ASPECT
FACILITATING SEAMLESS CLIMATE ADAPTATION

Deliverable 5.5: Scaling up co-produced seasonal-to-decadal climate information from WP4

December 2026

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Funded by the European Union

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement Nº 101081460.

Document information

D5.5 Scaling up co-produced seasonal-to-decadal climate information from WP4	
Grant Agreement number	101081460
Project title	Adaptation-oriented Seamless Predictions of European ClimaTe
Project acronym	ASPECT
Project start date	1 January 2023
Project duration	48 months
Work Package	WP5
Deliverable lead	ULeeds
Author(s)	Kexin Geng, Suraje Dessai, Andrea Taylor, Iain Clacher (University of Leeds); Freya Garry (Met Office); Marta Terrado Casanovas, Carlos Delgado Torres, Veronica Torralba (Barcelona Supercomputing Centre); Chiara Calderaro, Simone Taddeo, Emi Lazzari, Majid Niazkar, Marinella Masina, Panos Athanasiadis, Sebastiano Roncoroni (Euro-Mediterranean Centre on Climate Change); Aleksandra Kržič (Republic Hydrometeorological Service of Serbia); Ralf Döscher, Yi-Chi Wang (SMHI)
Type of deliverable* (R, DEM, DEC, other)	R
Dissemination level** (PU, CO, CI)	PU
Date of first submission	
Revision n°	-
Revision date	-

Please cite this report as: Geng, K., Dessai, S., Taylor, A., Clacher, I., Garry, F., Terrado Casanovas, M., Delgado Torres, C., Torralba, V., Calderaro, C., Taddeo, S., Lazzari, E., Niazkar, M., Masina, M., Athanasiadis, P., Roncoroni, S., Kržič, A., Döscher, R., Wang, Y.-C., (2026),

Scaling up co-produced seasonal-to-decadal climate information from WP4, D5.5 of the ASPECT project.

Disclaimer: *Funded by the European Union. Views and opinions expressed are, however, those of the author(s) only and do not necessarily reflect those of the European Union or the European Climate, Infrastructure and Environment Executive Agency (CINEA). Neither the European Union nor the granting authority can be held responsible for them.*

***** **R**=Document, report**;** **DEM**=Demonstrator, pilot, prototype; **DEC**=website, patent filings, videos, etc.; **OTHER**=other

****** **PU**=Public, **CO**=Confidential, only for members of the consortium (including the Commission Services), **CI**=Classified

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Acronyms

Recognising the substantial number of acronyms in this document, we provide the below acronym list for readers to refer to:

ASPECT	Adaptation-oriented Seamless Predictions of European ClimaTe
BSC	Barcelona Supercomputing Center
CMCC	Centro Euro-Mediterraneo sui Cambiamenti Climatici
EIOPA	European Insurance and Occupational Pensions Authority
EU	European Union
FD	Frost Days
GDD	Growing Degree Days
IT	Information Technology
MO	Met Office
NHS	National Health Service
SCI	Seamless Climate Information
SMHI	Swedish Meteorological and Hydrological Institute
UK	United Kingdom
ULeeds	University of Leeds
WMO	World Meteorological Organization
WP	Work Package

Executive Summary

Effective adaptation to changing weather and climate risks requires climate information that is useful and usable within organisational decision-making. Our previous large-scale survey of climate information use amongst organisations in Europe (Deliverable 5.3) revealed a gap between organisational planning horizons (up to ten years ahead) and the timescales of the information currently used, as well as a need for easier-to-understand and more reliable information. WP4 sought to address these needs and identify effective approaches for delivering climate information through co-production with ASPECT Super Users (Deliverables 4.2 and 4.3). However, whether this co-produced climate information can also benefit other users who were not involved in its development remains unknown and therefore an important topic for empirical research.

This deliverable (D5.5) explores the potential for extending use of climate information co-developed in WP4 to wider users. Four different surveys were conducted among respondents in Europe in agriculture, finance, government, and heatwave sensitive sectors, with approximately 100 respondents per survey. These surveys used similar questions but tested climate information tailored to different sectors. The climate information tested in these surveys largely drew on selected elements of information developed and refined through Tasks 4.2 and 4.3, with one survey testing publicly available seasonal-to-decadal information products. Materials were selected, simplified and adapted for approximately 5–10 minutes of reading. The surveys examined respondents' objective and subjective understanding of the information, evaluations of its quality, perceived usefulness for organisational decision-making, willingness to share it, and suggested improvements.

Our results indicate potential for wider use of the information assessed. Across the four surveys, 83–93% of respondents agreed that the information was usable, with supporting planning activities and implementing adaptation actions consistently among the most highly rated potential applications. In each survey, more than 60% of respondents were willing to share the information within their organisations. However, positive perceptions of usability coexisted with difficulties in interpretation: the proportion finding the information easy or very easy to understand ranged from 40% to 80%. This variation may reflect differences in both the complexity of the information provided in each survey and respondents' expertise and familiarity with climate information across sectors and roles. Recurring improvement priorities included guidance or training on using the information within organisations and making it easier to understand, alongside context-specific needs for geographical tailoring, further details on reliability, and timely access.

This task (Task 5.5) contributes to WP5's objective of increasing the usability of seasonal-to-decadal climate information for adaptation by improving our understanding of whether and how information developed under WP4 can be scaled up. The findings connect climate information development in WPs 1–3 and in-depth co-production with Super Users in WP4 to the wider uptake

of ASPECT outputs. Evidence on user understanding, perceived quality, potential applications and improvement needs provides feedback relevant to prediction development in WPs 1–3 and the assessment of co-produced information in WP4. The work also draws on collaboration with WPs 6 and 7. WP6 supports the technical implementation of the websites developed in WP4 and used in the surveys, while WP7 supports participant recruitment through communication and dissemination activities. Feedback from the surveys can also inform future exploitation activities in WP7. In this way, D5.5 contributes to ASPECT's objective 6) Designing and implementing a delivery system for the data and methods produced by ASPECT, enabling the scaling up of the use of climate risk information on the 1–30-year time-scale from beyond pilot studies to become a mainstream tool in adaptation.

About ASPECT

ASPECT aims to set up and demonstrate a seamless climate information (SCI) system with a time horizon up to 30 years and accompanied with underlying research and using climate information for sectoral applications. The project's goal is to improve existing climate prediction systems and to merge their outputs across timescales together with climate projections to unify a SCI as a standard for sectoral decision-making.

The project focus will be on European climate information, but we will also look where there is a wider policy interest (e.g., disaster preparedness) and in regions of European interest. We will maintain a strong link with the WCRP lighthouse activities to exploit learning for explaining and predicting earth system change. To provide a bandwidth diversity of information, the SCI system will be based on multi-model climate forecasts and will build on learning from projects such as EUCP. It will align with new activities on Digital Twins within Europe, including DestinE. The SCI will combine physical science aspects with those from other disciplines to ensure the information is robust, reliable, and relevant for a range of user-driven decision cases. The information package will incorporate baseline forecasts and projections (plus uncertainty), and will explore new frontiers (e.g., extremes which are of socioeconomic high-level interest).

To ensure success, the research will encompass: an understanding and attribution of various processes along timescales (such as exploring signal-to-noise ratio) and their impact on predictability, new ways of initialisation of the prediction systems, merging predictions with projections, provision of regional SCI for Europe by downscaling (statistical methods, AI) and HighRes models (including convection-permitting models) and innovative post-processing method enhancing the skill and robustness of the climate forecasts.

1 Introduction

Co-production with end-users is a good approach to incorporate users' needs in the construction of climate information. However, an important question is whether this co-produced knowledge can be scaled up to reach and address the decision making needs of a broader pool of potential users. There is a short literature section of the existing evidence, however, little empirical research addressing this question, covered in Section 3. Therefore, this work aims to examine the extent to which samples of the co-produced climate information from WP4 can be scaled-up to meet the decision needs of a broader range of potential users, which is also called horizontal upscaling. In this task, we tested four different climate information tailored to agriculture, finance, government, and heatwave sensitive sectors, separately. Four different surveys were therefore conducted of respondents in Europe from different sectors, to answer the following questions:

- How understandable is the co-produced climate information for broader potential users?
- How do they evaluate the usefulness and quality of climate information?
- How useful would the climate information be in supporting their adaptation decision-making process?
- How willing are they to share the climate information?
- How do they feel that the climate information could be improved?

2 Definitions and types of upscaling

Upscaling of climate information or climate services is a complex process involving transfer, replication, dissemination, extension, institutionalisation and expansion beyond pilots, prototypes, or case studies (Goddard et al., 2025; Reveco Umaña et al., 2026). It is not simply the wider distribution of a product, but an iterative and adaptive process through which the knowledge or tools reach new users beyond the actors involved in the initial development process, embed in new institutional and decision-making contexts, extend service functions, and increase their value or adaptation impact (Blundo-Canto et al., 2021; Golding et al., 2025; Guentchev et al., 2023; Lemos et al., 2025; McClure et al., 2024; Reveco-Umaña, 2023).

Guentchev et al. (2023) provide a useful classification for examining the upscaling of climate services, which is subsequently adopted by Reveco Umaña et al. (2026). They distinguish three main types: 1) horizontal upscaling, which refers to reaching more users and extending services to wider geographical areas; 2) vertical upscaling, which refers to changes to the institutional, infrastructural, organisational and political environment needed to support implementation; and 3) functional upscaling, which refers to expanding or modifying the features and functions of the services.

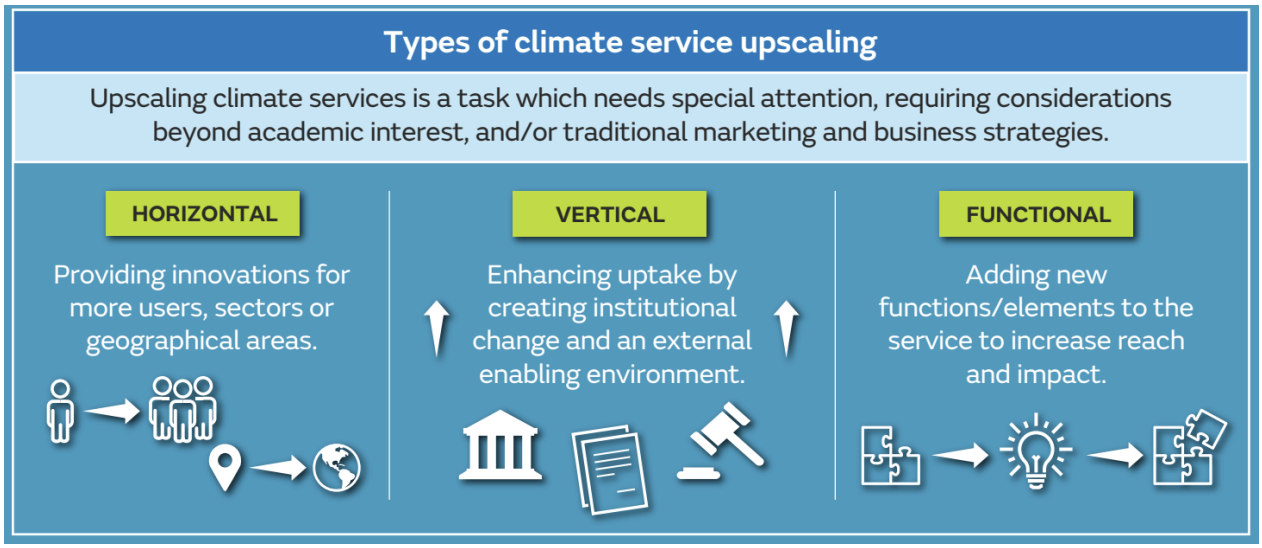


Figure 2-1 Types of climate service upscaling. Reproduced in part from the Met Office's UKCR upscaling overview explainer infographic.

For the new climate information developed by the ASPECT project, it is necessary to understand whether potential users beyond the original co-production with Super Users can interpret it, perceive it as relevant to their decisions and intend to use it (Christel et al., 2018; Kirchhoff et al., 2013; Lemos et al., 2025), before efforts toward wider dissemination, institutional embedding or expanding in function. Note, efforts to scale products are outside the scope of the ASPECT project, requiring future funding. This work focuses on identifying the potential for horizontal upscaling, which is an important early consideration for this newly developed climate information.

3 Literature review

3.1 Empirical research on horizontal upscaling

Empirical research on the effects or potential of climate information upscaling remains limited. As Blundo-Canto et al. (2021) suggest, this may be due to the scientific community's focus on information quality. The non-excludable and non-rivalrous nature of climate information, as well as its transformation throughout the upscaling process, also makes evaluation challenging.

To our knowledge, the only empirical research has been conducted in the United States. Based on two surveys of 5,393 farmers and agricultural advisers in the US Midwest, Lu et al. (2022) evaluated the horizontal upscaling potential of the co-produced climate-driven decision support tools. They assessed this potential through three aspects: awareness (of the project and the indicators provided), use of the tools, and willingness to recommend. The results showed that many respondents outside the original co-production process perceived the tools as relevant to their needs and reported using, considering using or being willing to recommend them.

3.2 Use of climate information in the survey sectors

In the ASPECT project, different climate information prototypes were developed to meet the respective needs of the agricultural, governmental, financial, and humanitarian (food security and emergency response) sectors. Although empirical studies about horizontal upscaling remain limited, research on climate information use or evaluation in these sectors can still provide insights into potential users' expectations of climate information for their sectors. For example, in addition to the three aspects (i.e., awareness, use, and willingness to recommend) mentioned by Lu et al. (2021), Madhuri's (2023) systematic review of 118 studies on agricultural climate information services highlighted the importance of examining users' understanding and comprehension of climate information, especially when forecasts involved uncertainty or inaccuracies. All these dimensions should be carefully considered during the upscaling process. D5.1 provides a detailed review of climate information use and the associated barriers and enablers. In this section, we provide a brief overview of research in the sectors covered by our surveys.

3.2.1 Agriculture sector

There is plenty of research discussing users' needs for climate information or services in the agricultural sector. For a comprehensive review, see Born et al. (2021). These studies find that, although a range of forecasting tools and knowledge is available, greater attention should be paid to contextualising the information for regional cultural discrepancies, local physical conditions, or the needs of different populations, and to the processes through which users translate it into strategic and operational decisions and adaptation actions (Carr et al., 2020; Friedman et al., 2022; Khosravi et al., 2024; Madhuri, 2023). The upscaling of climate information does not concern only one type of end user but affects multiple producers, translators, transmitters, and users. As the services reached new users, their feedback led to improvements in services, creating a reinforcing cycle of co-production, use, feedback and adaptation (Blundo-Canto et al., 2021).

3.2.2 Finance sector

Climate-related risks are increasingly recognised as material financial risks, and therefore need to be identified, measured, priced, monitored and managed (Bressan et al., 2024). However, empirical research on the use of climate information in the financial sector remains limited. Although investors and regulators recognise that climate risk estimates can support decision-making, most studies focus on quantifying risk exposures or estimating financial impacts, with less attention to how such information is incorporated into internal financial decisions (El Faroui & Benali, 2026). Effective use of climate information depends on its availability, credibility, comparability and relevance to financial decisions, alongside institutional pressures and market incentives (Attoh et al., 2022; El Faroui & Benali, 2026; Hain et al., 2022). Drawing on a literature review, interviews and four case studies in the Netherlands, Attoh et al. (2022) find that no single physical climate risk assessment approach is suitable for all decision contexts in the financial

sector. They identify user engagement and co-production, needs identification, data availability and quality, internal integration, and communication as five cardinal points for the effective use and expansion of the physical climate risk information. Hamaker-Taylor et al. (2018) examine the demand and supply of climate services across different segments of the financial sector and identify the barriers and enablers shaping their uptake of climate services. They found that demand for climate services depended on the contexts and needs of different financial-sector segments. The establishment of voluntary risk-disclosure frameworks and self-regulatory initiatives, such as the TCFD recommendations, encouraged the use of climate services. Barriers to uptake included the lack of awareness and limited resources and capacity.

3.2.3 Emergency response and humanitarian sector

In the emergency response and humanitarian sectors, translating climate information into adaptation actions is very important to maximise capacity of these sectors to support vulnerable members of society during and after increased extreme weather and other climate-related impacts. This cannot depend on forecasts alone but requires contextualised information, financial resources and institutional support (Müller et al., 2020; A. S. Tozier de la Poterie et al., 2018). The experience of the Red Cross Red Crescent provides a longitudinal example of extending climate information use across emergency-response organisations. Coughlan de Perez and Mason (2014) describe how co-production between climate information providers and humanitarian users enhanced the usefulness and usability of the tools. At the time of their study, more than 60 National Red Cross and Red Crescent Societies had participated in the Preparedness for Climate Change programme since 2006. Tozier de la Poterie et al. (2023) provide more recent evidence from interviews with participants in Red Cross and Red Crescent anticipatory-action programmes across 18 countries. They found that these programmes built capacity within National Societies by providing resources, automating decision-making, and using phased implementation triggers, which then encouraged proactive early action and improved response operations. To support sustained expansion, locally tailored information, local ownership and capacity, stakeholder collaboration, alignment with existing warning systems, and financing and institutional support are required.

3.2.4 Governance sector

In the governance sector, upscaling climate information requires a high degree of contextualisation (Reveco Umaña & Máñez Costa, 2026). Research across municipal administrations shows that the use of climate information depends on customary working practices, existing procedures, administrative competencies, legal requirements, political and strategic priorities (Reveco-Umaña, 2023), and concrete decisions and actions (Ulrich et al., 2026). Even within the same administration, differences in departmental roles, responsibilities, workflows, and staff expertise and capacity, may also lead to variations in the interpretation and use of the climate information (Harrs et al., 2024). Several interactive tools developed through the UK Climate Resilience Programme illustrate how climate services co-produced with a small group of local authorities can

be extended to a wider user base while remaining responsive to local needs. For example, an urban heat climate service combining accessible “Heat Pack” factsheets with a locally tailored Heat Vulnerability Index was initially co-produced and piloted in Belfast, then replicated in Manchester through adaptation to the city’s local context (Ramsey et al., 2024). Similar in concept to the heat packs, ‘City Packs’ were created by the Met Office, which evolved into Local Authority Climate Service Climate Explorer Reports, demonstrating a successful scaling of a service across all local authorities in the UK. Similar progress also has been made in Germany. Riach and Glaser (2024) evaluated practitioners’ awareness, understanding and use of municipal climate profiles that were scaled up to all 1,103 municipalities in the state of Baden-Württemberg. Their survey found that 94% of respondents perceived added value in the profiles, and 92% indicated that they might use them in the future.

3.3 Summary

Overall, although a growing body of literature has examined the use of climate information or evaluated the outcomes of particular upscaling initiatives, empirical studies that quantitatively assess the potential for upscaling before wider implementation remain limited. Existing research is concentrated predominantly in the agricultural sector, with comparatively little attention paid to other sectors, such as financial institutions, government organisations, and emergency response or humanitarian actors. Moreover, most climate information examined in existing literature is weather forecasts, sub-seasonal, or seasonal information, whereas climate information over longer timescales was less discussed. The Government Office for Science (2026) identifies uncertainty over demand, resources and technical capacity constraints, lack of information and difficulties in interpreting it as barriers to scaling adaptation solutions. These gaps highlight the need for ex ante quantitative assessments of potential users’ understanding, evaluation, and intended use of, and willingness to recommend, newly developed climate services across a wider range of sectors and timescales.

4 Method

4.1 Approach

Task 5.5 used surveys to examine the extent to which climate information co-produced or incorporated into products developed from the ASPECT project is also useful and usable for meeting the decision needs of other potential users. Detailed descriptions of the co-production processes and the climate information tailored to the Super Users[1] by WP4 are provided in Deliverables 4.2 and 4.3, which extend beyond the specific products evaluated in the surveys. For the purposes of the surveys, selected climate information developed in WP4 were simplified into four products. The products retained the principal climate indicators, timescales and decision contexts of the corresponding Super User case studies, while limiting the expected reading time to approximately 5–10 minutes.

1) For the agricultural-sector survey, the climate information was presented as a climate bulletin adapted from information co-produced with Codorníu for vineyards in Catalunya, Spain. It introduced seasonal and decadal predictions of frost days and growing degree days, using maps, probability bar charts, and time series tables.
2) For the finance sector survey, the product was delivered through an online storyboard . It introduced the concept of physical climate risk through the interaction of hazard, exposure and vulnerability, and illustrated the physical climate risks that pension funds may carry within their investment portfolio.
3) For the multi-sectoral temperature predictions survey, some existing examples of European temperature information were delivered through an online storyboard for emergency-response and humanitarian users, with the website created by WP4 specifically for the survey. The storyboard covered recent observations, seasonal predictions for the next three months, and decadal predictions for the next year(s). The ASPECT website contextualised this information and explained how information about extreme heat could support preparedness and resilience across different timescales[2].
4) For the governance sector survey, the information was delivered through a presentation slide prototype based on the ASPECT governance case study in the Emilia-Romagna

[1] In ASPECT, Super Users are organisations that work closely with researchers to co-produce climate information spanning from seasons to decades, which can help make better informed decisions for adaptation, enhancing resilience to climate change and extreme weather.

[2] As respondent rates were a concern, the survey was kept short by only testing some examples of climate information showcased in the website. Therefore, the survey itself tested several preexisting climate information products utilised in the WP4 main website co-produced with the British Red Cross, including an extract of seasonal information provided by the Met Office (the UK three month outlook) and an extract from the WMO Lead Centre for Annual-to-Decadal Prediction. For clarity, the pieces of climate information tested in this survey were themselves not generated by ASPECT, but these preexisting products form important parts of the emergency response website created in WP4 with the British Red Cross.

region of Italy. The prototype introduced decadal climate predictions and statistical downscaling. It presented examples of precipitation anomalies, prediction skill, and temperature change.

4.2 Participant recruitment

Dissemination of the surveys began in the summer of 2025. We launched the survey for each sector sequentially, starting with the pension sector, and then agriculture, government, and heat-sensitive sectors. Given the challenges encountered in recruiting participants, some questionnaires were further shortened and refined during this period. For some sectors, multiple pilots were conducted before the final survey was launched. Relevant differences between these versions are explained in the corresponding results section for each survey.

Participants have been recruited through the Prolific platform, as well as through the ASPECT project's social media channels and professional networks, such as umbrella associations and organisations within the corresponding sector, and communities of practice established through related projects. Prolific is an online platform for recruiting and contacting participants from an active pool of verified individuals. It allows us to target participants based on characteristics such as sector and geographical location and invite them to complete surveys in exchange for small financial rewards. Given that Prolific's participant pool is concentrated in the UK and the US, more UK respondents were recruited for our surveys when selecting respondents from European countries. Respondents recruited through Prolific who passed the attention checks received a small financial reward around £3 for their participation, depending on the survey length. Those who did not pass the embedded screening questions or attention checks received partial payment in accordance with the platform's rules. Survey responses from all recruitment channels were collected and recorded using the Qualtrics platform.

4.3 Survey Design

The surveys were designed using the Qualtrics online survey platform. The agricultural and governance sector surveys were available in English, French, German, Spanish, Portuguese, Italian, Serbian and Greek. The other two surveys were available in English. Respondents were first presented with an introductory page outlining the aims of the survey and were asked to confirm their consent to participate. Potential participants then completed sector-specific screening questions, followed by basic questions about themselves and their organisations. Eligible participants were subsequently asked to assess the climate information provided in terms of its understandability, quality, and usability, and their willingness to share the information and their suggestions for future improvements. The final section collected further background information about their organisations. Full details of all questions and response options can be found in Appendix I.

4.3.1 Understanding of climate information

Respondents were asked to review the climate information provided for approximately 5–10 minutes, or to read through some detailed explanations of selected contents from the provided climate information. Respondents then answered a series of questions assessing their understanding of provided material. Understanding was assessed using both subjective and objective measures. All sectoral surveys measured the overall ease-of-understanding on a five-point scale ranging from “very hard” to “very easy”. In some surveys an additional question assessed whether the balance between text and images was appropriate. Objective understanding was assessed through questions examining whether respondents could correctly interpret key aspects of the information presented. These included probabilities, the most likely predicted conditions, forecast quality, prediction skill, trends in weather or climate variables, and distinctions between key concepts, such as decadal climate predictions and long-term climate projections. Respondents were then asked to select the statement that best described or interpreted the prediction shown. Responses to these questions were coded as correct, incorrect, or “don’t know/not sure” for subsequent analysis.

4.3.2 Quality Evaluation

To assess participants’ perceptions of the quality[3] of the climate information provided, they were asked to rate their agreement with eight evaluation criteria using a five-point Likert scale (1 = “Strongly disagree”; 5 = “Strongly agree”), with an additional “Don’t know / Not applicable” option. The criteria were suitable format, understandability, trustworthiness, accuracy, usability, beneficial to themselves, beneficial to the organisation, and beneficial to the sector.

4.3.3 Usability for decision making

Respondents were first asked to indicate the current stage of climate information use within their organisations. They then assessed how the climate information provided could be used within their organisation. Following the typology proposed by Jagannathan et al. (2023), six types of climate-information use were examined: 1) Understand, 2) Motivate and Communicate, 3) Inform, 4) Plan, 5) Fund, and 6) Take Action. Respondents rated their agreement with statements representing each type on a five-point Likert scale ranging from “Strongly disagree” to “Strongly agree”, with an additional “Don’t know / Not applicable” option. Respondents who did not select “Agree” or “Strongly agree” for any of the six types of climate information use were asked why the information would not help their organisation.

[3] “Quality” is used throughout this deliverable to refer to participants’ overall assessment of the climate information. In the climate information bulletin provided for the agriculture sector survey, the term is also used in the narrower sense of forecast accuracy.

4.3.4 Willingness to share

Respondents were asked whether they would be willing to share the climate information inside and outside their organisation. Follow-up questions identified potential internal audiences and invited respondents to name external audiences.

4.3.5 Improvements required

A multiple-response question asked how the information could be improved, such as understandability, training for use and communication, tailoring to organisations' needs and scales, clearer reliability and uncertainty information, greater accuracy, stronger relationships with providers, etc. Optional free-text questions captured further tailoring needs and other suggested improvements.

