NATURAL HAZARDS ATLAS TASMANIA

A Natural Hazards Atlas for Tasmania:

Mapping natural hazards to build disaster resilience and preparedness

Stakeholder Needs Analysis Summary Report

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About the stakeholder needs analysis

The University of Tasmania's Climate Futures Research Group is developing the Natural Hazards Atlas for Tasmania (NHAT), a publicly accessible, web-based platform designed to provide detailed, locally relevant information on natural hazards and climate change. Funded by the National Emergency Management Agency's Disaster Ready Fund, the Atlas aims to support risk planning, emergency preparedness, and resilience-building across Tasmania.

The Stakeholder Needs Analysis is a foundational component of the NHAT project. It identifies the information needs, preferences, and capabilities of stakeholders across sectors to ensure the Atlas is co-designed with its users and tailored to their operational contexts. This document provides a summary of findings and recommendations and outlines how the NHAT team is working to respond to the identified stakeholder needs.

Project aims

The needs analysis aimed to:

1. Assess stakeholder awareness of natural hazards and climate risks
2. Understand current natural hazard preparedness and resilience planning
3. Identify information gaps and preferred data formats
4. Inform the co-design of NHAT outputs and tools.

Methodology

A mixed-methods approach was used (Figure 1), including:

- An online survey
- In-person and online workshops across Tasmania
- Semi-structured interviews.

Analysis of quantitative and qualitative data was undertaken across six common themes of inquiry (Figure 2).

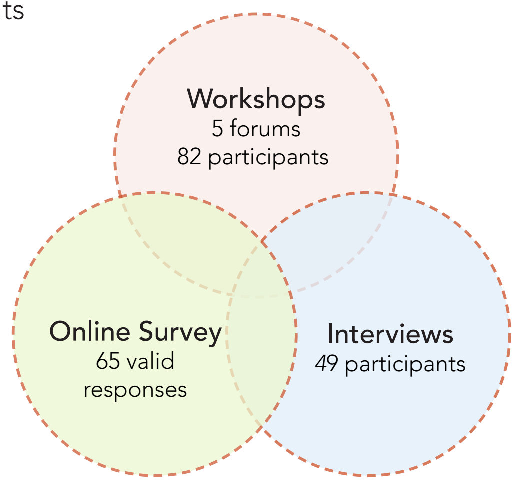


Figure 1: Participants by consultation method

1. Understanding exposure to, and management of, natural hazards
2. Establishing current access to, and use of, natural hazard and climate change information
3. Identifying future needs for information on natural hazards and climate change
4. Identifying preferred parameters and measures for natural hazard and climate change information
5. Identifying preferred formats for natural hazard and climate change information
6. Establishing capability building and support needs to enable uptake of the Atlas

Figure 2: Six themes of inquiry

Participation

Stakeholders represented a range of sectors (Figure 3): Local and state government, emergency management, public health, infrastructure and utilities, agriculture and aquaculture and natural resources. Local government authorities were well represented across Tasmania, with this sector most highly represented. Other well represented sectors were natural resources, state government, emergency management, and infrastructure and utilities.

Participants were identified as being from a particular sector depending on their organisation or unit's role. State government participants included those not already counted in state natural resources, infrastructure and utilities, emergency management, or public health organisations.

Despite extensive outreach, some sectors were underrepresented. The project team acknowledges these gaps and is committed to ongoing engagement efforts where possible beyond the initial consultation phase.

