

Abstract

In response to the increasing frequency of emergency events in Aotearoa New Zealand, search and rescue non-government organisations have become more involved in civil defence emergency management activities. Despite this increased engagement, these organisations are not formally integrated into legislation, response training nor response planning. Through a systematic literature review, this study explored the involvement of non-government organisations in emergency events and focuses on their historical roles, current utilisation and potential future incorporation. Traditional core search and rescue functions involve mobilising community volunteers, fostering effective coordination between community and the official response and deploying highly skilled personnel as well as supplying specialised training and equipment that can be incorporated into a coordinated response effort. However, the findings of this study reveal the essential role non-government organisations play in events often goes beyond these core search and rescue functions. As the number of emergency events increases, the importance of understanding how these organisations can be better used is imperative to deliver collaborative approaches and the best outcomes for communities.

Exploring the role of search and rescue non-government organisations in emergency events: a systematic review in Aotearoa New Zealand

Peer reviewed

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publication.

Introduction

Aotearoa New Zealand has experienced an increase in seismic and climate hazards over the past decade (Cheng 2024; Ministry for the Environment 2023; National Emergency Management Agency 2023). This has resulted in search and rescue non-government organisations (SAR NGOs) increasing involvement in response activities under Civil Defence Emergency Management (CDEM) declared events (Hubbard 2022). Yet, SAR NGOs that include Surf Lifesaving, Coastguard, Land Search and Rescue and Amateur Radio Emergency Communications, are not currently included in CDEM legislation, response training or response planning (Te Kāwanatanga O Aotearoa 2023; Gisborne District Council 2023). With the release of various reviews into recent emergency events (New Zealand Government 2024; Bush International Consulting 2023, 2024) and the update to the emergency management legislation (New Zealand Government 2024), there is a need to review the literature and reflect on work to date to identify and address knowledge gaps to develop research directions. A systematic approach was adopted to collect and analyse relevant grey and academic literature that applies to the deployment of SAR NGOs in CDEM-led events in an Aotearoa New Zealand context.

The systematic literature review is a process where evidence is collected on a specific topic that fits prespecified eligibility criteria (Mengist et al. 2020).

We considered 3 questions:

- How have SAR NGOs been utilised in CDEM events in Aotearoa New Zealand?
- How are SAR NGOs currently being used in CDEM events in Aotearoa New Zealand?
- What work is being done in Aotearoa New Zealand to incorporate SAR NGOs into CDEM events and response planning?

Methodology

Due to the limited academic research data available in Aotearoa New Zealand (New Zealand Search and Rescue 2023a), this systematic literature review was conducted in 2 phases.

1. Phase One encompassed a review of grey literature using the NEWZTEXT database and newspaper articles from across Aotearoa New Zealand. Grey literature is material that has not been published in book or journal form (Massey University 2023). This required more input as each article needed to be manually searched to establish its relevance to the inclusion criteria as the titles were often obscure, typically referring to events, people or locations rather than directly signifying SAR involvement.
2. Phase Two looked at national and international academic research on the search and rescue sector's involvement in emergency events in Aotearoa New Zealand using the Massey University Discover library database and Google Scholar.

Definitions

To ensure a comprehensive search of relevant literature, it was essential to define and clarify the search terms and their definitions. For this paper, the term 'civil defence' is as used in the *Civil Defence Emergency Management Act 2002* (section 4) (New Zealand Government 2002). A 'civil defence' emergency:

(a) is the result of any happening, whether natural or otherwise, including, without limitation, any explosion, earthquake, eruption, tsunami, land movement, flood, storm, tornado, cyclone, serious fire, leakage or spillage of any dangerous gas or substance, technological failure, infestation, plague, epidemic, failure of or disruption to an emergency service or a lifeline utility, or actual or imminent attack or warlike act; and

(b) causes or may cause loss of life or injury or illness or distress or in any way endangers the safety of the public or property in New Zealand or any part of New Zealand; and

(c) cannot be dealt with by emergency services, or otherwise requires a significant and coordinated response under this Act.