4.3.6 Respondent's background

Background questions varied across sectors. Common questions covered respondents' professional experience and organisational roles, as well as their organisations' size, country, geographical scope of operations, longest planning horizon, and vulnerability to weather- or climate-related risks. Individuals' demographic information, such as gender, was not collected, as the surveys focused on respondents' perceptions of the climate information provided in the context of their organisational roles.

4.4 Data quality and analysis

Qualtrics and Prolific removed responses that did not meet quality criteria, including implausibly short or excessively long completion times and failed bot-detection checks. For surveys disseminated through Prolific, two attention checks were also included in the understanding and usability sections. Respondents were asked to select the required option for each question, i.e., "strongly agree" that they were paying attention to this survey, or "strongly disagree" that they were not reading the survey. Respondents who failed to select the required response to either question were excluded from the formal analysis. The final number of valid respondents included in each survey is reported in the Results section.

Analyses were run separately for each survey. The survey responses were analysed primarily using descriptive methods. For each question analysed, we calculated the percentage of respondents for each choice option. For questions that allow multiple answers, the number of respondents is used as the denominator for calculation. Hence, the cumulative percentage of options can exceed 100% for these questions. In the corresponding figures, the title of the y-axis or x-axis indicates the exact type of observations used for calculation. Percentages were rounded for presentation. Pearson correlation analyses were also conducted to assess the associations of subjective understanding with objective understanding.

5 Agriculture sector survey results

Four versions of the survey were published. Eligibility was limited to individuals with more than one year of professional experience in the sector. The initial pilot version was distributed through ASPECT's wine-sector network in July 2025, and two respondents completed the questionnaire.

The questionnaire was subsequently shortened to improve readability and encourage participation. This revised long version was distributed to wine-sector practitioners through the project network and further disseminated through an ASPECT online webinar in December 2025. Three respondents completed this version between November 2025 and February 2026.

Following the discussion in the project's General Assembly, the research team further shortened the questionnaire and simplified its comprehension questions to improve the response rate. This shortest version targeted the broad agriculture sector not only viticulture, and was then distributed through ASPECT's wider agricultural-sector contacts from May 2026, recruiting one additional respondent.

In June 2026, the Prolific platform was used to recruit more respondents from the broader agricultural sector. An additional screening question was included to confirm that participants worked in agriculture, together with two attention-check questions to assess response quality.

Overall, 108 responses were collected, of which 102 were from the Prolific platform. Nine respondents from the Prolific platform failed the attention checks (see section 3.3), resulting in a final valid sample of 99. Of these, 93 were recruited through Prolific and completed the shortest version. The remaining six were recruited through ASPECT's own networks: two completed the pilot version, three completed the long version, and one completed the shortest version.

In the following subsections, we report the main results for those who completed the shortest survey version (N = 94, 1 from ASPECT network and 93 from the Prolific platform), to avoid confusion and facilitate comparison across surveys. Results from questions included only in the pilot and long survey versions, or specifically designed for the agricultural bulletin, are presented in Appendix A2.1 as supplementary information.

Respondents worked with a diverse range of crops, including vegetables, fruits, cereals, potatoes and sugar beet, oilseeds, olives for oil production, grapes for wine production, and other crops (Figure 5-1). Among them, 9 worked with grapes for wine. They further answered their primary area of work or expertise within the agriculture sector and their organisations' roles in the crop value chain. 27% of them identified crop production as their primary area of work. Other reported areas included business ownership (22%), project management (19%), research and development (12%), crop processing (12%), and others (9%). 62% reported that their organisations were crop growers or producers within the crop value chain.

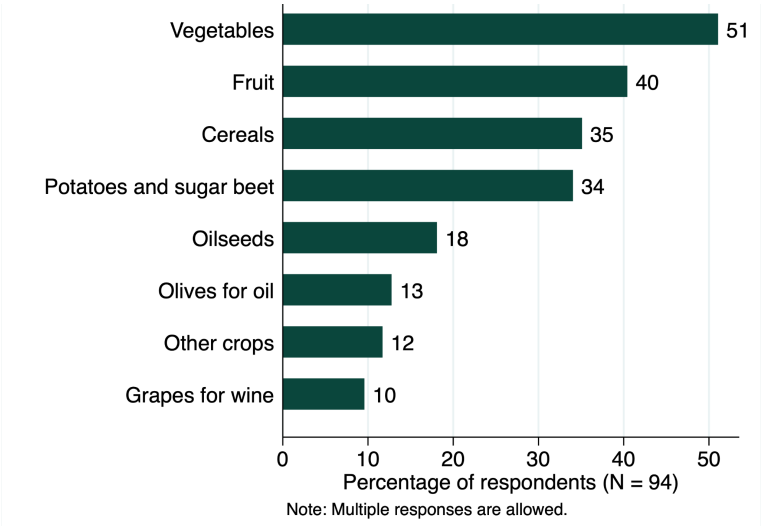


Figure 5-1 Type(s) of crops respondents work with

The majority of respondents (68%) considered their organisations to be moderately or very vulnerable to weather- or climate-related impacts (Figure 5-2). A further 10% rated their organisations as extremely vulnerable, reflecting the agricultural sector's high level of exposure to weather and climate conditions. More background details about the respondents and their organisations can be found in Appendix A2.1.1.

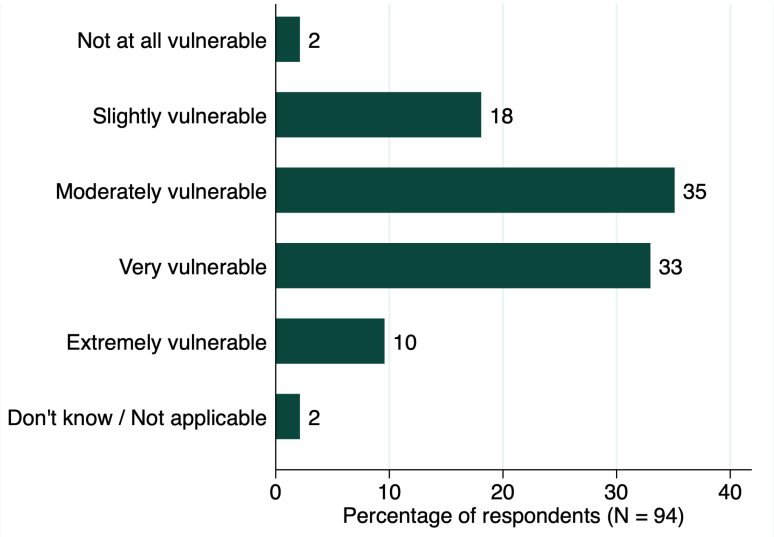


Figure 5-2 Organisational vulnerability to weather or climate-related impacts

5.1 Understanding

Respondents were asked to read the full five-page climate bulletin of the climate information before answering questions about their understanding of its content. Selected graphs and their corresponding explanations were presented directly within the questionnaire to reduce completion time (see A1.1 for the full survey protocol). An example of these questions is shown in Table 5-1. Respondents were not required to read the full bulletin, which was provided via an external link. Instead, they were asked whether they had read it. Among the 94 respondents, 66% had read the bulletin, 32% had not read it but intended to review it later, and 2% had not read it and were not interested in doing so. 40% of the total 94 respondents found the information easy or very easy to understand, 37% found it neither difficult nor easy, and 22% found it difficult or very difficult (Figure 5-3). This pattern is similar for the 9 wine sector respondents, of whom 44% found the information easy or very easy to understand.

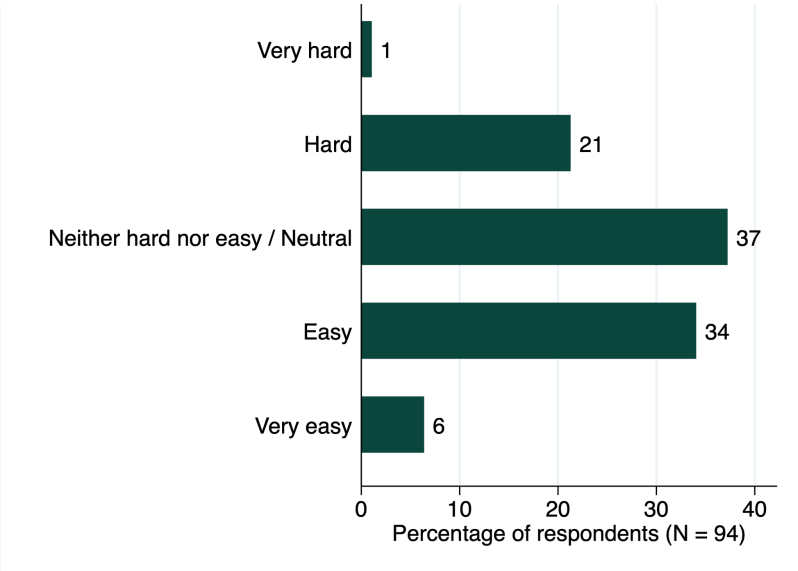
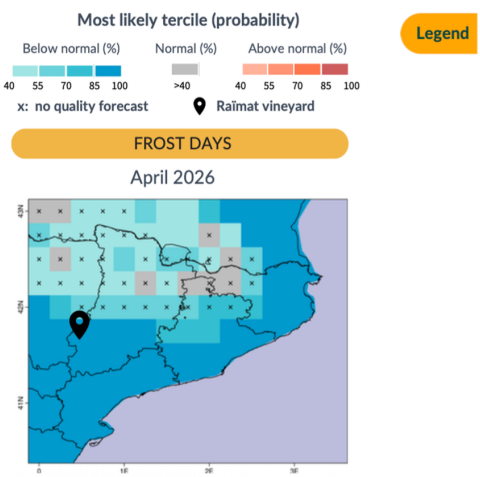


Figure 5-3 Understandability of the information provided

Respondents were then asked three questions assessing their understanding of specific content: the maps presenting seasonal and decadal predictions about Frost Days and the bar chart presenting seasonal predictions about Growing Degree Days. The specific questions asked can be found in Appendix A1.1, Section D.

Table 5-1 An example of questions testing objective understanding in the agriculture survey

Seasonal prediction - Map
The following map shows the probabilistic forecasts of frost days for April 2026 across Catalunya. Please select the best description of the situation that the Raïmat vineyard will experience in April 2026.
 Options: a. 40%-55% probability of below normal number of frost days, and the prediction has some quality. b. 85-100% probability of below normal number of frost days, and the prediction has some quality. c. 85-100% probability of below normal number of frost days, but the prediction doesn't have quality. d. More than 40% probability of normal number of frost days, but the prediction doesn't have quality. e. 85-100% probability of above normal number of frost days, and the prediction has some quality. f. Don't know / Not sure Correct answer: b

The results of these questions are shown in Figure 5-4. More than 80% of the 94 respondents correctly identified both the predicted probability and the quality of the decadal prediction shown on the map. However, fewer than half correctly interpreted the seasonal predictions presented either as maps (47%) or bar charts (38%). Similar results were observed among the 9 respondents from the wine sector, with a lower percentage of correct responses to each question than in the full sample.

Errors in interpreting the seasonal prediction map included confusing “below normal” with “above normal” (22.3%), selecting the wrong percentage range or colour category (12.8%), misclassifying “some quality” as “no quality” (8.5%), and making a combination of these three errors (6.4%). For the seasonal prediction bar chart, 35.1% misclassified “no quality” as “some quality”, while 24.5% were unable to identify the normal range of the indicator for the specified period. The confusion between “below normal” and “above normal” frost days was also reported by the wine sector Super User Codorniu. They noted that an above-normal number of frost days indicates colder conditions, which is however represented in red in the predictions and may lead to some confusion (see D4.3 for detailed feedback).

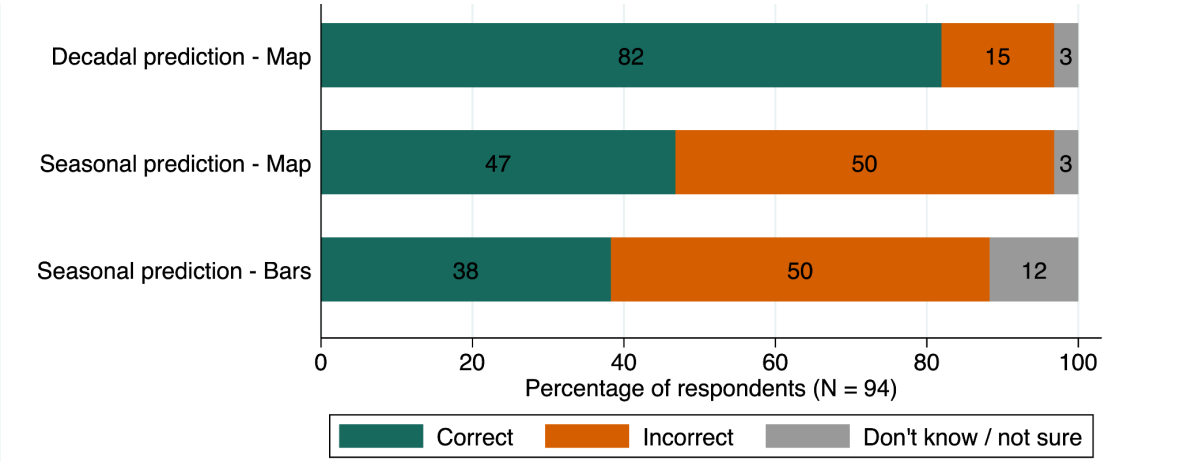


Figure 5-4 Understanding of specific content provided

5.2 Quality Evaluation

Most respondents evaluated the information positively across all eight criteria shown in Figure 5-5. Levels of agreement were comparatively lower for the information's accuracy and trustworthiness and for whether it would benefit respondents themselves and their organisations. Among the nine wine sector respondents, the two highest-ranked criteria and the lowest-ranked criteria remained the same as in the full sample, while "trustworthy" and "beneficial to yourself" ranked higher.

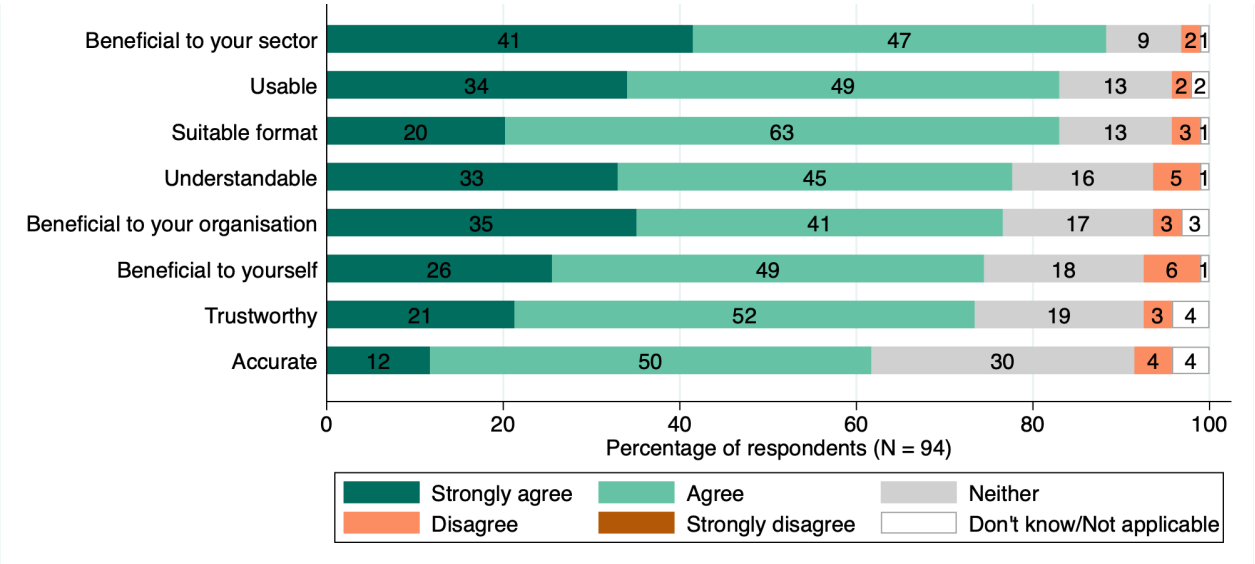


Figure 5-5 Perception of the information quality

They were also asked to assess the usefulness of seasonal and decadal climate information to their organisations (Figure 5-6). Of the 94 respondents, 63% considered seasonal climate information to be very or extremely useful, compared with 43% for decadal climate information. Among the nine wine sector respondents recruited through the Prolific platform, the percentages who rated seasonal and decadal forecasts as “extremely useful” or “very useful” were similar, at 77% and 78%, respectively. However, a higher percentage selected “moderately useful” for seasonal forecasts (22%) than for decadal forecasts (11%).

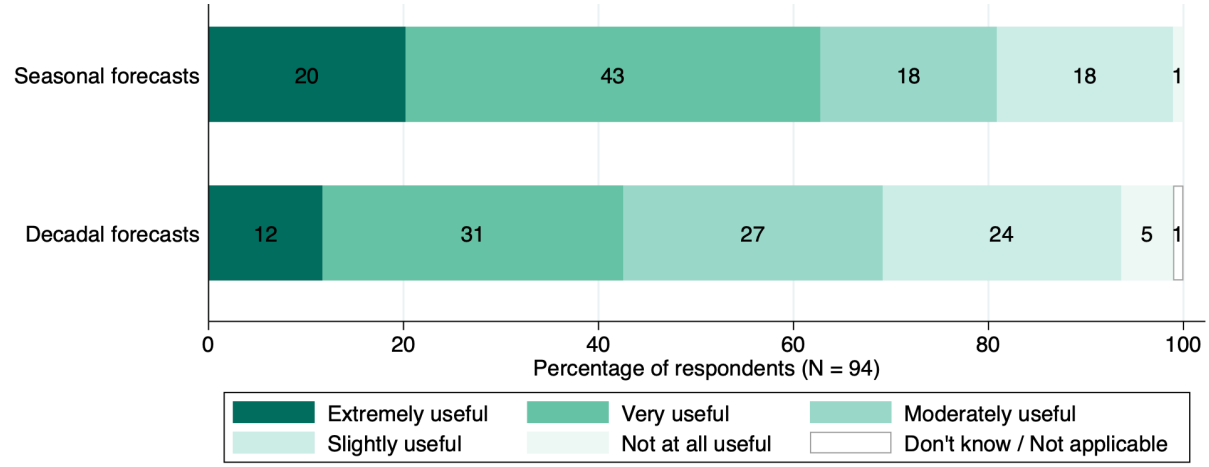


Figure 5-6 Usefulness of seasonal and decadal climate information

5.3 Usability for decision making

Among the 94 respondents, 39% reported that their organisations already used some form of climate information, while 54% understood what climate information was but did not actively use it. Only 6% were unfamiliar with climate information. For the nine wine sector respondents, 7 of them were unfamiliar with climate information, and the remaining two understood but did not actively use climate information.

Regarding the potential use of the information, 79% of respondents agreed or strongly agreed that it could improve their organisations’ conceptual understanding of climate-related topics and regional or local issues, even without an explicit intention to apply that knowledge instrumentally (Figure 5-7). A further 78% agreed or strongly agreed that the information could support broader organisational planning, while 72% believed that it could help their organisations implement climate-adaptation measures, such as changes to management practices, operations, rules, or policies. In addition, 66% thought that it could support applications for climate adaptation or mitigation funding, 63% believed that it could help generate support for climate action or facilitate discussion of climate issues with regional and local communities, and 62% felt that it could inform practitioner models or research activities. For the nine wine sector respondents, a higher

percentage (89%) of respondents agreed that it will help them inform practitioner models or research activities.

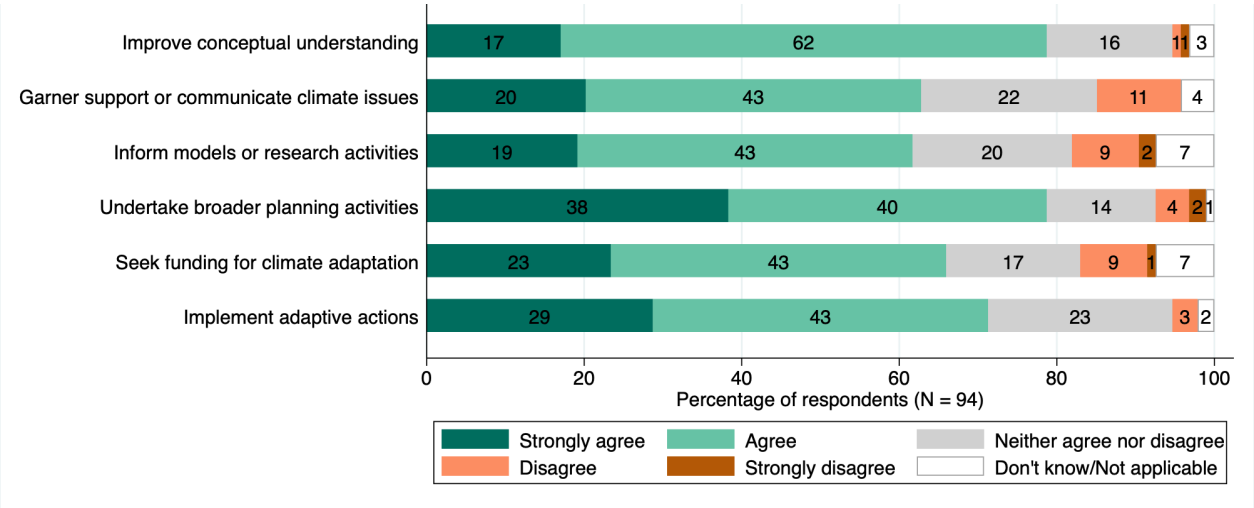


Figure 5-7 Potential use of the provided climate information

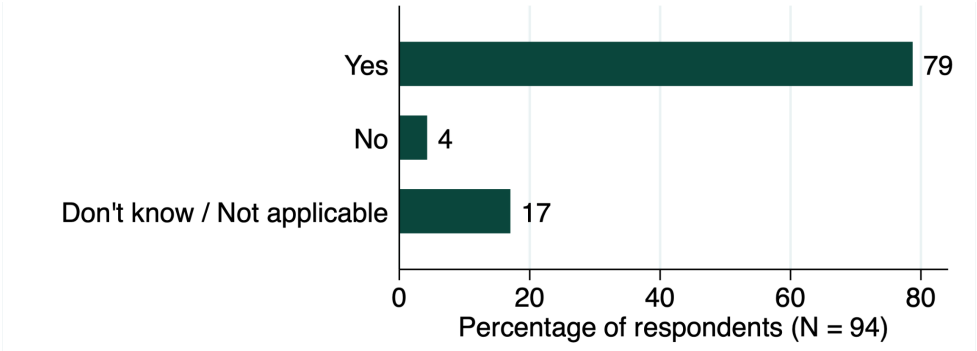
Only one respondent disagreed or strongly disagreed with every statement. This respondent explained that the information was "not relevant to our geographical scale of interest." This respondent reported that their organisation operated globally and noted in an open-ended response that they were more interested in global trends. This feedback echoes comments from a Super User that higher spatial resolution does not necessarily improve usability: depending on users' needs, aggregated results may be more useful than finer-scale outputs (see D4.3).

5.4 Willingness to share

79% of respondents indicated that they would share the climate information with others within their organisations (see Figure 5-8). For the nine wine sector respondents, this number is 67%. Potential audiences included owners, directors, and senior or junior managers (72%); staff working in strategic or planning roles, such as planners and policymakers (58%); and professional or technical staff, such as analysts, engineers, scientists, researchers, and technicians (54%), and others (3%).

Around half (49%) of the respondents indicated that they would share the information with people outside their organisations, and 24% of them would not share it externally. For the nine wine sector respondents, these numbers are 33% and 44%, respectively. The intended audiences included farmers and agricultural peers; business partners and supply-chain actors, such as clients, buyers, suppliers, distributors, retailers, and funders; other partners and stakeholders; universities and research institutions; government agencies and agricultural bodies, such as chambers, associations, and foundations; the general public; and their families and friends.

(a) Share with others within their organisations



(b) Share with others outside their organisations

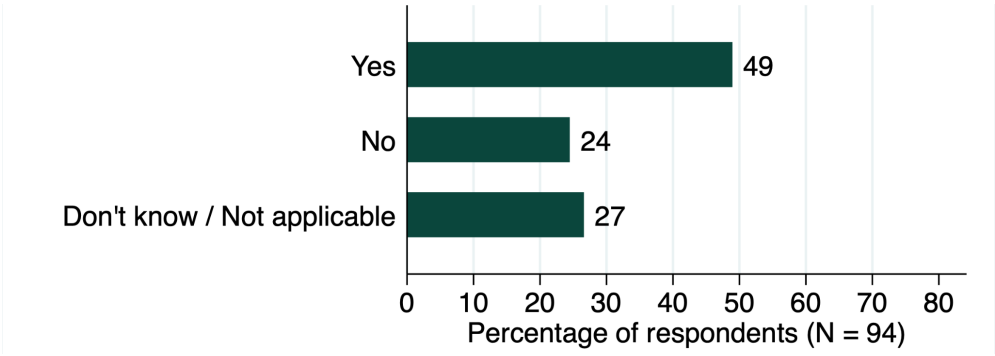


Figure 5-8 Willingness to share inside and outside respondents' organisations

5.5 Improvements required

Among the 94 respondents, 57% wanted the information to be easier to understand (Figure 5-9). Other commonly identified priorities were better tailoring to the geographical scale relevant to their organisations and easier access to the information. 43% of respondents wanted it to be better tailoring to their needs and timescales of interest, and easier to access. Approximately one-third also called for more details of uncertainty, greater accuracy and reliability, better tailored to their organisations' needs, guidance or training on how to use the information, and better tailored to their timescale of interest. For the nine wine sector respondents, guidance and training on using the climate information within their organisations is the top priority.