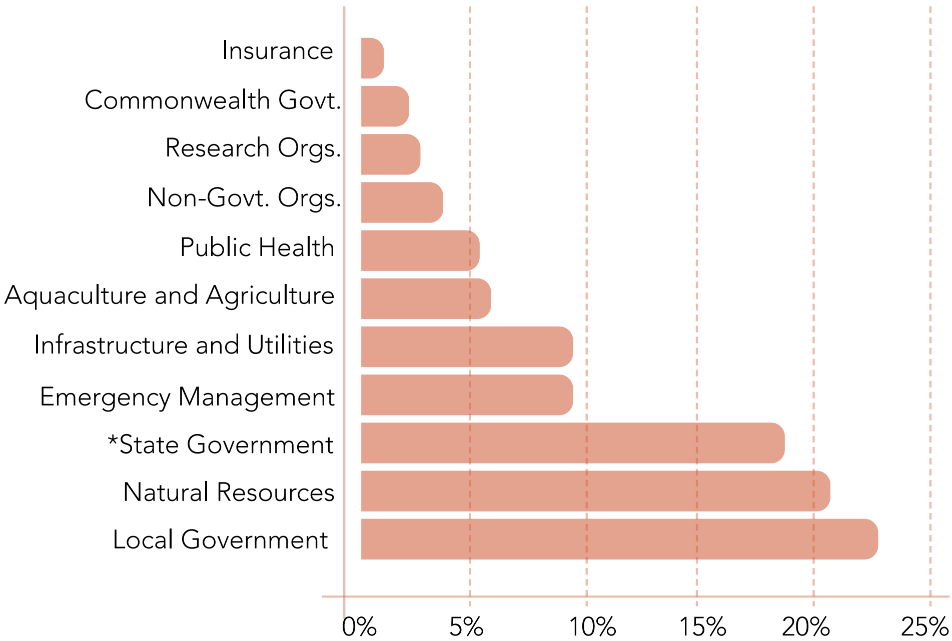


Figure 3: Percentage of participants by sector

*State Government participants include all State Government participants not already counted in *Natural Resources*, *Infrastructure and Utilities*, *Emergency Management*, or *Public Health*.

Overarching findings

Here we present a synthesis of the overarching findings from the stakeholder needs analysis. The subsequent sections offer more information regarding the six themes for analysis.

Awareness and priority hazards

The stakeholder consultation revealed a strong awareness across Tasmanian sectors of the growing risks posed by natural hazards, particularly in the context of a changing climate. Bushfires and floods were identified as the most pressing concerns, with compound events – such as bushfires combined with heatwaves – gaining attention for their complex interactions and impacts. Hail and blizzards were of least concern, while many stakeholders expect coastal hazards (e.g., inundation and erosion) and extreme rainfall to become more significant over time.

Planning, preparedness and information challenges

Many organisations reported a vulnerability and lack of resilience to natural hazards, especially those in the health sector and non-government organisations. Despite this, most are actively engaged in natural hazard risk management, using climate and hazard data for planning and preparedness. However, efforts are often limited by fragmented data systems, inconsistent data formats and a lack of technical expertise among staff to interpret complex information.

Data needs

Stakeholders commonly use, or wish to use, data from sources like The LIST (Land Information System Tasmania) and LISTmap, the Bureau of Meteorology (BoM), and the Tasmanian State Emergency Service (Tas SES). They expressed varying needs for data spanning short, medium, and long-term timeframes to support effective planning. This data should offer fine spatial resolution, in addition to summaries over relevant geographic boundaries such as Local Government Areas and river catchments.

There was strong interest in a wide range of technical parameters, including temperature extremes, rainfall, wind speed, soil moisture and fire danger indices. Stakeholders also highlighted the value of comparing emissions scenarios, and overlaying other geographic information (e.g. population, infrastructure, vegetation) with natural hazards data to better understand the interactions of change scenarios with future risks and inform longer term planning.

Preferred formats

Preferred data formats included maps, infographics, time series, and data tables, available through an interactive online platform. Technical users sought downloadable datasets for GIS (Geographical Information System) integration, while those who engage with community or decision-makers valued concise, plain English summaries and infographics.

Building capability, trust and cross platform integration

There was a widespread call for capability building. Stakeholders requested tailored training, sector-specific case studies, and ongoing support to utilise and make the most out of the Atlas. Stakeholders also expressed the importance of government endorsement and integration with platforms like LISTmap to ensure trust, uptake and long-term sustainability of the Atlas.

1 Understanding exposure to, and management of, natural hazards

Table 1 provides a summary of how different sectors understand, experience and manage natural hazards. It highlights the hazards considered most pressing, sector-specific priorities, and perceptions of vulnerability and resilience. The table also outlines how hazard data is currently used, approaches to climate change planning and the time frames guiding these efforts.

