
Locally-led
Disaster risk reduction
Climate change adaptation
Participatory governance

ABSTRACT

Both scholars and global policy point to the need for, and effectiveness of, locally-led and collaborative disaster and climate change practices. However, there is a need for analysing how these collaborative approaches are developed and used in practice in different contexts. This paper outlines the use of collaborative approaches by a climate change and disaster community of practice across seven local government areas in the Northern Rivers region, New South Wales, Australia. The region has experienced multiple large-scale flood and bushfire disasters since 2017. This ethnographic study uses established collaborative governance and adaptive governance theoretical frameworks to draw findings from: lived experiences of researchers, 22 interviews with diverse stakeholder groups, in-person and online events and the first author's research diary. The findings indicate that collaborative practice in response to disasters and climate change has resulted in both effective outcomes and multi-dimensional challenges, which have lasting implications for communities across the Northern Rivers region. Three critical leverage points for enhanced collaboration and effectiveness were identified. First, improved use and flow of information such as climate projections and place- and needs-based information. Second, mindset shifts that value community knowledge and contributions, and improved practice through enhancing skills in community development and community-led recovery in disaster and climate change practitioners. Lastly, collectively moving from reactive to proactive responses to climate change and disasters. These insights provide an opportunity for improving the design of community-based risk reduction programs and multi-stakeholder governance arrangements into the future, in the state of New South Wales and beyond.

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https://doi.org/10.1016/j.ijdrr.2024.104366
Received 12 September 2023; Received in revised form 14 February 2024; Accepted 1 March 2024
Available online 7 March 2024

1. Introduction

Convened in 2022, the UN Global Disaster Risk Reduction Platform stressed that effective governance and coordination arrangements between stakeholders plays an important role in traversing siloes to "stop the spiral of increasing disaster impact and risk" [1]. Recent climate change literature also stresses that 'how we govern' is critical to high order interventions that can address the root causes and impacts of climate change (for example Morrison et al. [2]). Likewise, the recent Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report (2022) [3] called for the creation of multi-stakeholder 'solution spaces' to transition to more climate resilient development pathways and a net zero emissions future. In short, there is a trend towards advocating for multi-stakeholder governance arrangements – also referred to as 'collaborative governance' - for addressing growing climate change and disaster risks. However, there is a need for analysing how these collaborative approaches are actually developed and used in practice in different contexts, especially at the local level where disasters and climate change are acutely felt [4–6].

In addition to an emphasis on collaborative forms of governance, global policy frameworks such as the Sustainable Development Goals [7], the Sendai Framework for Disaster Risk Reduction [8] and the Paris Agreement [9] stress the role of local level actors in achieving the aims of the frameworks. The international donor and humanitarian community made a commitment to speeding up a localisation agenda at the World Humanitarian Summit in 2016, summarised in the 'Grand Bargain' (Inter-Agency Standing Committee [10]). Reviewed in 2021, parties agreed to ensure that "greater support is provided for the leadership, delivery and capacity of local responders and the participation of affected communities in addressing humanitarian needs" ([11], pg.1). The role of local actors and communities as agents of change for risk reduction is also well represented in the academic literature across geographies [12–15].

In 2018, the Australasian Fire and Emergency Services Council warned that climate change may cause cascading events that challenge the capacity of existing organisational structures and reveal their inadequacy in the face of increasingly complex scenarios. Subsequently, the east coast of Australia experienced successive widescale disasters, including mega-fires in 2019/20 (the 'black summer'), and wide scale flooding in 2022, challenging many assumptions about how emergencies are and should be managed [16]. A Bushfire Royal Commission into the black summer highlighted the need for improved and less siloed governance arrangements as well as for communities to accept that they will need to step up when emergency services are insufficient. "In significant emergencies and disasters, emergency management personnel do not, and never will, have the capability and capacity to solve the emergency threat for every individual at risk" [17]. This gap in support is potentially exacerbated by a shift in policy by the Australian Defence Force in the recent Defence Strategic Review [18] towards an increased focus on the threat of conflict, and less on assisting Australian states and territories with disaster response and recovery [19].

The question is how to ready the Australian and other populations for an increasingly hostile climate, including one where communities may be left to fend for themselves. Another question is also how best to adapt existing governance and decision-making structures to address root human contributions that are exacerbating risk such as building in the midst of increasingly volatile forests and on flood plains [20]. Australian disaster-related practice certainly points to a trend in the need for and implementation of community-led risk reduction approaches [21–25]. The need for research on linking community-led (informal) and government-led (formal) has also been noted [25]. Global trends also suggest an important part of the solution lies in collaborative governance approaches that draw upon the resources of a range of stakeholders. Examples of studies on the practice of localised collaborative forms of governance in disaster and climate change in Australia include [26–29 and elsewhere examples include and [30–33].

In summary, collaboration and partnerships are much lauded foundations for addressing the wicked problems of climate change and disasters [34], including implementing global frameworks and realising government policies. Locally based organisations, businesses, governments and community networks are also the bedrock of localisation agendas. How local actors participate in, and practice, collaborative governance in a climate change and disaster context is, however, an under researched area.

The study reported here investigated what forms of collaborative governance are being practiced at the local level in Australia – covering civil society (including for example communities, community-based organisations, universities and non-government organisations), government agencies and private sector entities. The Northern Rivers region of New South Wales (NSW) - a region long synonymous with thinking and acting 'outside the box' [35] – is used as the site of this research. This study asked:

What are the characteristics and outcomes of local level collaboration for addressing climate change and disasters in the Northern Rivers region, and which factors might further enhance their effectiveness?

The research aimed to provide insights into the types of governance and systems related attributes needed to enable not just the Northern Rivers, but Australia and other countries, to anticipate climate change and future large-scale disasters. This was achieved through collecting reflections of researchers and a community of practice across seven local government areas, based on in-situ involvement in climate change action, disaster response and community risk reduction. This paper argues that collaborative governance in the Northern Rivers is being driven by a shadow network of innovation [36], forced in part by the enormity of the scale of climate change and disasters and the failure of the existing governance system to anticipate these emerging realities. The paper outlines suggestions from a broad range of local actors on factors that could support self-efficacy and connect formal and informal networks of action. These leverage points can be used to improve multi-stakeholder governance systems and outcomes, and transition actions from the current reactionary state to a more proactive anticipation of future climate.

The paper first presents the conceptual framework of collaborative governance and adaptive governance used in this study to investigate collaborative practice in the Northern Rivers. Next, the ethnographic research design is described, including reflections on being concurrent researchers, residents and local actors in the midst of disasters. Results are presented according to broad components of established collaborative governance frameworks (Ansell and Gash [37] and Emerson et al. [38]), including a summary of the starting conditions, design, process, outcomes and system interactions that take place in collaborative processes that aim to address climate change and disasters within the Northern Rivers. This is followed by a discussion of key insights from the results and

conclusions, including reflections on the study's limitations and suggestions for future research and practice.

2. Key concepts, analytical frameworks and research design

2.1. Key concepts

At international, national and Australian state and territory scales, policy responses to climate change and disasters incorporate a broad range of processes, platforms and often siloed approaches [39,40]. However, at the local level, stakeholders are more interconnected, and communities experience these processes, impacts and solutions as a continuum [41,42]. At the community level, citizens in Australia feel they are in a constant state of disaster impact, recovery, and thinking through longer term adaptations (such as should they leave their location permanently) [43]. To many, climate change and disasters can't be managed separately, hence this paper focuses on reflections on collaborative approaches to addressing both at the local level.

Similarly, while addressing adaptation, greenhouse gas mitigation, sustainable development and disasters simultaneously is a policy conundrum, the interconnection of these concepts and approaches are indeed required to transform societies to adjust to the climate challenge [34,44]. The Intergovernmental Panel on Climate Change define climate resilient development pathways as "trajectories that strengthen sustainable development, and efforts to eradicate poverty and reduce inequalities while promoting fair and cross-scalar adaptation to and resilience in a changing climate. They raise the ethics, equity and feasibility aspects of the deep societal transformations needed to drastically reduce emissions to limit global warming …" ([3] pg. 2917). Previous research has highlighted that this integrated approach "will minimize overlap and duplication of projects and programmes, result in more efficient approaches, reduce administrative burdens and increase the potential to consider multiple goals simultaneously" [45]. Although ambitious, this paper has sought perspectives from a community of practitioners who are involved in oftentimes overlapping collaborative approaches at the local level to address climate change, disaster and sustainable development challenges. As vulnerability and risk are unifying terms in the fields of climate change and disasters [3], we will use the term 'risk reduction' in the reporting of this research unless referring to a name. This will also enable terminology used in this paper to be in alignment with the Sendai Framework for Disaster Risk Reduction [8].

2.2. Collaborative and adaptive governance frameworks

This study uses a collaborative governance conceptual framework that has been tested in previous research in the Pacific Islands region [46]. The framework draws upon the theoretical work of collaborative governance scholars Ansell and Gash [37] and Emerson et al. [38] and is further elaborated with the results of an extensive literature review (see Table 1). The topic of collaborative governance tends to appear as theory in public administration and public management disciplines, though it is applied to a broad range of issues such as health, environment and water management. The definition used for this research by Emerson et al. is purposefully broad and unlike Ansell and Gash [37] does not limit itself to formal structures:

> *"the processes and structures of public policy decision making and management that engage people constructively across the boundaries of public agencies, levels of government, and/or the public, private and civic spheres in order to carry out a public purpose that could not otherwise be accomplished"* ([38], pg. 2).

A collaborative governance framing is useful for this research as the authors aim to understand *how* collaboration is being practiced in the Northern Rivers. Hence the study focuses on the processes of collaboration. These include the starting conditions, design,

Table 1
Key components of collaborative governance theory (developed from Ref. [46]).

Key components of collaborative governance arrangements (Ansell and Gash [37] and Emerson et al. [38])	Key considerations emerging from collaborative governance literature used to investigate collaborative practice in the Northern Rivers
1. Starting conditions	- Incentives or motivations for involvement (for example broader level macro governance and organisational influences [47]) - Power and/or resource imbalances (for example through discourse, gender dimensions [48] and formal authority [49]) - Trust [37]
2. Design	- Types (for example description of broad approach and detailed activities, including the level of formality) [37] - Participation (for example who attends from which types of organisations and communities) [50]
3. Process	- The key components of the process itself (often cyclical and can include for example partnership formation/trust-building, strategy development through dialogue and implementation and evaluation of outcomes [51] as well as administration or 'meta-governance' of the process [52])
4. Outcomes	- Multidimensional outcomes (these can include outcomes related to the problem being addressed, the process itself, organisations, participating individuals, non-participating stakeholders/citizens, and unexpected outcomes in a wider system context) [51]
5. System	- Relationship between the collaborative process and the wider system that it operates in (influence on and influence by the wider system) [38] e.g. Influence of broader social, political and cultural settings [53] and disaster and climate risk context [4]

collaborative process, outcomes and system interactions. As defined by Ansell and Gash "starting conditions set the basic level of trust, conflict, and social capital that become resources or liabilities during collaboration" ([37] p. 550). This research focuses on three major components of *starting conditions* that can infiltrate the entirety of the collaborative process: motivations for involvement in collaborative processes, power and/or resource imbalances and trust between participants. In *designing* collaborative arrangements, more formalised collaborations might be characterised by dedicated by-laws or appear in government policies and plans, have a fit-for-purpose website, an organisational structure and formalised meeting agendas and minutes [54]. However, Stout and Love ([55], p. 131) caution the over reliance on highly prescriptive governance arrangements because informal spaces allow a level of inter-personal dynamics "where creative process occurs". Hence the level of formality of collaboration is investigated in this research.

Scott and Thomas ([47], p. 192) describe collaborative governance as "a toolbox that policymakers and managers wield for public problem solving". In this sense, it is not one prescriptive *process*, but a set of many approaches that can be used. Linked with the collaborative process is the resulting *outcomes*. Outcomes can be multidimensional and includes both benefits and challenges. For example, outcomes can range from the level of participation by individuals, through to organisational outcomes through to addressing a jointly shared problem through structural changes. Outcomes can be intended or unintended [51]. The final attribute that can influence a collaborative arrangement is wider systemic factors such as the rationale for a collaboration taking place. These can assist in enabling the outcomes of a collaboration (for example through political will) and also represent a broad set of factors that can hinder a collaborative process [38].

Disasters themselves provide 'windows of opportunity' in which to transform governance systems [36]. Given the emphasis in policy documents on the need to adapt governance systems to align with emerging climate realities, this paper (particularly in the discussion) also draws upon the conceptual framing of adaptive governance. The concept of adaptive governance has emerged in the past two decades, born out of a need for more effective governance of complex environmental problems and better management of the interactions between social and ecological systems to address them [56]. Key characteristics of adaptive governance from the literature are summarised in Table 2.

2.3. Research design

This research employs an ethnographic approach which is specifically recommended for investigating the practices of collaborative governance and location specific research [37,59]. Three of the authors lived within the Northern Rivers region of NSW, and the three remaining visited the region soon after the major flooding events in 2022. Numerous methods, including research diary, online and in person events, recordings of public flood hearings held by the NSW State Government and semi-structured interviews were utilised to collect a range of data source types. Data were then triangulated and cross checked (Table 3).

Data were collected from a community of practice across seven local government areas (Tweed, Byron, Ballina, Lismore, Kyogle, Richmond Valley and Clarence Valley– see Fig. 1), based on the participant's in-situ involvement in climate change action, disaster response and community risk reduction. The authors deliberately recruited interviewees originating from a spectrum of stakeholder types and geographical areas to garner diverse perspectives on the practice of collaboration. Table 4 outlines the distribution of stakeholder type across the 22 interviews (16 identified as female, 6 male). First People's perspectives were incorporated across all data collection methods. Due to the embeddedness of the researchers within the Northern Rivers, there were no significant challenges in recruiting interviewees from the region using a combination of purposive and snowball sampling. Snowball sampling enables access to wider networks through cumulative trust rather than cold calling prospective participants and draws upon unique information that specific people with experience and expertise can provide rather than perspectives from the general population [60,61]. However, requests for interviews with state government representatives in the state's capital, Sydney, went unanswered. These deficiencies, and risks of bias from snowball sampling [60] were countered through using transcripts of publicly available online footage of state government agency responses to the NSW flood inquiry held in Sydney. Drawing upon 26 h of transcripts from these public hearings also enabled perspectives about collaboration to be gathered from a much wider range of stakeholders and geographies outside author networks.