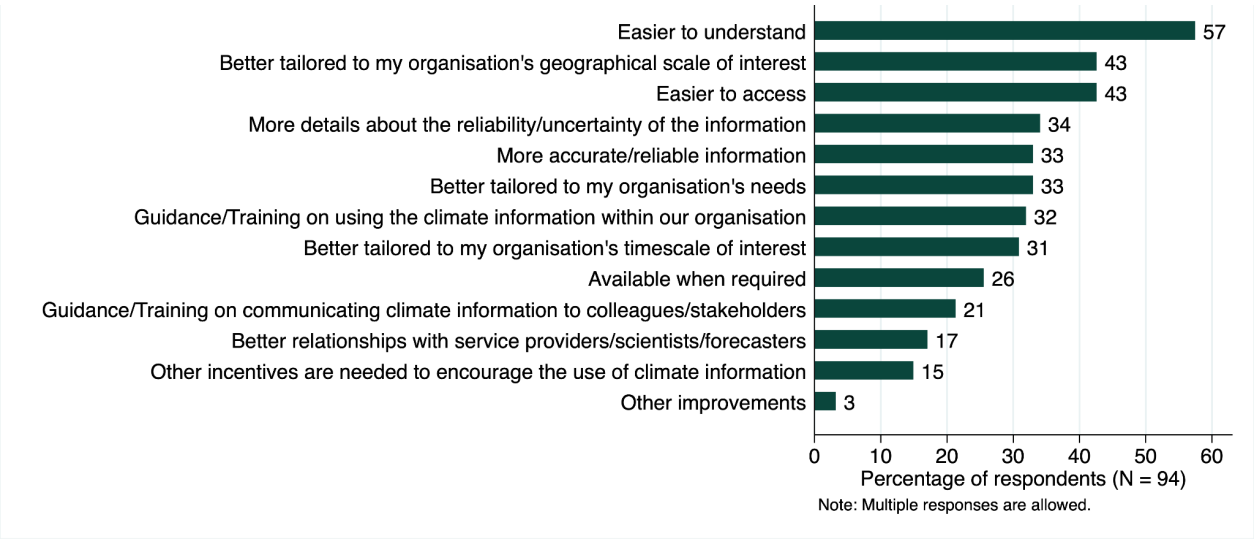


Figure 5-9 Areas of improvements for the provided information

6 Finance (pensions) sector survey results

We distributed the finance sector survey through the ASPECT project's own networks from June 2025. This approach yielded only five respondents. Therefore, in July 2026, we further shortened the survey, expanded our target audience and distributed it through the Prolific platform. Prolific participants were selected based on two criteria: they lived in European countries and worked in the finance or insurance industries. In total, we received 97 valid responses through Prolific. Combining these with the original ASPECT network responses, the final valid sample comprised 102 respondents.

Respondents' main area(s) of activity within the financial sector were shown in Figure 6-1, including 35 from the pension sector (34%). Of the total respondents, 60 (59%) were from the United Kingdom, with additional respondents from Poland, the Netherlands, and other ten European countries. Besides the higher proportion of UK residents in the Prolific participant pool, another reason for the high percentage of UK respondents could be London's position as the world's second-ranked financial centre and top ranked financial centre in Europe.

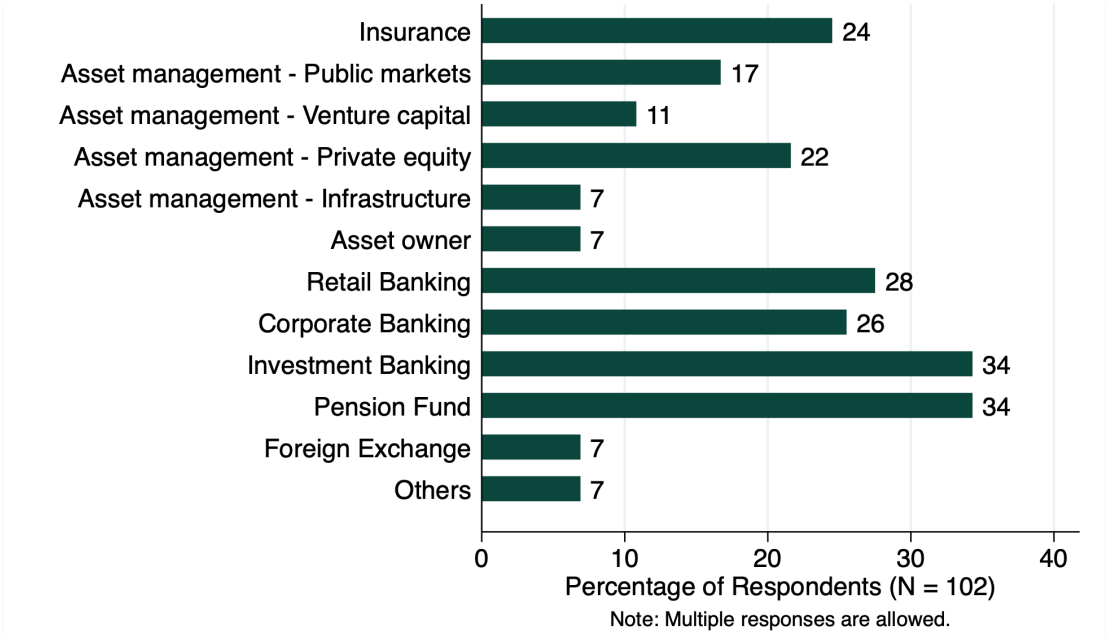


Figure 6-1 Organisation's main area(s) of activity

Among the 67 respondents working in the broader financial sector rather than in pension funds, 54% agreed that their business activities are slightly vulnerable to climate-related impacts, followed by 34% moderately vulnerable and 6% very vulnerable. Only 6% reported that their activities are not at all vulnerable. About the 35 pension-sector respondents, 32 (91%) agreed that the investments they made (e.g., as a trustee), advised (e.g., as an investment consultant) or

made (e.g., as an asset manager on behalf of a pension fund including via an insurance company) were sensitive in some way to weather/climate or its impacts (e.g., at risk from loss, damage, or impairment). 24 pension-sector respondents (69%) indicated that their investments were moderately vulnerable to climate-related impacts, while 9% reported that they were very vulnerable and 20% were slightly vulnerable. More background details of these respondents can be found in Appendix A2.2.1.

6.1 Understanding

To test the understanding of climate information specific to the pension sector, respondents were first asked to carefully read a short website produced by ASPECT partners (see Section 4.1 and examples were given in Figure 6-2). This website is one part of the pensions case study, and was created specifically as an accessible product for non-technical users (details of the website can be found in Deliverables 4.2 and Deliverable 4.3).

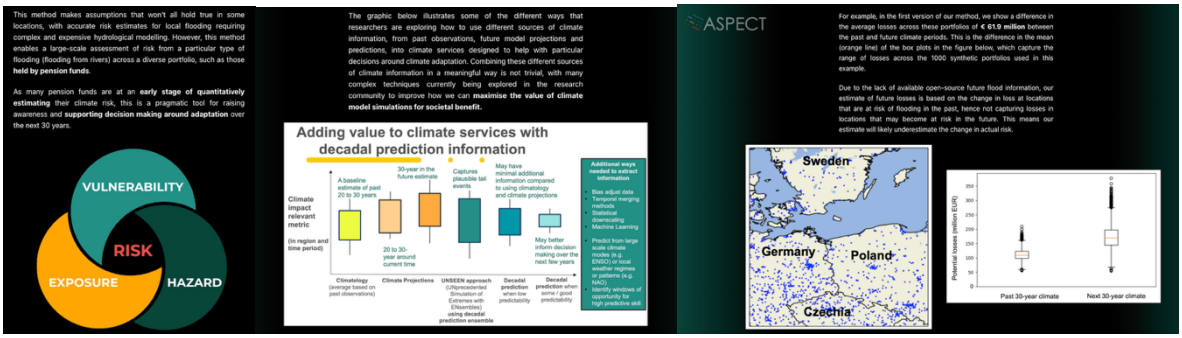


Figure 6-2 Screenshots of the website

More than half of the 102 respondents agreed that the balance of text and images on the website was appropriate. 38% felt that there was somewhat too much text, and 6% of the respondents indicated that they would prefer more images. For pension-sector respondents, the findings are similar as shown in Appendix A2.2.2.

42% of total respondents agreed that the provided information is easy or very easy to understand and only 29% of them thought it was very hard or hard to understand, as shown in Figure 6-3. For pension-sector respondents, the percentage of “easy” is even higher but “very easy” was not selected (see Appendix A2.2.2).

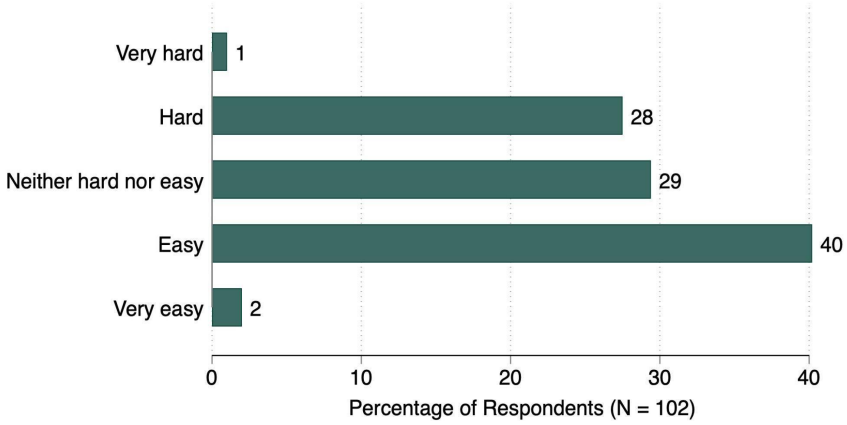


Figure 6-3 Understandability of the information provided

Several test questions were also included to evaluate whether respondents correctly understood key concepts, such as climate risk estimation, climatology, predictions, and projections, as well as figures and textual information. Respondents were asked to mark each of seven statements as True, False, or Don't know. The detailed questions can be found in the Appendix A1.2, Section C. Some examples of these questions are shown in Table 6-1.

Table 6-1 Examples of questions testing objective understanding in the finance survey

Statement	Correct answer
A '1 in 10-year' event means that it will occur exactly once every 10 years.	False
Long-term climate projections use information about the current climate state to provide a forecast about the likely trend over the next few years.	False
Decadal climate predictions are designed to understand changes to the average climate over many decades.	False

Note. For each statement, participants were given three options: True, False, or Don't know.

As shown in Figure 6-4, most respondents can correctly interpret the concept of climate risk estimation and climatology, but failed to correctly distinguish decadal climate predictions and long-term climate projections. The findings were similar for only pension-fund respondents (see Appendix A2.2.2).

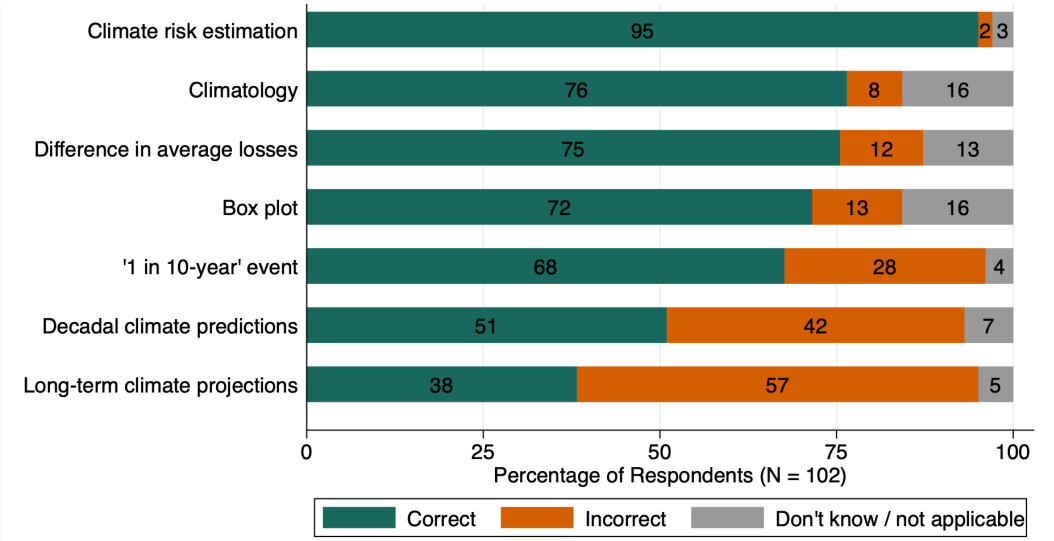


Figure 6-4 Understanding of specific content provided

6.2 Quality Evaluation

Respondents' perceptions of the quality of the information provided were explored by asking them to rate their level of agreement with eight quality criteria on a five-point scale, where 1 represents "Strongly disagree," 3 represents "Neither agree nor disagree," and 5 represents "Strongly agree". Figure 6-5 presents the results. Focusing on the share of respondents who agreed or strongly agreed, the findings indicate that the prototype was perceived positively across all criteria, particularly in terms of usability, suitability of format, and benefits to their sectors. However, around half of the total respondents disagreed or were uncertain about whether the prototype would be beneficial to them personally. The findings for pension-sector respondents were similar, although understandability was rated more highly than trustworthiness, compared to the results for the total samples (see Appendix A2.2.3).

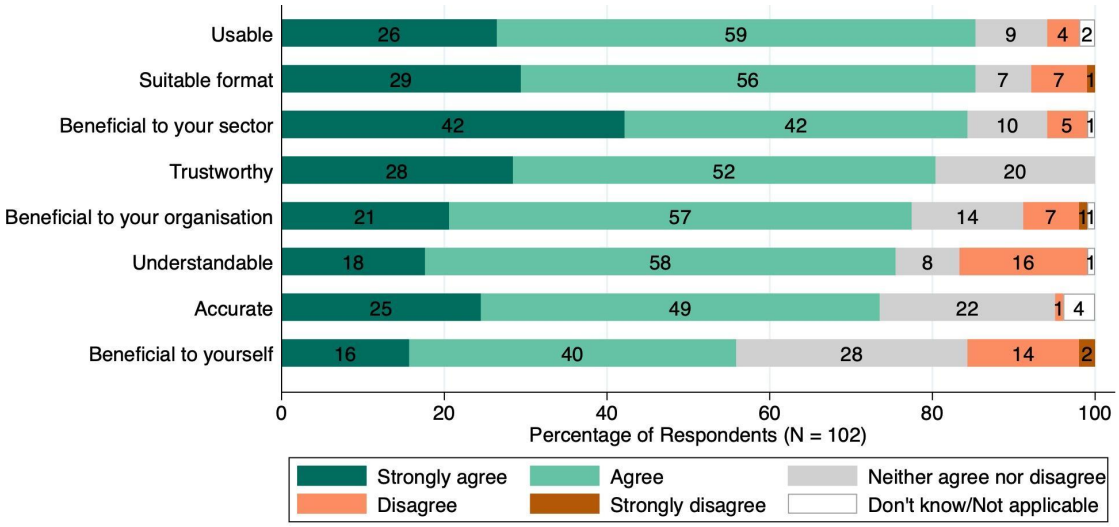


Figure 6-5 Perception of the prototype quality

6.3 Usability for decision making

Among all respondents, 37% indicated that their organisations already use climate information, while 51% said that they understand it but have not yet actively used it. A further 12% reported being unfamiliar with climate information. Among the 35 pension-sector respondents, 20 already use climate information, while 12 respondents understand it but do not actively use it. Two respondents provided additional details in the following open-ended question. One mentioned that their organisation actively integrates climate information into its investment and systematic strategies, for example, in company evaluations and in determining stock weights and exclusions. Another respondent noted that their organisation uses climate information for education and modelling purposes.

We then asked respondents to assess the extent to which the provided climate information could help their organisations. Most Prolific respondents agreed that the information provided would be useful for their organisations in improving their understanding of climate-related concepts and undertaking broader planning activities, followed by implementing adaptive actions and informing models or research activities. Only around half felt that it would be useful for seeking funding for climate adaptation or mitigation (see Figure 6-6).

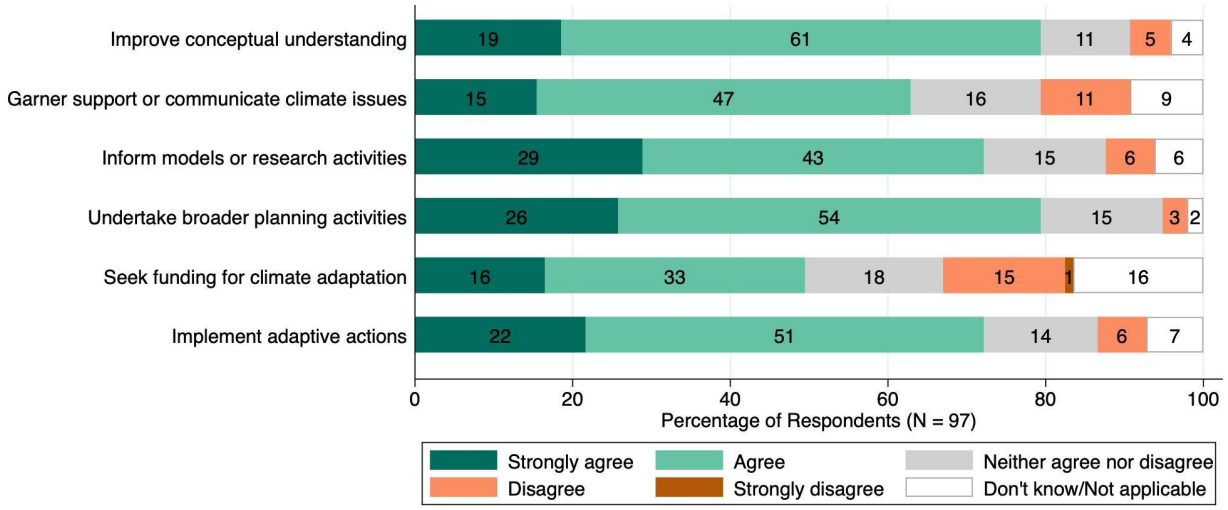


Figure 6-6 Potential use of the provided climate information (Prolific respondents)

Only two respondents disagreed with all of these types of information use within his/her organisation. The reasons given were that they were not required to use weather or climate information in their role, unsure whether it would be useful for their organisations, or they thought the information was not accurate or reliable enough, lack of trust in information source or provider, difficult to understand, and not relevant to their geographical scale of interest.

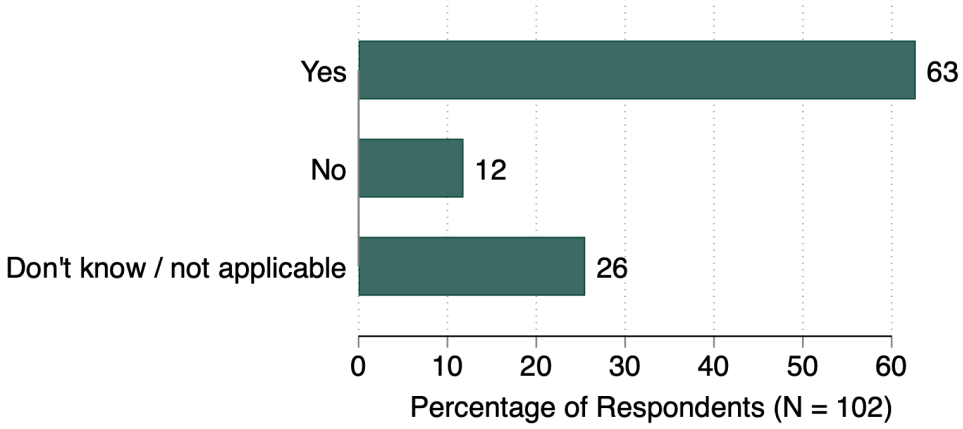
One respondent noted that *"The industry lacks tangible case studies of the financial materiality of climate impact, especially those that are not abstract in nature. This would be a very tangible, easy-to-understand example. Albeit it is focused on a relatively niche part of asset markets for the average institutional investor."*

6.4 Willingness to share

Among all respondents, 63% indicated that they would be willing to share the information internally, 12% would not be willing to share it, and 26% selected "Don't know / Not applicable" (see Figure 6-7). Of the 60 respondents who answered the optional follow-up question on internal sharing, 53 (88%) reported that they would like to share the information with their organisation's executive or leadership member, followed by beneficiaries (48%), regulators (33%) and others (3%).

42% of the total respondents indicated that they would be willing to share the information with external audiences, for example, clients and asset holders, professional peers in the financial sector, investors and fund stakeholders, insurers and regulators, research organisations, government bodies, media, and business partners.

(a) Share with others within their organisations



(b) Share with others outside their organisations

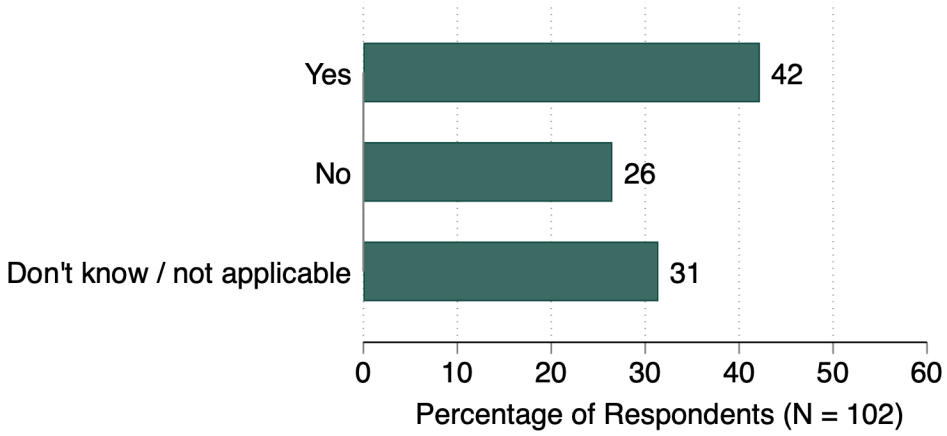


Figure 6-7 Willingness to share inside and outside respondents' organisations

6.5 Improvements required

The most commonly suggested improvements include providing guidance/training on its use (57%), easier to understand (49%), and tailoring the information to their organisations' specific needs (38%). Figure 6-8 shows the full list of suggestions.



Figure 6-8 Areas of improvements for the provided information

7 Temperature predictions survey results

This survey tested the interpretation of temperature predictions, which is inspired by the Emergency response case study. It was distributed through the ASPECT project's own networks (e.g., ASPECT social media and the Met Office Climate Newsletter), direct sharing by the WP4 case study lead with people at the British Red Cross and European members of the International Federation of the Red Cross Red Crescent societies during workshops, and then using the Prolific platform between May and July 2026. In total, 92 respondents completed the survey, of which 12 were recruited through the ASPECT network and 80 through Prolific.

Table 7-1 Respondents' sectors

Sectors	N	Percentage
Emergency-response or humanitarian sector	23	25%
Health, medical and pharmaceutical	38	41%
Social care, charity and community services	11	12%
IT, research and professional services	8	9%
Agriculture, environment and animal-related sectors	5	5%
Education	3	3%
Transport	2	2%
Law enforcement	1	1%
Chemical industry	1	1%

One-quarter of respondents worked in the emergency-response or humanitarian sector, while 75% (N = 69) worked in other sectors. Among the 69 respondents outside this sector, more than half worked in health, medical, or pharmaceutical services. Other represented fields included social care, charities, and community services; IT, research, and professional services; agriculture, environmental, and animal-related sectors; education; transport; law enforcement; and the chemical industry (Table 7-1). In the following subsections, we report the findings for the whole sample, and the analysis for emergency response or humanitarian sector participants can be

found in Appendix A2.3. For most questions, the findings are similar between those participants and the whole sample. Differences were mentioned in the corresponding subsections below.

Most respondents considered their organisations vulnerable to weather- or climate-related impacts (Figure 7-1). Overall, 39% rated their organisations as moderately vulnerable, 21% as very vulnerable, and 9% as extremely vulnerable. A further 28% considered their organisations slightly vulnerable, while only 1% rated them as not vulnerable at all. More details about the sample composition can be found in Appendix A2.3.1.

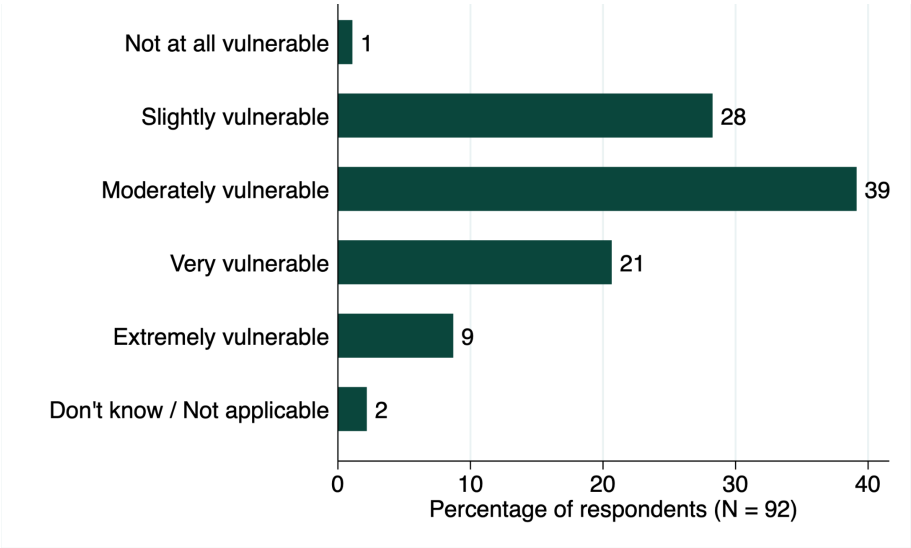


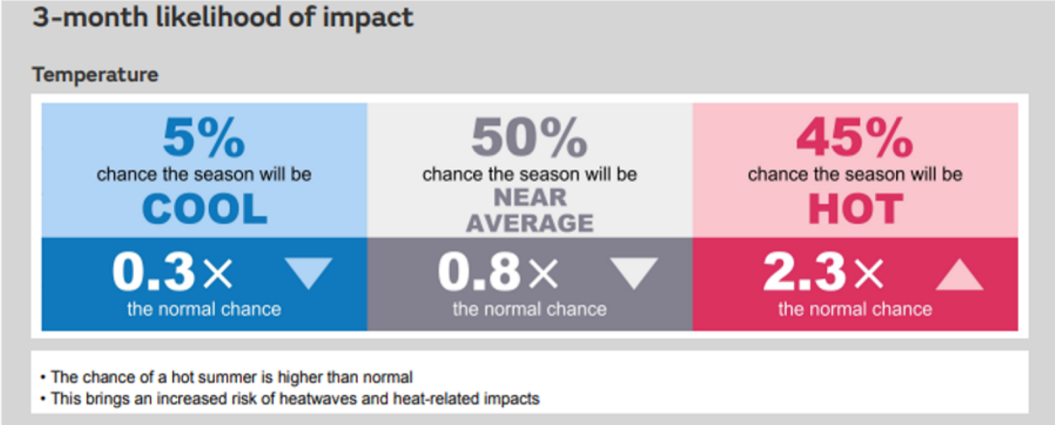
Figure 7-1 Organisations' vulnerability to weather or climate impacts

7.1 Understanding

To reduce the completion time, respondents were not required to read all the information shown on the website provided, but they were asked to indicate whether they had read it. Overall, 89% of respondents had read the temperature-prediction information provided on the website, while the remaining 11% had not read it but indicated that they might review it later.