(New Zealand Government 2002)

The definitions for SAR NGOs for Coastguard, Surf Lifesaving New Zealand, Land Search and Rescue, and Amateur Radio Emergency Communications are as outlined in the *New Zealand Search and Rescue Operation Framework* (New Zealand Search and Rescue 2022).

Criteria for inclusion

This review focused on literature that included at least one of the SAR NGOs (Coastguard, Surf Lifesaving, Land Search and Rescue or Amateur Radio Emergency Communications) and civil defence emergency events. An article was deemed eligible for inclusion if it met the following criteria:

- included the term 'civil defence' and must refer to an emergency under the specified definition
- included at least one of the search terms 'Coastguard'; 'Surf Lifesaving' OR 'SLSNZ'; 'Land Search and Rescue' OR 'LandSAR', 'Amateur Radio Emergency Communications' OR 'AREC'
- was relevant to Aotearoa New Zealand
- was written within the time period between 2011 and 2023.

The year 2011 was chosen as the earliest limit. This year served as a natural time boundary because the Canterbury earthquake response saw significant developments in search and rescue and CDEM sectors. Additionally, it was observed through search trials that relevant literature was limited prior to 2011.

Source and search procedures

The databases searched included NEWZTEXT, Discover and Google Scholar for studies meeting the specified criteria. The search took place in September 2023 and the search strings used were:

- 'civil defence' AND Coastguard OR 'Coast Guard'
- 'civil defence' AND surf lifesaving OR SLSNZ
- 'civil defence' AND LandSAR OR 'Land Search and Rescue'
- 'civil defence' AND AREC OR 'amateur radio emergency communications'.

Each SAR NGO was searched independently from the other organisations and not as a collective group. This was to ensure a wider collection of data. For the NEWZTEXT database, the INNZ category 'Index New Zealand' and the 'Newzindex' category were ticked to search each of the strings.

The search string had AND 'New Zealand' added when searching on Massey Discover and Google Scholar to eliminate articles that did not match the inclusion criteria.

For the search results, each article's preliminary relevance was determined by title, specifically looking for words that related to CDEM events such as earthquake, tsunami,

landslide, flood, storm, cyclone, inundation, tornado, catastrophic, unprecedented, evacuation and rescue or that related to the SAR NGOs’ names or roles (rescue, search, save lives, heroes).

From this, if the content appeared to meet the inclusion criteria it was interrogated to search for further relevance. If this was confirmed, a full reference was obtained including the author, title, year, date and the article link for future reference and was categorised as an ‘identified’ file.

This was later interrogated for relevant data and emerging themes. If this process confirmed the article met the inclusion criteria and provided adequate data, it was moved to a ‘referenced’ category and incorporated into the systematic literature review. The results for each search string are shown in Table 1.

Results

The search resulted in a total of 1,822 relevant articles from the 3 databases, being Coastguard New Zealand (862), Surf Lifesaving New Zealand (568), Land Search

Table 1: Systematic literature review search results.

Coastguard New Zealand		
NEWZTEXT	Massey University Discover	Google Scholar
260 results	405 results	197 results
30 identified	15 identified	3 identified
27 referenced	5 referenced	3 referenced
Surf Lifesaving New Zealand		
NEWZTEXT	Massey University Discover	Google Scholar
470 results	53 results	45 results
62 identified	1 identified	0 identified
36 referenced	0 referenced	0 referenced
Land Search and Rescue		
NEWZTEXT	Massey University Discover	Google Scholar
113 results	208 results	55 results
15 identified	2 identified	3 identified
15 referenced	2 referenced	3 referenced
Amateur Radio Emergency Communications		
NEWZTEXT	Massey University Discover	Google Scholar
11 results	5 results	2 results
0 identified	1 identified	0 identified
0 referenced	1 referenced	0 referenced

and Rescue (376) and Amateur Radio Emergency Communications (17).