An interview guide was developed based on the collaborative governance framework outlined in this paper. Interview participants were asked broad questions relating to their perceptions of collaboration, followed by asking them questions in relation to examples of climate change and disaster-related collaborations that they'd been involved with in the Northern Rivers. For example, questions related to how power played out, design characteristics, outcomes and how broader systemic dimensions interacted with their

Table 2
Key elements of adaptive governance theory.

Characteristic	Detail
Polycentricity	The need for multiple levels of power and decision making to interact "Collaboration of a diverse set of stakeholders, operating at different levels, often through networks from local users to municipalities, to regional and national organisations, and also to international bodies" ([57], pg. 447)
Governing to the scale of the problem	Institutions and networks aligning with the location/scale of the problem/ecological system (across political, jurisdictional boundaries) ([57]; [36])
Reflexivity	Incorporating scientific and local knowledge to foster social learning and adapt responses. "Needs shared in networks can help central authorities allocate resources to support what worked on the ground" ([58] pg. 307)
Shifting power downwards	A move away from centralised, top-down decision making [58]. "Devolution of management rights and power sharing that promotes participation" ([57] pg. 449).

Table 3
Range of methods employed in this ethnographic study of collaborative governance[1].

Method	Extent	Abbreviation in results	Detail
Research diary (first author)	2020–2023	R	Noting insights from research and experiences in the Northern Rivers during that time period.
Notetaking at public disaster/climate change themed events occurring in the Northern Rivers	15 events 2019–2023	E	Notes from public events, including events run through Resilient Byron such as the Resilience hub at Renew Fest 2021 in Mullumbimby and the 'Resilience and Regeneration Roadshow' which involved public discussions during February–April 2021.
Notetaking at online public events (in some cases due to COVID-19 restrictions)	12 2020–2023	W	Notes from 12 web based events, including podcasts featuring Northern Rivers perspectives.
Transcripts from 5 public hearings of the 'Select Committee on the Response to Major Flooding in New South Wales'	5 videos recorded in March 2022	V	Over 26 h of footage from five separate recordings were transcribed, coded and analysed. This footage incorporated public hearings in Lismore, Murwillumbah and Ballina and two events at Parliament House in Sydney.[1] These hearings contained statements from politicians, government agencies, the flood affected public, First Nations groups, non-government organisations, businesses, and community organisations as well as responses from these stakeholders to questions from the Committee.
Semi-structured interviews	22 (between 45 min to over 1 h)	P	Interview participants (P) were recruited based on pursuing a range of perspectives on multi-stakeholder collaborations. Interviewees and in some cases event panellists provided useful suggestions and introductions for recruitment to ensure representation across geographies and organisation types.

Fig. 1. Location of the Northern Rivers, NSW within Australia (© CSIRO Australia) [62].

collaborative initiatives. Research adhered to strict Australian research ethics protocols with human ethics approval to undertake the research (including with First Nations participants) (GU Reference number 2019/445).

Results were coded in the software program N-Vivo (version 12) using deductive coding into high level themes using the collaborative governance framework presented in section 2. Inductive coding was then used to further reduce data into a series of sub-headings based on the emergence of findings [63]. A summary of the research project's codebook appears in Appendix 2.

Table 4
Number of interview participants organised by stakeholder group and broad area of work (to ensure anonymity).

Stakeholder group	Area of work	Participants	Total
1. Business and industry	Small enterprise	2	3
	Medium enterprise	1	
2. State government	Climate change and disaster related	3	3
3. Local government	Disaster recovery	3	3
4. Non-government organisation	Disaster	2	4
	Environment	1	
	Community	1	
5. Community based organisation	Community associations	2	3
	Education	1	
6. Politician	Local government Councillors	2	2
7. Academic	Governance	1	1
8. Citizen	Community organiser	3	3
			22

2.4. Researcher positionality: living with disasters

The research took place throughout the period 2019–2023. The authors, their families and their communities navigated extremely challenging conditions throughout this period, including fires in October 2019 and floods in 2022. Between these two climatic events, the global COVID-19 pandemic raged, leading to numerous lockdowns and ongoing restrictions. Being embedded in the local communities in which the disasters took place meant that researchers could better understand the lived experience of participants in the study as they were also experiencing these themselves. For example, the conditions during this research limited access to some interviewees who were too traumatised by events to participate. The personal experiences of researchers who lived through the series of events have given this research unique insights that have been captured alongside the insights of research participants. However, to reduce bias, personal insights were crosschecked with interview participants, public documents, and other material available for analysis. Meetings between researchers routinely discussed and reflected on 1) the experience of participants in the study (anonymously) and 2) the local and state governance processes which were known and regularly input into by researchers. These were documented and used later to synthesise researcher perspectives on the research question. Ethnographic or embedded research also has limitations such as potential for bias and subjectivity and is difficult to replicate [64]. Through making conscious efforts to address this bias through collecting non-personal data sources and collating reflections from public hearings and events, the benefits of ethnography were drawn upon while addressing limitations that could affect the research outcomes.

3. Research context: Northern Rivers – rolling hills, rolling disasters

The Northern Rivers region is the coastal north-eastern corner of NSW, Australia, with a strongly growing population of about 550,000 people at the time of this research [65]. The region is drained by three major rivers: the Richmond, Tweed and Clarence (see Fig. 1). Much of the area was originally covered with dense rainforest which attracted timber getters in the mid 1800s and then dairy farmers who further cleared the land as part of a purchase deal under the Robertson Land Act 1861 [66]. Settlements like Lismore, Grafton and Murwillumbah developed along the rivers as service centres and transport hubs. Sea ports were established at the settlements of Ballina and Byron Bay. Over time traditional industries were largely replaced by tourism. The demographics of the region have also changed as alternative life-stylers, surfers, sea changers and urban professionals have made the region their home. Byron Bay, for example, has evolved from a town dependent on a whaling station and abattoir to an internationally renowned high-end resort town.

The proximity to rivers and flood plains meant that towns and farmland flooded regularly. In the mid 1950s and again in the mid 1970s record floods occurred, with a near record event occurring in 2017. These floods inundated towns, damaged infrastructure and transport throughout the region, made people homeless and reduced incomes from farming and other industries. After WWII and the 1950s floods, formal inquiries were undertaken and systematic efforts were established to implement the recommendations. New construction authorities were established that focused on levees, drainage works and pumping stations. For example, Grafton on the Clarence River has been protected by a major levee since 1967 (although this protection did not extend to South Grafton). Small levees offer some protection for parts of the Murwillumbah central business district where flooding is relatively shallow due to the extensive floodplain. Lismore proved more challenging. Different parts of the city, including the Central Business District (CBD), received different levels of protection. Despite numerous recommendations to do so [67], local authorities did not use their planning powers to reduce exposure to flood risk [68–70].

3.1. The case of Lismore

Lismore is one of the most flood prone cities in Australia [71]. Its location next to the confluence of the Wilson's River and Leycester Creek ensures frequent deep flooding with limited warning time. Despite a First Nations history of floods, Lismore's floodplain has become home to some 2000 houses, 800 businesses, schools and key infrastructure such as the Norco milk factory. Following the 1954

[1] https://www.youtube.com/playlist?list=PLb7SKvfgKNwYKVbOv4fBTX2UizaWVHK7y.

flood enquiry, small levees and related measures were put in place. The post-1974 record-flood period saw a floor level requirement placed on buildings, road raising to give more time for evacuations, and a small-scale property acquisition program targeting the lowest lying areas. Unfortunately, the local council did not rezone the purchased areas. However, an alternative flood-free town centre was established on high ground at Goonellebah [67]. Reports argued that emergency planning still needed to consider a likely maximum flood level of about 14 m (AHD) [67]. This is now estimated at 16 m [68]. Further flood reports reiterated earlier findings. In 2005 a levee was built to provide 1:10 year protection for the CBD and larger levees were again considered. A near record flood in 2017 led to robust community commentary on the need for better flood risk reduction (see, for example, Lismore Citizen's Review [72]). Flood insurance gradually became available last century, yet due in part to successive flood disasters and associated rising prices, this remains out of reach for many [73].

3.2. Climate change in NSW

Temperatures in eastern Australia have already risen 1.4–1.6C [74]. Warmer air holds more moisture, resulting in the potential for increased flood intensity [74,75]. Cyclone tracks are shifting poleward, "with potentially serious consequences for south-eastern Queensland and north-eastern NSW" ([76], pg. 15). Conversely, due to climate change droughts are set to increase in intensity, frequency and duration in NSW [74]. In 2019 for example, NSW recorded its lowest ever annual rainfall, just 55% of its average [77]. A series of Integrated Regional Vulnerability Assessment (IRVA) workshops in the North Coast region of NSW in 2016 [100] highlighted that with worsening hazard extremes, climate change will exacerbate existing economic, social and environmental vulnerabilities. Impacts cited in the report included situations where food and fuel supplies are cut, roads destroyed, emergency services are stretched, as well as loss of life and biodiversity.

Findings of a 'Resilience and Regeneration Roadshow' held across five locations in the Byron and Ballina local government areas in 2021 demonstrated that there was common concern amongst citizens for flood and fire hazards (see Appendix 3). This included concern for the potential to be cut off without outside support and information (communications down, food chain cut off). Social vulnerabilities such as the housing and the mental health crisis linked to the COVID-19 pandemic also featured prominently in public discussions. These concerns are also reflected in the wider Australian public; up to 72% of respondents to a national climate change survey in 2022 felt "either 'fairly' or 'very' concerned about the effects of climate change" ([78] pg. 5).

3.3. Recent disasters

In the week up to March 3, 2022, parts of northern NSW received over 1 m of rainfall – a scenario where climate projections became reality. This 'rain bomb', associated with a persistent La Nina event in the Pacific region [75] caused one of the most devastating disasters in Australia's written history. To compound the impact, this flood event followed two years of a global pandemic during which Sydney and often NSW as a whole were at the epicentre of contagion in Australia. These events were preceded by the 2019 bushfires which saw the bushfire season begin in July 2019 and end in March 2020, a total of 240 days of active bushfire threat [79]. It was so dry that ancient World Heritage rainforest burned in the hills to the north of Lismore. Preceding that, in 2017 widescale flooding occurred in the Northern Rivers region, associated with ex-tropical cyclone Debbie.

The scale and nature of the 2022 flood event took even the most prepared citizens by surprise [91]. Businesses who moved their stock to higher ground still had it destroyed by unprecedented flood water. Houses above the 'flood line' in Lismore were inundated. Whole roads and houses were pummelled by hundreds of landslides and boulders, leaving people trapped in mud and subsequently cut off from assistance for periods of up to six weeks. In Lismore, a flood more than 2 m higher than the previous record occurred, with shocked residents left clinging to their roofs. Warning systems proved inadequate and the capabilities of both emergency agencies and the public were overwhelmed. The adaptations for the previous record floods were of no use, and the results were devastating, not just in Lismore but for much of the Northern Rivers region. Beyond damage to 10,849 homes [80], the broader population experienced periods of no or limited access to cash, petrol, communications, food, schools, carer services and medical assistance.

The NSW State Emergency Management Plan [99] refers frequently to the role of local level actors, including communities, as pivotal to emergency preparedness, response, recovery and risk reduction (see Appendix 1 for a summary). In addition, the state's recovery plan incorporates Australia's national principles for disaster recovery, including understanding local context, using community-led approaches, effective communication and a "coordinated and adaptive approach between community and partner agencies, based on continuing assessment of impacts and needs" ([81] pg. 4). While there is a clear policy commitment to multi-stakeholder and bottom-up approaches, this research has investigated whether there is a reality of collaborative practise in the Northern Rivers in pre and post disaster contexts.

4. Results

Using the analytical framework presented in section two, this section presents findings gathered from interviews and in person and online events across the Northern Rivers collected post-2019 bushfires and pre and post the 2022 floods. Following the collaborative governance framework outlined in section 2, findings include reflections on the starting conditions, design, processes, outcomes and system interactions of both climate change and disaster related collaborations in the Northern Rivers. Results also present reflections from participants on which factors enhance the effectiveness of local level collaboration for addressing climate change and disasters.

4.1. Starting conditions

This section outlines results according to three major components of collaborative governance starting conditions: motivations for involvement in collaborative processes; power and/or resource imbalances; and trust between participants.

4.1.1. Motivations

Participants held a wide range of views on the question of what motivates participation in collaborative forms of governance, including.

1. Disaster and climate related motivations such as addressing the dire needs of disaster affected communities (Participant (P)4, P9, P10, P11, P14, P15), implementing lessons from past disasters (P11, P15), correcting ineffective disaster recovery approaches (P19, P20) and concern for climate change (P3, P8, P11). "Climate change, it's the inspiration for me for all of it … because it overarches everything" (P11).
2. Organisational development focused motivations included a desire for more transparent and informed decision making in government (P3, P14, P16), reduced duplication (P2), fulfillment of organisational mission (P8) and business supply chain continuity and social responsibility (P4, P17).
3. Social motivations such as creating a culture of collective local impact (P6, Research diary note (R)3), drawing upon the strengths and skills of different organisations to address a common issue (P1, P7, P10, P11), a collective 'love of place' and community (P5, P12, P17), protecting the environment (P1, P8) and reducing wasteful consumerism (P8).

Some cautioned that motivations were not always altruistic – motivations were perceived by a quarter of interviewees to be driven by ego (P10, P14, P16, P19, P20): "You've got egos that come into it, personal agendas … men's clubs sometimes" (P10). One First Nations respondent highlighted that there was no other option but to work collaboratively with non-Aboriginal people within a non-Aboriginal system (P18).