Table 1: Key insights: Understanding, exposure to, and management of natural hazards

Inquiry theme	Summary
Most pressing hazards	Bushfire and flood were identified as the most pressing hazards, with compound events (i.e., bushfires combined with heatwaves) gaining attention due to their complexity. Many stakeholders expect coastal hazards and extreme rainfall to become more significant over time. Hazards such as hail and blizzards were considered less critical.
Sector-specific priorities	Priorities varied depending on operational focus and geography.
Vulnerability and resilience	Based on a five point scale, respondents generally rated their organisations, or their stakeholders, as vulnerable but somewhat resilient to natural hazards. .
Use of natural hazard data	Data is widely used, but challenges limit its effectiveness: • Limited technical capacity and understanding of climate variables by users. • Fragmented data sources and inconsistent formats. • Concerns about using non-standard or non-endorsed data.
Climate change planning	Most sectors are integrating climate change into planning through: • Climate adaptation strategies and updated risk assessments. • Use of climate projections in infrastructure and policy planning. • Participation in national and state-level resilience initiatives.
Planning timeframes	Planning occurs across multiple timeframes: • Short-term (1–5 years) for operational needs and emergency response. • Medium-term (up to 10 years) for strategic planning and adaptation. • Long-term (20+ years) for infrastructure resilience and sustainability.

Natural hazards of most concern

Representatives across sectors consistently identified compound hazards, bushfire and flooding (including extreme rainfall) as top priority hazards, followed by storms (including coastal storm surges, thunderstorms, and extreme wind), coastal hazards, drought and heatwaves. All participants anticipated that these hazards will become even more important in the future (Figure 4).