Selected information was presented directly within the questionnaire, and respondents were asked to select the option that best described the predictions shown in each table or graph (detailed questions can be found in Appendix A1.3 and an example can be found in Table 7-2). The percentage of respondents who answered each comprehension question correctly is presented in Figure 7-2.

Table 7-2 An example of questions testing the objective understanding in the temperature predictions survey

Most likely summer conditions
Example parts of the UK 3-month outlook for summer 2025 (produced by the Met Office) is provided below.  Based on the outlook shown above, which conditions are most likely to occur in the UK during the summer of 2025? Options: a. Cooler than normal b. Near average c. Hotter than normal d. Don't know / Not sure Correct answer: b

Respondents generally performed well on most of the comprehension questions. However, a substantial group of respondents did not answer all questions correctly about the seasonal predictions, presented as a 3-month likelihood of impact table by the Met Office as part of the 3-month outlook available for contingency planners and other UK users seeking seasonal forecast information (as shown in Table 7-2).

91% correctly identified the higher than usual chance of a hotter summer compared to a 'normal'/'typical year' (in a baseline period), and 85% correctly understood the preparedness recommendation. However, only 59% correctly identified the most likely summer conditions. The remaining 41% selected "hotter than normal" (45% chance) rather than the correct response, "near average" (50% chance), indicating particular difficulty in interpreting the probability of each condition. Given that the chance of a hot summer is also shown to be significantly greater than is usual in the baseline period ('2.3 x the normal chance'), so although the technically correct answer to the most likely summer conditions was that the 50% 'near average' category had the greatest probability, we acknowledge that an interpretation that the summer is likely to be on the hotter rather than colder side is broadly not wrong in plain language terms.

We note that the eye may be easily drawn by the visual of the bigger number and red colour of the 'hot category', and that the respondents were focussed on the importance of hot weather/impacts due to the topic of the survey, which could both have contributed to the assumption that a hot summer was predicted to be the most likely outcome. Therefore, the product features that helped respondents easily recognise the change in seasonal risk, may have also resulted in some respondents focussing less on the most likely probability numbers. It is also important to note that as we were preparing a short survey, we shared only a small subset of information about the predictions; for example for the 3-month outlook, we note that more context on interpretation is shared in the full product and on the Met Office website.

All respondents correctly interpreted the historical temperature trend shown by the Met Office decadal prediction of global temperature difference above period 1850-1990. 89% correctly interpreted the anomaly in average summer temperature presented in the map of anomaly of average summer temperature prediction for Europe from the World Meteorological Organisation Lead Centre for Annual-to-Decadal Prediction.

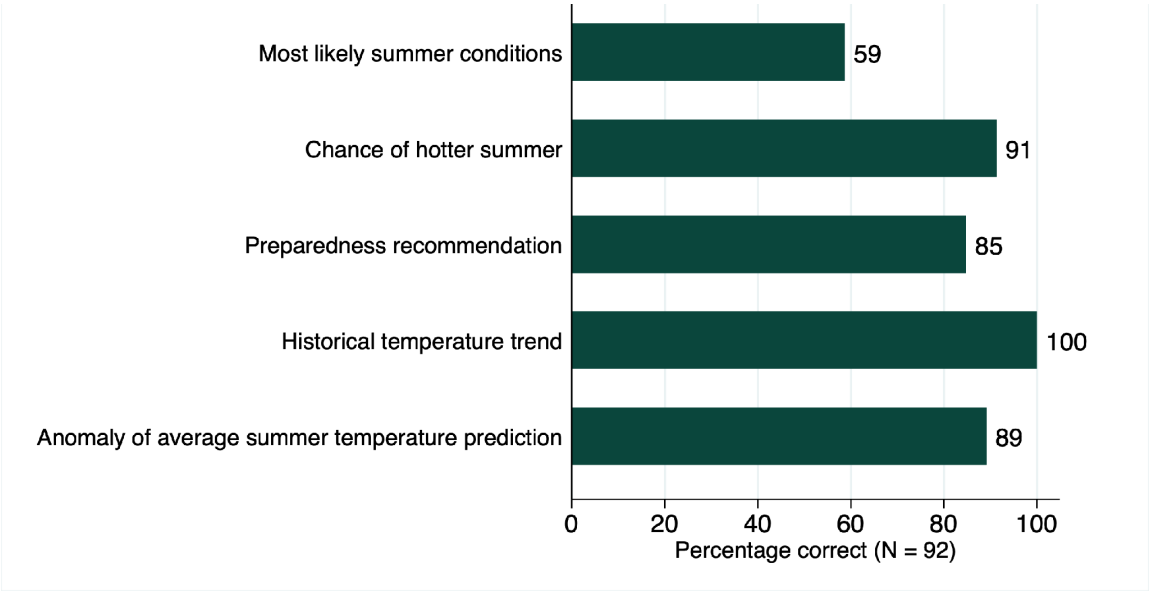


Figure 7-2 Understandability of the information provided

On the subjective scale, overall, 55% of the respondents rated the provided climate information as easy and 18% as very easy to understand (Figure 7-3). A further 20% considered it neither difficult nor easy, while only 7% found it difficult.

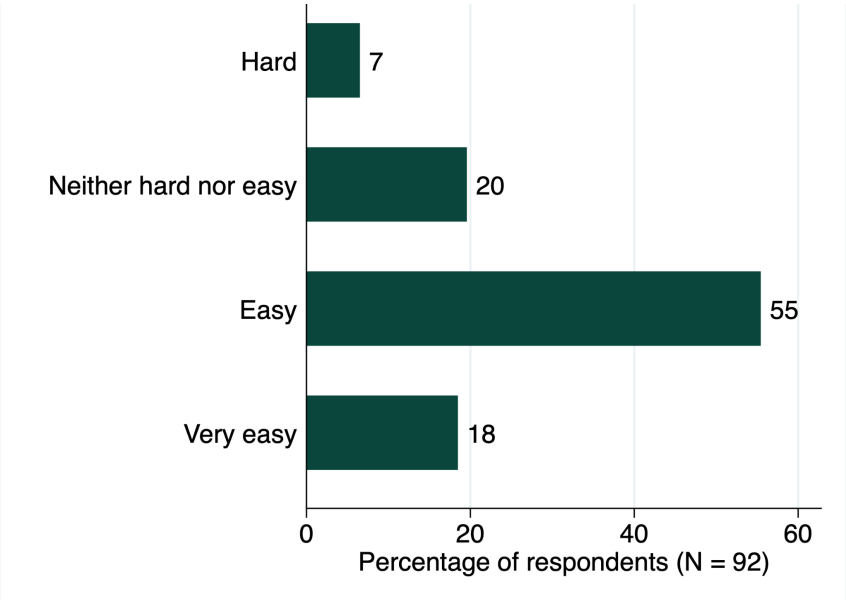


Figure 7-3 Ease of understanding of the climate information provided

7.2 Quality Evaluation

Respondents evaluated the temperature predictions positively across all eight quality criteria (Figure 7-4). The highest level of positive assessment was recorded for its relevance to respondents' sectors, with 92% agreeing or strongly agreeing that it would be beneficial. 90% considered the information trustworthy, 89% thought it would benefit their organisations, and 86% regarded it as both usable and personally beneficial. A further 83% considered it accurate, 81% found it understandable, and 79% regarded its format as suitable. The comparatively lower rating for the presentation format suggests that prediction climate information products could benefit from further improvement and user-centred design. For emergency response or humanitarian sector users (N=23), usable, understandable, and suitable formats were ranked higher, while beneficial to yourself and accurate were ranked lowest (see Appendix A2.3.3).

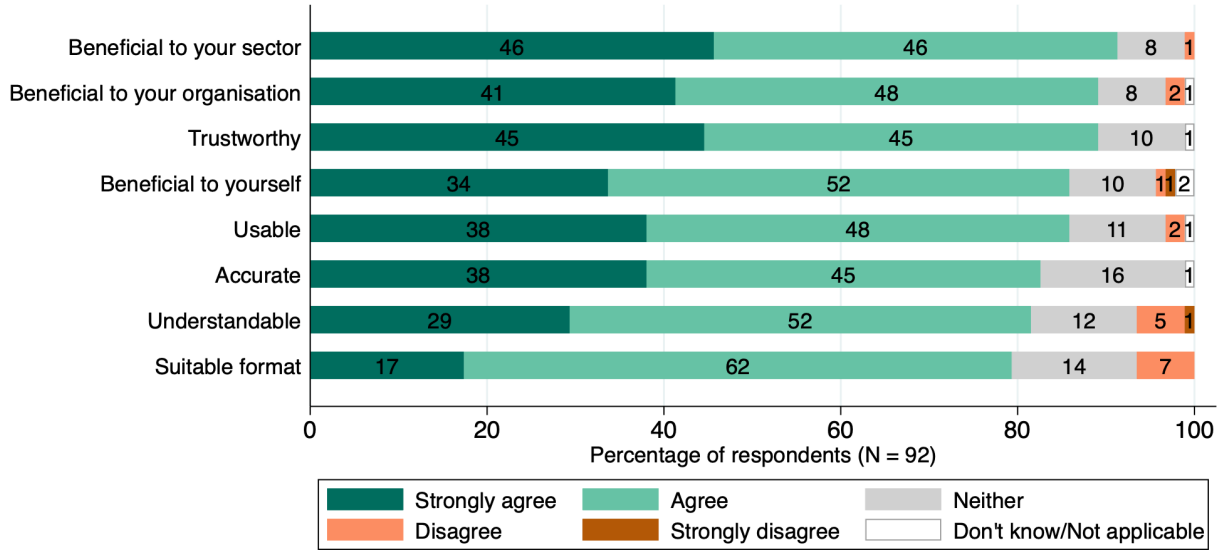


Figure 7-4 Quality evaluation of climate information provided

The perceived usefulness of climate information varied by timescale (Figure 7-5). Information covering the next three months received the strongest assessment, with 65% rating it as very or extremely useful and a further 27% as moderately useful. Half of the respondents considered information for the next three years very or extremely useful, while 48% gave the same ratings to observations of current climate conditions. Long-term information covering the next 30 years received the lowest ratings: only 39% considered it very or extremely useful, while 32% rated it as only slightly useful or not useful at all.

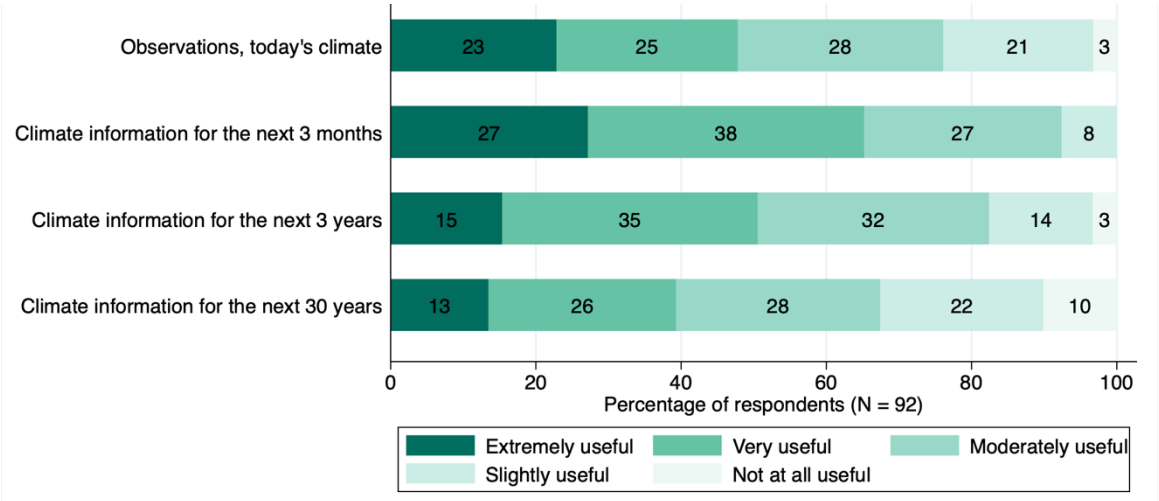


Figure 7-5 Usefulness of climate information in different timescales

7.3 Usability for decision making

Although over 90% of the respondents reported that they were familiar with climate information of some form, active organisational use remained limited. Overall, 62% declared that they understood climate information but did not actively use it, while 29% reported that their organisations already used it.

Respondents identified organisational planning and adaptation as the strongest potential applications of the information (Figure 7-6). 85% agreed or strongly agreed that it could support broader planning activities, and 83% believed that it could help their organisations implement adaptive actions. 62% thought that it could help garner support or communicate climate issues, and the same proportion believed that it could inform models or research activities. Smaller proportions felt that it could improve conceptual understanding (58%) or be used to seek funding for climate adaptation or mitigation (51%). For emergency response or humanitarian sector respondents, their agreement for each of these potential uses is overall higher than that of the whole sample.

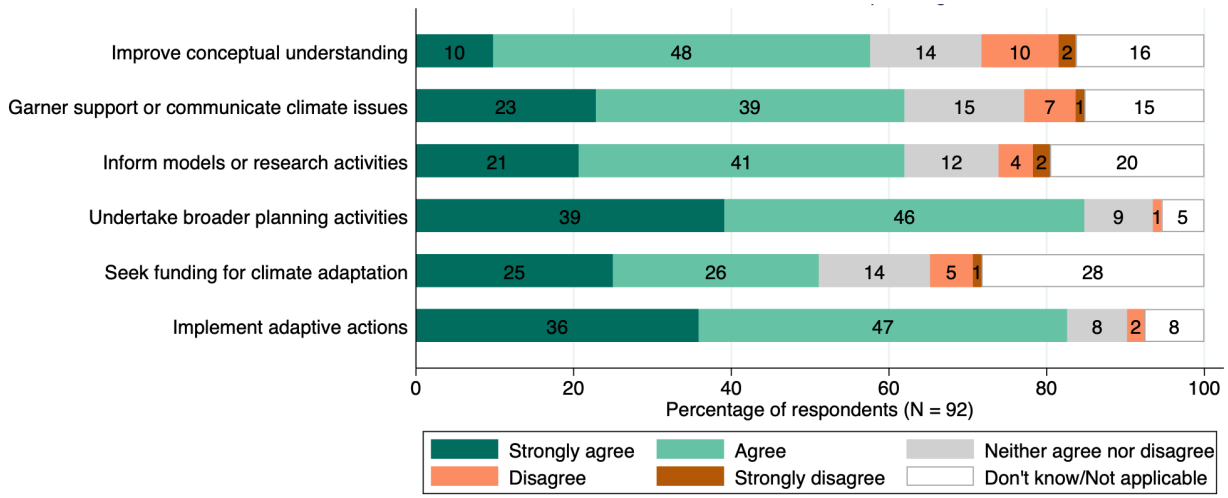


Figure 7-6 Organisations' potential use of the climate information provided

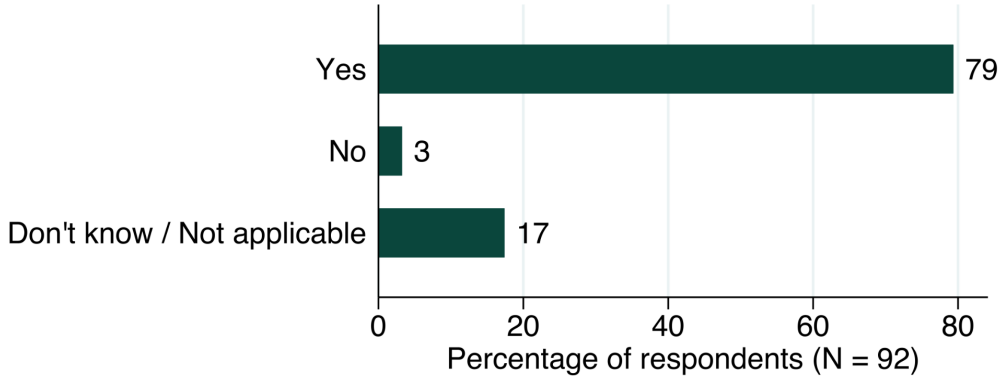
Only two respondents disagreed or strongly disagreed with all the statements, explaining that use of climate information was not required in their roles, its potential usefulness for their organisations was unclear, or it was not relevant to their geographical areas of interest.

7.4 Willingness to share

79% of the respondents were willing to share the temperature prediction survey information within their organisations, while only 3% said that they would not. 62% indicated that they would also share it externally (see Figure 7-7). 28 respondents further reported the external audiences they

would like to share the information with. These include local authorities and policymakers, local communities and charities, company stakeholders, business partners, and other professional contacts, trade unions, campaign groups and political groups, and their families and friends.

(a) Share with others within their organisations



(b) Share with others outside their organisations

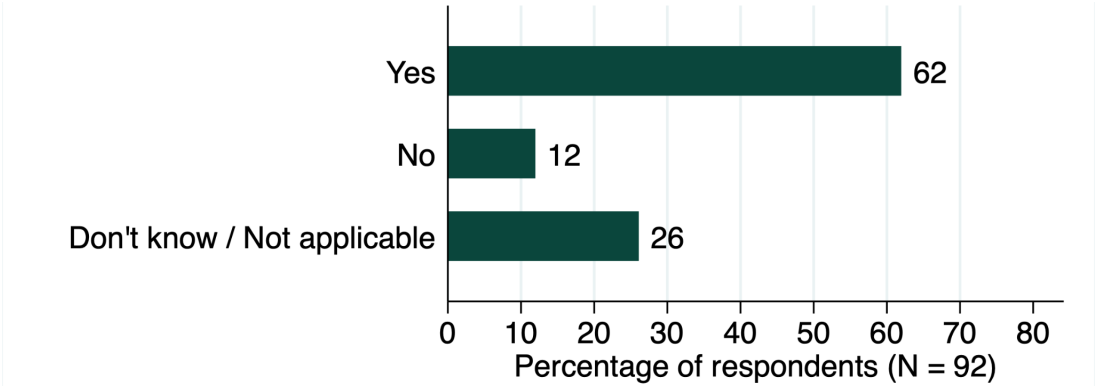


Figure 7-7 Willingness to share inside and outside respondents' organisations

7.5 Improvements required

The most frequently identified improvement was additional guidance or training on using climate information within respondents' organisations, selected by 52% of the respondents (Figure 7-8). Other major priorities included ensuring that the information was available when required (48%), making it easier to access (46%), and tailoring it more closely to organisations' geographical areas of interest (42%). Respondents also called for information that was easier to understand (38%) and better tailored to organisational needs (35%). Around one-third requested more detail on reliability and uncertainty (32%), guidance on communicating climate information to colleagues and stakeholders (30%), and better alignment with organisational timescales (30%). Less

frequently selected improvements included more accurate or reliable information (20%), stronger relationships with service providers, scientists, and forecasters (15%), and additional incentives to encourage the use of climate services (10%). For emergency response or humanitarian sector respondents, easier to access is the top priority, followed by guidance or training and better tailored to their organisation's needs (see Appendix 2.3.5).

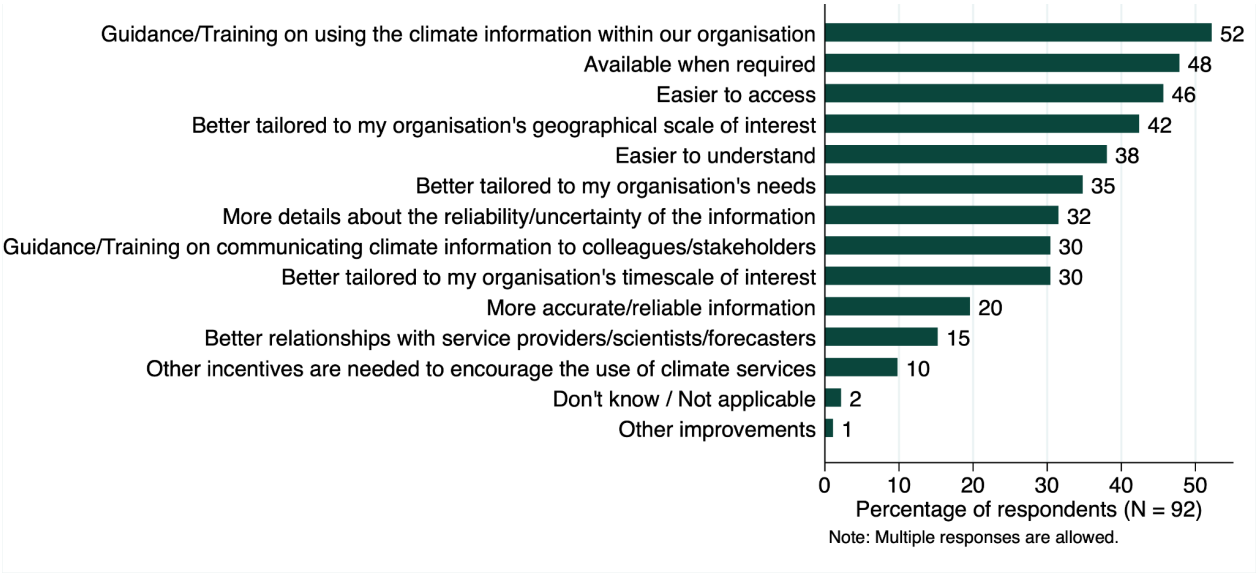


Figure 7-8 Improvements required for the provided climate information

8 Governance sector survey results

This survey was initially distributed through the ASPECT project team's professional networks and related projects, including the CLIMAAX Community of Practice, beginning in December 2025. However, no valid responses were obtained through these channels. Therefore, in July 2026, the research team began recruiting participants through the Prolific platform to obtain an adequate sample size.

Three screening criteria were applied to identify eligible participants: (1) employment in the public governance sector; (2) a position above support or entry level; and (3) at least one year of professional experience. Two additional attention-check questions were included in the main survey to assess response quality. In total, 106 respondents completed the survey. Six failed the attention checks, resulting in a final sample of 100 valid respondents.

Around half of the respondents held professional or technical roles in their organisations, followed by managerial or supervisory roles (32%) and strategic or planning roles (18%). Only 2% held executive or leadership positions (Figure 8-1).

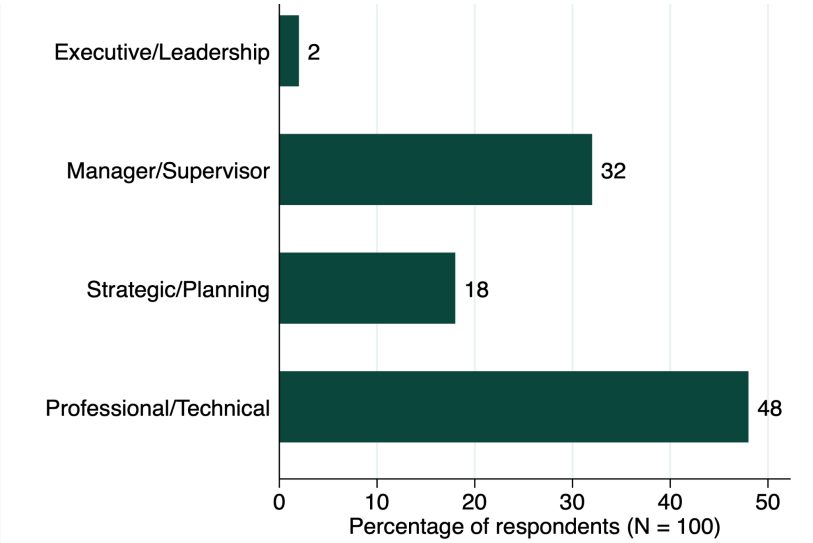


Figure 8-1 Respondents' primary roles in their organisations

Regarding the type of administration, 33% of respondents worked for a national government agency and 27% for a local or city administration. This is in line with the geographical scope of government they worked (e.g., national, regional, provincial). A further 17% worked for a regional administration and 14% for another type of public organisation. Relatively few respondents worked for regional agencies (4%), public-health authorities (1%), or civil-protection organisations (1%), while 3% selected other types of administration (Figure 8-2).

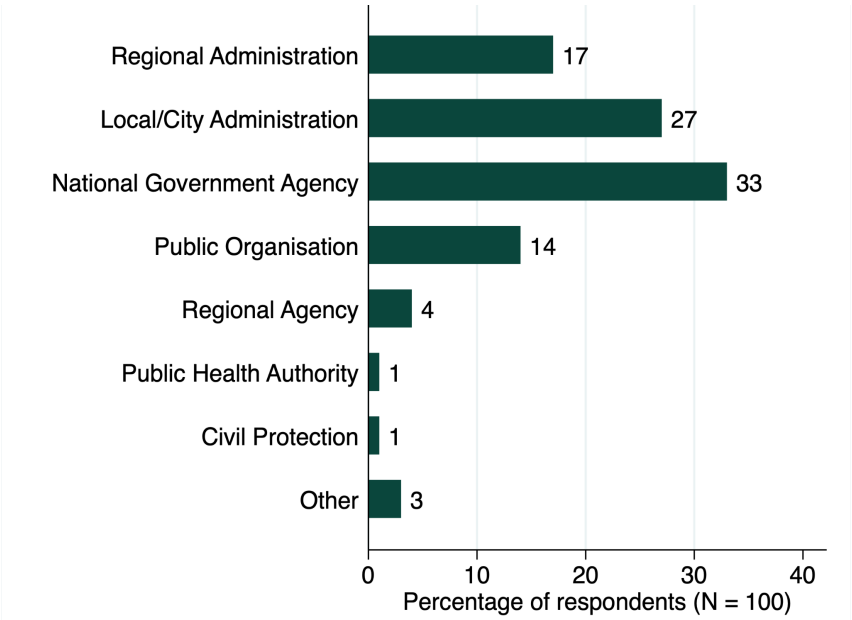


Figure 8-2 Type of administration respondents worked for

Almost half of the respondents (49%) considered their regions moderately vulnerable to weather- or climate-related impacts. A further 21% rated their regions as very vulnerable and 5% as extremely vulnerable. Only 1% of them considered their regions as not vulnerable at all (Figure 8-3).