4.1.2. Trust/respect

In a region that traditionally has a deep mistrust of government, there was ironically a sense of being let down by government during the 2022 floods - a broken social contract which set the scene for interactions and created barriers to effective collaboration. "People ran out of food" …."There is trauma from the absence of government" (Event (E)12). Respondents emphasised a recurrent feeling of being let down by 'the system' and the perhaps false idea that someone will always be there to answer emergency calls. There was also disbelief at being sidelined by top down and centralised decision making. "[T]here was a top down system that came in because of politics, it actually didn't work … everything worked in silos rather than go through the established governance structure" (P19). Some participants felt they had to 'pick up the pieces' and spend vast amounts of energy on repairing inappropriate actions and ineffective outcomes (P5, P20, Video recording (V)13).

The mistrust also existed outside of disasters, in relation to the feeling that centralised decision making is exacerbating risk, for example through over-ridden development decisions. "There are more than a number of documented cases where outside authorities will come in and gazump thoughtful, considered planning which goes to the heart of balancing the need for growth and development with maintaining the fabric and amenity of the community" (V3). Another example was mistrust brought about by centralised support for fossil fuel interests and expansion, "depending on the degree to which the government shows contempt for the population in a

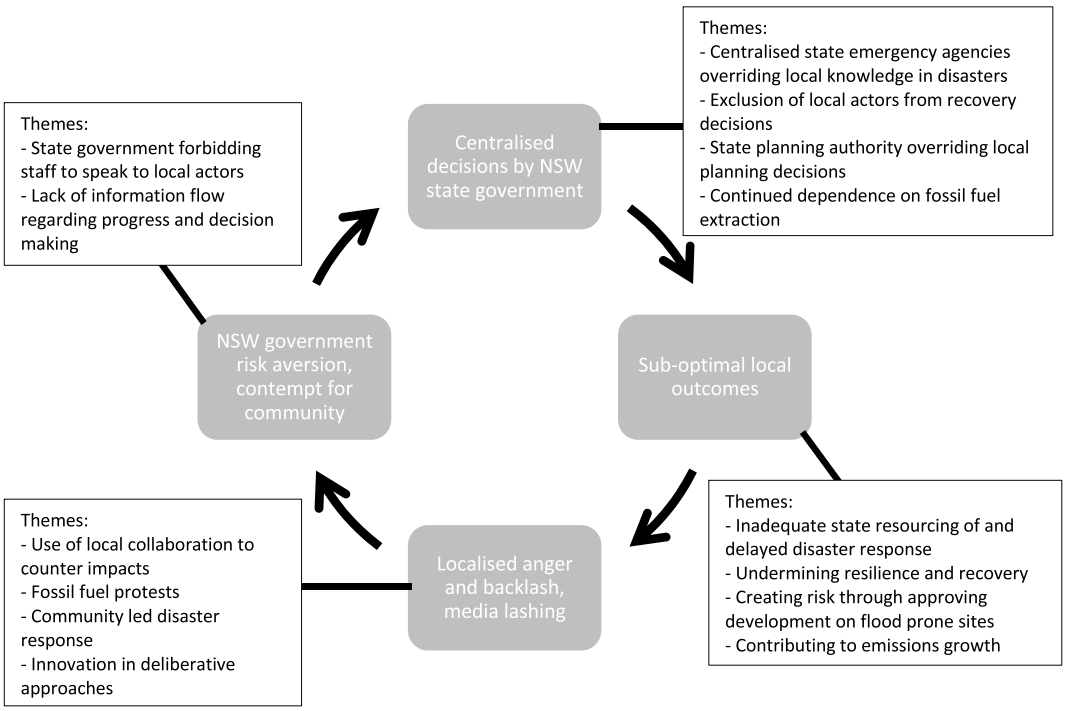

Fig. 2. Cycle of mistrust between centralised and localised decision making which triggered local level innovation and collaboration in response.

region that is having gas fields imposed upon them against their will" (P12). Fig. 2 summarises the cycle of mistrust between centralised and localised decision making in the Northern Rivers.

Along with the anger and mistrust, the lack of government presence and accessibility created innovation in local level collaborative governance: "People (community) organised search and rescue teams to check on people – set up a hub to assess and meet needs. We expected someone representing government to turn up – but they didn't (E12)". Local actors coalesced to provide coordination and leadership; "local leaders from Richmond also got together to form a recovery committee of our own, in the absence of any leadership anywhere else. The committee was made up of local school principals, local business representatives, local club representatives and the local government employee, and was chaired by the local police sergeant. We discussed ways to move forward" (V2).

In some cases, trust was established over time between different types of stakeholders, enabling collaborative governance

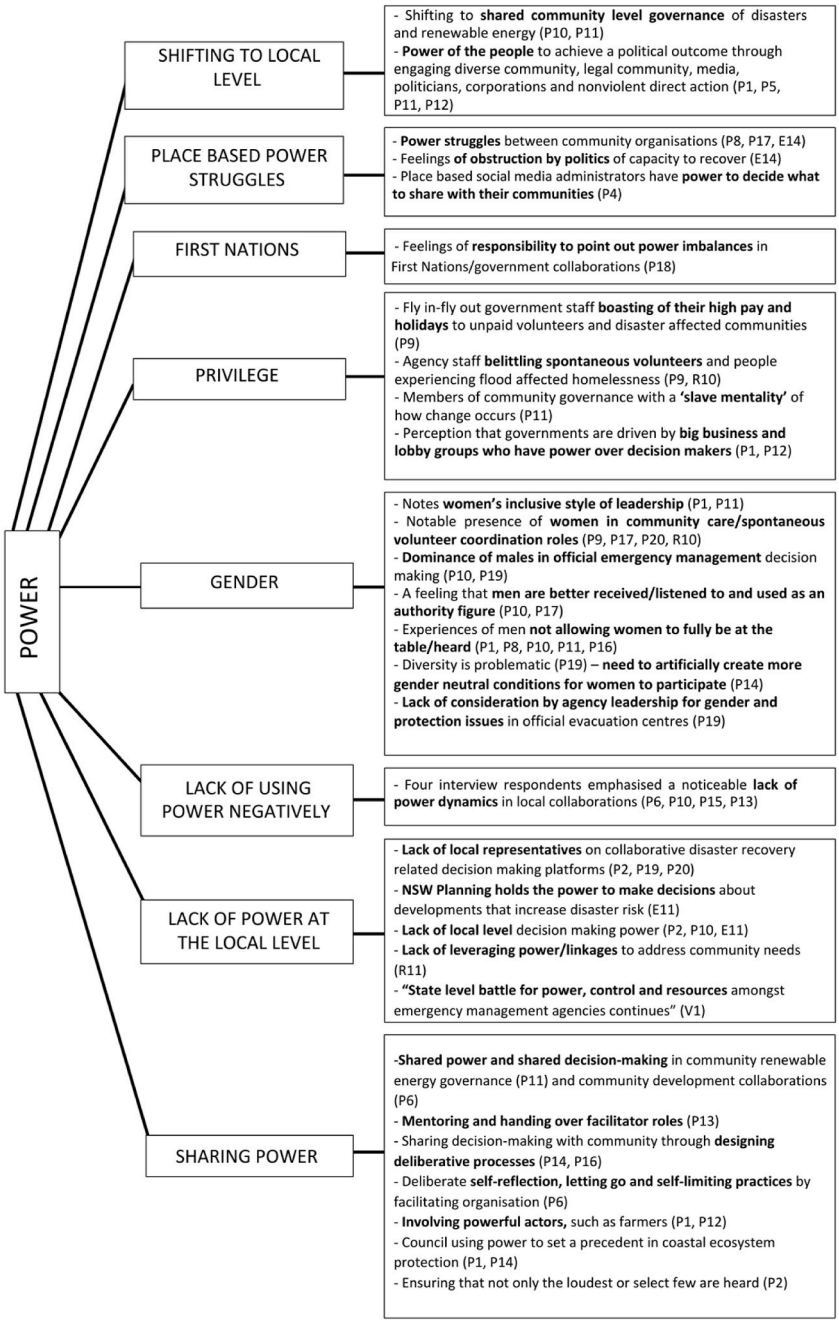

Fig. 3. Use of power in collaborative arrangements in the Northern Rivers.

arrangements to be established. Examples include trust between local government and First Nations groups: “A strong relationship had to be formed first - so they could be trusted. Council were told this is about old people baring their soul” (E1). Local governments also highlighted the value of relationship building established through multi-stakeholder working groups and roundtables: "creating regular informative opportunities to share and to learn from each other, I think is crucial. As soon as you’ve got that, then you’ve got a bit of buy in, you’ve got a bit of basic respect, you’ve got a degree of faith and trust" (P2). In disasters, existing relationships were drawn upon to mobilise much needed support, highlighting the importance of local actors and relationship building to ensure timely, appropriate and accepted action. This included from First Nations organisations, and place-based organisations drawing upon their networks and providing trusted support (V1).

4.1.3. Power

Power was strongly perceived as having a negative impact on collaborations, including power relating to privilege, gender and race. In fact, gender was the highest frequency theme in the ‘power’ category (number = 14) As per the trust analysis above, many respondents also emphasised the state government’s power (vertical power) affecting or overriding local level (horizontal) governance and decision making. More positively, in some cases power was shifted from centralised to community levels: “Using power of the people to achieve a political outcome” (P12). It was also shared amongst organisations or not perceived at all as being an issue in some community-based collaborations Fig. 3 highlights the use of power in collaborative arrangements in the Northern Rivers.

5. Design - level of formality and stakeholder participation

This section outlines the level of formality within collaborative arrangements in the Northern Rivers region. Informal collaboration (outside the formal government decision making system) tended to be oriented around a specific action purpose and was generally outcome focused (Table 5). Informal structures were more likely to be used to rectify a perceived failure of the formal governance system – for example to prevent the expansion of fossil fuel projects, to respond to an absence of emergency services, or amend recovery projects that were deemed ineffective. Despite the serious nature of the challenges being addressed, the unifying and celebratory nature of some grass-roots collaborations was noted: “creating change doesn’t have to be in the trenches, it can be about having fun, coming together” (E3). The scale and damage of disasters in Northern Rivers, including populations cut off from roads and communication by flood waters, fires and landslips meant official evacuation centres and support was often out of reach. This in turn triggered grass roots informal collaboration amongst cut off communities, businesses and organisations.

Formal collaboration was more likely to be linked with coordination between actors and for the purposes of information sharing rather than jointly working together towards a specific outcome. There are exceptions to this, namely health collaborations to address climate change and cross-sector regional climate action planning. Formal collaborative efforts have been spearheaded by local governments who are a pivot point between communities (including First Nations communities), community-based organisations, NGOs, private sector and higher levels of government. At the local level, the private sector was much more likely to be engaged in informal collaborations with communities and non-government organisations than involved in formal structures. Some NGOs held formal roles in the disaster recovery process however their ability to undertake these roles has been hampered: “our capacity in recovery hubs is limited by our human resources and the funds we can raise, both of which have been impacted by the pandemic and economic pressures” (V4). Innovative forms of participatory formal governance, such as deliberative democracy, were developed and trialled in the Northern Rivers.

Table 5
Level of formality and types of collaboration design.

Level of formality	Types of collaboration design
Formal collaboration	• Creation of formal **joint decision-making platforms** between local governments, state government agencies and First Nations groups (E1, E4, E6) • State and local government and non-government organisations establishing a renewable **energy working group** (P12) • Creation of new community/place-based risk reduction focused organisations/structures (P9, P0, P11, P17, P21, P22, V3, V4) • Development and adoption of a **citizen jury process** as a model for community engagement in resilient infrastructure decision making (P3, P14, P16) • Creation of **multi-stakeholder roundtables** for two-way information flow (e.g. Community group roundtables with local Council (P14); mental health roundtable with Minister for Emergency Services (V5)) • Establishment of an **inter-government agency recovery operation centre** (V2, V5) • Development and evolution of **‘Community Resilience Networks’ facilitated by local government** (involving state/local government, NGOs, community associations) (P19, P21, P22, R11)
Informal collaboration	• Spontaneous development of **community led collaborations** in flood and fire affected areas (E12, I9, P15, P17, P20, P21, V2, V3) • **First Nation’s networks** drew upon each other for disaster response and recovery (e.g. preschools, medical centres, land councils, cooperatives (W2, V1, V2) • **Gasfield Free movement** creation bringing together ‘farmers, hippies, business interests, Indigenous communities’ (P5, P12, P13) • Collaborating across local government, elected representatives, community based organisations and state government agencies to **redesign disaster recovery initiatives** for greater outcomes (initiated by affected communities) (R3, P20) • **Businesses** providing social, labour and material support in collaboration with community groups (including farmers) post-floods (P4, P17, V1, V2) • Establishing **cross-regional networks** of community hubs post-disaster (P5, P12, P21, P22) • **Intra-community collaboration** through creation of action groups (R7)

6. Collaborative process - 'what they did together'

Types of collaborative approaches that stakeholders used while they worked together in the Northern Rivers are outlined in detail in Appendix 4 and summarised here. Respondents highlighted that to facilitate buy-in from diverse actors, they used approaches such as creating a joint vision: "create a movement based on finding a common mission, seeing a shared vision. When I go to a club I ask what is your mission and focus, then I look for the link" (E3). They also convened meetings between emergency services and communities, created simple joint positive narratives so that diverse groups can buy into a campaign, and used petitions. In addressing climate change and disasters, groups of stakeholders in the Northern Rivers have worked collectively to implement response, recovery and risk reduction initiatives (such as community events and provide mental health support) and also address climate change through preventing fossil fuel extraction. Some innovative administration-related approaches to managing collaborations were shared by participants, including instigation of a 'stewardship team' to guide inter-agency collaboration, sharing grant writing responsibilities and utilising trusted convenors to bring diverse actors together. The highest frequency approach related to communication and knowledge creation. Diverse stakeholders have worked together to increase knowledge of emergency management structures, communicate with the public about recovery initiatives, conduct training on the art of collaboration, and link and learn from community hubs post-fire and flood. However, there were limited investments in monitoring and evaluation of collaborative efforts.

7. Outcomes (benefits and challenges)

This section highlights a vast array of outcomes (both benefits and challenges) that have resulted from stakeholders working collaboratively in the Northern Rivers.