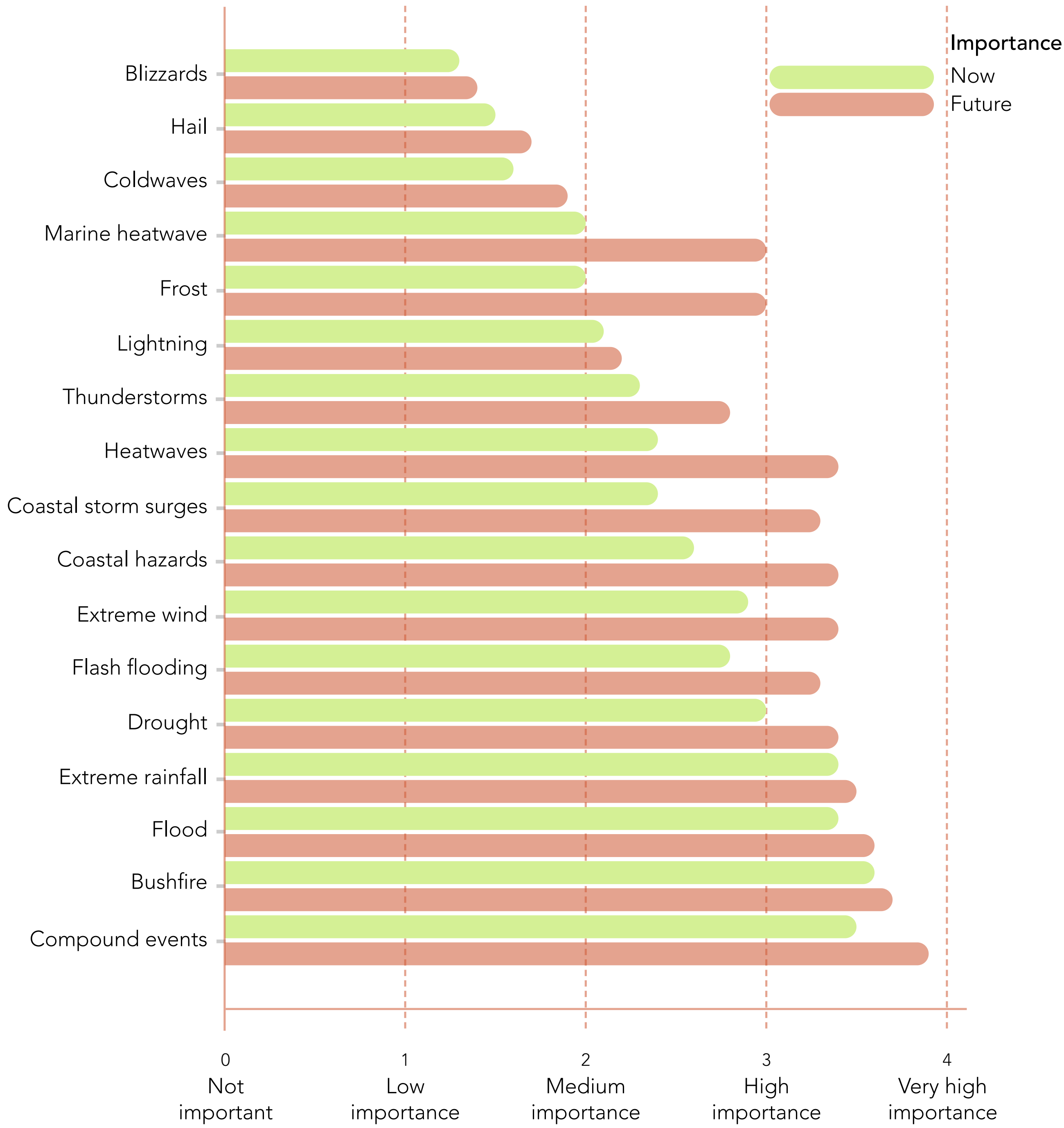


Figure 4: Perceived level of importance of natural hazards now and into the future

Source: Stakeholder workshops.

Operational impact and exposure

Workshop participants completed diagrams illustrating risks, highlighting the impact of natural hazards on operations (or on their stakeholders) or their relative operational exposure to hazards. Figure 5 highlights the collated results for the sectors best represented. Reflecting participants' perceptions of the importance of natural hazards, bushfires, floods and heatwaves again emerged as pressing hazards through this exercise. Sector-specific differences were evident: infrastructure and utilities viewed most hazards as having a similar level of impact, while emergency management prioritised bushfires and compound hazards. The State government considered all hazards important, while local government stressed particular concern for bushfire, flood and coastal hazards.

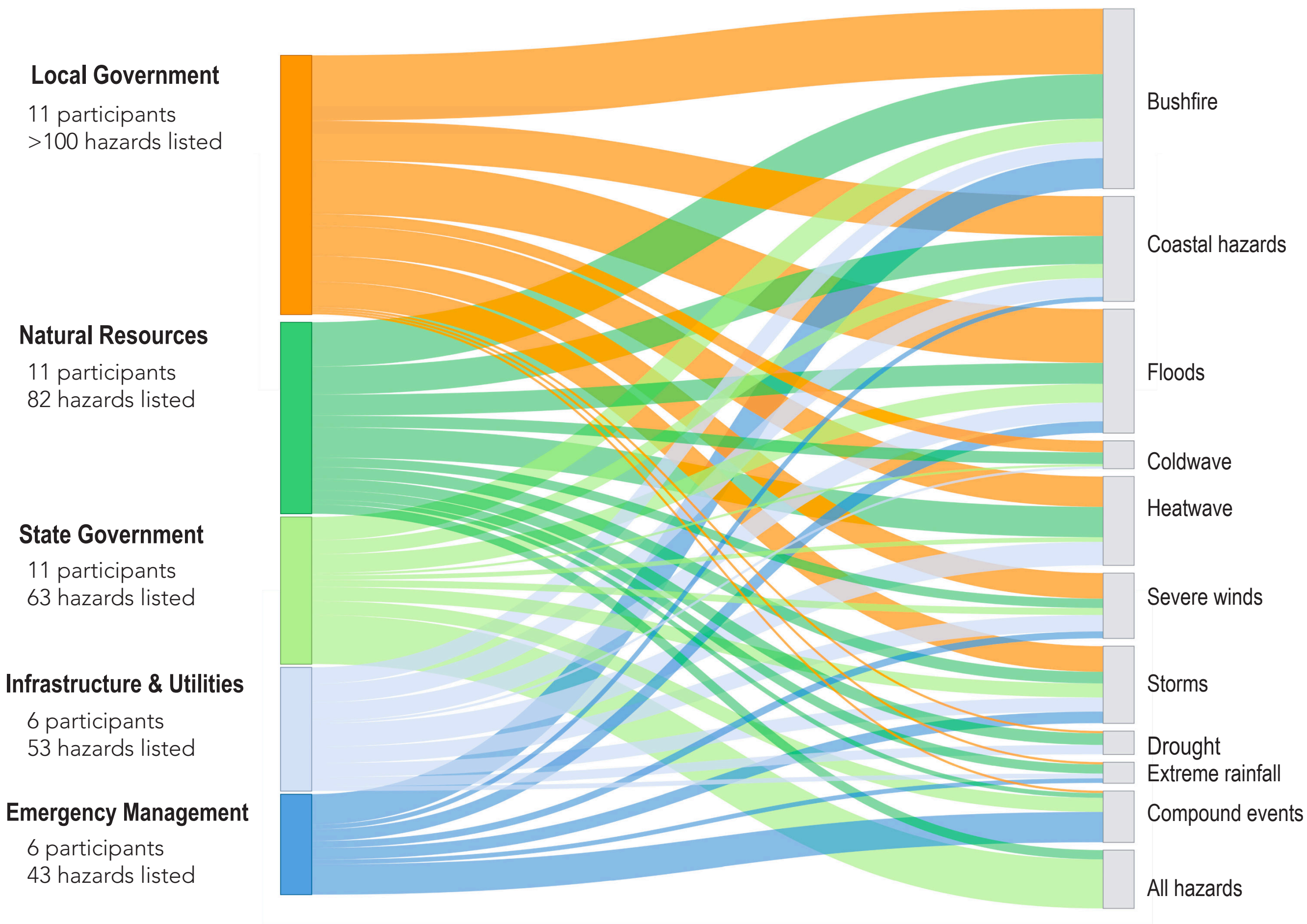
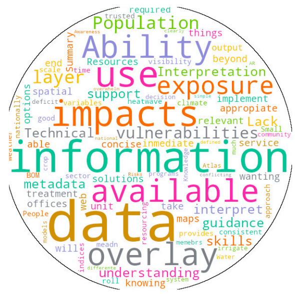


