

CLIMATE INFORMATION IN THE NON-PROFIT SECTOR: NEEDS ANALYSIS



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ABOUT THE AUTHORS

FEA Secretariat

Future Earth Australia is a national peak initiative that enables Australian scientists, governments, industry, and NGOs to collaborate both with each other and with international networks and programs across Australia working towards achieving the Sustainability Development Goals of the United Nations.

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Research team

Dr. Taryn Laubenstein, Research and policy officer

Taryn.laubenstein@science.org.au

Dr. Tayanah O'Donnell, Director

Tayanah.odonnell@science.org.au

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EXECUTIVE SUMMARY

This report details findings from desktop research, online surveys, and an in-person workshop with non-profit organisations operating in the sustainability space in New South Wales, Australia. These methods explored non-profit organisations' use of and perceived needs for climate information. Climate information includes the translation of climate related data, often together with other relevant information, into customised products such as projections, forecasts, information, trends, economic and social impact analysis, technological, and other assessments, advice on best practices, development and evaluation of solutions, and any other services in relation to climate that may be valuable to users.

Climate information use

Non-profit organisations are well-informed on climate risks, and most use climate information regularly to promote communication/education activities and sometimes advocacy. Organisations use a variety of sources of climate information, gravitating towards federal, state, and international resources, but rely on synthesised sources like newspapers or infographics when they are unable to access primary sources due to a lack of financial resources, or where they lack in-house scientific expertise.

Barriers to use of climate information

The primary barrier to using climate information is a lack of resources, both in terms of finances and staff capacity (time), along with independent capability to navigate climate information resources. Compounding this issue is the complex nature of many currently available resources and the disjointed landscape of available information.

Gaps in climate information

Many organisations view climate information as overly technical and complex and desire more synthesised and simplified resources, such as human-centred narratives and technological tools to assist in climate data navigation. Others with more expertise want more complex information such as case studies and more accurate and longer-term forecasts, including more information on extremes and variability. For both types of climate information, participants desire more regional and local-scale resources.

Recommendations for improvements to climate information

Key recommendations include requests for continued two-way communication between non-profits and government and increased opportunities for capacity building through government-led training events. To improve climate information, it should be provided in both narrative-style synthesis and detailed formats that are compatible across federal, state, and local sources, and the information must be updated and consistent. The uncertainties, assumptions, and risks that underpin projects should be disclosed, but the government should ensure that these uncertainties do not inhibit the use of climate information by providing leadership on the importance of mitigating and adapting to climate risks. This leadership can take the form of statutory frameworks alongside public engagement.

INTRODUCTION

This report details findings from desktop research, online surveys, and an in-person workshop with non-profit organisations operating in the sustainability space in New South Wales, Australia into their use of and perceived needs for climate information. This research was commissioned by the NSW Department of Planning, Industry and Environment (DPIE, formerly the Office of Environment and Heritage) with the objective of outlining current patterns of use of climate information in the sector, identifying barriers to using climate information and gaps in currently available information, and making recommendations on how climate information could be improved. Climate information includes the translation of climate related data, often together with other relevant information, into customised products such as projections, forecasts, information, trends, economic and social impact analysis, technological, and other assessments, advice on best practices, development and evaluation of solutions and any other services in relation to climate that may be valuable to users (European Commission 2015).

The NSW government announced a new Climate Change Policy Framework in November 2016, with the objective of achieving net zero emissions by 2050 and making NSW more resilient to a changing climate. DPIE leads a number of programs funded by this policy framework, including the AdaptNSW website, a key resource for climate information in NSW. In order to better serve users of climate information, DPIE requires an understanding of how different stakeholders currently use NSW climate information, as well as how stakeholders would like to improve that information. The findings of this analysis will enhance the climate information currently provided through AdaptNSW.

Aims

The research objectives are:

1. To understand whether and how climate information is currently used by non-profits operating in the sustainability space
2. To identify known barriers and challenges to use of climate information
3. To identify gaps in currently available climate information
4. To make recommendations for improvements to climate information

Context

When considering the market for climate information, it can seem intuitive to classify involved parties as either providers or users of climate information. However, the divide between these groups is not a binary, but rather a spectrum, which can be visualised as a value chain (Fig. 1). The below value chain was developed by the NSW Office of Environment and Heritage to demonstrate how different organisations can serve as both providers and users of climate information through specific functions. These functions are **developing infrastructure** such as observational facilities or global climate models, **modelling data** using raw data, **converting** raw data into climate information, **contextualising** climate information through regional climate models, **translating** data outputs into useable information, products, tools, and services, and **using** climate information products to inform decision-making. Based on this value chain, we hypothesised that non-profits in NSW will primarily **translate** and **use** climate information.