7.1. Beneficial outcomes of collaborative approaches

Participants highlighted a diverse range of benefits, emerging at different scales from individual through to system wide, in working collaboratively (see Appendix 5). 'Soft' benefits ranged from individuals reporting enhanced knowledge, understanding, skills, a shared load and a sense of empowerment. "Every stakeholder's individual weight is lifted, when it's shared" (P2, P4). Organisations benefitted from enhanced reputations, organisational culture changes, a sense of mutual respect and improvements in organisational agility. Some participants noted enhanced sustainability and knowledge retention when actors worked together. In some cases, disaster related collaborations (intra-community and between community and emergency services) increased comradery, established a shared understanding and fostered a sense of achievement. The highest frequency beneficial outcome (number = 49) related to the importance respondents placed on enhanced relationships: "it's about building that adaptive capacity and building those partnerships and connection points. Because we do become a bit siloed in government at times, and by networking, it can improve the ability to deliver services" (P3).

Tangible outcomes include the pursuit of social equity, including by First Nations peoples to enable a shift in power (E6). In many cases, stakeholders worked together to address a problem that was common to them. A range of outcomes have resulted across the Northern Rivers, including those relating to improved environmental, economic and social outcomes, self-efficacy through community-led disaster response and recovery, improved communication channels between stakeholders, risk minimisation and the innovation of new models of participatory forms of governance. These innovations are being shared elsewhere – across local government areas, across state borders and in the case of deliberative democracy – internationally. Appendix 5. presents further detail on the outcomes of collaborations created to address climate change and disasters in the Northern Rivers.

7.2. Challenges encountered

Respondents had much to say about the challenges they encountered in working collaboratively to address climate change and disasters in the Northern Rivers. In fact, 'challenges' was the third highest-ranking theme across the data set, with significant mentions of the theme across all stakeholder types (number = 152). Challenges were grouped according to three categories and subsequent subthemes: structural; context; and attitudes, knowledge and practice (see Appendix 6).

Structural dimensions pointed towards a perceived lack of sustained funding for disaster-related positions in local governments and lack of investment in or value placed on collaborative processes. Additional perceptions of structural challenges included ongoing information and coordination barriers, insensitivity and hollow promises of some government representatives, slow and centralised decision-making processes and disregard for local knowledge and systems. The bypassing of local leadership and structures in disaster response and recovery had a detrimental impact: "there was huge gaps between the community and this leadership because the local system or the local existing relationships were just pushed aside or ignored" (P19). Context related challenges included ongoing barriers to participation that COVID-19 created, the inability of some stakeholders to engage in multi-stakeholder discussions due to being disaster affected, and a feeling of sheer physical and emotional exhaustion across stakeholder types post-disaster.

Attitudes, knowledge and practice-related challenges included the prevalence of anger and intra community and inter-organisational tensions over post-disaster solutions, such as infrastructure. Challenges to collaboration in the broader climate change and disaster risk reduction spaces linked with feelings of funding competitiveness: "I have been absolutely blown away by the amount of competitive behaviour between not for profits" (P8) and a distrust brought about by the feeling that some actors weren't qualified. Respondents noted a reluctance for some actors to engage in collaborative processes, resulting in some cases, in the deliberate ceasing of communication between a range of actors at various points post-disaster. Many of the challenges that either triggered collaboration or hindered collaboration were also heavily linked with wider systemic features. These are captured further in the following section.

8. System interactions

This section presents an investigation of systemic features that influence how and why a collaboration takes place [38], specifically the relationship between local level collaborative processes in the Northern Rivers and the wider systems that they operate within. References to systemic attributes was the highest frequency theme across the data sets (number = 362). Participants commented frequently on systemic features that they felt either enabled or hindered collaboration or that were factors influencing the rationale for local level collaborative practice (see Fig. 4).

Systemic features that fuelled collaborations included a lack of investment in resilient infrastructure (such as drainage systems), early warning systems that were deemed grossly inadequate, politicisation of disaster funding (including the exclusion of Lismore in significant national disaster grants), and an overdependence on volunteer run emergency services that were under resourced. A lack of consideration for climate change in federal and state government policies was also highlighted: for example "Climate change is not mentioned in the 10 year national health strategy" (W11). Additionally, participants noted concern for a political, cultural and funding landscape that involved denying climate science and development decisions that created risk: "Clearly we have seen the impact of all this development on flood-prone land" (V5). These bigger picture under-investments in risk reduction and disaster context created the setting for collaborative practice in Northern Rivers NSW – both in terms of motivating actors to work together to address it or contributing to disaster conditions that necessitated collaboration. Cultural factors also featured highly, particularly the culture of top-down emergency management culture clashing with ideas of community-led recovery. "It was just like, response lights and sirens mentality and no responsibility in terms of that community collaboration at all" (P19).

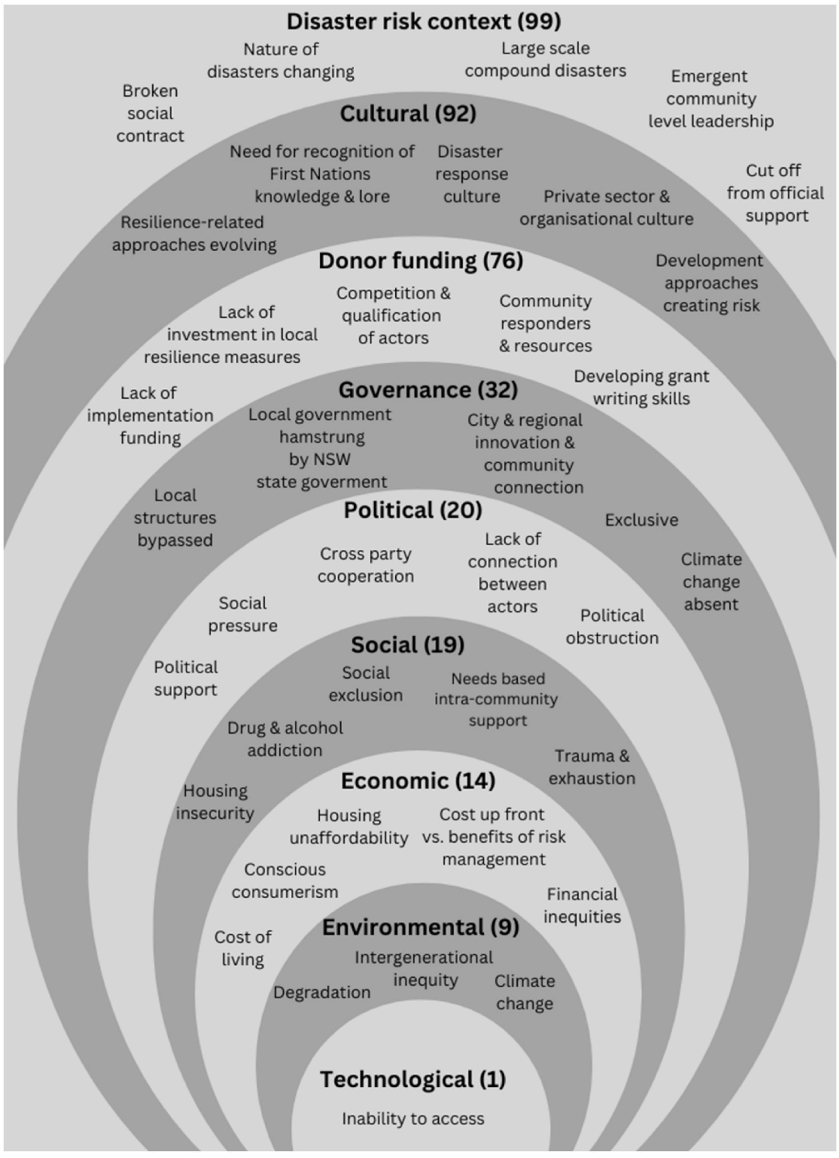

Fig. 4. Systemic factors influencing collaborations in the Northern Rivers (size of circle represents total number of occurrences per high level systems theme – top five factors included for each theme).

9. Factors enhancing local level collaboration for resilience

Respondents had a wide range of suggestions for how collaborative practice could be enhanced at the local level: 320 codes in total. Factors deemed to enhance the effectiveness of collaboration ranged in scale from the micro (shifts in individual mindsets and skillsets) through to organisational and collaborative platform features, to the macro systems related enablers. These factors are presented in Fig. 5.

A collaborative mindset was deemed as someone with an openness to change, a willingness to work towards collective rather than just individual goals and the valuing of diverse perspectives, including community representatives, at the table. The need for making room linked commonly with the ability to have cultural proficiency for walking with First Nations peoples – enabling representation or separate space for consultation, deep listening, empowering for self-determination in the disaster space and use of culturally safe language. "We have a cultural responsibility and right to have a seat around any table where discussions are had about the protection and care of our lands, which we know is vital in ensuring that this region does not continue to suffer drastically by these disasters" (V1).

Organisational factors that enabled collaboration included the agility to work beyond individual and organisational work plans, allocating time to collaboration and dedicated commitment to community engagement and liaison functions as a feedback mechanism. Respondents emphasised that collaborative platforms or partnerships benefitted from having clarity on a broad and inclusive vision towards outcomes – "it has to begin by being very clear what are we collaborating for and what is it pretty clearly that we want to achieve, and we're working from a place of shared mission" (P6). Clear roles and contribution of members and a widening of membership to allow needs across stakeholders to be understood were also raised. System dimensions deemed necessary for cross organisational collaboration included region or catchment wide approaches and a preventative approach: "There is no point rebuilding something to be the same as it was before … We have to build back more resilient than they were, and that takes into account how we live with our river system. We have to have that whole catchment strategy, not only a study but the recommendations out of those taken on board and put into place, otherwise we are going to be sitting here again after the next disaster, talking about the same things. Our communities can't afford to do that again" (V1).

9.1. *Collaborative leadership*

Many respondents were very clear on what constituted the type of leadership attributes that are required to facilitate collaborative practice. The attributes of collaborative leadership are summarised in Fig. 6, including a representative quote from each theme.

Many highlighted their deep respect for those who listened to them during the recovery process. "If you go in there with the thought process of empowering, and not talking to I think that's a really, really good step" (V3). Others felt leaders needed to step up their game: "This is about confidence in all levels of leadership that people come first, that humanity comes first and that those who are in positions of power, and those who are key decision-makers directly within our region and above, take it upon themselves to act quickly and maximise their profiles and their positions of leadership to support this region" (W4).

10. Discussion

The following section elaborates on insights from the research, situating them in existing literature and highlighting policy and practice changes that could advance collaborative practice in the Northern Rivers and beyond.

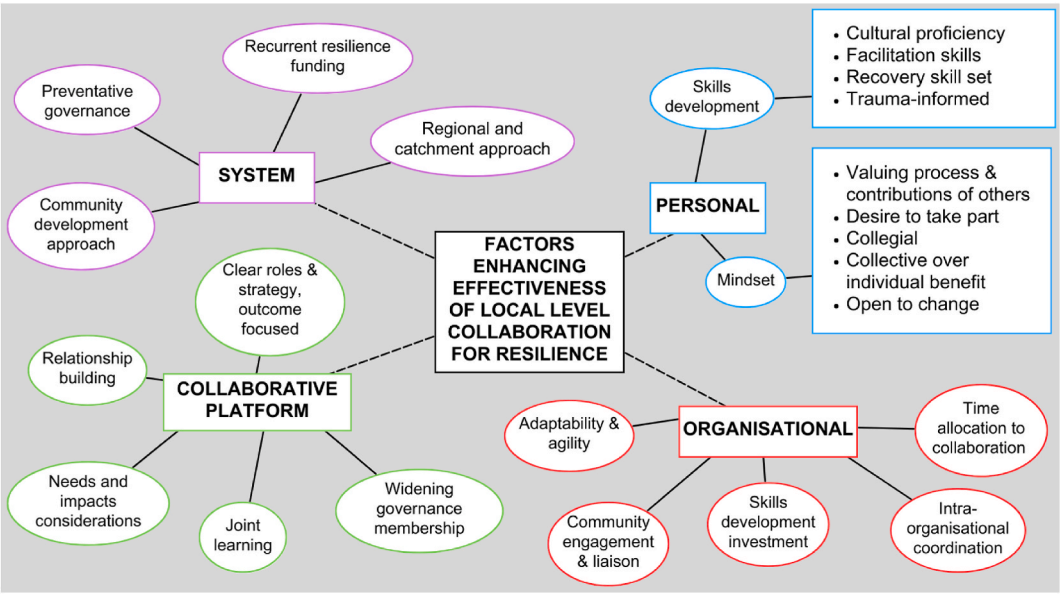

Fig. 5. Factors deemed by participants to increase the effectiveness of local level collaboration.

Fig. 6. Attributes of collaborative leadership.

10.1. Paradoxes of collaborative governance

Collaborative forms of governance are paradoxical – they are entirely essential, yet very difficult to undertake [50]. Collaborative governance in the Northern Rivers is no exception, and the results of this research highlight numerous paradoxes. This includes the simultaneous coexistence of the rigid culture of emergency governance and adaptability of emergent community responses and the ensuing siloed formal and informal approaches to governing disasters and climate change that are occurring. Communities are exercising their power through linking efforts and influencing political power within a risk averse public sector who often hold a very low level of trust of community efforts. Collaborative governance scholars point out that these interactions are part of the process: "when different actors are interacting and different levels are juxtaposing in interorganisational collaborations, it will naturally confront with different interests, preferences, resources, and powers, that undergo a continuous process of negotiation and contestation" ([50] p. 13). Despite these challenges, the results of this study demonstrate that a wide range of positive outcomes from collaboration occurred.