Figure 5: How sectors perceive the impact of natural hazards on, or their exposure to, their operations. Each line links a sector (left) to a natural hazard (right), with line width indicating how often each natural hazard was mentioned. Colours represent different sectors. The number of workshop participants within each sector undertaking this exercise, along with the frequency of hazards listed, is indicated.

Source: Stakeholder workshops.

2 Current access to, and use of, natural hazard and climate change information



The survey, interviews and workshops gathered insights into participants' current access to natural hazards and climate information, how they use this information, the sources they rely on and the existing gaps and challenges associated with accessing such information. Table 2 outlines key insights.

Four key themes emerged, the last two relating to information deficits:

- Information accessibility – Participants noted that data is often not user-friendly, making it difficult to locate, navigate, or apply effectively.
- Interpretation and communication barriers – Challenges were highlighted in understanding and interpreting detailed information about natural hazards.
- Data gaps – Participants identified missing or insufficient data for certain hazards, such as droughts, marine heatwaves and compound hazards.
- Accuracy and resolution – They also pointed to a lack of accuracy and resolution in data across various temporal and spatial scales.

Table 2: Key insights: Current access to, and use of, information

Inquiry theme	Summary
Natural hazard data - high interest but usability challenges	Over 70% of participants either currently use or are interested in using natural hazard data, but face issues with usability, inconsistent formats and lack of local detail.
Main barriers to accessing information	Barriers include: • Poor usability and data sharing. • Difficulty interpreting complex or localised data. • Gaps in hazard coverage and resolution.
Trusted information sources	Most trusted sources include: • Bureau of Meteorology (BoM). • Land Information System Tasmania (The LIST and LISTmap). • Tasmanian State Emergency Service (Tas SES). • CSIRO. These sources are valued for accuracy, real-time data and alignment with policy.
Sector specific use	Different sectors use data for planning, emergency response and risk management – each needing tailored, reliable information.

3 Future natural hazards and climate change needs.

To ensure the Atlas remains relevant to users' evolving needs, participants were consulted on their future information requirements related to natural hazards and climate change – including the types and purposes of information needed, preferred time frames, spatial and temporal scales and data required to address current gaps. Findings reveal a strong demand for more detailed, localised and forward-looking information to support planning, preparedness, and resilience across sectors. Key insights are outlined in Table 3.