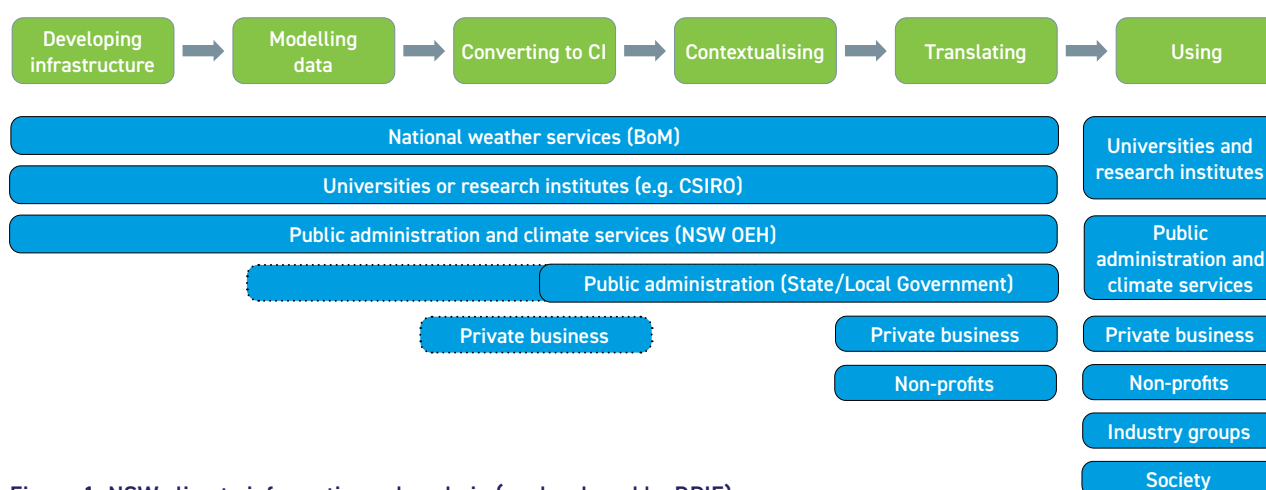


Figure 1. NSW climate information value chain (as developed by DPIE).

Methodology

The needs analysis involved three key research stages, as outlined below:

Desktop review

Using a list of key stakeholders from the non-profit sector as identified by DPIE, we identified the primary types of climate information and their uses by non-profit organisations. We searched each stakeholder's website for the five most recent publications of any type; these included white papers, fact sheets, blog posts, media releases, infographics, explainers, communication guides, videos, podcasts, maps, submissions, media articles, and policy statements. We then determined the topic of these publications, as well as the sources of climate information that were used in the publications. Sources of climate information were classified into nine types. These types are:

- Scientific articles
- International resources
- Australian federal government resources
- State government resources
- Local government resources
- Non-profit resources
- Industry resources
- General media
- Social media

To identify the barriers to use and gaps in climate information, we conducted a desktop review of the grey and scientific literature on climate information, focusing on the non-profit sector.

Online survey

To test the findings of the desktop review, a survey was sent to the list of targeted non-profits prior to the workshop. This survey contained questions pertaining to the type, topic, source, time scale, geographic scale, frequency of use and purpose of climate information use in each organisation, as well as open-ended questions about challenges to using climate information and gaps in currently available climate information. The results of this survey were collated prior to the workshop and presented to the participants. A total of 26 stakeholders completed the survey.

Workshop with key stakeholders

A workshop was held with a group of targeted non-profit organisations with the objectives of corroborating the findings of the desktop review, consolidating feedback from the pre-workshop survey, and subsequently identifying further recommendations for improving climate information services in NSW. A total of 15 representatives attended the workshop.

We identified a workshop as a key method for this needs analysis given that climate information has broad applicability, cross-sectoral uses, and its value is construed differently by divergent users. In particular, the workshop was held as several small focus groups followed by a whole-room discussion. Focus groups create an environment in which stakeholders are encouraged to consider the needs of the sector in a more holistic sense than if they were asked the same questions in isolation, and encourage deliberation among participants (Cyr 2014).

The workshop commenced with a presentation of the pre-workshop survey to outline current patterns of climate information use. Next, the participants were grouped into small focus groups and discussed key questions around climate information use. Following the discussion, the focus groups shared their conclusions with the larger group and had the opportunity to respond to other groups' ideas. The same process was repeated to identify barriers to use of climate information, gaps in climate information, and recommendations for changes to climate information. Detailed notes and an audio recording were taken during the workshop and transcribed afterwards to ensure that all participants' ideas were recorded.

FINDINGS

What are the primary activities and priorities of non-profits?

Non-profit organisations in NSW that operate in the sustainability space perform a variety of activities. Research from our desktop review reveals that the top five activities that NSW non-profits undertake are: **education/communication, collaboration/ networking, advocacy, research, and projects**. The online survey results show that most organisations perform a combination of these activities, with communication/ education, collaborating/ networking, and advocacy representing the top 3 most common activities (Fig. 2). Among "other" activities are legal representation, community organising, and farming.

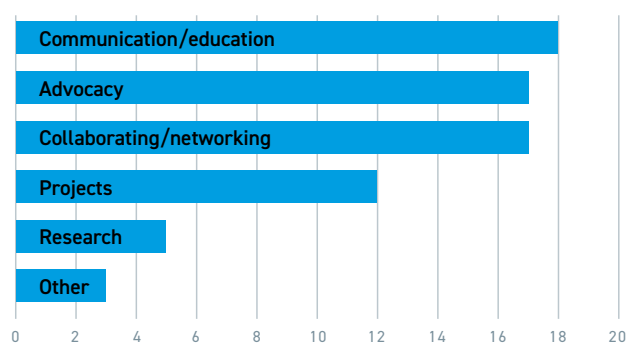


Figure 2. Survey responses indicating the primary activities of the organisation (multiple answers could be selected).

Through the desktop review, we also determined the primary interests of each organisation. These interests are: **climate, natural environment, humans, built environment, and energy**. The survey reveals that most organisations have overlapping interests, with climate and natural environment at the forefront, followed closely by humans and energy (Fig. 3). In the "other" category are religious engagement, contaminated soils and groundwater, and agriculture.

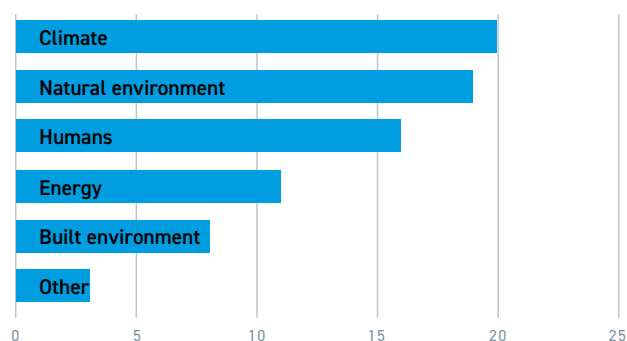


Figure 3. Survey responses indicating the primary interests of the organisation (multiple answers could be selected).