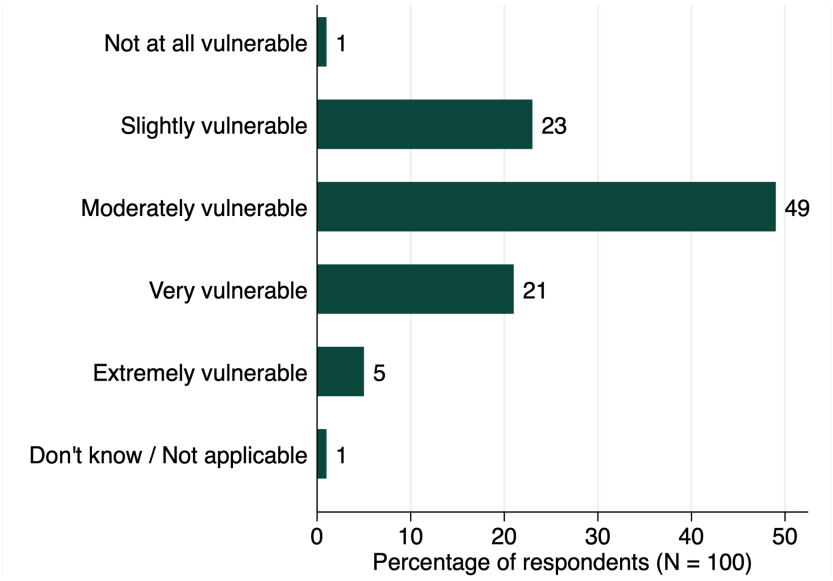
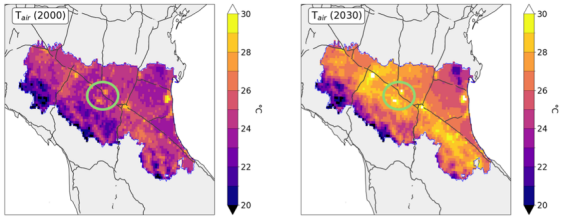


Figure 8-3 Vulnerability of respondents' region to weather or climate-related impacts

8.1 Understanding

The full seven-page climate information slide deck was provided in the questionnaire via an external link. Respondents could choose whether to review it before answering the subsequent questions about the information. Key content and explanations were presented directly within the relevant comprehension questions; therefore, it was not necessary for them to read the full slide deck to complete the survey. Overall, 77% of the respondents had read the climate information, while 18% had not read it but intended to review it later. Only 5% had not read the information and were not interested in doing so.

Table 8-1 An example of questions testing the objective understanding in the governance sector survey

2000VS2030 Tropical nights
ASPECT researchers also predict **heat extremes**. The maps below show predicted overnight temperatures in the Emilia-Romagna region for the years **2000** (left) and **2030** (right). The legend on the right of each map indicates the temperature range. Yellow shades represent hotter areas, while purple shades indicate cooler areas. For example, in 2000 (left), the area marked by the green circle had nighttime temperatures ranging from 22 to 29 °C.

Compared with 2000, is the nighttime temperature in the area marked by the **green circle** on the maps above expected to be hotter or cooler in 2030? Options: a. Hotter b. Unchanged c. Cooler d. d. Don't know / Not sure Correct answer: a

Respondents demonstrated a high level of understanding of the specific content presented. Almost all correctly interpreted the comparison of tropical nights between 2000 and 2030 (99%) and the ensemble mean for heavy rainfall (98%). Most respondents can also correctly understand the decadal precipitation prediction (91%) and the prediction-skill information (90%) (Figure 8-4).

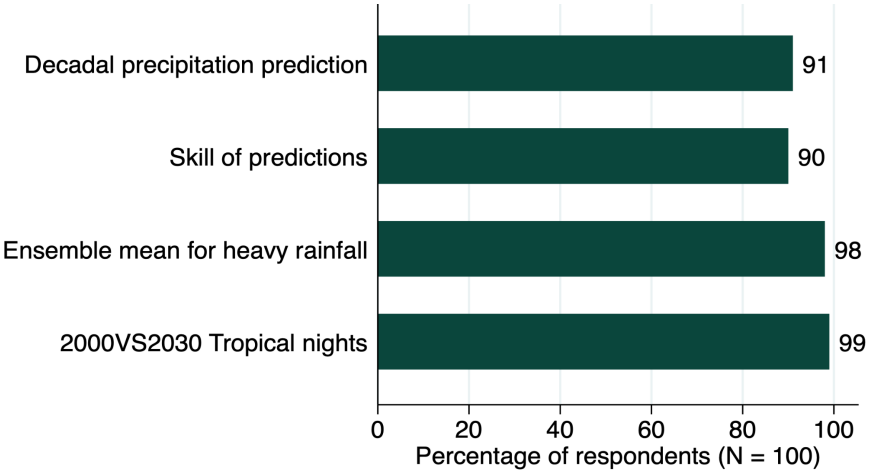


Figure 8-4 Percentage of correct responses for each specific content

80% of the respondents found the information easy or very easy to understand. Only 7% found it difficult or very difficult to understand (Figure 8-5).

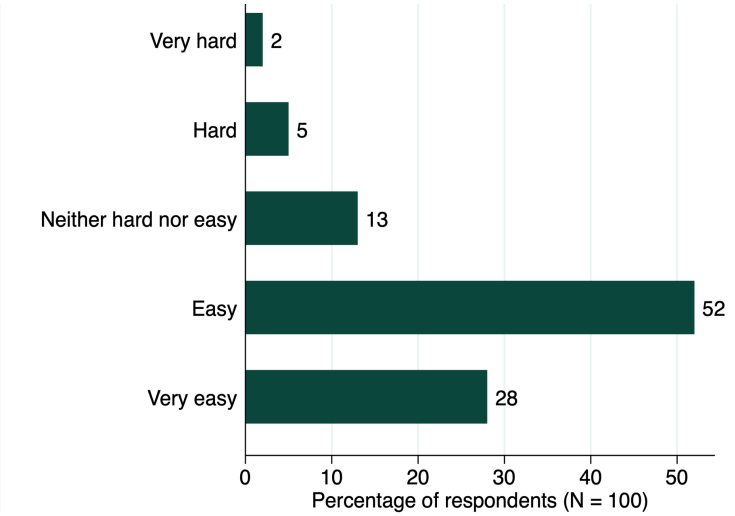


Figure 8-5 Understandability of the information provided

8.2 Quality Evaluation

Respondents generally evaluated the provided information positively across all eight quality criteria, particularly its usability, understandability, and suitability of format. However, some respondents were still uncertain about its potential benefits. Around 10% of the respondents disagreed or strongly disagreed that the information would benefit their organisations, their sectors, or themselves (Figure 8-6).

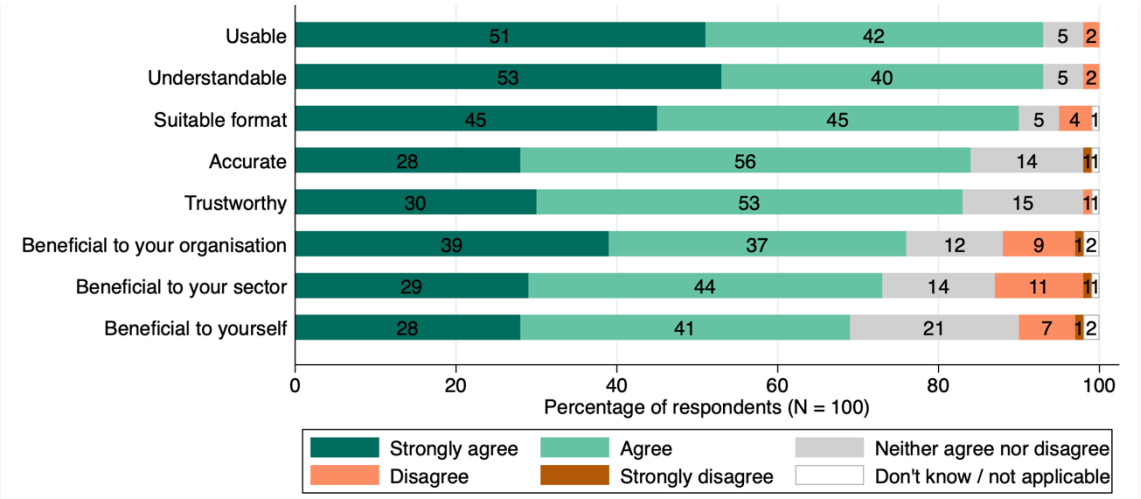


Figure 8-6 Perception of the information quality

8.3 Usability for decision making

More than half of the organisations (60%) understood what climate information was but did not actively use it. 30% of the respondents reported that their organisations already used some form of climate information, while 10% were unfamiliar with it.

Around three-quarters agreed or strongly agreed that the provided information could improve their organisations' conceptual understanding of climate-related topics and regional/local issues (77%), support broader planning activities (76%), garner support for climate action or communicate climate issues (75%), or support the implementation of climate adaptive actions (75%) (Figure 8-7).

Six respondents disagreed or strongly disagreed with all the statements because they were not required to use weather/climate information in their roles, they were not sure how it could be useful for their organisations, or they thought it was not relevant to their timescales of interest.

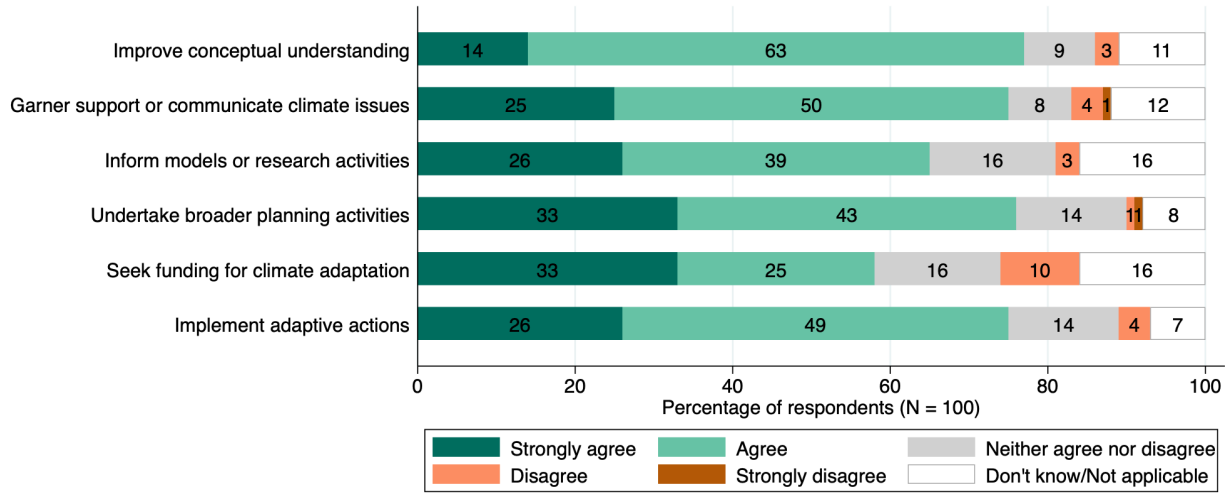


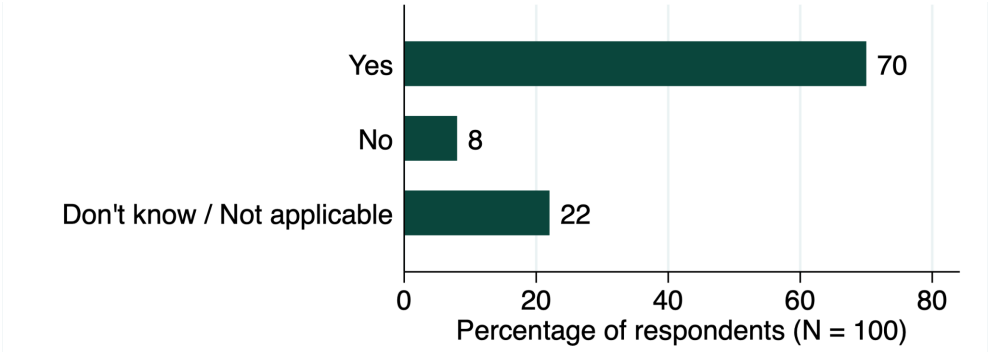
Figure 8-7 Potential use of the provided climate information

8.4 Willingness to share

Overall, 70% of respondents indicated that they would like to share the climate information with others within their organisations, with only 8% would not share it internally (see Figure 8-8). Among the 70 respondents willing to share the information internally, managers and supervisors were the most frequently selected audiences (80%), followed by their colleagues in strategic or planning roles (74%), professional or technical staff (57%), executive or leadership teams (54%), and supportive or entry-level colleagues (33%).

More than two-thirds of respondents (68%) indicated that they would share the climate information with people outside their organisations, and 16% would not share it externally. 45 respondents provided further details about whom they would like to share the information with. The intended audiences included local communities, charities and voluntary groups, non-governmental organisations, local councils, emergency responders and other public-sector organisations, business partners and stakeholders, scientific organisations and universities, the general public, and respondents' families and friends.

(a) Share with others within their organisations



(b) Share with others outside their organisations

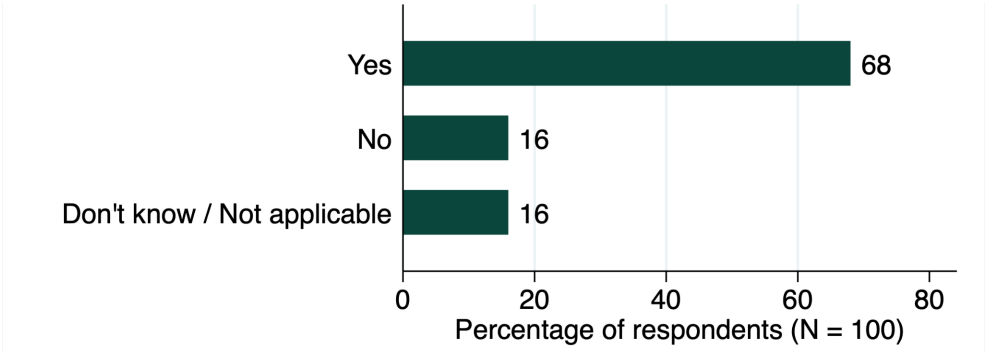


Figure 8-8 Willingness to share inside and outside respondents' organisations

8.5 Improvements required

The most frequently identified improvement was guidance or training on using climate information within respondents' organisations (49%). Other top requirements included providing more detail about the reliability and uncertainty of the information (40%), ensuring that it was available when required (39%), and tailoring it more closely to organisations' geographical areas of interest (37%). Better relationships with service providers, scientists, and forecasters (18%), more accurate or reliable information (16%), and other incentives to encourage the use of climate information (11%) are less frequently selected by the respondents (Figure 8-9).

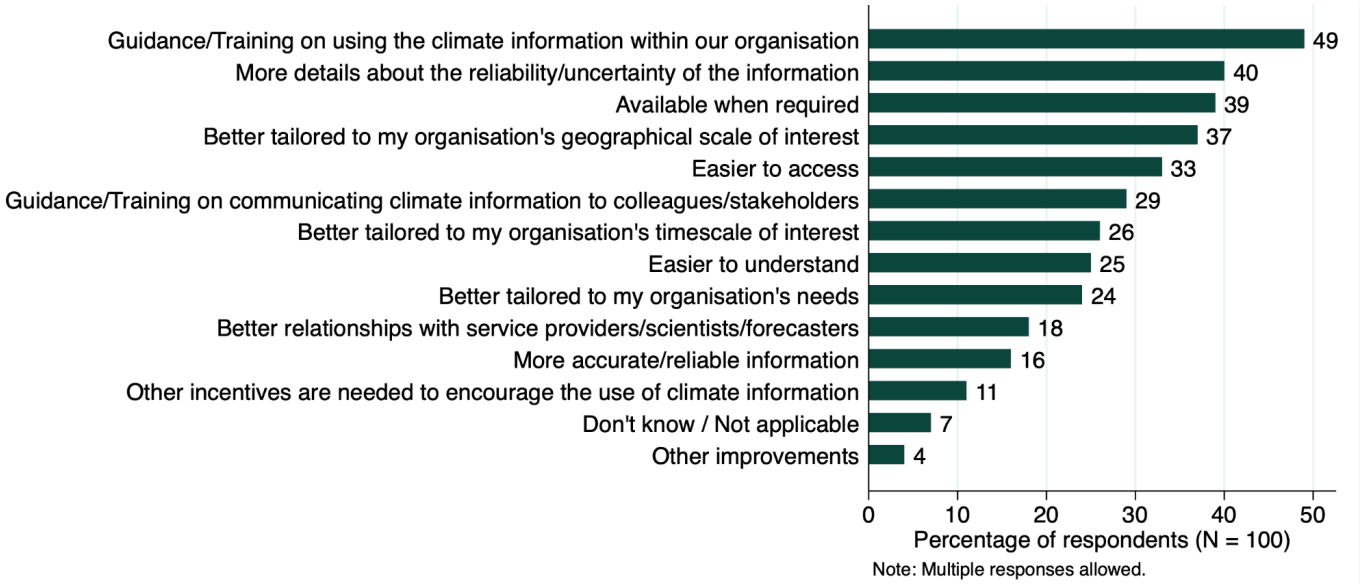


Figure 8-9 Areas of improvements for the provided information

9 Comparison of surveys

This section provides a cross-survey comparison of findings from the agriculture, finance, government and multi-sectoral temperature predictions surveys. The comparison focuses on five main dimensions: respondents' understanding of the climate information, their subjective evaluation of its quality, its potential usability for decision-making, willingness to share the information, and the improvements suggested. Table 9-1 provides an overview of the comparison, with details discussed in the subsections below.

Table 9-1 Comparison of surveys

	Agriculture	Finance	Governance	Temperature predictions
Complexity of the climate information	High	Low	Medium-High	Medium-Low
Subjective understanding[4] (easy or very easy)	40%	42%	80%	73%
Association between objective understanding and subjective understanding[5]	No significant association	Significant positive association	No significant association	No significant association
Quality Evaluation Agreement (Top-Bottom; positive evaluation on all 8 criteria)	88% Beneficial to sector 62% Accurate	85% Usable 56% Beneficial to yourself	93% Usable 69% Beneficial to yourself	92% Beneficial to sector 79% Suitable format
Usability for decision making (Top-Bottom; most agree the provided information is useful)	79% Improve understanding 62% Inform models or research activities	80% Improve understanding 49% Seek funding for adaptation	77% Improve understanding[6] 58% Seek funding for adaptation	85% Support broader planning activities 51% Seek funding for adaptation

[4] For subjective understanding, the reported percentages represent positive ratings ("easy" or "very easy"). Neutral responses are not counted as positive ratings, as they do not indicate that respondents found the information easy to understand; however, they should not be interpreted as indicating difficulty either.

[5] Objective understanding is not included in this summary table because differences in the materials tested and the content and number of questions limit comparability across surveys. Instead, we report the associations between subjective and objective understanding within each survey, assessed using Pearson correlation analysis. Only the pension sector survey showed a statistically significant positive correlation at the 1% level, with a Pearson correlation coefficient of 0.26.

[6] High ratings of subjective understanding do not necessarily conflict with identifying understandability as an area for improvement. Respondents may find the information easy to understand themselves while recognising potential difficulties for others, or may consider it understandable but still see scope for improvement.

Willingness to share (Most would like to share within their organisations)	79% inside 51% outside	63% inside 42% outside	70% inside 68% outside	79% inside 62% outside
Improvements required (Top 2)	59% Easier to understand 44% Better tailored to geographical scale of interest	57% Guidance/Training on using the climate information within our organisation 49% Easier to understand	49% Guidance/Training on using the climate information within our organisation 40% More details about the reliability	52% Guidance/Training on using the climate information within our organisation 48% Available when required

9.1 How understandable is the co-produced climate information for broader potential users?

The sector-specific results show considerable variation in how easily respondents understood the provided information. Agriculture and finance respondents reported greater difficulty with the provided information than respondents in the governance and temperature predictions surveys. Positive assessments were highest in the governance survey (80%), followed by the temperature predictions survey (73%). By comparison, only 40% of agriculture respondents and 42% of finance respondents described the provided information as easy or very easy to understand, while 37% and 29%, respectively, selected the neutral option.

These differences should be interpreted cautiously, as the four surveys evaluated different information products and involved respondents with different professional backgrounds. The questions assessing their objective understanding also have different levels of difficulty. The agriculture and governance surveys presented relatively complex products containing more technical details about climate predictions, whereas the finance survey used a storyboard that primarily introduced key concepts relating to physical climate risks and climate information across different timescales. A similar storyboard was provided for the temperature prediction survey to provide context to the information, but the survey itself actually tested samples from existing publicly available climate information products (reflecting the challenges of testing longer climate information products in a short survey).

The comparatively low positive assessment in agriculture may partly reflect the complexity of the bulletin for a broad audience of agricultural practitioners, e.g., farmers and producers, who may have varying levels of familiarity with technical climate information. Although the governance product also contained technical information, e.g., prediction skill, 48% of respondents held professional or technical roles within their organisations. Their relevant expertise may have contributed to the higher overall percentage reporting that the information was easy or very easy to understand. In addition, the difficulties in interpreting probabilities reported in both the agricultural and temperature prediction surveys warrant further research attention. The

presentation of probabilities in tercile categories, the choice of colour scales, and the combination of information on multiple types of chances can all create interpretation challenges for diverse user groups. User testing is therefore necessary when developing future prediction-based products, before scaling them up to a wider user base.

The finance and temperature prediction storyboards provided more introductory information. Nevertheless, compared with professionals working in healthcare and emergency response, finance respondents may have had less experience using climate information in their work (e.g., Attoh et al., 2022; Hain et al., 2022). Finance respondents were also required to read the complete storyboard before answering the relevant questions, which may have increased the cognitive burden. These factors could help explain why the percentage of finance respondents rating the information as easy or very easy to understand remained relatively low despite the comparatively introductory nature of the product. The comprehension results also revealed a specific communication challenge. Most finance respondents struggled to distinguish decadal climate predictions from long-term climate projections. This suggests that introductory materials should make the distinction between these products more explicit. The climate services community could easily improve this by adding a clear comparison or some examples of their intended uses that could support more accurate interpretation while keeping the materials accessible.

There was no strong evidence of a positive association between respondents' objective and subjective understanding, except among respondents in the finance sector. This suggests that perceiving climate information as easy to understand does not necessarily mean that users can interpret it correctly. When information is complex, as in the agriculture sector survey, users may recognise their limited understanding and approach it cautiously. Information that appears easy to understand at first glance may warrant closer attention, as introduced in the governance sector and temperature prediction surveys. In these cases, a high proportion of respondents rating the information as easy to understand may indicate over-confidence rather than accurate interpretation.

9.2 How do they evaluate the usefulness and quality of climate information?

Positive evaluations were recorded across all four surveys against eight criteria: suitable format, understandable, trustworthy, accurate, usable, beneficial to the respondent, beneficial to their organisation, and beneficial to their sector. Usability was rated highly. In each survey, more than 80% of respondents agreed or strongly agreed that the information was usable. These results are slightly higher than the finding reported in Deliverable 5.3, which drew on a larger survey distributed across climate-sensitive organisations in Europe. In that survey, 78% of the 1,186 respondents agreed or strongly agreed that the weather and climate information used by their organisation was usable.

In the agriculture sector and temperature predictions surveys, respondents were additionally asked to rate the usefulness of information provided at different timescales, using a scale from 1 ("not at all useful") to 5 ("extremely useful"). In agriculture, seasonal forecasts were considered more useful than decadal forecasts. This may reflect respondents' professional roles, as most reported that their organisations' work and their own expertise focused on crop production, where short-term decisions may be more frequent. The timing of survey distribution in June may also have influenced the results. For wine sector users, for example, summer is a busy period for vineyard management and preparation for the upcoming harvest. These immediate operational needs may have contributed to their preference for seasonal predictions. A similar pattern was observed in the temperature predictions survey, whose respondents were mainly from the emergency response, humanitarian, and healthcare sectors. Seasonal forecasts received the highest usefulness rating, followed by interannual forecasts, observations, and decadal forecasts. In Deliverable 5.3, results across the broader sectoral sample showed that past and near real-time climate information (e.g., observations) was used by more participants than future information (e.g., seasonal, interannual/decadal predictions). In the present surveys, the stronger preference for seasonal forecasts may reflect their closer alignment with the operational planning and preparedness needs of our respondents in the agriculture, emergency response, humanitarian and healthcare sectors. However, perceived usefulness does not necessarily imply that users can correctly understand or apply the information. In the agricultural survey, for example, seasonal predictions were perceived as more useful than decadal predictions, despite lower assessed interpretability. Once useful information has been identified, iterative user testing is therefore still needed to ensure that the products are understandable and usable. This is also found in a previous report, where no association was found between users' objective understanding of the climate information and their preference for the information presentation (Taylor et al., 2016).

For the finance and governance sector users, "usable" was the highest-rated of the eight criteria. In both surveys, "beneficial to yourself" received the lowest positive rating, although it was still agreed or strongly agreed by 56% of finance respondents and 69% of government respondents. The contrast suggests that respondents could recognise the general usability of the information without necessarily seeing how it related to their individual responsibilities. Role-specific guidance may help individual practitioners better incorporate the climate information into the routine tasks and decisions.

In the agriculture and temperature predictions surveys, "beneficial to your sector" was the highest-rated criterion. In agriculture, "accurate" received the lowest positive rating, at 62%. One possible explanation is that the agriculture survey included predictions with no forecast quality. Although presenting this information transparently gives respondents an honest account of forecast performance, in addition to being a good practice, it may also have reduced their confidence in the accuracy of the information product. Besides, the label "some quality" may also cause confusion, as some users may interpret it as indicating "no quality". Future products could therefore consider a clearer binary classification using the labels "quality" and "no quality". In the

temperature predictions survey, “suitable format” received the lowest positive rating among the eight criteria, although 79% still agreed or strongly agreed that the format was suitable. The open-ended responses offer some indication of the formats that users may prefer. For example, one respondent requested geographically filterable information that could be used to inform regional or local models. This suggests that future prediction-based climate information products could benefit from more interactive formats, such as developed for other climate applications (e.g. ERAExplorer and ThermalTrace, developed by WP6) and the LACS Explorer tool for the UK discussed in the Introduction, all of which are shared in the main British Red Cross website product developed by WP4.