Table 3: Key insights: Future information needs

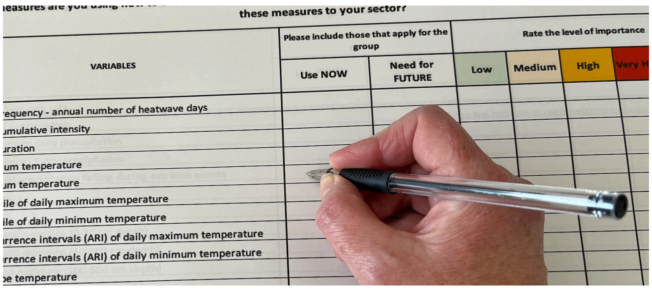
Inquiry theme	Summary
Stakeholder preferences - time frames, temporal scales and spatial resolution	**Timeframes** – Near future (up to 2040) was prefered, but many also stated a need for data extending to 2060 and beyond. **Temporal scales** – Monthly, seasonal, and annual data were identified as most useful, while sub-hourly and hourly data were less commonly needed. **Spatial resolution** – There was a call for for fine-scale spatial data of 1-5km resolution. Some preference for even finer scales was also voiced, particularly regarding floods and rising sea levels. However, many stakeholders recognised resolution limitations and favoured data integrity.
Geographic and regional priorities	Over half of respondents wanted data for all of Tasmania, while Local Government Areas (LGAs) were viewed as the most useful data boundaries, followed by river catchments and fire management areas.
Data gaps	Stakeholders identified several critical data gaps: • Lack of integrated, high-resolution datasets. • Insufficient data on emerging risks (e.g., thunderstorm asthma, marine heatwaves). • Limited real-time data for operational decision-making. • Inadequate information on compound and cascading hazards.
Evolving needs	Evolving needs included: • Greater demand for real-time and localised data. • More detailed projections for health, agriculture, and infrastructure. • Better tools for integrating data into planning and emergency response.

4 Preferred parameters and measures for natural hazard information

The Natural Hazards Atlas for Tasmania aims to provide stakeholders with a range of natural hazards data to support decision-making. To this end, stakeholders were asked to identify which technical parameters and quantitative measures they wanted to see included in the new Atlas. Table 4 provides a summary of key insights.

Table 4: Key insights: Preferred technical parameters

Insight	Summary
Broad demand for climate and hazard metrics	Stakeholders require a wide range of quantitative measures to support planning, including: • Temperature, rainfall, wind speed, sea level, and fire danger indices. • Soil moisture, drought indices, and air quality data. • Event-specific metrics (e.g., heatwave duration, storm surge, flood recurrence intervals).
Varied sector specific needs	Sectors prioritise different data, for example: • The health sector requires indicators to inform heat and air quality alerts and determine food security risks. • Local government needs focus on data to inform local flood, storm surge and fire risk. • The agriculture sector looks to soil moisture measures and rainfall trends to guide crop planting and predict yields. • Emergency management requires real-time hazard information to support effective response planning.
Interest in future scenarios	Stakeholders support the inclusion of multiple climate change scenarios (e.g., Paris Agreement, high-emission scenarios) and, if possible, land use/demographic projections to inform long-term risk and resilience planning.
Support needed for non-technical users	Many users rely on experts to interpret technical data; therefore, it is hoped that the Atlas will include clear explanations, visual tools, and guidance to make complex data accessible.



Measures currently used and preferred

The top 10 technical measures currently used by stakeholders, and those that they would like to incorporate in the future for operational risk assessment and planning purposes, are outlined for each of the natural hazards in Figure 6. The figure shows that while bushfires, flooding and extreme temperatures rely on a wide range of measures, other hazards depend on fewer. For example, wind assessments mainly use maximum daily wind gust and wind direction, whereas coastal hazard assessments commonly rely on mean sea level and tide height.

Figure 6: Circular bar plots showing the top 10 measures currently used and those preferred for future use in natural hazard assessments, based on survey percentage of responses. Current and future measure preferences are combined - the larger the circle the most prefered now and into the future.

Abbreviations: AFDRS= Australian Fire Danger Rating System, FFDI= Forest Fire Danger Index MFDI = Buttongrass Moorland Fire Danger Index, CAPE = Convective available potential energy, ARI = Average Recurrence Interval, PP = precipitation.

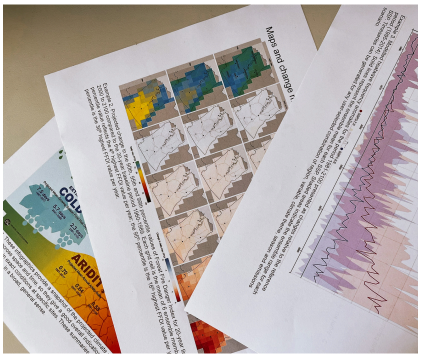
5 Preferred formats for natural hazard and climate change information

Workshop and survey participants, and interviewees, were asked to identify their preferred formats for the presentation of natural hazards information and data. Respondents indicated their preference for a wide variety of formats for visualising information. These formats range from technical visualisation methods, such as recurrence intervals, to more accessible ones aimed at a broader audience, like infographics. Overall, the most preferred formats were maps, infographics, time series and tables, though preferences varied depending on technical capabilities and intended use of information.