Among non-profits, there is a wide range of priority climate risks. Survey respondents indicate that their primary risks include impacts and effects on:

- Natural ecosystems, including habitat and species loss (6)
- Agriculture, including drought and seasonal shifts (6)
- Increases in natural disasters (4)
- Human health, including emotional and mental health (4)
- The built environment, including effects like urban heat and flooding (4)
- Energy systems, and subsequent changes to the cost of energy (4)
- Adaptation (3)
- The economy (2)
- Coastal zone and storm surges (2)
- Disaster preparedness (1)
- Intergenerational equity (1)
- Contamination (1)

What are the key types and sources of climate information?

Both the survey and workshop reveal that non-profit organisations rely on a wide variety of types and sources of climate information (Figs. 4 & 5). The most frequently cited sources of climate information are international and federal resources such as reports from the IPCC, BoM, and CSIRO. State resources are also rated as highly used in the online survey, although only two of 15 workshop participants were familiar with the AdaptNSW website prior to the event. Rather, documents such as State of the Environment reports (for example, NSW Environment Protection Authority 2018) are cited as key state-level climate information. International, federal, and state sources of climate information are broadly considered to be reliable, though some participants perceive the data to be out-of-date or not timely enough for projects with quick turnaround times.

Climate information provided by non-profit organisations is popular for its ease of use, as oftentimes it is in accessible formats such as infographics, narrative-style documents, and interactive media that can be easily understood by non-specialists. Non-profit resources are also generally considered to be trustworthy. Some notable sources identified during the workshop are the Climate Council, Adapt NRM, the Australian Academy of Science, the Atlas of Living Australia, Coast Adapt, and HeatWatch reports from

the Australian Institute. International resources are also seen as trustworthy, with key resources including the UN Sustainability Development Goals, the Stockholm Resilience Centre, and AdaptME, an adaptation toolkit from the UK Climate Impacts Programme.

For non-profits with specialist user groups, industry-specific resources like those from ASBEC or religious leaders such as the Pope are seen as relevant to their user base and therefore highly trusted. Similarly, the development of the Task Force on Climate-related Financial Disclosures framework (TCFD 2017, 2019) has been useful for those organisations that deal with industry to give them a common language to discuss climate information and risk.

Generally, organisations with fewer resources in terms of time and expertise often rely on summary information, such as infographics and fact sheets, as well as narrative-style climate information such as news articles from publications like The Conversation, The Guardian, and The Lancet, in addition to blogs and social media. These types of climate information are easily accessible and understandable compared to scientific journal articles, which are perceived as both high-quality and inaccessible, as they require a subscription fee that is too high for many small non-profits. Even for organisations with access to journals, the complexity and density of the primary literature make them limited in their usefulness when resources are spread thin. Only organisations with highly trained staff and adequate time can use scientific journal articles regularly as sources of climate information.

Finally, in-person interactions are highly rated sources of climate information. These include relationships with or presentations from researchers, conferences, workshops, and community interactions. Participants at the workshop show a particular affinity for knowledge broker relationships, whereby experts explain the standards and logistics of climate information databases or create compelling narratives about climate information to reach different user bases.

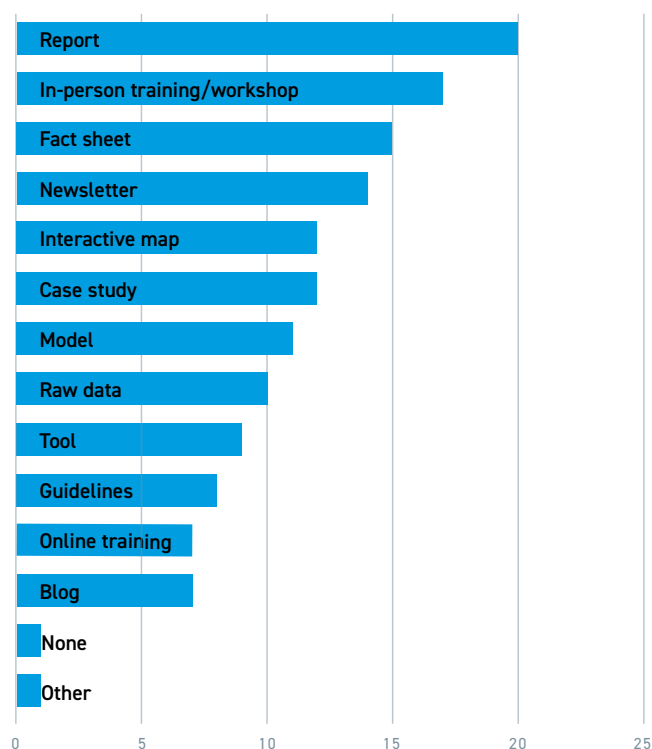


Figure 4. Survey responses to the types of climate information that are used by the organisation (multiple answers could be selected).

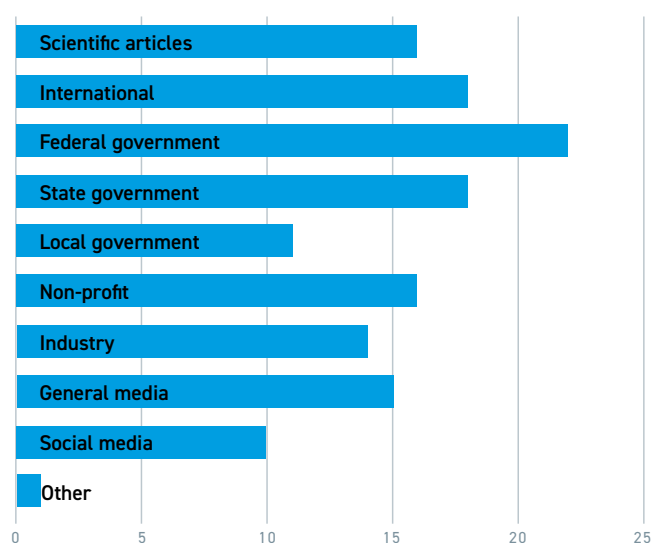


Figure 5. Survey responses to the sources of climate information that are used by the organisation (multiple answers could be selected).