10.2. Evolving disaster and climate change landscape

Large scale disasters across Australia at national, state and local levels, and in this case the Northern Rivers of NSW, are forcing shifts in the way that disasters and climate change are responded to, prepared for and ultimately governed. A 'disordering' of the predominant system of legitimacy and stability [82]. These shifts are being forced because no amount of government resourcing and training will ever be enough to place these resources everywhere all at once. Based on this reality, communities and local governance networks of businesses, non-government organisations and First Nations groups are innovating and pushing for change. This finding is consistent with adaptive governance scholarship which anticipates local level pushes for change when established centralised governance mechanisms prove inadequate to fit a problem [83]. The adaptive governance literature concludes that neither a fully local nor fully centralised governance will suffice, and that an interplay between formal and informal and between scales is required. Embracing this high level of complexity, including evolving structures and actors and self-organising, co-operative and adaptive local systems also corresponds with Complex Adaptive Systems (CAS) theory [84,85].

Participants in this research shared frustration at national and state governments which under-anticipated (or outright denied the possibility of) climate change and the types of complex interplay and scale of disasters that have been experienced in recent years. This finding is consistent with previous literature published on climate governance in Australia in that the types of anticipatory policies to address climate extremes have been beyond the ability of emergency services to conceptualise [65]. Similarly, adoption of meaningful national adaptation and greenhouse mitigation policies have been quashed by a systemic denial of climate science by a fossil fuel dependent nation state [86,87] and communities have had to suffer the brunt of it. Future action is required to plan the Public Service at all levels around the information and science that is available to it.

In the Northern Rivers, many actors are working in a reactionary mode that responds to problems rather than anticipates and reduces risk to them. There is a desperate need for a movement towards a more fit for purpose system that interacts in a continuum of disaster preparedness, response and recovery; while simultaneously creating an environment where risks are prevented or mitigated. This would enact Australia's international commitment to the Sendai Framework for Disaster Risk Reduction which is yet to translate

to a culture of risk reduction in practice in NSW. Similarly, such an approach would also support Australia's commitments under the United Nations Framework Convention on Climate Change (UNFCCC) on progressing proactive climate adaptation planning that supports adaptation at all scales (including local). This includes a shift from probability to risk-based development decisions by local and state governments, including considering climate change risks for the duration of a building's life [20]. For example, developments are occurring on known flood areas in the Northern Rivers, with infill creating risk for those around them. The root causes need to be stemmed, and in some cases managed retreat facilitated proactively, in addition to increasing disaster response capabilities [88,89].

10.3. Towards a paradigm shift: interweaving emergency management and community development

Consistent with both Bushfire Royal Commission, academic [23,90,91] and citizen led reports [72], the findings of this study support the need for a more decentralised and adaptive governance of disasters and climate change. In a large-scale disaster, where rural and regional communities are cut off from emergency services, response agencies can anticipate that community-led welfare initiatives will occur. By connecting these communities with emergency, social and community development services prior to disasters, relationships can be built, and trust established. In some cases, this requires a culture shift on the part of emergency services, who need to recognise the unique roles of different actors and understand and adopt to some extent a community development approach. These findings confirm insights from previous CAS research in the Northern Rivers on the importance of transforming health promotion approaches in the context of climate change. This includes moving from linear top-down approaches to helping "practitioners engage the interactive intelligence of their communities" and acknowledging "the power of networked communities to address problems in unexpected ways" ([92] p. 83).

There is evidence of new networks occurring in the Northern Rivers where trials are underway to better connect non-government and community-based organisations to Council-led Community Resilience Networks and for Community Resilience Networks to be better connected to Local Emergency Management Committees. Improved organising amongst community organisations outside of the formal governance structures is also needed and evidenced, for example through the establishment of the 'Creative First Aid Alliance[2]' between artists. Without broad engagement and interconnected 'networks of networks' in place, disaster response will continue to be something that happens to, rather than something that occurs in partnership with communities.

The differences in approaches and value add of the formal and informal is evidenced in communities and emergency services holding contrasting views of the definition of 'welfare checks'. For emergency services a welfare check takes place to ascertain whether someone is alive or needs hospitalisation or immediate rescuing. A welfare check in the eyes of a connected community is whether someone needs a casserole, or whether children need minding so a disaster-affected parent can 'have a breather' or go to a government operated recovery hub, or whether an elderly resident needs help moving their perished goods to the curb or their precious china carefully wiped clean of mud. The two have very distinct and important roles. One does not negate the other.

10.4. Improved information flow, repairing trust

It's not just the infrastructure laying in tatters in the Northern Rivers. There are deep feelings of being let down by government, mistrust and competition between supporting actors, and community division on what the next steps could and should be. Mediation and repair of relationships, for coordination if not collaboration between actors would be to the benefit of communities. Through improved inclusion of a range of stakeholders in connection with climate change and disaster governance and improved information flow, respondents involved in this research believe trust and mutual respect can be established.

As one respondent noted "silence breeds suspicion" (V4). Tokenistic as it may be –interactions between community stakeholders with politicians and leaders of emergency services and recovery initiatives in a post-disaster landscape provides a gesture and results in a feeling of being listened to. Importantly, it also builds bridging capital in preparation for the next disaster. Respondents emphasised the importance of being asked what they need rather than being told what is coming (this highlights the case for needs based assessments rather than cookie cutter approaches). Interview respondents emphasised wanting acknowledgement of the enormity of what they have been through and what they have had to hold and being recognised as valid contributors to community recovery.

Information sharing is not trivial, it leads to shared understanding, shared vision, shared ownership and creation of shared policy goals [50]. Examples include ensuring that communities are more sensitised to emergency management and structures, for instance by providing local maps on signs of who is responsible for what in the aftermath of disasters. Additionally, through resourcing dedicated liaison roles who have the ability to interact with and anticipate emergent and community responses [93] and by increasing information and feedback on recovery efforts through the in-person presence of politicians, mutual understanding can be fostered between actors. If emergency response, recovery and risk reduction are viewed from a community development lens, disaster aftermath is an opportunity to build community connection, mobilise support and leave skills behind that will be there well after the disaster service providers have disappeared. Given that respondents noted the gendered dimensions of disasters, committed integration of female perspectives is also essential.

A previous study on post-disaster recovery in the Northern Rivers identified that the closer a support actor is to the affected community, the more trusted they were [90]. A more decentralised approach in rapidly changing contexts is not a radical concept – defence force strategies have been redesigned around this approach in recognition that control from distant centralised commands delay responses, provide inappropriate direction for complex localised contexts and acknowledges the fluid unpredictability of conflict and security situations [94,95]. A decentralised and adaptive approach enables innovation, including for example emergent leadership and access to local support networks. Examples from the 2022 floods include the Koori Mail's 'Koori Kitchen' in Lismore (a First Nations owned and run newspaper turned disaster recovery provider in Lismore) and the Rebuilding Northern Rivers 2022 Facebook page (connecting a warehouse of donated goods to flood affected households across the Northern Rivers).

[2] https://www.creativefirstaid.com.au/.

The paradigm shift towards decentralisation and inclusion has occurred in the international humanitarian system which uses a thematic 'cluster' system linking non-government, private sector and government agencies together horizontally [96]. These collaborative arrangements (for example on the topics of food security, gender and protection, water, sanitation and health), are often ongoing, used not only for disaster response and recovery but for convening actors around impending threats and broader risk reduction efforts. These arrangements are also connected vertically with formally recognised community and sub-national governance arrangements. This paradigm shift in localisation is also evidenced in the Sendai Framework for Disaster Risk Reduction. The rhetoric even exists in the NSW state emergency management and recovery plans. But the culture shift has to happen from within, with an acceptance of the scale of disasters we are facing, with an acceptance from the public that the cavalry won't always come, and with an acceptance that improving information flow and programming based on context specific community needs and networks of actors can lead to greater impact.

Ongoing efforts to mobilise and organise communities through community associations, Red Cross initiated Community Resilience Teams or other forms such as the SES Community Action Teams can work on establishing and maintaining relationships with emergency services. This can ensure that early warning messages and information on road closures and dangerous hazards can be readily communicated with and through communities. Conversely, that the needs of communities can be communicated up the chain to local, state and federal government agencies. Examples include sharing location specific needs for sand bagging, disaster recovery needs of vulnerable groups and ongoing development issues that are creating risk.

Collaborative platforms are often used now in the Northern Rivers as information sharing platforms, leaving room for a move towards joint visioning, joint funding and joint implementation to achieve impact at scale. In some cases, widening membership requires widening of engagement approaches to allow more diverse voices to be heard – not everyone can consistently attend or have the ability to participate in a 'one stop shop' meeting. For example, Byron Shire Council has taken the initiative of revolving Community Resilience Network meetings around disaster affected communities. Building a network of networks, some formal, some not, can improve channels of communication, connection and mutual support. It can also lead to efficiencies for those supporting the networks with capacity building.

10.5. The need for enhanced skills in disaster and climate change fields of practice

The NSW flood inquiry [97] emphasised the need for training of communities as first responders. However, this research demonstrates that skillsets to address climate and disaster risk lay well beyond the limited window of response capability. If we truly are to see a movement towards community led recovery, risk reduction and response, then community members need to be supported to undertake this role. The ability of community organisations to function on an ongoing basis is an important precursor to linkages with broader governance systems and for linking with support for their communities. This includes management of volunteers, developing inclusive processes, enhancing leadership skills, writing and implementing grants, communicating with the public and managing relationships with the wider organisational ecosystem. The question remains as to how this can be optimally supported for those who undertake it and whether we can expect communities to shoulder this through volunteer action alone.

Engaging community groups in longer term risk reduction projects such as food, water and energy security, place-based planning and improving social connectedness can also maintain interest and networks when there is lag time between disasters. Plan C's creation of a network of trained community leaders in the Northern Rivers under the 'Community Carers and Responders[3]' program is an example of providing free training across the spectrum of response, preparedness, recovery and community risk reduction. The investment in First Nations' people's self-determination of disaster response and recovery initiatives was another important point raised in this research. However, skills development doesn't rest only in communities. The results of this research demonstrate that there is also a need for training decision makers within government agencies in understanding disaster recovery principles, community development approaches and enhancing collaborative leadership skill sets.

11. Conclusion

As climate change manifests, traditional governance structures and orders are being unsettled. These are key moments for reflection and adaptation of structural determinants of risk and how actors come together to respond to and reduce risk to disasters. This paper has evidenced that collaborative governance is being driven in the Northern Rivers by a network of informal innovation, forced in part by the enormity of the scale of climate change and disasters and the failure of the existing governance system to incorporate these realities. The results contain suggestions from a broad spectrum of local actors on factors that could increase the effectiveness of collaborative forms of local governance. The discussion highlighted several key leverage points [98] that can be used to improve outcomes and transform actions from the current reactionary state to a more proactive anticipation of future climate. These include improved use of climate information to anticipate and prepare; improved connection between community organisations and between community, non-government and government stakeholders; trust supported by enhanced information flow and mutual understanding; seeing disasters as a community development opportunity; and improving soft skill sets of community and government stakeholders.

The study demonstrates that there is currently a disconnect between the policy and academic emphases on the importance of collaborative, inclusive and localised governance and the reality of what is being undertaken on the ground. The study contributes useful insights for not only understanding the realities of the challenges involved in developing collaborative governance structures, but also how these structures and the people within them might adjust their practice to create a supportive enabling environment for a more climate-ready and resilient future. Further research would be useful in the investigation of overcoming cultural barriers to inclusive governance, both from the perspectives of First Nations people, and also in bridging emergency management and community

[3] https://www.planc.org.au/.

development perspectives. How community responses and recovery can be anticipated and supported, including resourced are questions that remain. Studies on the gendered dimensions of collaborative governance, including community responses, would be useful for making the argument for more inclusive disaster related decision making. A longitudinal and multi-site study would also benefit understanding of how collaborative governance evolves post disaster and across different contexts within the same state or country.

Funding

The first author was in receipt of an Australian Government Research Training Program Stipend Scholarship between 2019 and 2023. The second author was in receipt of an Australian Research Council Discovery Early Career Researcher Award between 2019 and 2022.

CRediT authorship contribution statement

Rebecca McNaught: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Software, Visualization, Writing – original draft, Writing – review & editing. **Johanna Nalau:** Conceptualization, Funding acquisition, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing, Formal analysis. **Rob Hales:** Conceptualization, Funding acquisition, Methodology, Supervision, Writing – original draft, Writing – review & editing, Formal analysis. **Emma Pittaway:** Formal analysis, Investigation, Project administration, Writing – original draft, Writing – review & editing, Data curation. **John Handmer:** Formal analysis, Writing – original draft, Writing – review & editing, Investigation. **Jean Renouf:** Formal analysis, Investigation, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Rebecca McNaught reports a relationship with World Bank that includes: consulting or advisory. Rebecca McNaught reports a relationship with Australian Bureau of Meteorology that includes: consulting or advisory. Rebecca McNaught reports a relationship with Palladium that includes: consulting or advisory. Rebecca McNaught reports a relationship with Plan C that includes: board membership and consulting or advisory. Jean Renouf reports a relationship with Plan C that includes: employment.

Data availability

The data that has been used is confidential.

Acknowledgements

The authors would like to acknowledge the perspectives of First Nations peoples who generously shared their time, experiences and insights in the development of this paper. Special thanks to Professor John Hay, Jenny Bird and Bronwyn Elliott in their review of a draft. We wish to acknowledge that the floods of 2017 and 2022 and bushfires of 2019 had lasting and catastrophic impacts on the people of the Northern Rivers. We are incredibly grateful to all of those who shared insights of their experiences in the hope of sharing learning and improving collective practice into the future.

Appendix 1

Role of community and other stakeholders in emergency preparedness and response – NSW State Emergency Management Plan[99].