Concerning the avenues for obtaining information on natural hazards, online resources emerged as the preferred choice, particularly through an open-access website, online regional summaries and webinars. While digital formats were most favoured, some respondents still valued downloadable printable materials, including regional or hazard specific summaries. Fewer than 25% of respondents recognized a mobile application (app) as a viable means for disseminating information, although it was considered beneficial in field environments.

Table 5: Key insights: Preferred formats

Insight	Summary
Maps and infographics strongly favored	Maps are the preferred format across sectors, followed by infographics, time series and tables. Clear and accessible information formats play a crucial role in facilitating interpretation and effective communication across diverse audiences.
Tailored formats for different users	Visual summaries and infographics appeal more to non-technical users. In contrast, technical users prefer detailed tables, time series, and GIS-compatible maps.
Online access is essential	Stakeholders favour a user-friendly website with interactive tools and downloadable data. A mobile app is seen as optional and most useful in field environments.
Flexible data presentation	Data should be available across short to long-term time frames.



6 Establishing capability building and support needs to enable Atlas uptake

The team behind the Atlas project is dedicated to collaborating with our stakeholders to cultivate the skills, knowledge and abilities essential for effectively utilising the new Natural Hazards Atlas for Tasmania. The interviews, in particular, offered important perspectives on how to provide this support. While some capability development needs were common across sectors, others applied to specific sectors and organisations.

Stakeholders consistently expressed a need for a comprehensive program of training that explains:

- What the Atlas offers to potential users, and
- How to work with the available data and information products.

For example, stakeholders across sectors requested the delivery of in-person and online workshops and webinars to step through the Atlas' content and to explain how to access, navigate and extract data. Training that explores the kind of decision-making scenarios that the Atlas might inform was also desired.

There was also a desire for training to be offered across geographic areas of Tasmania, along with customised training options for different sectors or diverse end-users (for instance, a municipal stormwater engineer has distinct data requirements compared to a municipal emergency management officer).

Table 6: Key insights: Capability building

Insight	Summary
Tailored training is essential	Stakeholders across sectors are seeking sector specific training, including workshops, webinars, case studies and practical guides to help them understand and apply the Atlas data effectively.
Support must be ongoing and accessible	There is strong demand for ongoing support such as online tutorials and practice notes, peer learning networks and communities of practice, a technical help line for real-time assistance.
Integration with existing systems is critical	Data should align with stakeholders' current systems (such as commonly used GIS platforms) for seamless integration and effective utilisation.
Leadership and endorsement matter	Executive support and backing from the Tasmanian Government are crucial to promote adoption, alleviate liability concerns and validate the use of the Atlas for planning purposes.

Responding to what we have heard

The success of the Natural Hazards Atlas for Tasmania, based on the stakeholder needs analysis, relies on five essential pillars: quality of data, collaboration with stakeholders, effective communication, capability building and government endorsement. These elements are essential for ensuring the Atlas is impactful, and that its data and resources are trusted, meaningful and widely adopted. The table below outlines these recommendations and how the Atlas is addressing them.

Table 7: Overarching recommendations and project response

	Recommendation	Summary	Project Response
1	Co-design with stakeholders	Continue to engage stakeholders throughout the design and delivery process to help shape Atlas content, functionality and and presentation.	The project team is engaging stakeholders in the co-design of Atlas resources via workshops, feedback mechanisms, and technical advisory groups.
2	Provide relevant high quality data	Whenever feasible, offer robust fine-scale data for short (1–5 years), medium (up to 20 years), and long-term (after 2050) timeframes, across emissions scenarios.	The project team is using downscaled climate projections derived from CMIP6 global climate models to achieve a fine scale resolution (~5 km) for Tasmania. Natural hazard indices are being developed for short, medium, and long-term horizons (to 2100), for low and high emission scenarios.
3	Present information in accessible and actionable formats	Use maps, infographics, time series, tables and interactive tools. Ensure usability for both technical and non-specialist users	Outputs are being designed with different audiences in mind. Resources will include maps and change maps, tables, time series, and interactive features available through the Atlas web portal. Non-specialist materials will include infographics, statewide and local hazard reports, user guides, and a glossary to support understanding of climate and natural hazards. These materials are being designed to enhance the accessibility and usability of the data for all users.
4	Enhance stakeholder capability	Offer training, case studies, workshops, and peer learning networks to support diverse users.	Informed by stakeholder requirements and an analysis of effective capability-building practices, we are creating focused and valuable resources.
5	Build trust and foster adoption	Secure government endorsement for the Atlas and integrate it with other well trusted information platforms such as LISTmap to build trust and ensure adoption.	The project team is working with representatives across government to ensure the Atlas can integrate with other complimentary and trusted information platforms, such as LISTmap and Tas SES information sources.