What is climate information used for?

As with the sources of climate information, the uses for climate information differ between organisations and according to their priorities (Fig. 6). At a broad scale, many organisations with a strong climate focus use climate information to drive their strategic priorities and to choose which issues to focus on in the short and long-term. These large-scale decisions then feed into more specific decisions, such as key project and partnerships to pursue. Some organisations take this even further and incorporate climate information into their hiring practices and travel/ budget constraints to ensure they operate at a carbon-neutral level. For project-based organisations, climate information is useful for designing and assessing projects, while member-based organisations see climate information as a window into the types of capacity building and training needed for their members.

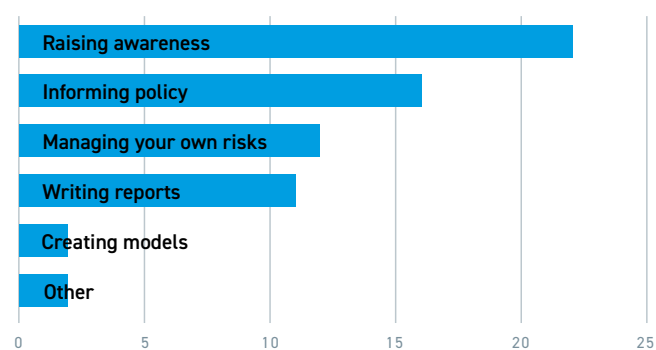


Figure 6. Survey responses to the uses for climate information in the organisation (multiple answers could be selected).

A major use of climate information across all the non-profits is in education/ communication. Some non-profits target the general public and create a broad array of resources based on climate information, including podcasts, fact sheets, blog posts, infographics, explainers, and videos. Less frequently, these organisations seek to spread their message via traditional media by creating media releases and writing their own articles. Some education/ communication organisations aim to reach specific user-groups, such as practitioners in their field, farmers, local communities, or ethnic and religious groups. In these instances, climate information is contextualised for their target audience. Organisations also undertake education/ communication activities to inform their communities and create grassroots movements and thereby influence decision-makers.

Many organisations in the survey and workshop have an advocacy component to their work, and in these cases climate information is used to inform their positions

on policy issues and to support their submissions to government departments, commissions, councils, and independent reviews. The information is also used to decide which research or campaigns they will undertake, or to highlight the gaps in policy that need to be filled. Indeed, workshop participants feel that a strong understanding of the political and government environment is needed in order to advocate well, and climate information makes up a key portion of this knowledge.

While some organisations design their strategic priorities around climate information, others use climate information on an as-needed basis. A number of advocacy groups use current events and “hot topic” issues to drive their primary projects. For instance, if an area were experiencing particularly poor air quality, the organisation would use that as an opportunity to talk to community members about the broader topic of air quality, using climate information as needed to support their ideas.

Project-based and research-based organisations are more likely to use scientific journal articles as well as raw data, as they tend to have in-house expertise in navigating these types of climate information. The information is used to understand issues specific to the organisations, including species and ecosystem shifts and changes to the energy system. These organisations also use raw data to develop bespoke models of climate or climate-related factors, incorporating the data into landscape modelling and understanding urban heat effects, which in turn can inform resilience planning or the cost of energy under different emission scenarios.

At the onset of this research, we hypothesised that non-profit organisations would **translate** and **use** climate information, based on the DPIE climate information value chain (Figure 1). The survey and workshop confirm that **translation** and **use** of climate information are the predominant functions that non-profits in NSW undertake. However, some organisations also create **models** using raw observable data and **convert** these models into useable climate information such as reports and fact sheets for use by other organisations.

Therefore, based on our findings, we contend that non-profits span a wider portion of the climate information value chain than was initially hypothesised by DPIE, and thus require a broader suite of climate information than has been previously anticipated. Conversely, some of the targeted non-profits are using climate information

infrequently or never. The following sections outline gaps in and barriers to use of climate information and can therefore suggest why some of the targeted organisations do not use climate information.

How can the use of climate information be increased in the sector, or with users?

The online poll and workshop questioning reveal that most non-profit organisations consider themselves as having average or above awareness and understanding of climate impacts (Fig. 7). Therefore, during the workshop we sought to determine which methods were the most effective for increasing the use of climate information among other non-climate focused non-profits, as well as techniques they have used to reach their user base.

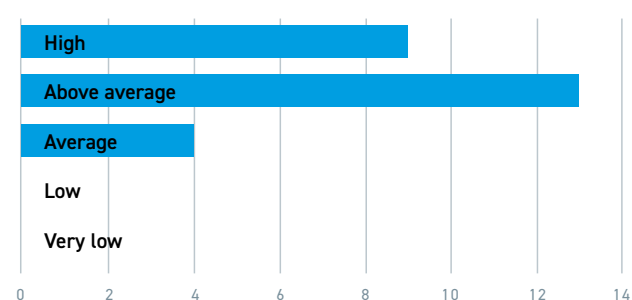


Figure 7. Survey responses indicating the respondent's level of awareness of and current understanding of climate impacts.

Across all organisation, the primary method for increasing climate information use is tailored products and compelling, personal narratives. By understanding their audience and their core values and beliefs, non-profits can create targeted messaging that will resonate with their users. The more personal and localised the information, the more effective it will be.