Table 2 shows the numbers of articles used in the final analysis.

In total, 82 articles published between 2011 and 2023 reporting on ‘civil defence’ emergency events and involving at least one of the 4 SAR NGOs met the inclusion criteria. These 82 articles included 9 academic sources and the rest were composed of grey literature. These articles were reviewed in order to answer the research questions.

Coastguard New Zealand

The Coastguard New Zealand search string contributed 30.4% of articles towards this review. Coastguard groups appear to play a crucial role in past and present CDEM emergency events. The Coastguard provides guidance during these events (De Graaf 2017; Scoop 2011; Otago Daily Times 2014a; Otago Daily Times 2014b; Ryan and Dougan 2015; Reuters 2011; McLean et al. 2012; Walton et al. 2020), offers valuable advice and support for evacuations (Radio New Zealand 2022; Cloke et al. 2023; De Graaf et al. 2022) and assists with volunteer coordination (Mamula-Seadon et al. 2012; Cloke et al. 2023; Scully and Shaw 2022).

The Coastguard is actively involved in supporting rescue and response activities (Davidson and Thompson 2011; Scoop 2023; Jones 2018; Meij et al. 2018) and has been involved in broadcasting essential emergency service messages (Ryan 2015; Otago Daily Times 2015a; Smith 2022; Radio New Zealand 2011). The Coastguard provides valuable assistance during rescue operations through collaboration with other organisations and individuals (De Graaf and Larid 2011; Jones 2011; Otago Daily Times 2015b, Mamula-Seadon and McLean 2015; Dougan and Fuatai 2014; Solignac and Ranford 2011; Stuff 2017).

The literature examined provided answers to the first 2 questions posed for this review on past and current use of SAR NGOs in emergency events. However, the literature did not provide insight into work being done in Aotearoa New Zealand to incorporate SAR NGOs into CDEM events and response planning.

Surf Lifesaving New Zealand

Surf Lifesaving New Zealand (SLSNZ) had the highest number of results with 43.9%. SLSNZ has played an essential role in emergency events both past and present. It has been involved in supporting responses to floods (Stuff 2023a, 2023b; Green and Chin 2022; Radio New Zealand 2023a; Radio New Zealand 2023b), cyclones (Henry 2022; Radio New Zealand 2015) and tsunami events (Scoop 2011).

Its contribution includes aiding evacuations of people from their homes (Chin 2022; Green and Chin 2022; Otago

Table 2: Final search results.

Coastguard New Zealand	Surf Lifesaving New Zealand	Land Search and Rescue	Amateur Radio Emergency Communications
862 total results	568 total results	376 total results	17 total results
48 identified	63 identified	20 identified	1 identified
25 referenced	36 referenced	20 referenced	1 referenced
30.4% of total hits	43.9% total hits	24.3% total hit	1.2% total hits

Daily Times 2018; Sharpe et al. 2021; Radio New Zealand 2017) and providing vital rescue operations (Caldwell 2023; Conchie 2023; Dunnett 2023; Gabel and Maher 2022; Hope 2022; Radio New Zealand 2023b; Rowe 2022; Sunday Star Times 2023; Modern Campground 2021; Thomas 2023). Additionally, it has been involved in delivering welfare supplies to isolated communities via inflatable rescue boats when logistic support functions have been unable to source alternative solutions (Hageman 2023; Stuff 2023c). SLSNZ has assisted emergency events by sweeping beaches and evacuating people from at-risk coastal areas during tsunami threats (Hamilton-Irvine 2022; Hunter 2022; Keith 2013; McPherson 2011; Hunter 2022) and its facilities have been used as evacuation centres when other facilities were unavailable (Auckland Council 2023; Our Auckland 2023; Mayron 2023; Nichols 2023; Otago Daily Times 2015b; Stuff 2023b).