9.3 How useful would the climate information be in supporting their adaptation decision-making process?

Across the four surveys, respondents generally considered the information useful for organisational decision-making (i.e., 49% to 85% agreed or strongly agreed). The six potential uses assessed were: improving conceptual understanding of climate-related topics and regional/local issues; gaining support for climate action or communicating climate-related issues; informing models or research; undertaking broader planning activities; seeking funding for climate adaptation/mitigation initiatives; and implementing climate adaptive actions (Jagannathan et al., 2023).

Undertaking broader planning activities (76%~85%) and implementing climate adaptive actions (72%~83%) were among the top three rated uses in every survey. Improving conceptual understanding was the top two rated use in agriculture, finance and governance sector surveys (77%~80%), although it was agreed by fewer respondents in the temperature predictions survey (58%). The latter could reflect the circulation of the temperature predictions survey during summer 2026, which was an exceptionally warm summer across Europe, and this topical awareness of heat may have reduced perceived need for conceptual understanding amongst temperature predictions respondents.

Overall, respondents valued the provided information most strongly for supporting organisational planning and enabling adaptation, indicating that it could be a useful input to organisational decision-making. This finding is consistent with Deliverable 5.3, in which 79% of respondents agreed or strongly agreed that weather and/or climate information was useful for decision-making within their organisations.

The lowest-rated use differed across the surveys. In finance, government, and temperature prediction surveys, seeking funding for climate adaptation received the lowest positive rating, at 49%, 58% and 51%, respectively. This common result may reflect the additional difficulties involved in seeking funding for climate adaptation. Accessing adaptation funding depends not only on the availability of relevant climate information, but also on strategic and institutional constraints

and arrangements (e.g., Müller et al., 2020; Riach and Glaser, 2024). In the agriculture sector survey, informing models or research activities was the lowest-rated use, although it still received a positive perception from 62% of respondents. This may be because most respondents were producers, owners or managers, whose roles involved relatively few research or technical tasks.

9.4 How willing are they to share the climate information?

Respondents to all four surveys were more willing to share the climate information with audiences inside their organisations than those outside their organisations. Internal willingness to share was highest in agriculture and temperature predictions, both at 79%, followed by governance at 70% and finance at 63%. External willingness to share was highest in governance, at 68%, followed by temperature predictions at 62%, agriculture at 51%, and finance at 42%. The willingness to share for agriculture products is consistent with previous results, which found willingness to recommend climate-driven decision support tools for agricultures ranged from 54.7% to 90.5%, depending on the tool, respondents' engagement in the co-production process and their roles (Lu et al., 2022).

The relatively high willingness to share the information, particularly within organisations, complements the high usability ratings and suggests that these positive perceptions may translate into action, although actual use was not assessed in these surveys. This pattern is also consistent with the pattern identified for how understandable the information is, which reflects that people are more likely to be willing to share information outside their organisations when they find it easy to understand. As highlighted in previous studies, ease of understanding is one of the key enablers of upscaling climate services (Guentchev et al., 2023). Managers, supervisors and executive teams may provide useful entry points for disseminating climate information within organisations. Outreach could initially target these actors to build leadership support and encourage wider circulation through existing management and communication structures. Staff in strategic, planning and technical roles could support this top-down process by interpreting the information and explaining its relevance to specific organisational decisions.

9.5 How do they feel that the climate information could be improved?

The sector-specific findings identify two recurring priorities: making climate information easier to understand and providing guidance or training on its use within organisations. As Blundo-Canto et al. (2021) noted, as climate services expand to new users and uses, capacity building is needed to address difficulties in interpreting and applying climate information. In Deliverable 5.3, making climate information easier to understand was the most commonly suggested improvement, followed by providing more accurate or reliable information, while guidance and training were selected less frequently. The greater emphasis on guidance and training in the present deliverable may reflect a difference in the survey context. Respondents to the survey documented in

Deliverable 5.3 evaluated their perceptions of some form of climate information they had already used, whereas the surveys in this Deliverable asked respondents to assess new and unfamiliar information products, provided without extensive guidance or training. Consequently, respondents may have perceived a greater need for support in interpreting and applying these products within their organisations.

10 Discussion

This deliverable examined the potential for horizontal upscaling of climate information beyond the Super Users involved in the ASPECT co-production process. Across the four surveys, respondents generally recognised the potential value of the information provided. However, responses were more varied when respondents assessed six specific ways in which the information could support their organisations. This result suggests a gap between recognising the general value of the provided climate information and identifying concrete applications within organisational decision-making. A related distinction in assessments of personal benefit and those for organisational and sectoral benefits suggests that recognising the broader value of climate information does not necessarily mean that its relevance to individual responsibilities is clear. Practical examples linked to users' roles and decision-making contexts may help address this gap.

Examining specific types of use helps clarify how the perceived usefulness of climate information could translate into organisational practice. This work drew on the typology developed by Jagannathan et al. (2023), which distinguishes six uses of climate information: understand, motivate and communicate, inform, plan, fund, and take action. Across the four surveys, supporting organisational planning activities and implementing adaptation actions were consistently among the most highly rated expected applications within respondents' organisations. This result broadly echoes Jagannathan et al.'s findings from approximately four years of co-production activities, including 16 focus groups and workshop discussions, in which taking action accounted for 46% of use-related codes and planning for 15%. Differences between the surveys were also observed. Improving conceptual understanding ranked among the top three uses in agriculture, government, and finance sector surveys. This finding supports the observation by Jagannathan et al. (2023) that improved understanding can itself be a valued outcome, even without immediate actions. Among respondents to the temperature predictions survey, most of whom work in emergency response, humanitarian, and healthcare sectors, communication and informing models were rated more highly than improving conceptual understanding. This result may reflect an emphasis on coordinating preparedness and supporting timely decisions to protect vulnerable populations within these sectors, although differences in the information assessed and respondents' roles may also have contributed. Seeking funding for adaptation or mitigation was among the lowest-rated uses, although 49–66% of respondents agreed that the information could support this activity. One possible explanation is that translating climate information into funding applications requires additional financial evidence, institutional support and relevant expertise. However, the lower ratings do not establish that funding is less important or should be addressed

later. As Jagannathan et al. (2023) emphasise, information use develops through an iterative process, with different decisions requiring different information and support.

A further, foundational requirement for wider use is that new users can understand and accurately interpret the information provided. Across the surveys, 76–93% of respondents agreed or strongly agreed that the climate information was understandable in their overall evaluations, while 40–80% described it as easy or very easy to understand. However, the misinterpretations observed in the comprehension questions suggest that some respondents may have overestimated their understanding, and that perceived ease of understanding does not necessarily reflect accurate interpretation. Misinterpretations were observed in relation to both key concepts, such as the distinction between predictions and projections, and technical details, including forecast probabilities, the most likely outcomes and prediction skill. Respondents could therefore recognise potential usefulness and benefits while still experiencing difficulties with interpretation. These findings highlight the importance of assessing understanding alongside general perceptions of usability during the actual upscaling process and providing explanations suited to users' professional backgrounds and familiarity with climate information. Consistent with these interpretation difficulties, respondents prioritised information that was easier to understand and guidance or training on its use across these four surveys. Alongside this additional support, respondents continued to call for geographical tailoring, greater accuracy and reliability, and easier access, echoing requirements previously identified for existing climate information. Willingness to share the information provides further insight into its potential reach. Respondents were generally more willing to share it within their organisations than externally, suggesting that existing organisational networks may offer a useful route for disseminating climate information and supporting its wider use.

Although this task was limited to a one-time assessment of the upscaling potential, its findings provide useful insights for future implementation of upscaling activities, which is beyond the scope of the current project. Our results identify several practical considerations for further development and delivery of climate information products and services. Even if co-produced climate information has already incorporated the knowledge and needs of sector experts and practitioners, further user engagement and co-development is needed during the upscaling process to help broader audiences within each sector understand and interpret the information and connect it to their specific roles and decisions. The findings also highlight the value of recognising multiple forms of use across different decision-making contexts, such as understanding, communicating climate issues, and supporting planning activities, alongside direct adaptation actions. In addition, guidance and training are important for supporting users with different needs and capacities. Such support could combine explanations of key messages with practical examples showing how the information can inform specific organisational and individual decisions. This may help users move from recognising the potential value of climate information towards interpreting and applying it appropriately within their own decision contexts.

References

Antwi-Agyei, P., Amanor, K., Hogarh, J. N., & Dougill, A. J. (2021). Predictors of access to and willingness to pay for climate information services in north-eastern Ghana: A gendered perspective. Environmental Development, 37, 100580. https://doi.org/10.1016/j.envdev.2020.100580

Attoh, E. M. N. A. N., de Bruin, K., Goosen, H., van Veldhoven, F., & Ludwig, F. (2022). Making physical climate risk assessments relevant to the financial sector – Lessons learned from real estate cases in the Netherlands. *Climate Risk Management*, *37*, 100447. https://doi.org/10.1016/j.crm.2022.100447

Blundo-Canto, G., Andrieu, N., Soule Adam, N., Ndiaye, O., & Chiputwa, B. (2021). Scaling weather and climate services for agriculture in Senegal: Evaluating systemic but overlooked effects. *Climate Services*, *22*, 100216. https://doi.org/10.1016/j.cliser.2021.100216

Born, L., Prager, S., Ramirez-Villegas, J., & Imbach, P. (2021). A global meta-analysis of climate services and decision-making in agriculture. *Climate Services, 22*, Article 100231. https://doi.org/10.1016/j.cliser.2021.100231

Bressan, G., Đuranović, A., Monasterolo, I., & Battiston, S. (2024). Asset-level assessment of climate physical risk matters for adaptation finance. *Nature Communications*, *15*(1), 5371. https://doi.org/10.1038/s41467-024-48820-1

Carr, E. R., Goble, R., Rosko, H. M., Vaughan, C., & Hansen, J. (2020). Identifying climate information services users and their needs in Sub-Saharan Africa: A review and learning agenda. *Climate and Development*, *12*(1), 23–41. https://doi.org/10.1080/17565529.2019.1596061

Christel, I., Hemment, D., Bojovic, D., Cucchietti, F., Calvo, L., Stefaner, M., & Buontempo, C. (2018). Introducing design in the development of effective climate services. *Climate Services, Climate Services in Practice: What We Learnt from EUPORIAS*, *9*, 111–121. https://doi.org/10.1016/j.cliser.2017.06.002

Coughlan de Perez, E., & Mason, S. J. (2014). Climate information for humanitarian agencies: Some basic principles. *Earth Perspectives*, *1*(1), 11. https://doi.org/10.1186/2194-6434-1-11

El Faroui, S., & Benali, M. (2026). Climate-related risks and financial decision-making: Insights from a systematic literature review. *Journal of Risk and Financial Management, 19*(8), Article 571. https://doi.org/10.3390/jrfm19080571

Friedman, R. S., Mackenzie, E., Baiga, R., Inape, K., Crimp, S. J., & Howden, M. (2022). Designing Climate Information Services to Enhance Resilient Farming Activities: Lessons From Papua New Guinea. *Frontiers in Climate*, *4*. https://doi.org/10.3389/fclim.2022.871987

Goddard, C. R., Guentchev, G., Palin, E. J., Harrison, M., Lowe, J. A., Dunbar, T., Fuller, E., Counsell, C., Dora, J., & Reeder, T. (2025). Creating and testing an approach for upscaling climate services. *Climate Services*, *38*, 100577. https://doi.org/10.1016/j.cliser.2025.100577

Golding, N., Lambkin, K., Wilson, L., Troch, R. D., Fischer, A. M., Hygen, H. O., Hama, A. M., Dyrrdal, A. V., Jamsin, E., Termonia, P., & Hewitt, C. (2025). Developing national

frameworks for climate services: Experiences, challenges and learnings from across Europe. *Climate Services*, *37*, 100530. https://doi.org/10.1016/j.cliser.2024.100530

Guentchev, G., Palin, E. J., Lowe, J. A., & Harrison, M. (2023). Upscaling of climate services – What is it? A literature review. *Climate Services*, *30*, 100352. https://doi.org/10.1016/j.cliser.2023.100352

Hain, L. I., Kölbel, J. F., & Leippold, M. (2022). Let's get physical: Comparing metrics of physical climate risk. *Finance Research Letters*, *46*, 102406. https://doi.org/10.1016/j.frl.2021.102406

Hamaker-Taylor, R., Perrels, A., Canevari, L., Nurmi, V., Rautio, T., Rycerz, A., & Larosa, F. (2018). *Report on the results of explorations of CS market development options for the financial sector* (EU-MACS D2.1). https://doi.org/10.13140/RG.2.2.26114.94405

Harrs, J.-A., Reinhart, V., Vögt, V., Scheib, J. P. P., Tewes, T., Pohl, T., & Rechid, D. (2024). Integration of climate information into urban climate change adaptation: A case study of municipal processes in Constance. *Climate Services*, *35*, 100495. https://doi.org/10.1016/j.cliser.2024.100495

Jagannathan, K., Buddhavarapu, S., Ullrich, P. A., Jones, A. D., & HyperFACETS Project Team. (2023). Typologies of actionable climate information and its use. Global Environmental Change, 82, 102732. https://doi.org/10.1016/j.gloenvcha.2023.102732

Khosravi, F., Bruno Soares, M., Teixeira, M., Fontes, N., & Graca, A. (2024). Assessing the usability and value of a climate service in the wine sector. *Climate Services*, *34*, 100496. https://doi.org/10.1016/j.cliser.2024.100496

Kirchhoff, C. J., Carmen Lemos, M., & Dessai, S. (2013). Actionable Knowledge for Environmental Decision Making: Broadening the Usability of Climate Science. *Annual Review of Environment and Resources*, *38*, 393–414. https://doi.org/10.1146/annurev-environ-022112-112828

Lemos, M. C., Maillard, L., Herbert, N., Domingue, S. J., Jagannathan, K., Wong-Parodi, G., Goto, E. A., Gill, D., Van Berkel, D., Kalafatis, S., Jorns, J. L., Basaraba, A., & Harrison, T. (2025). Scaling up actionable climate knowledge. *Proceedings of the National Academy of Sciences*, *122*(50), e2515771122. https://doi.org/10.1073/pnas.2515771122

Lu, J., Lemos, M. C., Koundinya, V., & Prokopy, L. S. (2022). Scaling up co-produced climate-driven decision support tools for agriculture. *Nature Sustainability*, *5*(3), 254–262. https://doi.org/10.1038/s41893-021-00825-0

Madhuri. (2023). How do climate information services (CIS) affect farmers' adaptation strategies? A systematic review. *Climate Services*, *32*, 100416. https://doi.org/10.1016/j.cliser.2023.100416

McClure, A., Daron, J., Bharwani, S., Jones, R., Grobusch, L. C., Kavonic, J., Janes, T., Zhang, M., Hill, E., & Mzime, M. (2024). Principles for co-producing climate services: Practical insights from FRACTAL. *Climate Services*, *34*, 100492. https://doi.org/10.1016/j.cliser.2024.100492

Müller, A., Bouroncle, C., Gaytán, A., Girón, E., Granados, A., Mora, V., Portillo, F., & van Etten, J. (2020). Good data are not enough: Understanding limited information use for climate risk and food security management in Guatemala. *Climate Risk Management*, *30*, 100248. https://doi.org/10.1016/j.crm.2020.100248

Ramsey, V., Scannell, C., Dunbar, T., Sanderson, M., & Lowe, J. A. (2024). Co-producing an urban heat climate service for UK cities: A case study of Belfast, Northern Ireland. *Climate Services*, *34*, 100464. https://doi.org/10.1016/j.cliser.2024.100464

Reveco Umaña, C., & Máñez Costa, M. (2026). Valuing climate information in context. *Npj Urban Sustainability*, *6*(1), 72. https://doi.org/10.1038/s42949-026-00395-0

Reveco Umaña, C., Schmidt, S., Delpiazzo, E., Bruno Soares, M., Terrado, M., Mysiak, J., St. Clair, A. L., Cortekar, J., Doblas–Reyes, F., Villwock, A., Jacob, D., Langendijk, G. S., Gonzalez Romero, C., Havlik, D., Greiving, S., Cheval, S., Grainger, S., Taddeo, S., Almond, S., … Pajot, E. (2026). The challenge of upscaling climate services: Towards a common framework. *Climate Services*, *42*, 100662. https://doi.org/10.1016/j.cliser.2026.100662

Reveco-Umaña, C. (2023). Exploring the use of climate information as practice. *Climate Services*, *30*, 100396. https://doi.org/10.1016/j.cliser.2023.100396

Riach, N., & Glaser, R. (2024). Local climate services. Can municipal climate profiles help improve climate literacy? *Climate Services*, *34*, 100449. https://doi.org/10.1016/j.cliser.2024.100449

Taylor, A. L., Dessai, S., Buontempo, C., Dubois, G., Viel, C., Jimenez, I., Palin, E., Bruno Soares, M., & Soubeyroux, J.-M. (2016). *Strategies for communicating levels of confidence in seasonal predictions: Recommendations and lessons learnt* (EUPORIAS Deliverable 33.5). EUPORIAS. https://doi.org/10.13140/RG.2.2.33646.20804

Tozier de la Poterie, A., Castro, E., Rahaman, H., Heinrich, D., Clatworthy, Y., & Mundorega, L. (2023). Anticipatory action to manage climate risks: Lessons from the Red Cross Red Crescent in Southern Africa, Bangladesh, and beyond. *Climate Risk Management*, *39*, 100476. https://doi.org/10.1016/j.crm.2023.100476

Tozier de la Poterie, A. S., Jjemba, W. E., Singh, R., Coughlan de Perez, E., Costella, C. V., & Arrighi, J. (2018). Understanding the use of 2015–2016 El Niño forecasts in shaping early humanitarian action in Eastern and Southern Africa. *International Journal of Disaster Risk Reduction, Communicating High Impact Weather: Improving Warnings and Decision Making Processes*, *30*, 81–94. https://doi.org/10.1016/j.ijdrr.2018.02.025

Ulrich, J., Baulenas, E., Bojovic, D., & Kause, A. (2026). Climate information use and needs for urban heat adaptation in Hamburg and Barcelona. *Environmental Science & Policy*, 184, Article 104492. https://doi.org/10.1016/j.envsci.2026.104492

Appendix I Questionnaires

A1.1 Agriculture sector survey (Prolific version)

Section A Information page

Welcome!
You have been invited to participate in a short survey conducted by the research project Adaptation-oriented Seamless Predictions of European ClimaTe (ASPECT). This survey content is inspired by ASPECT work that the Barcelona Supercomputing Center have been doing to help make climate information more accessible to people working at the oldest wine and cava producer Codorniu in Spain. If you are interested, at the end of the survey you can view the 2026-2027 bulletin co-produced with Codorniu.

Who is this survey for?
This survey is designed for people in the **agriculture sector**, who have **either used or could potentially use** weather/climate information in their work.

What are the questions about?
We will show you climate information about frost days and growing degree days, with additional explainers designed with the wine sector in mind. However, we welcome responses from people working in other agricultural sectors. We will ask you questions about the information provided.

Why are we asking these questions?
Your responses are essential for understanding how useful this climate information is in practice. By dedicating your time to this survey, your input will help us understand how climate information providers can better present information for users in Europe, which will benefit you, your organisation and sector, ultimately making Europe more resilient to climate variability and change.

How long will it take to complete the survey?
It will take you approximately 10 minutes to complete this survey.

What will we do with your data?
No personally identifiable data will be collected, and your responses will be anonymised. We believe there are no known risks associated with this research study; however, as with any online related activity the risk of a data breach is always possible. To the best of our ability your participation in this study will remain confidential, and **only anonymised data** will be published.

Thank you for taking the time to read through this information.

This survey is conducted by the University of Leeds, as funded by UK Research & Innovation (UKRI) and the EU Framework Programme for Research and Innovation 2021-2027 (Horizon Europe) through the ASPECT project.

To provide any further feedback about the design of the climate information, please contact:

- Senior Scientist: Dr. Marta Terrado, Barcelona Supercomputing Center, Spain. (marta.terrado@bsc.es)

For further information about the survey, please contact:

- Research Fellow: Dr. Kexin Geng, School of Earth and Environment, University of Leeds, UK. (K.Geng.@leeds.ac.uk).
- Project Investigator: Prof. Suraje Dessai, School of Earth and Environment, University of Leeds, UK. (S.Dessai@leeds.ac.uk)

1. **Please tick the first box below if you would like to participate in the survey.**
   a. I would like to participate in the survey.
   b. I **DO NOT** want to participate in the survey.

Section B Screening questions

1. What is your Prolific ID?

Please note that this response should auto-fill with the correct ID

${e://Field/PROLIFIC_PID}

2. Do you work in the agricultural sector?
   a. Yes
   b. No [SURVEY ENDS]

3. How many years of professional experience do you have in the sector related to the crop(s) you work with?
   c. Less than 1 year [SURVEY ENDS]
   d. 1-5 years
   e. 6-10 years
   f. 11-15 years
   g. 16-20 years
   h. More than 20 years

Section C Background questions

1. What type(s) of crops do you work with? (Multiple options may be selected)
   a. Cereals
   b. Potatoes and sugar beet
   c. Oilseeds
   d. Fruit
   e. Vegetables
   f. Grapes for wine
   g. Olives for oil
   h. Others (Please tell us which type of crop you are working with) _____

2. How would you describe your organisation's role in the value chain for the crop(s) you selected above? (Multiple options may be selected)
   a. Crop growers / producers
   b. Crop processors
   c. Crop sellers
   i. Others (Please provide details) _____
   d. Don't know / Not applicable

3. How vulnerable is your organisation to weather or climate-related impacts?
   a. Not at all vulnerable
   b. Slightly vulnerable
   c. Moderately vulnerable
   d. Very vulnerable
   e. Extremely vulnerable
   f. Don't know / Not applicable

4. Approximately how many hectares of land does your organisation manage under cultivation for the crop(s) you selected above?
   a. Hectares (Please enter a number) _____
   b. Don't know / Not applicable

5. Which category best describes your primary area of work or expertise within your organisation?
   a. Owner
   b. Project management
   c. Crop production

d. Crop processing
e. Research and development
j. Others (Please provide details) _____

Section D Understanding of the provided information

We will show you climate information produced for vineyards in Catalunya. Please read the following instructions carefully using a tablet, desktop computer or laptop.

The climate information can be accessed here. We encourage you to read the climate information before answering the following questions, but this is **NOT** necessary, you can also answer the questions based only on what is shown below if you prefer.

1. Have you read the climate information?
   a. Yes
   b. No, but I would like to take a look later.
   c. No, and I am not interested in it.

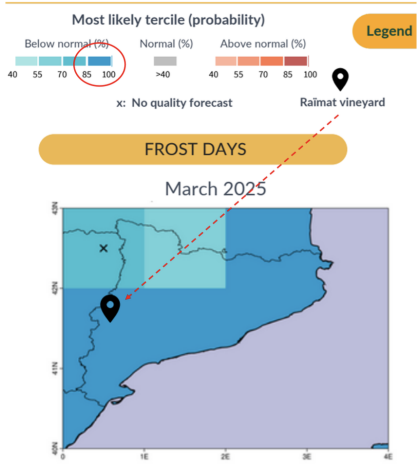
For the questions, we will focus on two main indicators:

1. Frost Days (FD): Number of days with minimum temperature below 0°C between March 1st and April 30th.
2. Growing Degree Days (GDD): Accumulated sum of daily differences between daily mean temperature and 10°C (vegetative growth minimum temperature), excluding days with mean temperature above 30°C, between March 1st and April 30th.

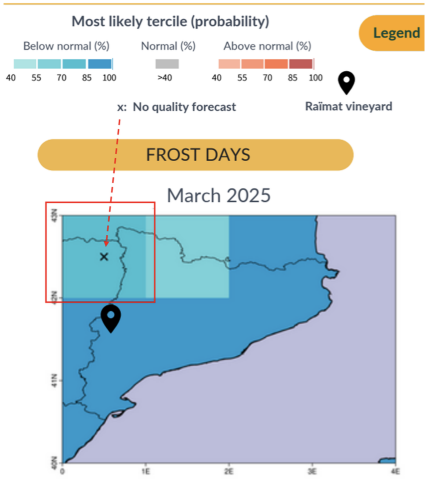
For each question in the next section, we will present a forecast for March-April 2025 with a detailed explanation, followed by the most recent forecast for March-April 2026. You will then be asked to provide your views on the 2026 forecast.

In the following 2 questions, you will be shown two presenting formats (Map and Bar graph) of the probabilistic forecasts of climate conditions for the **next months and seasons**, which is called **"seasonal prediction"**.

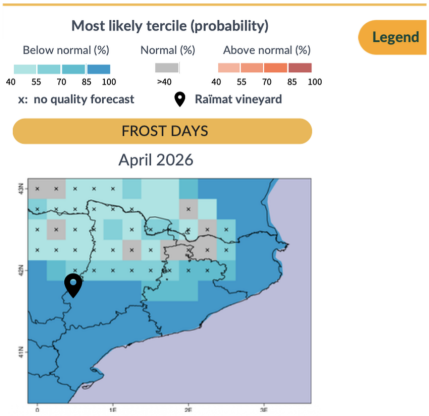
The following **map** shows the probabilistic forecast of frost days for March 2025 across Catalunya. The dark blue color represents a very high probability (85%-100%) of below normal number of frost days in the Raïmat vineyard marked by the location pin.



This forecast for Raïmat vineyard is more reliable than the average of past observations, which we refer to as "**having some quality**". In contrast, the forecast for the area shown in middle blue with a **cross symbol** has **no quality**, meaning that using the historical average would be better than using this forecast.