A specific technique that has shown high success is employing community champions who are respected in their communities to deliver key messaging, as peer-to-peer communication is likely to be more effective than information delivered by those perceived as "outsiders". However, if peer-led initiatives are not possible, non-profits can still create a sense of community using participatory methods like citizen science. If experts are called in to explain climate information, they should be well-versed in the translation of complex science as well as storytelling techniques, as they need to craft personalised, compelling narratives. Finally, if in-person interactions are not possible, websites, audio, and videos can reach broader audiences in remote locations, but still must be tailored to their audience.

Regardless of the method of communication, non-profits feel strongly that climate information communications should include not only information about the current climate, but also an emphasis on clear pathways to creating meaningful action. Some feel that a change in language is needed to create a sense of urgency and grab people's attention, but others think this language could dissuade sceptical audiences.

What are barriers and challenges to using climate information, and what would enable use of climate information?

The pre-workshop survey results suggest that a combination of internal and external factors are at play in preventing the use of climate information. Thus, during the workshop, the discussion was broken into two distinct sessions.

Internal Barriers

The primary internal barrier to using climate information is a lack of resources, both in terms of finances and time. Participants feel that the current market for climate information is complex, and therefore staff need to have expertise in dealing with this type of data. Yet many non-profits lack in-house expertise, hindering their use of climate information. Financial constraints can compound this issue by making it difficult for inexperienced organisations to bring qualified climate information interpreters onto their team. Without this experience, organisations can find it challenging to know which types of climate information will be the most helpful to them and their problem (Barsugli et al. 2013), and may even perceive their own risk in the face of future climate disturbances to be low (Brasseur and Gallardo 2016). However, even organisations with some in-house experience may still struggle due to time constraints. Many organisations struggle with competing priorities. Even if there is the desire to incorporate more climate information into their work, time constraints on already-strapped staff prevent their dedicating any significant amount of time to new climate initiatives (Measham et al. 2011). For organisations that rely on volunteers for some or all of their operations, volunteer fatigue is another concern that hinders their use of more varieties of climate information.

In some organisations, another internal barrier comes in the form of risk aversion. Climate change has become a highly politicised issue globally and in Australia, and this can mean that incorporating climate information can seem risky to some organisations (Lemos et al. 2012). This sense of risk aversion can come from internal leadership, for instance in

organisations that do not explicitly address climate in their mission statements, or from key stakeholders or users that are known to be opposed to political or controversial ideas. For organisations that work closely with scientists, there is a perception that scientists should not have politicised opinions. These organisations feel pressured to straddle a fine line between evidence-based policy and advocacy/opinion, which could prevent them from using climate information. However, it is important to note that risk aversion in itself is not always a negative trait. Some risk-averse organisations might view climate information as a strategy to mitigate risk, and thus risk-averse organisations could be steered into positive climate practices with leadership provided by the government, a concept that will be discussed in the "gaps and recommendations" section.

Internal resistance can also come in the form of rigid decision-making frameworks. Many organisations rely heavily on routines and established practices in their decision-making. This can foster an environment that stifles innovation and limits the use of new knowledge such as climate information, as deviating from the norm could expose individuals to criticism in the case of negative outcomes (Lemos et al. 2012). This ties into the final internal barrier, a lack of internal continuity and leadership (Lonsdale et al. 2017). A concerted push by staff might get some uptake of climate information, but frequent shifts in leadership staff or key priorities can prevent the maintenance of a sustained system for using climate information.

External Barriers

A major external barrier to using climate information is the disorganised landscape of climate information providers. For organisations lacking the expertise in navigating this landscape, the sheer volume of options can make it overwhelming to choose the proper resource. In particular, participants can have trouble identifying the most authoritative and credible sources. While it is helpful that multiple climate information providers operate in Australia, there are not enough resources to adequately record, monitor, and manage all climate information produced across government, academia, and the non-profit sector (Lindsey Jones 2016). This can lead to overlapping climate information across sectors, which wastes resources while making it difficult for non-profits to decide which climate information to use. Some coordination across providers could help to alleviate this problem, but participants also feel that government approval could help to identify those sources of climate information that are authoritative and credible.

Access to climate information is another key external barrier to use. Many small non-profits do not have access to scientific journals, which can prevent them from using relevant climate information. Similarly, many datasets that could be useful to non-profits are not open-access, meaning that only certain organisations can get past the gatekeepers of some climate information. A related issue is keeping track of key sources of climate information when the providing organisations undergo internal changes. For instance, one non-profit had been using an online government database when the government underwent a dramatic change. In the subsequent shuffle of departmental websites, the non-profit lost track of the database. The resource had been relocated, and fortunately at our workshop the participant was redirected to the new location of the database. Without this intervention, that resource would have been lost to the organisation. While we are happy to have helped one organization, this exemplifies the larger issue of shifting government structure affecting access to climate information. Furthermore, frequent changes in government require relationships to be rebuilt, and the loss of key relationships could also result in the loss of access to key sources of climate information.

Audience pressure and expectations are considered another key external barrier to use of climate information. Though many non-profits speak to an audience that cares about the climate, these audiences can exert high levels of scrutiny in terms of which resources organisations can use and cite, restricting the variety of sources that organisations can use. Conversely, some audiences can have trust issues surrounding scientific evidence, and participants feel that there is a need to create a perception of science as distinct from opinion in these audiences. A different, but equally important, audience to consider is grant-makers. Many organisations rely on grant funding to run their projects, and grants often come with strings attached that can prevent organisations from incorporating a climate element into their work.

Finally, virtually all participants agree that the politicisation of climate globally and in Australia is a major external factor that underlies many of the above-mentioned barriers to using climate information. If climate were not overtly political, it could be more easily integrated across party lines. Participants are unsure of the best method to achieve this de-politicisation, but they believe that clear government leadership could help the conversation move forward from debates around the causes of climate change into actionable ideas around adaptation and mitigation.