However, SLSNZ support during emergency events appears to be at its detriment as the organisation has had issues gaining reimbursement for costs of contaminated equipment from CDEM groups (Pennington 2023b; Glassey and Bray 2014). This is an area highlighted by Pennington (2023b) as a consideration for future planning if SLSNZ is to continue to support emergency responses. Aside from observations by Glassey and Bray (2014) and Pennington (2023b), the literature analysed did not offer insight into considerations for SLSNZ to be incorporated into future CDEM events and response planning.

Land Search and Rescue

Land Search and Rescue (LandSAR) contributed to 24% of the articles explored for this review. LandSAR has significantly expanded its role in emergency events. This is evident by its involvement increasing from 700 responses annually during 2019–20 to over 2,000 in 2022 (Hubbard 2022). This expansion in activity included door-to-door welfare checks and community outreach (Allott and Townsend 2022; Feek 2011; Otago Daily Times 2011; McAvine 2017; Allott and Townsend 2022; Radio New Zealand 2013), assisting authorities to evacuate people from their homes (Walton and Naish 2022; The Nelson Mail 2022) and supporting response activities (Geary 2019; Kestle and Potangaroa 2012; Rogers 2021; Porteous 2011;

Scully and Shaw 2022). Notably, LandSAR skills have recently been identified and incorporated as an asset in response plans for the Taranaki CDEM group (Horsfall 2019).

Amateur Radio Emergency Communications

Amateur Radio Emergency Communications contributed 1% of the articles for this review. It is important to note its contribution in providing support during emergency events. The organisation has established and maintains communication channels so operations can continue to function during events (Knowledge Bank 2023). A range of services include providing ‘highly trained’ unpaid personnel who deliver vital messaging services during emergency events (Amateur Radio Communications 2023).

Findings and themes

This review highlighted aspects of SAR NGO involvement in emergency events. Several themes were identified and extrapolated for analysis.

SAR collaboration

SAR NGOs were frequently described as working in collaboration with CDEM groups and responding agencies. This suggests that their operational training and experience add value to responses (Cloke et al. 2023; Geary 2019; Porteous 2011; Rogers 2021; Allott and Townsend 2022; The Nelson Mail 2022; Te Kāwanatanga O Aotearoa 2023). This collaboration provides insights into how SAR NGOs have contributed to past emergency events in addition to recent events that have taken place.

There is minimal evidence to demonstrate that SAR NGOs have been acknowledged and incorporated in planning for future emergency events including planning for severe large-scale emergency events that overwhelm regional resources, systems and response capabilities (Hawke’s Bay Civil Defence Emergency Management Group 2019; Horsfall 2019). Understandably, questions have arisen about recuperating costs for SAR NGOs that operate during emergency events (Glassey and Bray 2014; Hubbard 2022; Pennington 2023b). Particularly, there is a lack of formal agreements in place between SAR NGOs and CDEM groups (New Zealand Search and Rescue 2023b) and no

mention of SAR NGO involvement in legislation relating to CDEM emergency events (Civil Defence Emergency Management 2002). This has caused confusion as to which is the responsible agency to deploy these assets since it is not directly covered under the legislative jurisdiction of the Coordinating Authorities – New Zealand Police and Maritime New Zealand (Pennington 2023a; New Zealand Search and Rescue 2022; Pennington 2023b). This has led SAR NGOs to independently seek out memorandums of understanding and service-level agreements with CDEM groups directly, effectively bypassing government organisations responsible for the strategic leadership, policy and administrative support of the SAR NGOs (Surf Lifesaving New Zealand 2018).

There is a necessity to establish clear, formalised partnerships through agreements that define roles and responsibilities, expectations and health and safety requirements of SAR NGOs as stand-alone support agencies for the emergency management sector. SAR NGOs should be consulted to establish a clear understanding of their involvement in CDEM emergency events, their recommendations for future involvement and the expectations for being involved in emergency events and planning.