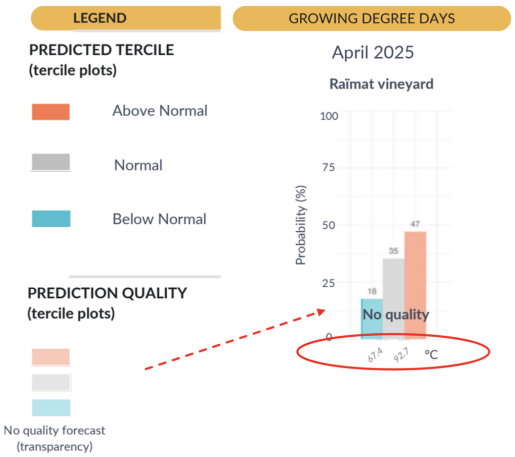


2. The following map shows the probabilistic forecasts of frost days for April 2026 across Catalunya. Please select the best description of the situation that the Raïmat vineyard will experience in April 2026.

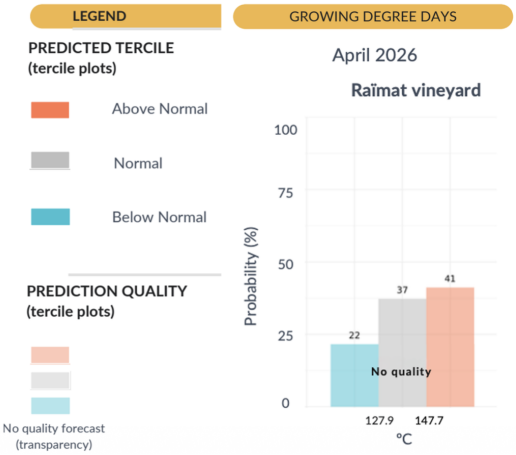


a. 40%-55% probability of below normal number of frost days, and the prediction has some quality.
b. 85-100% probability of below normal number of frost days, and the prediction has some quality.
c. 85-100% probability of below normal number of frost days, but the prediction doesn't have quality.
d. More than 40% probability of normal number of frost days, but the prediction doesn't have quality.
e. 85-100% probability of above normal number of frost days, and the prediction has some quality.
f. Don't know / Not sure

The **bar graph** below presents the probabilistic forecast of growing degree days for the Raïmat vineyard in April 2025. Given the cut points shown for each tercile in the x-axis, in Raïmat, the **normal** number of growing degree days in April 2025 ranges from **67.4 to 92.7 °C**. The probability of **above normal** growing degree days in April is **47%**, but the forecast has no quality (transparent colors).



3. The following bar graph shows the probabilistic forecast of growing degree days in April 2026 for the Raimat vineyard. Please select all correct descriptions of the situation that the Raïmat vineyard will experience in April 2026.



a. The normal number of growing degree days in April 2026 ranges from 127.9 to 147.7 °C.
b. 41% probability of above normal growing degree days, and the prediction has some quality.
c. All of the above
d. None of the above
e. Don't know / Not sure

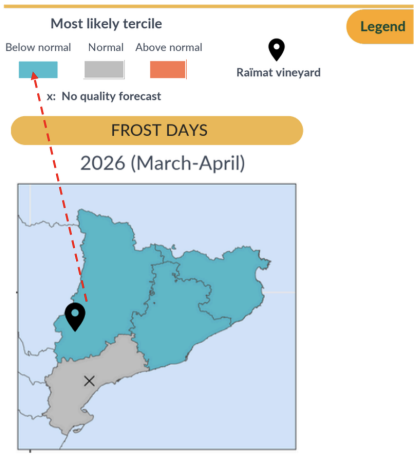
4. Which kind of figure do you prefer for the **seasonal predictions**?
   a. Map

b. Bar graph
c. like both
d. Neither map nor bar graph, I would suggest other figures. Please provide some details (optional). _____

5. I am paying attention to this survey. Select "Strongly agree".
   a. Strongly disagree
   b. Disagree
   c. Neither agree nor disagree
   d. Agree
   e. Strongly agree

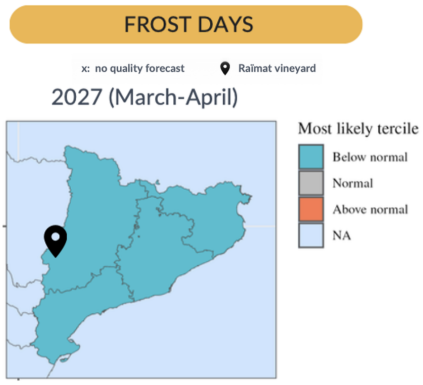
In the following question, you will be shown one presenting format (a Map) of the probabilistic forecast of climate conditions for the **next years**, which is called "**decadal prediction**".

The following map shows the probabilistic forecast of frost days for the period March-April 2026 across Catalunya. The blue color represents a high probability of below normal number of frost days in the northern regions of Catalunya and as normal in the south (in grey). Crosses indicate regions where there is no forecast quality.



6. Here is the probabilistic forecast of frost days for March-April 2027 across Catalunya.

   Please select the best description of the situation that the Raïmat vineyard will experience in the period March-April 2027.



a. Above normal, but the prediction doesn't have quality
b. As normal, and the prediction has some quality
c. Below normal, and the prediction has some quality
d. Don't know / Not sure

7. Do you like the map format for the decadal predictions?
   a. Yes
   b. Yes, but I would also like other figures. Please provide details (optional). _____
   c. No, I would suggest other figures. Please provide details (optional). _____

8. For how many years into the future would you like to have the predictions?
   a. One year
   b. Two years
   c. Three years
   d. More (Please provide details) _____

9. Overall, how hard or easy to understand did you find the information provided above?
   a. Very hard
   b. Hard
   c. Neither hard nor easy
   d. Easy
   e. Very easy

10. Are there any other climate-related indicators you would like to know, and in which format? (optional)

Section E Quality Evaluation

1. If this information was tailored to your area and according to your organisation's needs, please indicate to what extend you would consider the information provided to be:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Don't know / Not applicable
Suitable format						
Understandable						
Trustworthy						
Accurate						
Usable						
Beneficial to yourself						
Beneficial to your organisation						
Beneficial to your sector						

2. How useful would the following types of climate information be for your organisation?

	Extremely useful	Very useful	Moderately useful	Slightly useful	Not at all useful	Don't know / Not applicable
Seasonal forecasts						
Decadal forecasts						

Section F Usability

1. Please indicate the stage that best reflects how your organisation currently works with climate information.
   a. We are unfamiliar with climate information.
   b. We understand what climate information is but don't actively use it.
   c. We already use climate information.

2. [Display this question if “yes” is selected for F-1] For what purposes does your organisation use climate information? (Optional)

3. Having read the information provided in this survey, please indicate your level of agreement with the extent you would consider it would help your organisation:

*If some of the statements **DO NOT** apply to your sector, please select **"Don't know / Not applicable"**.

Statements:

a. To **improve** conceptual **understanding** of climate related topics and regional/local issues without having an explicit intention to use the knowledge for any instrumental purpose.
b. To **garner support** for climate action, or to discuss and **communicate** climate issues to regional and local community members.
c. To **inform** practitioner models or **research** activities.
d. To **undertake** broader **planning** activities.
e. To **seek funding** for climate adaptation/mitigation initiatives.
f. To **implement** climate adaptive **actions**, such as to change management and operations, or rules and policies.

Options:

a. Strongly disagree
b. Disagree
c. Neither agree nor disagree
d. Agree
e. Strongly agree
f. Don't know / Not applicable

4. Would the information provided in this survey help your organisation in any other way? (Optional)

5. I am not reading this survey. Select "Strongly disagree".
   a. Strongly disagree
   b. Disagree
   c. Neither agree nor disagree

d. Agree
e. Strongly agree

Section G Area of improvements

1. [Display this question if total number of “Strongly agree” or “Agree” of question F-3 equal zero and number of “Neither agree nor disagree” is less than 6] Based on the fact that you strongly disagreed or disagreed that the information provided could help your organisation, why are you not interested in using such climate information? (Multiple options may be selected)
   a. Not required to use weather/climate information in my role.
   b. Lack of familiarity with the topic of climate.
   c. Not sure how it could be useful for my organisation.
   d. Difficult to understand.
   e. Not relevant to our timescale of interest.
   f. Not relevant to our geographical scale of interest.
   g. Lack of trust in information source/provider.
   h. Not accurate or reliable enough.
   i. Lack of resources or expertise to use the information.
   j. Other reasons (please provide details) _____
   k. Don't know / Not applicable

2. Could the presented climate information be improved or provided in any of the following ways? (Multiple options may be selected)
   a. Available when required.
   b. Easier to access.
   c. Easier to understand.
   d. Better tailored to my organisation's timescale of interest.
   e. Better tailored to my organisation's geographical scale of interest.
   f. Better tailored to my organisation's needs.
   g. More details about the reliability/uncertainty of the information.
   h. More accurate/reliable information.
   i. Better relationships with service providers/scientists/forecasters.
   j. Guidance/Training on using the climate information within our organisation.
   k. Guidance/Training on communicating climate information to colleagues/stakeholders.
   l. Other incentives are needed to encourage the use of climate information.
   m. Other improvements
   n. Don't know / Not applicable

3. Could you please provide more details about how this information could be tailored to meet your needs? (Optional)

Section H Willingness to share

1. Would you be willing to share this climate information with others inside your organisation?
   a. Yes
   b. No
   c. Don't know / Not applicable

2. [Display this question if “yes” is selected for H-1] Who would you be willing to share this climate information with in your organisation? (This question is optional and multiple options may be selected.)
   a. Manager and above (e.g., Owner, Director, Senior Manager, Junior Manager)
   b. Strategic/Planning (e.g., Planner, Policy-maker)
   c. Professional/Technical (e.g., Analyst, Engineer, Scientist/researcher, Technician)
   d. Others (Please provide details) _____

3. Would you be willing to share this climate information with others outside your organisation?
   a. Yes
   b. No
   c. Don't know / Not applicable

4. [Display this question if “yes” is selected for H-3] Who would you be willing to share this climate information with outside your organisation? (Optional)

Section I More background information

1. Please select the European country in which your organisation is primarily located.

Not applicable (e.g., my organisation does not predominantly operate in one European country)	
Albania	
Andorra	
Armenia	
Austria	
Azerbaijan	
Belarus	
Belgium	
Bosnia and Herzegovina	
Bulgaria	
Croatia	
Cyprus	
Czechia	
Denmark	
Estonia	
Finland	
France	
Germany	
Georgia	
Greece	
Hungary	
Iceland	
Ireland	

Italy	
Latvia	
Liechtenstein	
Lithuania	
Luxembourg	
Malta	
Moldova	
Monaco	
Montenegro	
Netherlands	
North Macedonia	
Norway	
Poland	
Portugal	
Romania	
Russia	
San Marino	
Serbia	
Slovakia	
Slovenia	
Spain	
Sweden	
Switzerland	
Türkiye	
Ukraine	

United Kingdom	
Vatican City	

2. What is the geographical scale of your organisation's operations?
   a. Local (e.g., District/Town/City)
   b. Sub-national (e.g., Region/Province/County)
   c. National
   d. Multiple European countries
   e. Global
   f. Other (please provide details) _____

3. How would you classify your organisation?
   a. Private sector: Multi-national
   b. Private sector: National
   c. Private sector: Regional/local
   d. Public sector: National-level governmental organisation (e.g., directorate, agency, department)
   e. Public sector: Sub-national level governmental organisation (e.g., local government/local authority, municipality)
   f. Semi-public / Public-private partnership / Public enterprise
   g. Other (please provide details) _____

4. What is the approximate number of individuals employed in your organisation:
   a. Fewer than 10 employees
   b. Between 10 and 49 employees
   c. Between 50 and 249 employees
   d. More than 250 employees

5. What's the furthest in the future your organisation plans for?
   a. Less than a month
   b. Between 1 month and 6 months
   c. Between 6 months and 1 year
   d. Between 1 and 2 years
   e. Between 2 and 5 years
   f. Between 5 and 10 years
   g. Between 10 and 50 years
   h. More than 50 years
   i. Don't know / Not applicable

6. If you'd like to hear more about the ASPECT project or be contacted in the future, you can optionally provide your company name and email address. This is **entirely voluntary**—if you prefer not to share this information, simply click the arrow for 'next' to finish.

Name of your organisation

Your email

You may also be interested to view a more extensive co-produced bulletin designed with Codorníu - this bulletin can be accessed here.

In this bulletin, we introduce both the seasonal (2026) and decadal (2026-2027) predictions for March-April / April- September period in Catalunya. In addition to Frost Days and Growing Degree Days needed for frost protection, the bulletin also presents water management indicators, including growing season total precipitation, growing season average temperature, standardized precipitation and evapotranspiration index (SPEI), and heatwave.

We would greatly appreciate it if you could share the link to this survey, with other colleagues or people in your wider networks who may be interested in contributing to our research.

A1.2 Financial (pension) sector survey

Section A Information page

Welcome!
You have been invited to participate in a survey of the research project titled Adaptation-oriented Seamless Predictions of European ClimaTe (ASPECT).

Who is this survey for?
This survey is designed for people in the pension or finance sectors, and who have either used or could potentially use weather/climate information.

What are the questions about?
The survey will require you becoming familiar with a climate service prototype designed for the pensions sector. We would like to hear your perceptions and opinions of this prototype, including your understanding, evaluation, perceived usability, willingness to share and pay for it, and any suggested improvements.

Why are we asking these questions?
The results from this survey, which has been developed by the ASPECT research project, will help inform climate prediction research which could lead to an operationalised service in Europe giving ASPECT a legacy beyond the cessation of the project next year. By dedicating your time to this important EU project, you will help shaping the future generation of climate services that your organisation and sector could benefit from. It will then ultimately make Europe more resilient to climate variability and change.

How long will it take to complete?
It will take you approximately **15 minutes** to complete this survey.

What will we do with your data?
No personally identifiable data will be collected, and your responses will be anonymised. We believe there are no known risks associated with this research study; however, as with any online-related activity, the risk of a breach is always possible. To the best of our ability, your participation in this study will remain confidential, and **only anonymised data** will be published.

Thank you for taking the time to read through this information.

This survey is conducted by the University of Leeds, as funded by Innovate UK and the EU Framework Programme for Research and Innovation 2021-2027 (Horizon Europe) through the ASPECT project.

To provide any further feedback about the design of the climate service prototype for the pensions sector, please contact:

- Senior Scientist: Dr Freya Garry, Met Office, UK. (freya.garry@metoffice.gov.uk)

For further information about the survey, please contact:

- Research Fellow: Dr Kexin Geng, School of Earth and Environment, University of Leeds, UK. (K.Geng@leeds.ac.uk)
- Project Investigator: Prof Suraje Dessai, School of Earth and Environment, University of Leeds, UK. (S.Dessai@leeds.ac.uk)

1. **Please tick the box below if you would like to participate in the survey. Please use a tablet, desktop or laptop to complete this survey.**
   a. I would like to participate in the survey.
   b. I DO NOT want to participate in the survey.

Section B Background information

1. What is your Prolific ID?

Please note that this response should auto-fill with the correct ID

${e://Field/PROLIFIC_PID}

2. How would you classify your organisation's main area(s) of activity within the financial sector? (Multiple options may be selected)
   a. Insurance
   b. Asset management - Public markets
   c. Asset management - Venture capital
   d. Asset management - Private equity
   e. Asset management - Infrastructure
   f. Asset owner
   g. Retail Banking
   h. Corporate Banking
   i. Investment Banking
   j. Pension Fund
   k. Foreign Exchange
   l. Others (please give details) _____

3. Please select the European country in which your organisation is primarily located.

Not applicable	
Albania	
Andorra	
Armenia	
Austria	
Azerbaijan	
Belarus	
Belgium	
Bosnia and Herzegovina	
Bulgaria	
Croatia	
Cyprus	
Czechia	
Denmark	
Estonia	
Finland	
France	
Germany	
Georgia	
Greece	
Hungary	
Iceland	
Ireland	
Italy	
Kazakhstan	
Latvia	

Liechtenstein	
Lithuania	
Luxembourg	
Malta	
Moldova	
Monaco	
Montenegro	
Netherlands	
North Macedonia	
Norway	
Poland	
Portugal	
Romania	
Russia	
San Marino	
Serbia	
Slovakia	
Slovenia	
Spain	
Sweden	
Switzerland	
Türkiye	
Ukraine	
United Kingdom	
Vatican City	

4. [Display this question if “Pension Fund” is not selected for B-2] What is your primary role/position in your organisation? (optional)

5. [Display this question if “Pension Fund” is selected for B-2] Which category best describes your primary role/position in your organisation?
   a. Pension fund trustee
   b. Pension fund manager
   c. Investment consultant
   d. Actuary
   e. Asset manager
   f. Other _____

6. How many years of professional experience do you have in your current role?
   a. Less than 1 year
   b. 1-5 years
   c. 6-10 years
   d. 11-15 years
   e. 16-20 years
   f. More than 20 years

7. [Display this question if “Pension Fund” is selected for B-2] Are the investments you make (e.g., as a trustee) or advise (e.g., as an investment consultant) or make (e.g., as an asset manager on behalf of a pension fund including via an insurance company) sensitive to weather/climate or its impacts in some way (e.g., at risk from loss, damage, or impairment)?
   a. Yes
   b. No
   c. Don't know / Not applicable

8. [Display this question if “Pension Fund” is not selected for B-2] How vulnerable are your business activities to climate-related impacts?
   a. Not at all vulnerable
   b. Slightly vulnerable
   c. Moderately vulnerable
   d. Very vulnerable
   e. Extremely vulnerable

9. [Display this question if “Pension Fund” is selected for B-2] How vulnerable are the investments you make to climate-related impacts?
    a. Not at all vulnerable
    b. Slightly vulnerable
    c. Moderately vulnerable
    d. Very vulnerable
    e. Extremely vulnerable

10. [Display this question if “Pension Fund” is selected for B-2] Thinking about the largest scheme you are involved with, please select a range for its assets under management
    a. Less than €30m
    b. €30m-€70m
    c. €70m-€100m
    d. €100m-€500m
    e. €500m-€1bn
    f. €1bn+
    g. Prefer not to say

11. [Display this question if “Pension Fund” is selected for B-2] Thinking about the largest fund you are involved with, from the drop-down menu below, please select a country for where the fund is based

Not applicable	
Albania	
Andorra	
Armenia	
Austria	
Azerbaijan	
Belarus	
Belgium	
Bosnia and Herzegovina	
Bulgaria	
Croatia	
Cyprus	

Czechia	
Denmark	
Estonia	
Finland	
France	
Germany	
Georgia	
Greece	
Hungary	
Iceland	
Ireland	
Italy	
Kazakhstan	
Latvia	
Liechtenstein	
Lithuania	
Luxembourg	
Malta	
Moldova	
Monaco	
Montenegro	
Netherlands	
North Macedonia	
Norway	
Poland	
Portugal	

Romania	
Russia	
San Marino	
Serbia	
Slovakia	
Slovenia	
Spain	
Sweden	
Switzerland	
Türkiye	
Ukraine	
United Kingdom	
Vatican City	

12. [Display this question if “Pension Fund” is selected for B-2] Thinking about the largest fund that you are involved with, do you know if climate information is used in any investment decision making?
    a. Yes
    b. No
    c. Don't know / Not applicable

Section C Understanding of the provided information

In the next section, you will be shown a climate service prototype for the pensions sector, followed by some questions about your opinions on it. Please read the following instructions carefully using a tablet, desktop or laptop.

Here is a climate service prototype for the pensions sector. Please scroll down the window below to access all the information. Please click on this link if the prototype doesn't show below, or to open it in a different window, where you may find it easier to read.

Please note that reading the information will take approximately 10 minutes. The following questions on this page will be about how understandable the information presented is, and you may need to recall specific details.

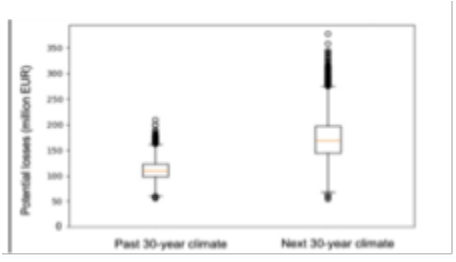
Please note: The content inside the window below is scrollable. Use your mouse or touchpad to scroll down and view all the information.

1. Does this climate service prototype have the right balance of text and images?
   a. There are too many images - I would prefer more text.
   b. Somewhat too many images.
   c. The balance of text and images is just right.
   d. Somewhat too much text.
   e. There is too much text - I would prefer more images.

2. How easy or hard to understand did you find the information provided?
   a. Very easy
   b. Easy
   c. Neither hard nor easy
   d. Hard
   e. Very hard

3. Please determine whether the following statement is true or false.

Statements:

a. Climate risk estimation needs to combine three types of information: hazard, exposure, and vulnerability.
b. The difference in average losses across the 1000 synthetic portfolios exceeds €100 million between the past and future climate periods.
c. The orange line in the box plots represents the mean potential losses.
d. 

e. A '1 in 10-year' event means that it will occur exactly once every 10 years.
f. Long-term climate projections use information about the current climate state to provide a forecast about the likely trend over the next few years.

g. Decadal climate predictions are designed to understand changes to the average climate over many decades.
h. Climatology provides information about averages based on past observations.

Options:

a. True
b. False
c. Don't know

4. I am paying attention to this survey. Select "Strongly agree".
   a. Strongly disagree
   b. Disagree
   c. Neither agree nor disagree
   d. Agree
   e. Strongly agree

Section D Quality evaluation

1. To what extent would you consider the information provided to be:

Please rate your level of agreement with the statements below.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Don't know / Not applicable
Suitable format						
Understandable						
Trustworthy						
Accurate						
Usable						
Beneficial to yourself						
Beneficial to your organisation						
Beneficial to your sector						

Section E Usability

1. Please indicate the stage that best reflects how your organisation currently works with climate information.
    a. We are unfamiliar with climate information.
    b. We understand what climate information is but don't actively use it.
    c. We already use climate information.

2. [Display this question if “We already use climate information.” is selected for E-1] For what purposes does your organisation use climate information? (Optional)

3. Having read the information provided on the website, please indicate your level of agreement with the extent you would consider it would help your organisation:
*If some of the statements DO NOT apply to your sector, please select "Don't know / Not applicable".
Statements:
    1. To **improve** conceptual **understanding** of climate related topics and regional/local issues without having an explicit intention to use the knowledge for any instrumental purpose.
    2. To garner support for climate action, or to discuss and **communicate** climate issues to regional and local community members.
    3. To **inform** practitioner models or **research** activities.
    4. To **undertake** broader **planning** activities.
    5. To **seek funding** for climate adaptation/ mitigation initiatives.
    6. To **implement** climate adaptive **actions**, such as to change management and operations, or rules and policies.

Options:
    a. Strongly disagree
    b. Disagree
    c. Neither agree nor disagree
    d. Agree
    e. Strongly agree
    f. Don't know / Not applicable

4. Will the information provided help your organisation in any other way? (Optional)

5. I am not reading this survey. Select "Strongly disagree".
   a. Strongly disagree
   b. Disagree
   c. Neither agree nor disagree
   d. Agree
   e. Strongly agree

Section F Areas for improvement

1. [Display this question if total number of “Strongly agree” or “Agree” of question E-3 equal zero and number of “Neither agree nor disagree” is less than 6] Based on the fact that you strongly disagreed or disagreed that the information provided could help your organisation, why are you not interested in using such climate information? (Multiple options may be selected)
   a. Not required to use weather/climate information in my role.
   b. Lack of familiarity with the topic of climate.
   c. Not sure how it could be useful for my organisation.
   d. Difficult to understand.
   e. Not relevant to our timescale of interest.
   f. Not relevant to our geographical scale of interest.
   g. Lack of trust in information source/provider.
   h. Not accurate or reliable enough.
   i. Lack of resources or expertise to use the information.
   j. Other reasons (please give details) _____
   k. Don't know / Not applicable

2. Could the information provided be improved in any of the following ways? (Multiple options may be selected)
   a. Available when required.
   b. Easier to access.
   c. Easier to understand.
   d. Better tailored to our organisation's timescale of interest.

e. Better tailored to our organisation's geographical scale of interest.
f. Better tailored to our organisation's needs.
g. More details about the reliability/uncertainty of the information.
h. More accurate/reliable information.
i. Better relationships with service providers/scientists/forecasters.
j. Guidance/Training on using the climate information within our organisation.
k. Guidance/Training on communicating climate information to colleagues/stakeholders.
l. Other incentives are needed to encourage the use of climate services.
m. Other improvements.
n. Don't know / Not applicable

3. Could you please provide more details about how this information could be tailored to meet your needs? (Optional)

Section G Willingness to share

1. Would you be willing to share this climate information with others **inside** your organisation?
   a. Yes
   b. No
   c. Don't know / Not applicable

2. [Display this question if “yes” is selected for G-1] Would you be willing to share this climate information with any of the following people in your organisation?

(This question is optional and multiple options may be selected.)

   a. Executive/Leadership
   b. Regulators (e.g., EIOPA)
   c. Beneficiaries (e.g., scheme members)
   d. Others (Please give details) _____

3. Would you be willing to share this climate information with others **outside** your organisation?
   a. Yes
   b. No
   c. Don't know / Not applicable

4. [Display this question if “yes” is selected for G-3] Who would you be willing to share this climate information with outside your organisation? (Optional)

Section H More background information

1. [Display this question if “Pension Fund” is not selected for B-2] What is the geographical scale of your organisation's operations?
   a. National
   b. Multiple European countries
   c. Global
   d. Other (please give details) _____

2. [Display this question if “Pension Fund” is selected for B-2] What is the geographical scale of your investment portfolio?
   a. National
   b. Multiple European countries
   c. Global
   d. Other (please give details) _____

3. [Display this question if “Pension Fund” is not selected for B-2] How would you classify your organisation?
   a. Private sector
   b. Public sector
   c. Third Sector (e.g., charity)
   d. International (e.g., United Nations agency, European Commission)
   e. Other (please give details) _____

4. [Display this question if “Pension Fund” is selected for B-2] How would you classify your fund?
   a. Private sector
   b. Public sector
   c. Third Sector (e.g., charity)
   d. International (e.g., United Nations agency, European Commission)
   e. Other (please give details) _____

5. From the list below, please select the Top 5 sectors of the economy that you think are going to be most affected by physical climate impacts.

Please drag and drop items from the list on the left into the box on the right. Once added, you can reorder your selections by dragging them up or down within the box to reflect your ranking.