What are gaps in currently available climate information?

Within the non-profit sector, organisations have different needs based on their interests and activities. However, there are a number of overarching principles that apply to the sector at large. Common issues surrounding climate information are that the information is complex and overly technical and lacks timeliness and consistent updates. If information is infrequently updated or lags too far behind, it is less likely to be used by non-profits that require a rapid turnaround of information. Additionally, some workshop participants have questions surrounding their confidence in different sources of climate information. They might encounter summary data that seems helpful, but without knowing the assumptions that underpin that data and who makes those assumptions, they are unable to incorporate that information.

With regard to the format of data, different organisations have different needs based on their capability in dealing with climate information. Education/ communication-oriented organisations or those with fewer resources are interested in information that is synthesised and simplified. For instance, one small, advocacy-based non-profit finds resources like NARCLiM to be “intimidating” and knows that information that is too sophisticated will not get used. Conversely, organisations that undertake research and projects tend to have the capacity to deal with raw datasets. These organisations feel that synthesised information runs the risk of being overly simplified, making it difficult to extrapolate that information to other contexts. These organisations desire more detailed information. Overall, the consensus is that there is no single “sweet spot” of information that strikes a perfect balance between being synthesised and detailed. Rather, climate information should be provided in simplified form, while also released alongside the underlying detailed data, in order to satisfy the needs of both types of organisations.

Given the breadth of available climate information, non-profits could theoretically draw from a variety of sources. However, particularly when dealing with raw data, participants feel that mismatched data styles prevent them from diversifying their sources. For instance, many national-level data sources are not compatible with state-level data sources, which in turn are not compatible with industry-specific datasets. Incompatibilities can stem from datasets covering different geographical areas, different time periods or intervals, or describing different variables. In these cases,

conversion between data types are either impossible or so cumbersome as to be impossible, effectively preventing users from drawing on multiple sources of climate information that could improve their outcomes.

When considering the ideal format of climate information, the majority of participants gravitate towards narrative-style information. This type of information is engaging and easy to share, and importantly can humanise data that seems abstract and removed from reality. For instance, indigenous knowledge contains rich stories of how humans have been adapting to a changing climate throughout history. The Bureau of Meteorology has some examples of “Indigenous Weather Knowledge” on their website, but this could be expanded and brought to life with videos or other imagery. Another proposal is to use the analogy of the industrial revolution to exemplify major socioeconomic shifts in human history and to highlight how humans navigated those challenges. Similarly, there are examples today that demonstrate how we are already experiencing effects of climate change. For example, farmers might be interested to learn how the lambing season is shifting earlier each year. There is a strong consensus that these stories need to be localised or specialised in order to be effective. A prime example of this is Climate Kelpie, a website aimed at farmers that uses animated videos of dogs to contextualise climatic concepts like El Niño. This and other community-targeted communication tools could be developed to explain the projected impacts of climate change at a regional level.

Among workshop participants, there is a desire for the government to take a leadership role in explaining the urgency of climate change, but there are differing opinions on the form that leadership should take. Some think that it is important to provide as much climate information as possible including information on uncertainties, such as the different emission pathways that might occur in the future. However, others think that providing different emission pathways could muddle the message. In the worst case, these participants fear, by communicating uncertainties, the government could effectively hand an excuse to unwilling industries or businesses to reject climate information and avoid incorporating it into their planning. Instead, these participants believe, the government should endorse one pathway and provide leadership in adapting to and mitigating their chosen pathways. A potential middle ground solution would be to accommodate uncertainty by building in flexibility to advice that can inform adaptive pathways. This option does not allow for the rejection of climate

information but does leave scope for different possible futures. Regardless of the exact method, there is a clear desire across all participants for the government to take leadership that not only champions climate information, but also provides clear pathways to actions that can be taken to adapt to and mitigate future changes.

In addition to the requests for synthesized and narrative-style information, participants also want other specific forms of information. These requests include raw data with geographic layers that can be combined and analysed, as well as data that is LGA and ABS compatible. There is also a desire for baseline data or longitudinal studies that can use historical perspectives to inform current and future changes. Some participants want case studies that can provide transparent examples of lessons learned through monitoring and evaluating projects at a regional level. Others desire socio-economic impact projections, such as an economic impact assessment of a do-nothing approach to climate, as well as information on the financial and legal risks associated with climate change.

The specific topics of climate information that are needed vary dramatically between industries. They include requests for more information on rainfall, flooding, water quality, hazard mapping of bushfires and cyclones, physical and mental health impacts, consumption of greenhouse gases across communities and industries, changes in phenology, plants, insects, and weeds, and adaptation techniques, particularly as they pertain to rivers and wetland ecosystems. While the topics are varied, participants are united in their desire for this information to be down scaled to council, postcode, or industry levels (Briley et al. 2015). However, one participant does require up-scaling, in the form of a national version of the AdaptNSW mapping tool.

Finally, there are a handful of requests for future forecasts. Participants want more accurate and longer-term forecasts, as well as more information on extremes and variability. Indeed, while most climate projects focus on means, extreme values are more valuable for organisations interested in hazards, such as groups that focus on physical assets and the built environment. Hazards like extreme temperatures, floods, and cyclones can be major issues for these organisations, but extreme events are difficult to predict, as they reflect large-scale trends interwoven with regional and local-scale feedbacks (Meehl et al. 2009). Finally, participants want more information around adaptation strategies under different future pathways.



RECOMMENDATIONS

Based on the above barriers and gaps in currently available climate information, we recommend several opportunities to improve the NSW Government's climate information services.