Text relating to role of community and other stakeholders (highlighted in bold)	Page no.
Objectives Consistent with the State Emergency and Rescue Management Act 1989 (SERM Act), the objectives of the EMPLAN are to: 1. a) provide clarity as to command and control, roles and coordination of functions in emergency management across all levels 2. b) emphasise risk management across the full spectrum of prevention, preparation, response and recovery 3. c) emphasise **community engagement** in the development and exercise of plans as well as in their operational employment 4. d) ensure that the capability and resourcing requirements of these responsibilities are understood.	**6**
Community and Stakeholder Engagement: **Community and stakeholder engagement is a critical aspect of emergency management across the full spectrum of prevention, preparation, response and recovery**. Agencies will engage with the community and stakeholders which will improve community understanding of these arrangements and promote disaster resilience.	**7**
Disaster Resilience: Disaster resilience is an outcome derived from a **sharing of responsibility between all levels of government, business, the non-government sector and the community** who then act on this basis prior to, during and after a disaster. Disaster resilience is significantly increased by active planning and preparation. A shared understanding of the disaster risks at community level is a vital precursor.	**7**
Community and Stakeholder Engagement **The community is a vital part of the New South Wales emergency management arrangements.** Agencies preparing plans under the EMPLAN will engage with the community and stakeholders, promote community understanding of the hazards they face, seek their input into the development of plans, especially at the local level, and involve communities and stakeholders where appropriate in exercising these plans. **This engagement enhances resilience, reduces exposure to hazards through mitigation, maximises community preparation** to act	

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Text relating to role of community and other stakeholders (highlighted in bold)	Page no.
effectively in the face of emergencies, and therefore allows the emergency management arrangements to target their efforts at the places, times and populations most vulnerable to a disaster.	
Community Warnings	**10**
Timely and accurate warning information for the public is vital during emergencies. These warnings should include advice about options and the likely impacts of an event.	
ERM is achieved by reducing, eliminating or mitigating the effect of the risks, either individually or in combination. For example:	**23**
• the hazard that has to be dealt with, for instance, reducing bush fire fuel loads	
• the physical exposure that an asset or a community has to a hazard, for instance encouraging building above the typical flood level of a catchment, or developing community understanding of when to evacuate or stay away from areas under threat	
• the exposure and vulnerability of these assets, for example the resistance of structures to fire or water.	
The ERM process requires the engagement of and consultation with Federal, State and Local Governments and government agencies, businesses, non-government organisations, communities and affected populations. In New South Wales, ERM is the process approved by the State Emergency Management Committee for assessing all hazards using methods that are in accordance with relevant international standards.	
Scope **Disaster preparation is the responsibility of the whole community**; government and not-for-profit agencies, business and industry, local communities, individuals and households. Preparation activities delivered in partnership between all agencies, organisations and communities help build engaged and resilient communities.	**24**
Key elements of preparation include:	
• Planning	
• capability development	
• training	
• exercises	
• **building community resilience**	
• risk communication.	
Sub plans detail roles and responsibilities of all relevant agencies and how command and control is exercised and include arrangements for handover of responsibility between Local, Region and State levels. Where there are tiered plans at State, Region and Local level, these must be integrated. **Plans should be developed with input from the community and include the community's role**.	**24**
EMPLANs at all levels and Sub-Plans and Supporting Plans must be formally reviewed on a regular basis. Reviews can be formal and extensive or more based around an assessment following an exercise or operation.	
Building Community Resilience	**25**
Consistent with the National Disaster Resilience Strategy, **the community needs to be equally prepared as response agencies for the impacts of all hazards** and in particular, the impacts of natural disasters.	
Resilient communities are better able to withstand a crisis event and have an enhanced ability to recover from residual impacts.	
Community engagement may be hazard specific or take an all-hazards approach. Regardless of the approach it is important that messages are consistent and coordinated across all programs. Community education and awareness campaigns aim to:	
• develop awareness of the nature and potential impacts of hazards	
• promote personal responsibility for managing risks and preparation for emergencies	
• develop awareness of emergency management arrangements and assistance measures	
• **encourage community participation in volunteering and infrastructure protection activities.**	
Evacuation	**32**
Evacuation of persons or domestic animals from an area of danger or potential danger is a possible strategy to mitigate the impact of any hazard. **Assessment of the imminent danger to the community**, and the need to evacuate, must be assessed prior to the decision to evacuate. Agencies that manage or control evacuation arrangements under any sub-plan are to ensure that such arrangements do not conflict with overall evacuation policy.	
Part 9 – Recovery Definition	**33**
Recovery is the process of returning an affected community to its proper level of functioning after an emergency. It will generally commence simultaneously with the Response phase.	
Scope	
A recovery operation aims, as far as possible, to assist the affected community to manage its own recovery, while recognising that there may be a need for external technical, physical and financial assistance.	
Recovery activities often begin spontaneously within a community. Formal recovery operations are intended to provide structure for what would otherwise be ad hoc assistance offered to people affected by emergencies.	
Unlike the response phase of an emergency, where the efforts of a small number of organisations are focussed on saving lives and property, **recovery is characterised by a complex array of issues and a much broader range of organisations and stakeholders**. Recovery programs and processes can have a lasting impact on the community and are often costly in terms of financial and other resources.	
The principles of recovery are set out in the New South Wales Recovery Plan as follows:	
• **use local capacity first**	
• **formalise structures where needed**	
• **involve local government**	
• **support from higher levels when needed**	
• **local structures remain responsible**	
• **whole of community approach.**	
Effective recovery requires the establishment of planning and management arrangements which are accepted and understood by recovery agencies and the community. Emergency Management Committees at all levels are responsible for recovery planning.	
Impact Assessment Initial recovery impact assessment	**34**
An assessment of the extent of damage, impact on the community and the potential need for a longer-term recovery process should take place within 24 h or as soon as practicable following the declaration of a natural disaster or other emergency where such assessment is required.	

Tier 1	Tier 2	Tier 3	Files	References
Concepts	Resilient development		17	31
	Collaborate words		15	15
Roles	Personal role		9	10
	Governments		18	37
	Private sector		7	12
	Civil society		13	22
	Citizens		16	27
	International orgs		0	0
Starting conditions	Past history		20	36
	Power		17	35
	Motivations		17	39
	Trust		12	16
	Partners involved		11	19
	Respect		3	3
	Gender		10	14
Design	Types		9	11
	Participation		11	13
	Formality	Formal	8	14
		Informal	10	13
Process	What they did		35	147
	Leadership		15	23
	Administration/ meta governance		16	22
	Implementation		5	6
	Monitoring and evaluation		1	3
	Information		6	12
	Communication and knowledge		19	43
	Scale and buy in		10	15
Outcomes	Individual		6	7
	Sharing/inspiring others		10	12
	Organisational		9	12
	Problem addressed		25	48
	Sustainability		4	4
	Challenges		45	152
	Level of success		7	9
	Equity		11	15
	Relationships		19	50
System interactions	Political		15	20
	Economic		9	14
	Donor/funding		20	76
	Disaster/climate change risk context		41	99
	Culture		30	92
	Governance		17	32
	Technological		1	1
	Environmental		6	9
	Social		11	19
Skills/approaches	Collaborative leadership		12	18
	Important skills/approaches		30	93
	Improving approaches		34	154
	Recommended practice		9	16
	Skills deficits		8	12
	Tools and training		12	19
	Existing skills		4	5
	Enablers		7	13
Policy readiness			8	8
Additional comments			1	7

Colour code:
1-10
11-20
21-30
31-40
41+

Appendix 2. Thematic coding results (codebook) across data sets (incorporating interview transcripts, notes from events (online and in person), video transcripts and a research diary).

Appendix 3. Challenges highlighted by participants of a 'Resilience and Regeneration Roadshow'

Appendix 4
Collaborative approaches – what stakeholders did together

Overarching approach	Examples of approaches used by collaborative partners
Administration/meta-governance (22)	• **Dedicated positions in Councils** to liaise between Council and First Nations people's groups (P14, P17, E1) • **Trusted convenor** drawing upon existing relationships – not 'cold calling' (P3, P4, P5, V1) • Shared grant writing resource/responsibility between organisations (P11) • Creation of a **'stewardship team'** to guide interagency collaboration (P12) and inter-community collaboration in a regional alliance (P12)
Communication/knowledge (43)	• **Conducting training** on how to collaborate (P12, P13) and training on unconscious bias and critical thinking for citizen engagement in deliberative processes (P16) • **Increasing knowledge of emergency management structures** across stakeholder types (P10, P19) • Increasing **knowledge across stakeholders of gas extraction impacts** (P12) • Using **public feedback to inform decision making** (P14) • **Creating joint narratives** beyond disaster to circumnavigate disaster and climate change fatigue and expand membership (P2, P2, E3) • **Community-based programme** to turn ideas into action (planning, pitching, partners, resources, risk management) (P6) • Connecting State Emergency Services and community volunteers with those in need of **emergency assistance** (W10, P21, V3) • **Amplification of recovery related communications** by community-based organisations (V1, P17, V2, V3) • **Use of social media to facilitate collaboration** between community organisations and members, including in the absence of phone services (P5, P15, V1, V3, R8) • Inter-agency collaboration to strengthen communication pathways during/post disaster (P19) including using **technological platforms** to reduce email traffic (P5) • **Linking and learning from other community hubs** post fire/flood and for the gas field free movement (P5, P12, P21, P22)
Implementation (29)	• First Nations' **cultural mapping** (P18) • Joint provision of **mental health support** (e.g. to affected children) (P20, V1) • Creation of disaster themed **community events** (P2, P10, P11, R3, R11) • Community run **renewable energy projects** (P11) • **Co-delivery** of climate change adaptation grants (P3) and disaster recovery grants (P21) • **Planting fruit trees** and creating **community stalls** for sharing clothing and food boxes (P6) • Bentley Blockade - **protesting against gas field expansion** in the Northern Rivers (P5, P12, P13)

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Appendix 4 (*continued*)

Overarching approach	Examples of approaches used by collaborative partners
Scale/buy in (15)	• **Community collaborations in cut off areas** who coordinated food, road clearing/access, fire fighting, linking lost family members, provided accommodation, animal welfare and medical care and cleaned houses (E12, P9, P15, P17, P20, P21, V2, V3) • **First Nation's led flood response**, care provision and strategic planning (W2, V1, V2) • **Community building and enabling self-reliance**, including through community events (E3, P5, R3) • **Creating a joint vision** across stakeholders of mutual contribution to community (I6, P12, E3) • Collaboration between education providers and communities to **set up evacuation centres** in response to the scale of flood damage (P15, P17, V1) • Setting up **sensitisation meetings** between communities/NGOs and agencies to begin relationship building and establish buy in (P10) • Creation of a **simple positive narrative** ('a big tent campaign') so that diverse groups can buy into it e.g. our water, our communities, our foodlands, our country (P12) • **Generating an understanding** of being part of a wider system and a culture of 'trust, responsiveness and generosity' across community stakeholders (P6) • **Creating a petition** to generate momentum and connect community (P1)
Monitoring and evaluation (3)	• Establishing **research and evaluation capacity** within a collaboration (e.g. produce surveys) (P12) • Quantifying impact through an **'impact amplifier'** position (P8)
Planning (4)	• State and local government and non-government organisations jointly applying for **renewable energy grants** (P12) • Disaster related agencies, local government and non-government organisations connecting with each other to **support communities through community events, drills, recovery decisions** etc (P2, P7, P10, R11, V2) • Cross-government collaborative design of **climate resilience plans** (P3)

Appendix 5
Outcomes of collaboration

Outcome category (occurrence)	Specific outcome examples given by respondents
Sustainability of outcomes (3)	• **Reduced burden**: "Collaboration eases the load" (E3); "Every stakeholder's individual weight is lifted, when it's shared" (P2, P4) • Community led collaboration with agencies **promotes sustainability** (P5, P10) • Local government and NGOs collaborating to write grants rather than a consultant **leaves institutional knowledge behind** (P7)
Sharing or inspiring others (12)	• Hard fought **First Nations' and government joint governance arrangements** are **inspiring other regions/councils** (P18, E1, E6) • **Leveraging strengths** (P5): "In Byron shire you get a lot of people who are highly talented, but they're using their talent elsewhere, and when they have an opportunity to apply or share that knowledge locally, the locals benefit from it" (P14) • **Finding a shared mission** beyond disaster and climate change with a common language that links to the missions of a range of stakeholders (P6) • **Collaborative approaches to protection of coastal ecosystems** are inspiring other locations to do the same (P1) • Victorian campaigners used the Northern Rivers Gasfield Free Communities **model** (Webinar (W)12) • First Nations groups used their **extensive networks** in New South Wales and internationally to share their flood stories and get housing on the agenda of the NSW Government (V2) and **raise funds** for their businesses and organisations (V1)
Enhanced relationships between stakeholder groups (49)	• **Enhanced relationships** through nurturing: "It's exactly like any form of relationship, it takes effort to maintain - that relationship doesn't happen by itself" (P18)) • **Overcoming COVID-related divisions**: "Due to COVID I'd only set foot in the school twice, it's (NB the disaster response) been a very big bonding experience. I think it gave the community a bit of a stronger bond" (P15) • **Interlocutors** working to improve understanding of and addressing issues between communities and disaster response agencies (P2, P10, V1, R11) • Community-led projects **strengthening networks and building relationships** (P2, P5, P11, V4) "The best recovery is community-led recovery and is based on trust and relationships within the community" (V1) • Collaborators **sharing their networks** of mutual interest with each other (P11) • **Improved inter-agency relationships** (P6, P7): "it's about building that adaptive capacity and building those partnerships and connection points. Because we do become a bit siloed in government at times, and by networking, it can improve the ability to deliver services" (P3) • Disaster related collaborations resulted **in comradery and improved connections** (P5, P7, V2): "people in these organisations, whether it's private, whether it's government, whether it's not for profit, when they have that kind of shared experience. I think that really creates a more meaningful network and more meaningful relationships such that community is actually stronger and more resilient after that" (P4)
Addressing problems that the collaboration identified (46)	• **Protection of coastal ecosystems** (P1, V5); waste minimisation (P8) • **Addressing homelessness** (P6) and **community support for disaster evacuees** (E12, E14): "the evacuees were crying when they were leaving, in gratitude, which was just amazing. They're calling us the chateau because … they had those first five days just to regroup before they hit the wide world again. There were really strong friendships building between evacuees" (P15) • **Improving communication between communities and agencies** (P2, P6, P17, R2): "everybody (NB agencies) collaborating together, outside of disaster, means that when it comes to the connection back to community, community don't have to repeat themselves over and over again" (P10) • **Political power used by local government to address needs on the ground** (P1, P20)

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Appendix 5 (*continued*)