Community and volunteer management

The literature documents the pivotal role played by SAR NGOs in mobilising community volunteers for emergency events. SAR NGOs often function as intermediaries and bridge the gap between the official response agencies and community-based efforts (Geary 2019; Land Search and Rescue New Zealand 2023; McLean et al. 2012; Mamula-Seadon and McLean 2015; Mamula-Seadon et al. 2012; Scully and Shaw 2022; Yarwood 2011). This was evident in the 2011 Canterbury earthquakes when Coastguard coordinated the community-led response in the isolated port of Lyttelton while feeding information to the coordination centre in Christchurch (Mamula-Seadon and McLean 2015; Mamula-Seadon et al. 2012).

SAR NGOs excel at promoting effective and collaborative coordination while preventing redundancy and duplication of effort. Moreover, they possess invaluable experience in managing ‘spontaneous’ volunteers. This is a critical aspect of emergency response operations (Department of the Prime Minister and Cabinet 2019; Allot and Townshend 2022; Cloke et al. 2023; Land Search and Rescue 2023; Lockwood 2019; Yarwood 2011). Oftentimes there are reservations from community when government organisations are involved in directing their activities during response (McLean et al. 2012; Mamula-Seadon and McLean 2015).

While there is an imperative to formally acknowledge and appreciate the contributions made by these organisations

in emergency events, there is also an opportunity to maximise their competences in volunteer management. Although SAR NGO personnel are unpaid, they are often highly regarded members of communities with mana (respect). Using this expertise and knowledge as a collective part of their respective SAR NGOs can contribute to positive coordination while influencing and empowering the community-based efforts in response.

Training and equipment

The reviewed articles uniformly acknowledge the critical role of training and equipment in enhancing SAR capabilities during CDEM emergency events (Chin 2022; Scoop 2020; Guildford, Watson et al. 2022; Land Search and Rescue New Zealand 2023; New Zealand Search and Rescue 2008; Radio New Zealand 2021; Sharpe et al. 2021; Modern Campground 2021, 2023; Volunteer New Zealand 2019). SAR NGOs invest significantly in training their volunteers, equipping them to operate as unpaid professionals with specialised skills, thus enabling safer and more effective outcomes (Knowledge Bank 2023; Land Search and Rescue New Zealand 2023; New Zealand Search and Rescue 2023b; Surf Lifesaving New Zealand 2022). Yet, training, skills, knowledge and equipment related to CDEM emergency events require additional resources and costs, particularly since SAR NGO engagement in these events has become more complicated, with increased frequency in uncertain and challenging conditions, often stretching capabilities (Glassey and Bray 2014; Hubbard 2022; Land Search and Rescue New Zealand 2023; Ministry of the Environment 2023; Te Kāwanatanga O Aotearoa 2023).

Nonetheless, SAR NGOs have raised valid concerns regarding the reimbursement of cost associated with equipment contamination during previous CDEM emergency events, health and safety requirements and the additional training requirements placing strains on their already limited funding rounds (Glassey and Bray 2014; Pennington 2023a; Hubbard 2022; Surf Lifesaving New Zealand 2022; Te Kāwanatanga O Aotearoa 2023;).

Another concern is the resource allocation and the potential for future funds being diverted from organisations such as New Zealand Response Teams or Fire and Emergency New Zealand that are mandated to provide vital assistance as part of their role in response (New Zealand Government 2002). A hazard-specific analysis would be necessary as different emergency events require unique responses and emphasis on additional training could affect volunteer participation if SAR NGOs were expected to handle non-traditional situations such as floods.

However, the broadening of responsibilities within the SAR NGOs may lead to unintended consequences, including decreased volunteer retention and the risk of skill displacement (Cessford and Kazmierow 2010). The

additional training requirements necessary to equip volunteers for expanded roles can place significant strain on their time, potentially resulting in burnout or disengagement. There is also a risk that the volunteers' core SAR skills may become diluted, reducing their effectiveness in specialised tasks. Balancing increased capacity with the maintenance of key competencies is important to mitigating these risks.