- **Enhance two-way communication.** Many workshop participants approve of the workshop and consultation process but see it as the first step in an ongoing relationship between non-profits and the government. They seek the opportunity to give regular feedback on climate information resources, thereby improving available resources through an iterative process. Indeed, virtually all of the cited literature, including a guide on best practices for climate services user engagement (WMO 2018), stress the importance of establishing two-way communication with users.
- **Provide training and tools.** Given that the complexity of climate information is a major concern, many participants would like the government to host training on using and navigating climate information. This could take the form of day-long in-person workshops, or web-based tours of available climate information. In whichever form, this training should aim to enhance internal capability in using climate information and determining the legitimacy and credibility of various sources. A complement to training could be online tools that are developed to help navigate different climate information sources, or to break down complex datasets in a user-friendly way.
- **Improve data compatibility.** A common issue across the sector is an inability to make different datasets work together. While it may prove difficult to improve compatibility between government and industry-specific datasets, it may still be possible to create consistency between federal, state, and local government datasets. This would create a national standard and help to streamline multiple sources of climate information. Existing frameworks likely preclude an entire restructure of the datasets. However, websites could include guidelines on using multiple datasets, or a single portal could be created to simplify access to multiple datasets. Similarly, the language used to describe climate information should be kept consistent across sources.
- **Disclose and advise on uncertainties.** Climate projections inherently will always involve some degree of uncertainty due to uncertainties in future greenhouse gas emissions, the climate response to radiative forcing, natural variability in the climate system, and the initial conditions entered into models (Bowyer et al. 2014). While improvements in technology and modelling can reduce the uncertainties, users will still have to learn to cope with uncertainty. The government can improve climate information by describing the risks, uncertainties, and assumptions that underlie climate information. However, to prevent uncertainty from becoming a convenient excuse to avoid using climate information, the language describing uncertainties should be clear and decisive around impacts. Training around dealing with uncertainties could also be helpful to non-profits.
- **Ensure longevity of climate information.** Government restructures are frequent in Australia and can impact user access to data, such as when government websites change. They can also cause lengthy gaps or lags in datasets, or even the complete discontinuation of some projects. Thus, there is a desire to see longevity and reliability in climate information that spans past the terms of office. The government should take internal action to ensure continued access to climate information regardless of restructures.
- **Ensure timeliness of climate information.** Non-profit organisations often require a rapid turnaround of information but note that many government websites are updated irregularly or infrequently. Climate information should be available as soon as it is processed and updated at regular intervals.
- **Release multiple formats of climate information.** Survey and workshop participants overwhelmingly desire narrative-style climate information, stressing the need for content that is engaging and has a human face. Using examples from indigenous knowledge, historical examples like the industrial revolution, and consequences of climate shifts that are evident today, the elements

of storytelling can have a meaningful impact on communities. However, narrative-style or other synthesised formats of climate information should be accompanied by more detailed resources that allow research-based organisations to explore and use the underlying data.

- **Create localised climate information.** Whether in synthesized or detailed formats, participants want climate information that is relevant to their users. State- and city-level organizations in particular have difficulty finding high-resolution climate information, yet this type of information is critical for their ability to make decisions and impact their users. Whenever possible, climate information should be available at levels smaller than the state, such as postcodes and councils.
- **Create statutory frameworks.** To increase the use of climate information across all sectors and communicate the urgency of addressing climate risks, participants see a role for the government to set statutory frameworks. These frameworks would ensure that decision-makers across industries actively consider climate information. For instance, government tenders might set standards that require considering the climate impacts of different activities, in the same way they currently set standards around gender equality or providing local jobs. Participants think these standards would have a cascading effect in that they would create demand for more climate information and thereby increase the accessibility, robustness, timeliness, and funding for climate information. Once standards are in place, the government could monitor and evaluate different sectors' involvement, use, and effectiveness in incorporating climate information into their work through tools like adaptation benchmarking.
- **Engage to create trust.** Particularly when dealing with the general public, scepticism and trust can be low when dealing with climate. This highlights the critical role of dedicated, trained field staff to provide real engagement with the public, rather than lecture-style communications. By emphasising relationships and taking a layered approach, the government can increase trust in climate information.
- **Provide leadership.** A major frustration in the non-profit sector is the politicisation of climate change, which participants believe has contributed to unwarranted suspicion and slow political will to address climate risks. A unified government statement on and response to climate would refocus the national conversation towards strategies for mitigation and adapting to climate change.

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APPENDIX A:

PRIMARY DATA SOURCES

List of workshop participants

1 Million Women (x2)
Australasian Land and Groundwater Association
Catholic Earthcare Australia
Climate Action Now Wingecarribee
Climate and Health Alliance
Earthwatch Institute
Environmental Defenders Office NSW
Environmental Institute of Australia and New Zealand
Ethnic Communities Council of NSW
Landcare Australia
Murray Darling Wetlands Working Group (x2)
OceanWatch Australia
Planning Institute of Australia

List of online survey participants

1 Million Women
ASBEC
Australasian Land and Groundwater Association
Australian Coastal Society
Catholic Earthcare Australia
Central Tablelands Landcare
Climate Action Now Wingecarribee
Climate and Health Alliance
Climate Council
Community Housing Industry Association
Earthwatch Institute
Environmental Defenders Office NSW
Environmental Institute of Australia and New Zealand
Ethnic Communities Council of NSW
Farmers for Climate Action (x4)
Friends of the Earth Australia
Landcare Australia
Landcare group
Murray Darling Wetlands Working Group (x2)
OceanWatch Australia
Planning Institute of Australia
Tenants' Union of NSW
World Wildlife Foundation Australia

APPENDIX B:

QUESTIONS

Workshop Questions

Current climate information use

- What are the key (top 3) sources of climate information that you use? Why do you use these the most?
- What decisions does climate information inform? To what extent?
- How can awareness of climate information be increased in the non-profit sector, or with its users? What methods and narratives are the most effective?

Barriers and challenges to use

- What factors within your organisation prevent you from using climate information? What would enable you to use it?
- What factors external to your organisation prevent you from using climate information? What would enable you to use it?