Table 8: Preferred measures (current and future) and project response

Natural Hazard	Preferred measures (current and future)	Project Response
Extreme Temperature	• Heatwave duration and frequency • Daily max and min temperatures • Heatwave cumulative intensity • 90th percentile of daily max and min temperature • Apparent temperature • Excess heat factor • ARI of daily max temperatures • Frost days	All preferred measures will be provided at ~5 km resolution. Data parameters will include the reference period, 1995–2014, and projections for short, medium, and long-term horizons (to 2100) under both low (SSP1-2.6) and high (SSP3-7.0) emissions scenarios. Measures will be calculated from bias adjusted climate model ensembles.
Bushfire	• Australian Fire Danger Rating System (AFDRS)* • Forest Fire Danger Index (FFDI) • Wind speed • Daily rainfall • Soil dryness index (SDI) • Daily max temperature • Daily min relative humidity • Drought factor	All preferred measures will be provided at ~5 km resolution, with the exception of AFDRS which is designed for operational management rather than long term planning. Measures will be applied according to the reference period and emissions scenario parameters described in extreme temperature (above), and calculated from bias adjusted climate model ensembles.
Wind	• Maximum daily wind gust • Wind direction • Hourly maximum wind gust • Upper/lower soil moisture*	Maximum daily wind gust, wind direction, and hourly maximum wind gust will be provided at ~5 km resolution. Measures will be applied according to the reference period and emissions scenario parameters described in extreme temperature (above), and calculated from bias adjusted climate model ensembles. Inclusion of soil moisture indices is being considered but remains uncertain due to the challenges of verifying the climate model outputs against observational data.
Flood	• Daily total precipitation • Runoff* • Hourly rain • Annual total precipitation • Annual number of heavy rain days • Upper layer soil moisture* • Consecutive wet and dry days • ARI of daily total precipitation • Percentage annual precipitation extreme events	All the preferred measures will be provided at ~5 km resolution. Measures will be applied according to the reference period and emissions scenario parameters described in extreme temperature (above), and calculated from bias adjusted climate model ensembles. Inclusion of upper- and lower-layer soil moisture and runoff indices is being considered but remains uncertain due to the challenges of verifying the climate model outputs against observational data.
Storm	• Total daily precipitation • Daily maximum wind gust • Hourly rain rate • Hail likelihood • Forecast snow depth* • Hourly maximum wind gust	All the preferred measures will be provided at ~5 km resolution. Measures will be applied according to the reference period and emissions scenario parameters described in extreme temperature (above), and calculated from bias adjusted climate model ensembles.
Sea Level Rise	• Mean sea level • Tide height • Daily total rainfall • Storm tide ARI • Runoff* • Wind speed direction	All the preferred measures will be provided at ~5 km resolution, though the provision of tide height and storm tide ARI requires clarification. Where data permits, measures will be applied according to the available reference period for sea level projections (1995-2014) and emissions scenario parameters described in extreme temperature (above). Measures will be calculated from bias adjusted climate model ensembles.

* Denotes that the measure will not be used or there is uncertainty around use

The Natural Hazards Atlas is a Disaster Ready Fund project funded by the Australian Government.

Citation: Barros A., Lyth A., Mocatta G., Allen K., Bowden A., Love P., Sharma K., Weeding B., Beyer K., 2025. A Natural Hazards Atlas for Tasmania: mapping natural hazards to build disaster resilience and preparedness: Stakeholder Needs Analysis Summary Report. Climate Futures, University of Tasmania, Hobart.

ISBN: 978-1-922352-21-7

Photography by Climate Futures and Simon Gregory: https://www.funktaculafotography.com

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