Outcome category (occurrence)	Specific outcome examples given by respondents
	• **Businesses supporting local community**: "for the first three days when we actually officially opened and started trading again (NB. after the floods) I just stood there and literally hugged a procession of people coming in and out of our shop" (P17) • **Improved (and often forced) self-efficacy** (P15, P17, P20, W2, V2) "now I'm really good at saying that's a fantastic idea. How can we support you to bring it to life" (P6); "evacuees just turned up and we accommodated them at the school. No one turned up from government or NGOs to help with anything" (E12) • **Halting gas exploration and extraction** in Northern Rivers farmland through over 140+ communities declaring themselves as gasfield free (P5, P11, P12) • Providing **access to people and services** in disasters and disaster recovery (P4, P5, P7, P8, P9, P12, P14, P15, P17, P20, R11, W2, V1, V2, V5) "And so we arranged with our neighbours in the morning to get tractors and just push through those damaged causeways … the tractor came and they started moving and within half an hour there are about 30 people and four machines" (P9) • **Addressing community based needs optimally** (P14, P16): "working collaboratively with organisations that specialise in particular things, like NDIS for example, the client is getting the best of everything"(P10) • **New governance models** linking communities with decision making e.g. deliberative democracy, community renewable energy, self-organisation, First Nations people (P11, P12, P14, P16, P18, E1, E6) • **Community development and risk reduction outcomes** (P2, P6, P14, P18) • **Place based and climate change action planning** (P3) • **Risk** mitigation to protect people from ill-effects of disaster recovery initiatives (P20)
Organisational benefits (12)	• **Overcoming barriers in large bureaucracies** by collaborating with more agile organisations (P5, P12) • **Shift in Council staff** on the role of community in disaster recovery and risk reduction (P19): "they see the benefits now of community development … sometimes our work can take 10/15 years to actually show an outcome, so it's small incremental changes that you don't necessarily see or feel or hear" (P18) • **Adoption of climate change**: "It was an outcome to say that climate change is embedded within all responsibilities of agencies and not positioned in an environmental agency, and then they are the ones responsible to respond" (P3) • **Reciprocity and mutual respect**: "I know for a fact that the businesses that we helped, when they needed us, they will help us when we need them, out of mutual kind of respect. And that's something you cannot just create in a contract or a service agreement" (P4) • **Improved business reputation**: "Being a private organisation having social responsibility we need to be kind of accepted and liked by the community to be a sustainable business, so being a good business is actually good for business. It's a bit of a paradox that way" (P4)
Individual benefits (7)	• **Social learning**: "I think it's not about just getting everyone's opinion, which has a value, but it's also accessing expert and specialised opinions.…increasing knowledge and expertise are really important" (P14) • **Sense of empowerment, belonging and social connectedness** from being involved in community organisations and participatory forms of governance (V1, P3, P15) • **Enhanced understanding of communities in a local area**: "If you are involved in recovery of any community, you know, you get to see the good, the bad, the ugly it's a really intimate sort of connection that you make, and not just with individuals, but with the entire community" (P18) • **Enhanced skills and knowledge of First Nations people** to navigate local government decision making processes (P18)
Social equity (15)	• **Consideration of those falling through the cracks** in community-led initiatives: "Some people battling drug and alcohol addiction won't come to a wine and cheese in the park, they're battling their own demons" (E3), • **Design of equitable collaborations with First Nations peoples**: "for me collaboration is working together, and equally working together as well" (P18) • **Giving voice to members of the community who don't usually have one** (breaking old power structures) (E14): "It can be very hard to facilitate engagement that meets all the needs of different demographics, different subsets of our community. You got to keep trying, absolutely got to be committed to it. Because all those groups have got really crucial aspects and inputs" (P14)

Appendix 6
Challenges encountered in implementing collaboratively

Challenges encountered	Specific sub-themes and results for each theme
Structures	**Staff and elected representative turnover (5)** • Staff turnover hampered proposed collaborative approaches (E10, V1, V4) • First Nations people needing to educate new councillors every time there is an election (E1) • Insecurity of climate change and disaster related local government positions (P19) **Outputs vs. outcomes approach (5)** • Perception that agency staff tick boxes rather than work towards outcomes (P2, E14, W6, V1) • Project vs. programmatic approach by local government (R4) **Slow decision making (4)** • Delayed resources/recovery programs due to 'red tape' (P20, R11, V1) • Living with uncertainty (E9) • Frustration at the pace of deliberative processes (P14) **Dependence on (3) and centralised decision making by (7) NSW State Government**

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Appendix 6 (*continued*)

Challenges encountered	Specific sub-themes and results for each theme
	• Recovery decision making resting with state agency, not local government (I7, I18, V1) • Inappropriate centralised decisions overriding local decisions (P9, P12, P19, V1, V4) **Information barriers (8)** • Risk/recovery information not permeating wider community (E7) and contradictory public messages (V1, V5) • Limited or no communications post-disaster (P15, R9, V1) • Repetition required when communicating with disaster agencies (P7, P10, V1) • Lack of systematic needs based community assessment (P19) • Interagency communication systems don't talk to each other (V1) **Lack of investment in process (6)** • Reluctance to invest in process (P7) because it is invisible (P6, P13) • Lack of recovery guidelines/understanding of community development in some local governments (P7) • Lack of contingency agreements in place (P8, V1) • Lack of clarity on who is responsible for flood mitigation, recovery, management of donated goods (P4, V1, V2V2, V4, R7)
Context	**Sense of responsibility (6)** • Encountering numerous challenges trying to find the best options for flood affected people and animals (P15, V1) • Guilt and sleeplessness knowing the disaster response collaboration didn't reach everyone in need (P9) • Balancing community need/expectation with funds and ability to keep providing (P9, P15, W2) **COVID-19 (7)** • Unable to meet in person which limited development of relationships and participatory approaches (P1, P2, P10, E10) • Reluctance to vaccinate meant reduced staff (P9, V1) • Division within communities (P17) • Dominated discussion over other pertinent issues (P2, P8) **Organisational infancy (4)** • Adjusting to new/emergent organisations on the scene (P5, P10) • Adjustment/refinement within a new organisation (P2, P11) **Cut off from official support (12)** •No access to formal government agencies (P9, P12, P14, P15, P17, R3, W8 V1, V2V2, V5) **Emotionally and physically drained (12)** •Exhaustion from multiple roles on a personal, family, community and professional level in a disaster landscape (P17, P19, P20, E14) •Disaster language fatigue (E3, P6) •Inability to engage in wider conversations due to being disaster affected (P17, E9) •Traumatised/exhausted volunteers (P9, W2) •Burn out, emotional toll (P1, P2, P20, R9)
Attitudes, knowledge, practice	**Reluctance to engage (7)** •Youth and First Nations people reluctant to engage in formal meeting processes (P14) •Limited adaptability and flexibility of local government/disaster agencies given fixed work programs (P2, P5) •Burnt by past collaborations (P8) •Deliberate sabotage of a deliberative process (P5, P14, P16) •Focused on organisational agenda/not prepared to negotiate (P1, P8) •Reluctant to engage communities in response coordination (V1) •Pulling staff out and disallowing staff to engage (V1, V4, P19, P20) •Withholding information (P8, P20, V1) •Reluctance to engage with new actors (P1, P10) **Inequity (1)** •Exclusion from community gatherings (E3, P17) •Inequitable or unrecognised contributions (P8), including for First Nations organisations (P18, W6) **Intra-community tensions (12) and conflict (16)** •Toxic culture, bullying and power struggles (P1, P9, P10, P13, E14, R5) •Tension and confrontation (P3, P12, P13, P17, E3, R10) •Fight or flight reactions (P18) •Anger (P1, P13), especially post-floods (P10, P17, R8, R10, V1) •Diversity of view points (P1, P8, W7) and difficult conversations (P5) **Competition and qualification (12)** •Fighting over who is helping who (P18, R7) •Under-qualified to deliver the work (P2, P7, P10, P20) •Grants/resources competition (P2, P5, P6, P8, P10, V4) •Undermining response and creating harm (P7, P19, P20) •Lack of understanding of community driven approaches and recovery at leadership level (P19, R6)

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Appendix 6 (*continued*)

Challenges encountered	Specific sub-themes and results for each theme
	•Lack of trauma informed approaches in service/evacuation centres (P19) and community meetings (R7) **Insensitivity (6)** •Agency staff not following through with pledges of support (P9) •Prioritising media opportunities post-floods (V2V2) •Lack of consideration for suffering and hurt post-flood (P17, P20) •Perceived arrogance and disregard for knowledge/people on the ground (V1, P19, P20), including First Nations people (V1, V2V2) •Feelings of being used as a stepping stone (P10) • Disregard for local systems and relationships (P19)

References

[1] International Institute for Sustainable Development (IISD), "Think Resilience" Approach Emerges as Key Recommendation from UN Platform, SDG Knowledge Hub (published 2nd June 2022), 2022, 20/6/2022, http://sdg.iisd.org/news/think-resilience-approach-emerges-as-key-recommendation-from-un-platform/?utm_medium=email&utm_campaign=SDG%20Update%20-%202%20June%202022&utm_content=SDG%20Update%20-%202%20June%202022+CID_1cd47463147fd1d7725996dff3a44b4c&utm_source=cm&utm_term=Read.

[2] T.H. Morrison, W.N. Adger, A. Agrawal, K. Brown, M.J. Hornsey, T.P. Hughes, M.C. Lemos, L.H. McHugh, S. O'Neil, D. Van Berkel, Radical interventions for climate-impacted systems, Nat. Clim. Change 12 (12) (2022) 1100–1106.

[3] IPCC. *Climate Change 2022: Impacts, Adaptation, and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press. Cambridge University Press, Cambridge, UK and New York, NY, USA, 2022, p. 3056, https://doi.org/10.1017/9781009325844.

[4] E. Brink, C. Wamsler, Collaborative governance for climate change adaptation: mapping citizen-municipality interactions, Environmental Policy and Governance 28 (No. 2) (2018) 82–97.

[5] M.A. Miller, M. Douglass, Governing flooding in Asia's urban transition, Pac. Aff. 83 (No. 3) (2015) 499–515.

[6] V. Kalesnikaite, Keeping cities afloat: Climate change adaptation and collaborative governance at the local level, Public Perf. Manag. Rev. 42 (4) (2019) 864–888, https://doi.org/10.1080/15309576.2018.1526091.

[7] United Nations, Transforming our world: the 2030 Agenda for Sustainable Development (2015). New York, USA.

[8] United Nations International Strategy for Disaster Reduction, Sendai Framework for Disaster Risk Reduction 2015-2030, 2015.

[9] United Nations, Paper Presented at the Conference of the Parties 21st Session, Paris Agreement, Paris, France, 2015.

[10] Inter-Agency Standing Committee (IASC), The Grand Bargain, IASC, Geneva, Switzerland, 2016.

[11] Inter-Agency Standing Committee (IASC), The Grand Bargain 2.0: Endorsed Framework and Annexes, IASC, Geneva, Switzerland, 2021.

[12] T. Chung Tiam Fook, Transformational processes for community-focused adaptation and social change: a synthesis, Clim. Dev. 9 (1) (2017) 5–21.

[13] A. Agrawal, M. Kononen, N. Perrin, The role of local institutions in adaptation to climate change, Social development papers - social dimensions of climate change - paper no. 118, 2009, The World Bank, Washington, United States.

[14] C. Raven, An opportunity to hope and dream": Disaster politics and the emergence of possibility through community-led recovery, Antipode 51 (2) (2019) 497–516.

[15] B. Ryan, K.A. Johnston, M. Taylor, R. McAndrew, Community engagement for disaster preparedness: a systematic literature review, Intern. J. Disast. Risk Reduc. 49 (2020) 101655.

[16] D. Owen, M. O'Kane, Final Report of the New South Wales Bushfire Inquiry, Government of New South Wales, Sydney, Australia, 2020.

[17] Mark Binskin, et al., The Royal Commission into National Natural Disaster Arrangements - Report. Canberra, Australian Capital Territory (2020).

[18] Department of Defence, National Defence – National Defence Review, Commonwealth of Australia, Canberra, Australia, 2023.

[19] S. Alexander, Australian Defence Force refocus of resources will leave a gap in response and recovery, Aust. J. Emerg. Manag. 38 (3) (2023) 6–8.

[20] Insurance Council of Australia, Climate Change Impact Series: Flooding and Future Risks, Insurance Council of Australia, Sydney, Australia, 2022. URL: https://insurancecouncil.com.au/wp-content/uploads/2022/05/2202May_Flooding-and-Future-Risks_final.pdfAccessedAugust32023.

[21] S. Darab, Y. Hartman, E.E. Pittaway, Building community resilience: lessons from flood-affected residents in a regional Australian town, The International Journal of Community and Social Development 2 (4) (2020) 409–425, https://doi.org/10.1177/2516602620981553.

[22] A. Howard, M. Rawsthorne, D. Sampson, M. Katrak, Supporting Community Led Approaches to Disaster Preparedness: Learnings from Three Pilot Locations (Evaluation of the Get Ready Disaster Resilient: Future Ready Pilots) Summary Research Report, University of Sydney, University of Newcastle and Foundation for Rural and Regional Renewal and Resilience, NSW, 2020.

[23] J. Longman, M.M. Braddon, B. Verlie, D. Schlosberg, M.L. Hampshire, M.A. Noonan, E. Saurman, Building resilience to the mental health impacts of climate change in rural Australia, The Journal of Climate Change and Health (2023), https://doi.org/10.1016/j.joclim.2023.100240.

[24] J. Schirmer, L. Dare, Planning and preparing for community-led disaster recovery: A guide for community-based organisations (2021). Canberra, Australia.

[25] C. Owen, How can governments enable and support community-led disaster recovery? Aust. J. Emer. Manag. 33 (1) (2018) 66–69.

[26] S. Ruane, Applying the principles of adaptive governance to bushfire management: a case study from the South West of Australia, J. Environ. Plan Manag. 63 (7) (2020) 1215–1240.

[27] B. Jacobs, C. Lee, S. Watson, S. Dunford, A. Coutts-Smith, Adaptation planning process and government adaptation architecture support regional action on climate change in New South Wales, Australia, Innov. Clim. Change Adapt. (2019) 17–29.