Gaps and recommendations

- What is missing in currently available climate information?
- What would you like to see in the future? What would be the most useful to you?
- How can the government better support the non-profit industry in identifying and addressing climate risks?

Survey Questions

1. Please select a descriptor of the primary function(s) of your organisation (can select multiple)
2. Please select a descriptor of the primary interest(s) of your organisation (can select multiple)
3. How would you rate your level of awareness and current understanding of climate impacts?
4. What are the priority climate risks for your industry and why?
5. To what extent are climate risks/ impacts integrated into planning and management in your organisation?
6. What types of climate information do you use? (can select multiple)
7. What topics of climate information do you use? (can select multiple)
8. What timescale of climate information do you use? (can select multiple)
9. What geographic scale of climate information do you use? (can select multiple)
10. Where do you source climate information? (can select multiple)
11. How often do you use climate information?
12. What do you use climate information for? (can select multiple)
13. What barriers or challenges do you have in accessing climate information?
14. What gaps are there in currently available climate information? What types, topics, scale, scope of climate information would be helpful to you?
15. How could the government raise awareness/ understanding of climate risks in the non-profit sector?
16. How could the government better support the non-profit sector in identifying and addressing climate risks?

APPENDIX C.

FURTHER SURVEY RESULTS

Below are the results of additional survey questions not discussed in the report. They pertain to the timescale, geographic scale, frequency, and topic of climate information used in the non-profit sector.

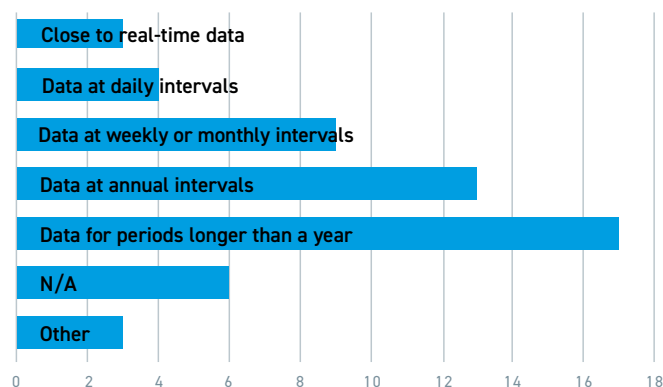


Figure C1. Survey responses indicating the timescales of climate information used by the respondent (multiple answers could be selected). The “other” responses pertained to timescales in the future, including trends, outlooks, and forecasts.

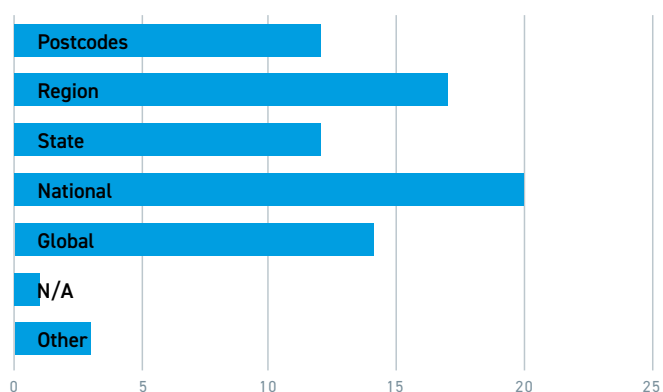


Figure C2. Survey responses indicating the geographical scales of climate information used by the respondent (multiple answers could be selected). The “other” responses pertained to industry-level or hyper-local scales.

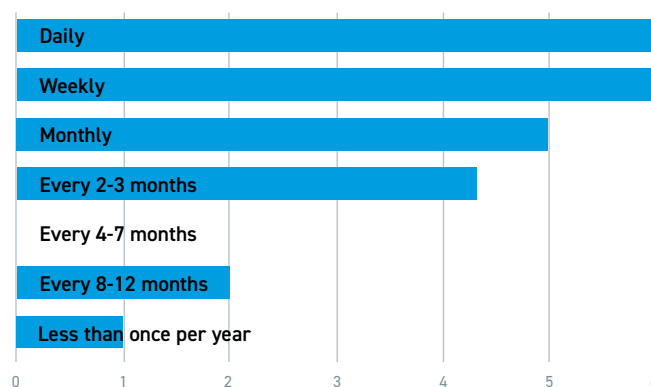


Figure C3. Survey responses indicating the frequency with which the respondent used climate information.

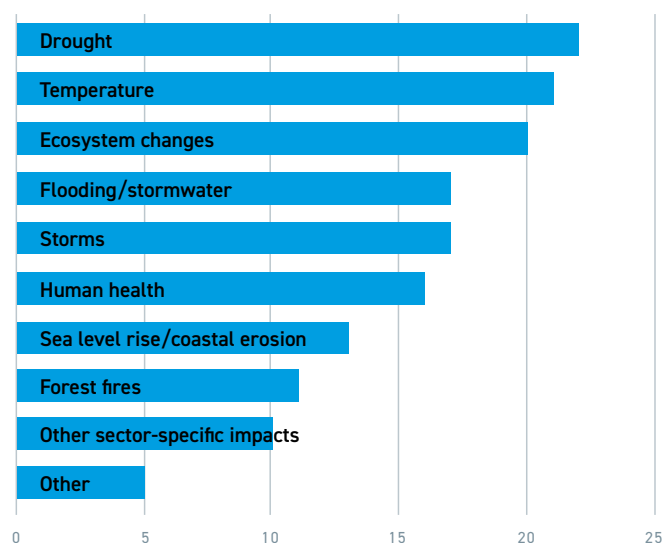


Figure C4. Survey responses indicating the topics of climate information that the respondent used (multiple answers could be selected). The “other” responses pertained to rainfall, extreme weather events, urban heat, insurance and business impacts, and the social psychology of climate change denial.