While the reviewed literature identifies opportunities for SAR NGOs within the CDEM framework, its reliance on newspaper articles introduces potential biases, limiting the breadth and objectivity of the insights. The release of reviews (New Zealand Government 2024; Bush International Consulting 2023; Bush International Consulting 2024) and the pending update of legislation (New Zealand Legislation 2024) highlights the need for critical discussions on funding and legislative considerations in the allocation of funding to SAR NGOs. This highlights the need for further research using diverse and objective sources to better understand and enhance the roles of SAR NGOs in emergency management.

Limitations

A limitation in this review is the restricted access to valuable literature and resources in the field of emergency management in Aotearoa New Zealand, particularly those relevant to catastrophic event planning. The anticipated Catastrophic Event Handbook by the National Emergency Management Agency (NEMA) remains unreleased (Radio New Zealand 2024). This has created challenges in obtaining comprehensive, up-to-date insights into the intended national strategies and specific preparatory frameworks that might have been applicable to this review. As a result, the use of grey literature from articles were used for this analysis. Grey literature often lacks rigorous peer-review process that adds quality and reliability of academic articles (Massey University 2020). The use of grey literature may lead to potential bias and may reflect the specific agendas or perspectives of the groups and organisations producing the material.

Funding and legislative frameworks, particularly in light of the anticipated Emergency Management Bill (Bush International Consulting 2023), play an important role in shaping the involvement of SAR NGOs in emergency management. An example is Surf Lifesaving taking on the flood rescue responsibilities despite the lack of formal funding or mandate. This scenario highlights the importance of setting clear funding priorities and assessing whether SAR NGOs can or should expand into roles without adequate support (Pennington 2023b). These limitations signal the need for a balanced evaluation of SAR NGOs contributions to emergency events, along with targeted recommendations for further research.

Conclusion

Search and rescue operations are a critical component of response in emergency events and involve prompt and coordinated efforts to locate, rescue and assist people in distress. The effectiveness of search and rescue is amplified by the collective involvement of government organisations and non-government organisations. Aotearoa New Zealand has observed a growing demand for the integration of search and rescue efforts into planning and response activities for emergency events and response planning. Questions arise as to the participation of SAR NGOs in CDEM events. The search and rescue sector has largely been at the fringes of CDEM events and support response operations when required but do not have a formal mandate.

This review explored 3 questions: How have SAR NGOs been utilised in CDEM events in Aotearoa New Zealand? How are SAR NGOs currently being utilised in CDEM events in Aotearoa New Zealand? What work is currently being done in Aotearoa New Zealand to incorporate SAR NGOs into CDEM events and response planning? The literature selected to examine these questions has largely answered 2 questions well. However, the third question requires additional investigation.

A comparative analysis of search and rescue practices between Aotearoa New Zealand and Australia could significantly enhance the credibility and depth of these findings. By examining the coordination mechanism and regulatory frameworks in both countries, the review considerations and findings have broader applicability, particularly in the Australian context. Replicating this study in Australia would involve exploring the role and contributions of Australian SAR NGOs, such as State Emergency Services and Surf Lifesaving Australia, in emergency management events. This comparative approach would contribute to a wider understanding of effective search and rescue practices and emergency management models across the Australasian region.

SAR NGOs can leverage community support and specialised skills and make substantial contributions to the overall efficiency and effectiveness of operations in emergency events. Nonetheless, knowledge gaps exist in the legislative frameworks governing SAR NGOs involvement, funding for specialised training and equipment (particularly health and safety aspects) as well as reimbursement for equipment and CDEM-specific readiness and response training. SAR NGOs have an important capacity to bridge the gap between an official response and community-based efforts. The involvement of SAR NGOs during emergency events in Aotearoa New Zealand highlights their impact on the CDEM sector and in communities. Further research should be undertaken in the areas of search and rescue collaboration with CDEM groups as well as training and funding opportunities and using the SAR NGO volunteers and community engagement skills effectively.

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