[28] Norman, Gurran, Regional solutions for multi-level governance challenges in Australian coastal and climate change planning, in: Multi-level Governance – Conceptual Challenges and Case Studies from Australia, ANU Press, Canberra, Australia, 2017.

[29] B.W. Head, Managing urban water crises: adaptive policy responses to drought and flood in Southeast Queensland, Australia, Ecol. Soc. 19 (2) (2014) 33, https://doi.org/10.5751/ES-06414-190233.

[30] A. Sullivan, D.D. White, M. Hanemann, Designing collaborative governance: insights from the drought contingency planning process for the lower Colorado River basin, Environ. Sci. Pol. 91 (2019) 39–49.

[31] A. Bramwell, J. Pierre, New community spaces: regional governance in the public interest in the Greater Toronto area, Urban Aff. Rev. 53 (3) (2017) 603–627.

[32] S. Carrasco, T. Egbelakin, N. Dangol, Fostering recovery through stakeholders-community collaboration in post-earthquake recovery in Nepal, Int. J. Disaster Risk Reduc. 88 (2023).

[33] A.L. Ostovar, Investing upstream: watershed protection in Piura, Peru, Environ. Sci. Pol. 96 (2017) 9–17.

[34] P.K. Singh, H. Chudasama, Pathways for climate resilient development: human well-being within a safe and just space in the 21st century, Global Environ. Change 68 (2021).

[35] R. Derrett, *Regional Festivals: Nourishing Community Resilience: the Nature and Role of Cultural Festivals in Northern Rivers NSW Communities*', PhD Thesis, Southern Cross University, Lismore, NSW, 2008.

[36] P. Olsson, L.H. Gunderson, S.R. Carpenter, L. Lebel, C. Folke, C.S. Holling, Shooting the rapids: navigating transitions to adaptive governance of social-ecological systems, Ecol. Soc. 11 (1) (2006) 18.
[37] C. Ansell, A. Gash, Collaborative governance in theory and practice, J. Publ. Adm. Res. Theor. 18 (4) (2007) 543–571, https://doi.org/10.1093/jopart/mum032.
[38] K. Emerson, T. Nabatchi, S. Balogh, An integrative framework for collaborative governance, J. Publ. Adm. Res. Theor. 22 (1) (2012) 1–29, https://doi.org/10.1093/jopart/mur011.
[39] G. Forino, J. von Meding, G. Brewer, D. van Niekerk, Climate change adaptation and disaster risk reduction integration: strategies, policies and plans in three Australian local governments, Int. J. Disaster Risk Reduc. 24 (2017) 100–108.
[40] T. Mitchell, M. Van Aalst, P. Silva Villanueva, Assessing progress on integrating disaster risk reduction and climate change adaptation in development processes, in: Strengthening Climate Resilience Discussion Paper No. 2, Institute for Development Studies, Brighton, UK, 2010.
[41] J. Mercer, Disaster risk reduction or climate change adaptation: are we reinventing the wheel? J. Int. Dev.: J. Dev. Sustain. Agric. 22 (No. 2) (2010) 247–264.
[42] T.G. Measham, B.L. Preston, T.F. Smith, C. Brooke, R. Gorddard, G. Withycombe, C. Morrison, Adapting to climate change through local municipal planning: barriers and challenges, Mitig. Adapt. Strategies Glob. Change 16 (2011) 889–909.
[43] S. Bradshaw, J. Gardner, J. Gergis, G. Blashki, Climate Trauma: the Growing Toll of Climate Change on the Mental Health of Australians, Climate Council of Australia, Sydney, Australia, 2023.
[44] L. Schipper, M. Pelling, Disaster risk, climate change and international development: scope for, and challenges to, integration, Disasters 30 (No. 1) (2006) 19–38.
[45] J. Nalau, J. Handmer, M. Dalesa, H. Foster, J. Edwards, H. Kauhiona, L. Yates, S. Welegtabit, The practice of integrating adaptation and disaster risk reduction in the south-west Pacific, Clim. Dev. 8 (4) (2016) 365–375, 2016.
[46] R. McNaught, K. McGregor, M. Kensen, R. Hales, J. Nalau, Visualising the invisible: collaborative approaches to local-level resilient development in the Pacific Islands region, Commonwealth J. Local Govern. (26) (2022) 28–52.
[47] T.A. Scott, C.W. Thomas, Unpacking the collaborative toolbox: why and when do public managers choose collaborative governance strategies? Policy Stud. J. 45 (1) (2017) 191–214, https://doi.org/10.1111/psj.12162.
[48] K. Johnston, A gender analysis of women in public-private-voluntary sector 'partnerships, Publ. Admin. 95 (1) (2017) 140–159, https://doi.org/10.1111/padm.12288.
[49] J.M. Purdy, R.M. Jones, A framework for assessing power in collaborative governance processes [with commentary], Publ. Admin. Rev. 72 (3) (2012) 409–418, https://doi.org/10.1111/j.1540- 6210.2011.02525.x.
[50] H. Wang, B. Ran, Network governance and collaborative governance: A thematic analysis on their similarities, differences, and entanglements, Publ. Manag. Rev. 25 (6) (2023) 1187–1211.
[51] A. Clarke, M. Fuller, Collaborative strategic management: strategy formulation and implementation by multi-organizational cross-sector social partnerships, J. Busin. Ethics 94 (2010) 85–101, https://doi.org/10.1007/s10551-011-0781-5.
[52] R.S. Morse, J.B. Stephens, Teaching collaborative governance: phases, competencies, and case- based learning, J. Publ. Aff. Educ. 18 (3) (2012) 565–583, https://doi.org/10.1080/15236803.2012.12001700.
[53] G. Mansuri, V. Rao. Localizing development: does participation work?, World Bank Publications, United States, 2013. https://openknowledge.worldbank.org/bitstream/handle/10986/11859/9780821382561.pdf?sequence=1&isAllowed=y.
[54] J.C. Calanni, S.N. Siddiki, C.M. Weible, W.D. Leach, Explaining coordination in collaborative partnerships and clarifying the scope of the belief homophily hypothesis, J. Publ. Admin. Res. Theory 25 (3) (2015) 901–927.
[55] M. Stout, J.M. Love, Integrative Governance, The American Review of Public Administration 47 (1) (2016) 130–147, https://doi.org/10.1177/0275074015576953.
[56] T. Dietz, E. Ostrom, P.C. Stern, The struggle to govern the commons, Science 302 (5652) (2003) 1907–1912.
[57] C. Folke, T. Hahn, P. Olsson, J. Nordberg, Adaptive governance of social-ecological systems, Annu. Rev. Environ. Resour. 30 (2005) 441–473.
[58] R.D. Brunner, A.H. Lynch. Adaptive governance and climate change, American Meteorological Society, Massachusetts, United States, 2010.
[59] R.K. Yin. Case study research: Design and methods, 4th edition, Sage Publications Inc, California, United States, 2009.
[60] I. Etikan, S.A. Musa, R.S. Alkassim, Comparison of Convenience sampling and purposive sampling, Am. J. Theor. Appl. Stat. 5 (1) (2016) 1–4.
[61] Teddlie, Yu, Mixed methods sampling: a typology with examples, J. Mix. Methods Res. 1 (1) (2007) 77–100.
[62] CSIRO, Northern rivers resilience initiative. https://www.csiro.au/en/research/natural-disasters/floods/northern-nsw-resilience-initiative, 2023.
[63] J. Fereday, E. Muir-Cochrane, Demonstrating rigor using thematic analysis: a hybrid approach of inductive and deductive coding and theme development, Int. J. Qual. Methods 5 (1) (2006) 80–92.
[64] M. Chapman, H. Gajewska-De, C. Antoniou, Chapter 14. The ethnographic international business researcher: Misfit or trailblazer, in: R. Piekkari, C. Welch (Eds.), Handbook of qualitative research methods for international business, Edward Elgar Publishing, 2004, pp. 287–314.
[65] J. Renouf, The implications of climate change for emergency management: the example of Australia, Int. J. Emerg. Manag. 18 (2) (2023) 144–171.
[66] M.E. Robinson, The Robertson Land Acts in New South Wales, 1861-84, Trans. Inst. Brit. Geogr., 61 (1974) 17–33, https://doi.org/10.2307/621597.
[67] J.W. Handmer, Property Acquisition for Flood Damage Reduction, Australian Water Resources Council, Canberra: CRES, ANU), 1984, p. 364pp. Final Report Series. (Reprinted in 1986 as CRES Working Paper 1986/26.
[68] Lismore City Council, Lismore Floodplain Risk Management Plan 2014, Lismore City Council, Lismore, NSW, 2014.
[69] A. Gissing, Opinion: Building Resilience for the Unprecedented, Australian Journal of Emergency Management, 2022. April 2022, https://knowledge.aidr.org.au/resources/ajem-april-2022-opinion-building-resilience-for-the-unprecedented/.
[70] Public Works Department. Lismore Floodplain Management Options Report. Product Evaluation Unit, Public Works Department, Government of New South Wales, Sydney, Australia, 1992. https://flooddata.ses.nsw.gov.au/related-dataset/lismore-floodplain-management-options-report-march-1992-report/resource/9af772f8-1a88-4afe-99ae-dcd91020d5d1.
[71] New South Wales State Emergency Service, Lismore local government area. https://www.ses.nsw.gov.au/flood-awareness-nsw/northern-rivers/lismore-lga/#:~:text=Lismore%20is%20one%20of%20the,falls)%20and%20intensity%20of%20rainfall, 2023.
[72] K. Alcock, R. Irwin, T. Madden, P. Thorpe, B. Trevan, Lismore Citizen's Review of the March 2017 Flood, Lismore, Australia, 2017.
[73] CHOICE, Weathering the Storm: Insurance in a Changing Climate, CHOICE, Sydney, Australia, 2023.
[74] Government of New South Wales, NSW Climate Change Adaptation Strategy, State of New South Wales, Sydney, Australia, 2022.
[75] Climate Council of Australia, A Super-charged Climate: Rain Bombs, Flash Flooding and Destruction, Climate Council of Australia, Sydney, Australia, 2022.
[76] C. Bruyère, B. Buckley, A. Prein, G. Holland, M. Leplastrier, D. Henderson, P. Chan, J. Done, A. Dyer, Severe Weather in a Changing Climate, second ed., Insurance Australia Group, Sydney, Australia, 2020.
[77] Australian Bureau of Meteorology, New South Wales in 2019: Record Warm and Record Dry, 2020. Accessed 4th August, 2023. URL: http://www.bom.gov.au/climate/current/annual/nsw/archive/2019.summary.shtml.
[78] G. Bradley, S. Deshpande, K. Paas. Climate Action Survey, 2022 Technical Report, Climate Action Beacon, Griffith University, Queensland, Australia, 2023.
[79] Public Service Association of New South Wales, Submission to the Royal Commission into National Natural Disaster Arrangements, Public Service Association of New South Wales, Sydney, Australia, 2020.
[80] NSW Reconstruction Authority, One Year on from the February-March 2022 Severe Weather and Floods, NSW Reconstruction Authority, Sydney, NSW, 2023.
[81] Government of NSW. NSW Recovery Plan, Resilience NSW, Government of NSW, Sydney, NSW, 2021.
[82] R. Eckersley, (Dis)order and (in)justice in a heating world, Int. Aff. 99 (1) (2023) 101–119.
[83] B.C. Chaffin, H. Gosnell, B.A. Cosens, A decade of adaptive governance scholarship: synthesis and future directions, Ecol. Soc. 19 (3) (2014).
[84] J.H. Holland, Complex adaptive systems, Daedalus 121 (1) (1992) 17–30.
[85] S.J. Lansing, Complex adaptive systems, Annu. Rev. Anthropol. 32 (1) (2003) 183–204.

[86] M. Wilkonson. The Carbon Club, Allen and Unwin, Crows Nest, Australia, 2020.
[87] M. McDonald, After the fires? Climate change and security in Australia, Aust. J. Polit. Sci. 56 (1) (2021) 1–18.
[88] Insurance Council of Australia. Building a more resilient Australia: Policy proposals for the next, Australian Government, Insurance Council of Australia, Sydney, Australia, 2022.
[89] Insurance Council of Australia. Climate change impact series: Action of the sea and future risks, Insurance Council of Australia, Sydney, Australia, 2021.
[90] J. Birch, H. Luke, The Northern Rivers Flood Recovery Study, Lismore, NSW, 2022.
[91] M. Taylor, F. Miller, K. Johnston, A. Lane, B. Ryan, R. King, H. Narwal, M. Miller, D. Dabas, H. Simon. Community experiences of the January-July 2022 floods in New South Wales and Queensland – final report: policy-related research findings, Natural Hazards Research Australia, Melbourne, 2023.
[92] van Beurden, Kia, Wicked problems and health promotion: reflections on learning, Health Promot. J. Aust. 22 (2) (2011) 83–84.
[93] A. Kia, A. Ricketts, Enabling Emergence: the Bentley Blockade and the Struggle for a Gasfield Free Northern Rivers, vol. 00, Southern Cross University Law Review, 2018, pp. 49–74.
[94] S. Boas, B.A. Eyal, Challenges of military leadership in changing armies, J. Polit. Mil. Sociol. 28 (1) (2008) 43–59.
[95] L.W. Vogelaar, Leadership from the edge: a matter of balance, Journal of Leadership and Organisational Studies 13 (3) (2007) 27–42.
[96] United Nations Office for the Coordination of Humanitarian Affairs Unocha, Cluster coordination, relief web. https://reliefweb.int/topics/cluster-coordination, 2023.
[97] M. O'Kane, M. Fuller, New South Wales Independent Flood Inquiry, Government of New South Wales, Sydney, Australia, 2022.
[98] D. Meadows. Leveragte points: places to intervene in a system, The Sustainability Institute, Hartland, United States, 1999.
[99] Government of New South Wales. State Emergency Management Plan, Government of New South Wales, Sydney, Australia, 2018.
[100] Government of NSW, Integrated regional vulnerability assessment: North Coast of New South Wales, Volume 1: assessment report, Office of Environment and Heritage, Sydney, Australia, 2016.