Items:

a. Agriculture, Forestry and Fishing.
b. Mining and Quarrying.
c. Manufacturing.
d. Electricity, Gas, Steam and Air Conditioning Supply.
e. Water Supply, Sewerage, Waste Management and Remediation Activities.
f. Construction.
g. Wholesale and Retail Trade.
h. Transportation and Storage.
i. Accommodation and Food Services.
j. Information and Communication.
k. Finance and Insurance.
l. Real Estate (Commercial and residential).
m. Arts, Entertainment and Recreation.
n. Other Service Activities.
o. Others (please give details) _____

6. What's the furthest in the future your organisation plans for?

a. Less than a month
b. Between 1 month and 6 months
c. Between 6 months and 1 year
d. Between 1 and 2 years
e. Between 2 and 5 years
f. Between 5 and 10 years
g. Between 10 and 50 years
h. More than 50 years
i. Don't know / Not applicable

7. If you'd like to hear more about the ASPECT project or be contacted in the future, you can optionally provide your company name and email address. This is entirely voluntary—if you prefer not to share this information, simply click the arrow for 'next' to finish.

Name of your organisation

Your email

A1.3 Temperature predictions survey

Section A Information page

Welcome!

You have been invited to participate in a short survey conducted by the research project Adaptation- oriented Seamless Predictions of European ClimaTe (ASPECT). This survey content is inspired by ASPECT work that the Met Office in the UK has been doing to help make climate information more accessible to people working at the British Red Cross. If you are interested, at the end of the survey you can view the website co-produced with the British Red Cross.

Who is this survey for?

This survey is designed for people whose work is or might be affected by **hot summers and extreme heat**, and who have **either used or could potentially use weather/climate information**.

What are the questions about?

We will show you a short website of climate information about current and future temperature, with additional explainers designed with the emergency response/humanitarian sector in mind. However, we welcome responses from people working in other sectors. We will ask you questions about some of the information about temperature predictions provided in this website. It is also possible to respond to these questions without looking through the website.

Why are we asking these questions?

Your responses are essential for understanding how useful this information is in practice. By dedicating your time to this survey, your input will help us understand how climate information providers can better present information for users in Europe, which will benefit you, your organisation and sector, ultimately making Europe more resilient to climate variability and change.

How long will it take to complete the survey?

It will take you approximately 10 minutes to complete this survey. We estimate that reading the website will take around 5 minutes.

What will we do with your data?

No personally identifiable data will be collected, and your responses will be anonymised. We believe there are no known risks associated with this research study; however, as with any online related activity the risk of a data breach is always possible. To the best of our ability your participation in this study will remain confidential, and only anonymised data will be published.

Thank you for taking the time to read through this information.

This survey is conducted by the University of Leeds, as funded by UK Research & Innovation (UKRI) and the EU Framework Programme for Research and Innovation 2021-2027 (Horizon Europe) through

To provide any further feedback about the design of the website, please contact:

- Senior Scientist: Dr Freya Garry, Met Office, UK. (freya.garry.@metoffice.gov.uk)

For further information about the survey, please contact:

- Research Fellow: Dr Kexin Geng, School of Earth and Environment, University of Leeds, UK. (K.Geng.@leeds.ac.uk)
- Project Investigator: Prof Suraje Dessai, School of Earth and Environment, University of Leeds, UK. (S.Dessai@leeds.ac.uk)

1. **Please tick the first box below if you would like to participate in the survey.**
   a. I would like to participate in the survey.
   b. I **DO NOT** want to participate in the survey.

Section B Screening questions

1. What is your Prolific ID?

Please note that this response should auto-fill with the correct ID

${e://Field/PROLIFIC_PID}

2. How many years of professional experience do you have in your sector?
   a. Less than 1 year [SURVEY ENDS]
   b. 1-5 years
   c. 6-10 years
   d. 16-20 years
   e. More than 20 years

Section C Background questions

1. Are you from the emergency response/humanitarian sector?
   a. Yes
   b. No, please tell us what sector you work in._____

2. How vulnerable is your organisation to weather or climate-related impacts?
    a. Not at all vulnerable
    b. Slightly vulnerable
    c. Moderately vulnerable
    d. Very vulnerable
    e. Extremely vulnerable
    f. Don't know/ Not applicable

Section D Understanding of the provided information

We will show you a website and you will be asked some questions about your opinion on it. Please read the following instructions carefully.

The website can be accessed here. We encourage you to read the website before answering the following questions, but this is **NOT** necessary, you can also answer the questions based only on the information shown below if you prefer.

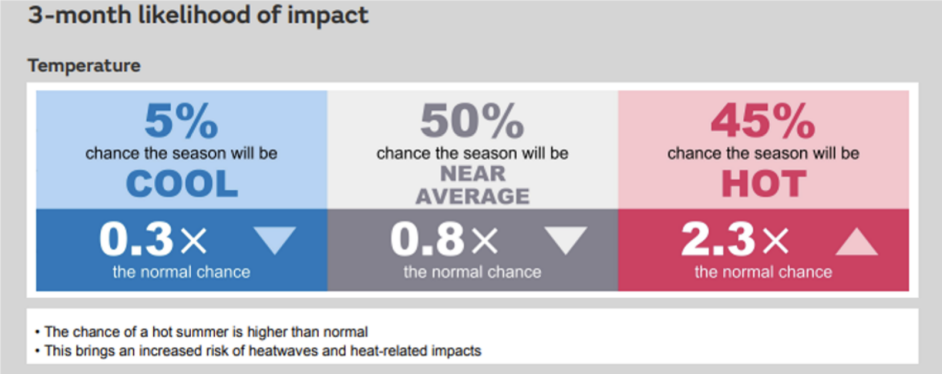
1. Have you read this website?
    a. Yes
    b. No, but I would like to take a look later.
    c. No, and I am not interested in it.

The next 3 months: the seasonal summer forecast

Seasonal forecasts can help focus efforts for preparedness ahead of hot summers. Seasonal forecasts are created using lots of different model simulations. Depending on how many of these simulations are warmer or cooler than each other gives us probabilities for a warmer or cooler period. The forecast tells us what the 3-month temperature outlook is compared to a normal likelihood over the past climate period 1991-2020. This gives us probabilities of whether it will be relatively cool, near average, or warm.

With the local information we already know about the current climate, we can use the seasonal forecast to help inform decision making. For example, if the chance of upcoming warm spring or summer months is higher than normal, then you might consider what has happened in recent warmer than usual years and prepare for similar or more severe events.

Example parts of the UK 3-month outlook for summer 2025 (produced by the Met Office) is provided below.



2. Based on the outlook shown above, which conditions are most likely to occur in the UK during the summer of 2025?

a. Cooler than normal
b. Near average
c. Hotter than normal
d. Don't know / Not sure

3. Based on the outlook shown above, compared with a typical year, is the chance of a hotter summer higher, lower, or about the same?

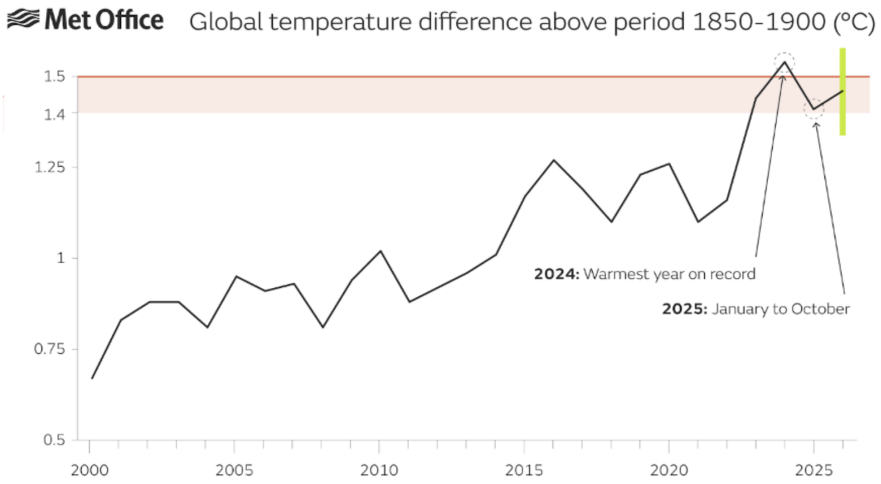
a. Higher than usual
b. Lower than usual
c. About the same as usual
d. Don't know / Not sure

4. Based on the outlook shown above, would you recommend your organisation take any additional measures to prepare for potential heatwaves and impacts if this was issued for this summer?

a. I would recommend normal preparedness action for heat.
b. I would recommend greater preparedness action for heat.
c. I would recommend lower preparedness action for heat.
d. Don't know / Not sure

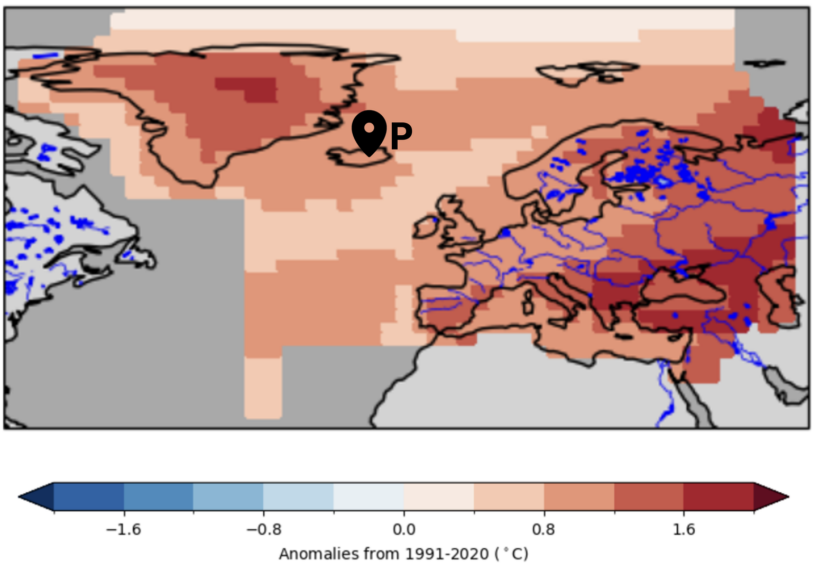
The next year/s: Added information from decadal climate predictions

Decadal predictions can help us prepare for the coming year or the next few years ahead. The graph below shows the Met Office forecast of global average surface temperature for 2026 compared to the global average temperatures since the year 2000.



5. Based on the above graph what is the overall temperature trend over the last 26 years?
   a. Getting warmer
   b. Getting cooler
   c. No clear change
   d. Don't know / Not sure

The map below shows the anomaly of average summer (June, July and August) temperature prediction for Europe for the year 2025 from the World Meteorological Organisation Lead Centre for Annual-to-Decadal Climate Prediction.



6. Based on the above map, how is the temperature at Location P predicted to change in 2025?
   a. Warmer than the 1991-2020 temperature
   b. About the same as the 1991-2020 temperature
   c. Cooler than the 1991-2020 temperature
   d. Don't know / Not sure

7. Overall, how hard or easy to understand did you find the information provided above?
   a. Very hard
   b. Hard
   c. Neither hard nor easy
   d. Easy
   e. Very Easy

Section E Quality Evaluation

1. If this information was tailored to your area and according to your organisation's needs, please indicate to what extent you would consider the information provided to be:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Don't know / Not applicable
Suitable format						
Understandable						
Trustworthy						
Accurate						
Usable						
Beneficial to yourself						
Beneficial to your organisation						
Beneficial to your sector						

2. How useful would the following types of climate information be for your organisation?

	Extremely useful	Very useful	Moderately useful	Slightly useful	Not at all useful	Don't know / Not applicable
Observations, today's climate information						
Climate information for the next 3 months						
Climate information for the next 3 years						
Climate information for the next 30 years						

Section F Usability

1. Please indicate the stage that best reflects how your organisation currently works with climate information.

a. We are unfamiliar with climate information.
b. We understand what climate information is but don't actively use it.
c. We already use climate information.

2. [Display this question if "yes" is selected for F-1] For what purposes does your organisation use climate information? (Optional)

3. Having read the information provided in this survey, please indicate your level of agreement with the extent you would consider it would help your organisation:

*If some of the statements **DO NOT** apply to your sector, please select "**Don't know / Not applicable**".

Statements:

a. To **improve** conceptual **understanding** of climate related topics and regional/local issues without having an explicit intention to use the knowledge for any instrumental purpose.
b. To **garner support** for climate action, or to discuss and **communicate** climate issues to regional and local community members.
c. To **inform** practitioner models or **research** activities.
d. To **undertake** broader **planning** activities.
e. To **seek funding** for climate adaptation/mitigation initiatives.
f. To **implement** climate adaptive **actions**, such as to change management and operations, or rules and policies.

Options:

a. Strongly disagree
b. Disagree
c. Neither agree nor disagree
d. Agree
e. Strongly agree
f. Don't know / Not applicable

4. Would the information provided in this survey help your organisation in any other way? (Optional)

Section G Area of improvements

1. [Display this question if total number of “Strongly agree” or “Agree” of question F-3 equal zero and number of “Neither agree nor disagree” is less than 6] Based on the fact that you strongly disagreed or disagreed that the information provided could help your organisation, why are you not interested in using such climate information? (Multiple options may be selected)

a. Not required to use weather/climate information in my role.
b. Lack of familiarity with the topic of climate.
c. Not sure how it could be useful for my organisation.
d. Difficult to understand.
e. Not relevant to our timescale of interest.
f. Not relevant to our geographical scale of interest.
g. Lack of trust in information source/provider.
h. Not accurate or reliable enough.
i. Lack of resources or expertise to use the information.
j. Other reasons (please provide details)_____
k. Don't know / Not applicale

2. Could the presented climate information be improved or provided in any of the following ways? (Multiple options may be selected)

a. Available when required.
b. Easier to access.
c. Easier to understand.
d. Better tailored to my organisation's timescale of interest.
e. Better tailored to my organisation's geographical scale of interest.
f. Better tailored to my organisation's needs.
g. More details about the reliability/uncertainty of the information.
h. More accurate/reliable information.
i. Better relationships with service providers/scientists/forecasters.
j. Guidance/Training on using the climate information within our organisation.
k. Guidance/Training on communicating climate information to colleagues/stakeholders.
l. Other incentives are needed to encourage the use of climate services.
m. Other improvements
n. Don't know / Not applicable

3. Could you please provide more details about how this information could be tailored to meet your needs? (Optional)

Section H Willingness to share

1. Would you be willing to share this climate information with others **inside** your organisation?
    a. Yes
    b. No
    c. Don't know / Not applicable

2. [Display this question if “yes” is selected for H-1] Who would you be willing to share this climate information with in your organisation?

3. Would you be willing to share this climate information with others **outside** your organisation?
    a. Yes
    b. No
    c. Don't know / Not applicable

4. [Display this question if “yes” is selected for G-3] Who would you be willing to share this climate information with outside your organisation? (Optional)

Section I More background information

1. Please select the European country in which your organisation is primarily located.

Not applicable (e.g., my organisation does not predominantly operate in one European country)	
Albania	
Andorra	
Armenia	
Austria	
Azerbaijan	
Belarus	
Belgium	
Bosnia and Herzegovina	
Bulgaria	
Croatia	
Cyprus	
Czechia	
Denmark	
Estonia	
Finland	
France	
Germany	
Georgia	
Greece	
Hungary	
Iceland	

Ireland	
Italy	
Latvia	
Liechtenstein	
Lithuania	
Luxembourg	
Malta	
Moldova	
Monaco	
Montenegro	
Netherlands	
North Macedonia	
Norway	
Poland	
Portugal	
Romania	
Russia	
San Marino	
Serbia	
Slovakia	
Slovenia	
Spain	
Sweden	
Switzerland	
Türkiye	

Ukraine	
United Kingdom	
Vatican City	

2. What is the geographical scale of your organisation's operations?
    a. Local (e.g., District/Town/City)
    b. National
    c. Global
    d. Other (please provide details)

3. What is the approximate number of individuals employed in your organisation:
    a. Fewer than 10 employees
    b. Between 10 and 49 employees
    c. Between 50 and 249 employees
    d. More than 250 employees

4. What's the furthest in the future your organisation plans for?
    a. Less than a month
    b. Between 1 month and 6 months
    c. Between 6 months and 1 year
    d. Between 1 and 2 years
    e. Between 2 and 5 years
    f. Between 5 and 10 years
    g. Between 10 and 50 years
    h. More than 50 years
    i. Don't know / Not applicable

If you'd like to hear more about the ASPECT project or be contacted in the future, you can optionally provide your company name and email address. This is entirely voluntary—if you prefer not to share this information, simply click the arrow for 'next' to finish.
Name of your organisation

Your email

You may also be interested to view a more extensive co-produced website designed with the British Red Cross about extreme heat and past and future climate information - this website can be accessed here.

We would greatly appreciate it if you could share the link to this survey, with other colleagues or people in your wider networks who may be interested in contributing to our research.

A1.4 Governance sector survey

Section A Information page

Welcome!

You have been invited to participate in a short survey conducted by the research project Adaptation-oriented Seamless Predictions of European ClimaTe (ASPECT). This survey content is inspired by ASPECT work that helps make climate information more accessible to people working at local governments in the Emilia- Romagna region of Italy.

Who is this survey for?

This survey is designed for people in **regional and local government** who have **either used or could potentially use** weather/climate information in their work.

What are the questions about?

We will show you climate information about rainfall and temperature. We will ask you questions about the presented information.

Why are we asking these questions?

Your responses are essential for understanding how useful this climate information is in practice. By dedicating your time to this survey, your input will help us understand how climate information providers can better present information for users in Europe, which will benefit you, your organisation and sector, ultimately making Europe more resilient to climate variability and change.

How long will it take to complete the survey?

It will take you approximately **10 minutes** to complete this survey.

What will we do with your data?

No personally identifiable data will be collected, and your responses will be anonymised. We believe there are no known risks associated with this research study; however, as with any online related activity the risk of a data breach is always possible. To the best of our ability your participation in this study will remain confidential, and **only anonymised data** will be published.

Thank you for taking the time to read through this information.

This survey is conducted by the University of Leeds, as funded by UK Research & Innovation (UKRI) and the EU Framework Programme for Research and Innovation 2021-2027 (Horizon Europe) through the ASPECT project.

To provide any further feedback about the design of the climate information for the local and regional governance sector, please contact:

- Principal Scientist: Dr Jaroslav Mysiak, Euro-mediterranean Centre for Climate Change, Italy. (jaroslav.mysiak@cmcc.it)
- Principal Scientist: Dr Panos Athanasiadis, Euro-mediterranean Centre for Climate Change, Italy. (panos.athanasiadis@cmcc.it)
- Research Fellow: Dr Simone Taddeo, Euro-mediterranean Centre for Climate Change, Italy. (simone.taddeo@cmcc.it)

For further information about the survey, please contact:

- Research Fellow: Dr Kexin Geng, School of Earth and Environment, University of Leeds, UK. (K. Geng.@leeds.ac.uk)
- Project Investigator: Prof Suraje Dessai, School of Earth and Environment, University of Leeds, UK. (S.Dessai@leeds.ac.uk)

1. Please tick the first box below if you would like to participate in the survey.
   a. I would like to participate in the survey.
   b. I DO NOT want to participate in the survey.

Section B Screening questions

1. What is your Prolific ID?

Please note that this response should auto-fill with the correct ID.

${e://Field/PROLIFIC_PID}

2. Do you work in the public governance sector?
   a. Yes
   b. No [SURVEY ENDS]

3. Which category best describes your primary role/position in your organisation?
   a. Executive/Leadership (e.g., Director General, Department Head, Mayor, Senior Official)
   b. Manager/Supervisor (e.g., Division Manager, Unit Head, Team Leader)
   c. Strategic/Planning (e.g., Policy Officer, Planner, Programme Coordinator)
   d. Professional/Technical (e.g., Analyst, Specialist, Engineer, Researcher)
   e. Supportive/Entry-Level (e.g., Assistant, Apprentice, Intern / volunteer) [SURVEY ENDS]

4. How many years of professional experience do you have in your current role?
   a. Less than 1 year [SURVEY ENDS]
   b. 1-5 years
   c. 6-10 years 11-15 years
   d. 16-20 years
   e. More than 20 years

Section C Background questions

1. How vulnerable is your region to weather or climate-related impacts?
   a. Not at all vulnerable
   b. Slightly vulnerable
   c. Moderately vulnerable
   d. Very vulnerable
   e. Extremely vulnerable
   f. Don't know / Not applicable

2. At which level of government do you currently work?
   a. National / Central government
   b. Regional government
   c. Provincial / Metropolitan authority
   d. Municipal / Local government
   e. Public agency or regulatory body
   f. Public-owned company or enterprise
   g. Other (please specify)_____

Section D Understanding of the provided information

We will show you climate information produced for local governments in the Emilia-Romagna region of Italy and you will be asked questions about your opinion on it.
Please read the following instructions carefully.

The climate information can be accessed here. We encourage you to read the slides before answering the following questions, but this is **NOT** necessary, you can also answer the questions based only on what is shown below if you prefer.

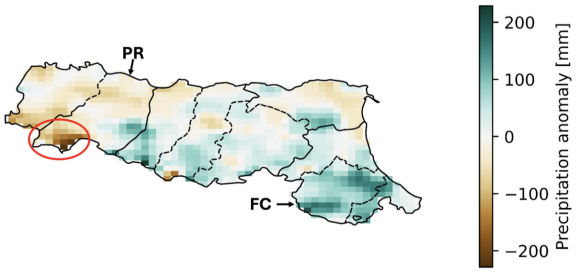
1. Have you read the climate information?
    a. Yes
    b. No, but I would like to take a look later.
    c. No, and I am not interested in it.

What is a decadal climate prediction?
Decadal climate predictions use recent ocean data to forecast the likely climate trend over the **next 1 to 10 years**.

At present, decadal predictions are available only at a spatial resolution of about 100 km. To make the results more useful for municipalities, ASPECT researchers apply an advanced method called "**statistical downscaling**" to translate the predictions into **higher- resolution information** (5 km).

The following map shows an example illustrating how the predicted annual precipitation anomaly, averaged over the next five years, could be displayed for the Emilia-Romagna region. A precipitation anomaly (in mm) is the difference between predicted precipitation and the normal conditions for that area.

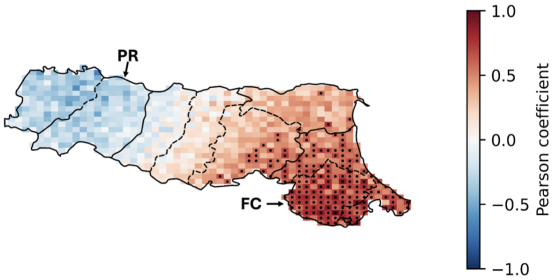
As shown in the legend on the right, positive values indicate wetter-than-normal conditions (shown in green), while negative values indicate drier-than-normal conditions (shown in brown). Darker colours represent larger deviations from normal conditions. For example, for the province of Forli-Cesena (FC), wetter than normal conditions are predicted for the next five years.



2. Please select the option that best describes the predicted conditions for the southwestern part of the **Province of Parma (PR)**, marked with a red circle in the above map.
    a. Wetter than normal
    b. As normal
    c. Drier than normal
    d. Don't know / Not sure

One question you may have at this point is: **how reliable are these predictions?** Researchers often refer to this as the **skill of prediction**.

One way to assess prediction skill is to generate predictions for a past period, which is known as "**hindcasts**", and then compare them with real-world observations. If the hindcast results move in the same direction as the observations, which is called a "positive correlation", the predictions are considered to have significant skill and can be considered trustworthy.
ASPECT researchers use an indicator called the "**Pearson coefficient**" (as shown in the legend on the right of the map below) to describe the direction and strength of the correlation between hindcasts and observations. In the map below, **red** indicates a **positive correlation**, suggesting **higher prediction skill** (the darker the red, the higher the skill). In contrast, **blue** indicates a **negative correlation**, suggesting **lower prediction skill** (the darker the blue, the lower the skill). The black dots in the map indicate areas where the correlations are statistically significant. For example, the predictions for the **province of Forli-Cesena (FC)** are shown in dark red, which means highly skillful and therefore highly trustworthy.



3. Based on the above map, please select the option that best describes the skill of predictions for the **Province of Parma (PR).**

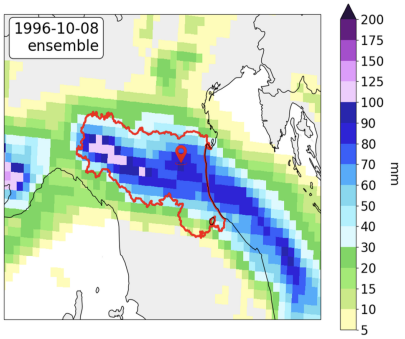
a. High skill
b. Marginal high skill
c. Low skill
d. Don't know / Not sure

4. I am paying attention to this survey. Select "Strongly agree".

a. Strongly disagree
b. Disagree
c. Neither agree nor disagree
d. Agree
e. Strongly agree

For climate extremes, scientists are interested not only in a single predicted outcome but in **a range of plausible futures**. To capture this, they simulate the same event, for example, the heavy rainfall event, many times with slightly different starting conditions, and then compute the average across these predictions, which is called "**ensemble mean**".

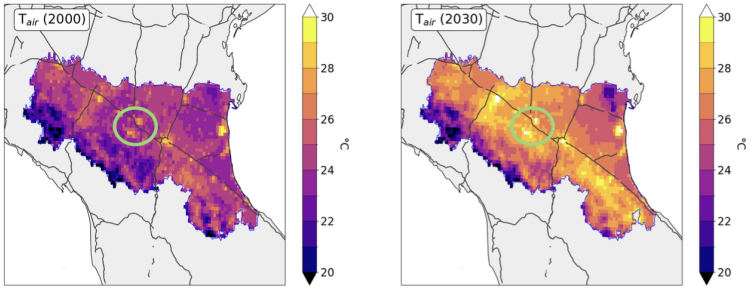
The map below represents the ensemble mean for heavy rainfall in the Emilia-Romagna region (marked by the red line). The purple area indicates a higher rainfall in the region, with more than 100 mm/day.



5. Based on the above map, please select the option that best describes the amount of rainfall received at the location marked by the **red location pin**.

a. 10-30 mm/day
b. 70-100 mm/day
c. 150-200 mm/day
d. Don't know / Not sure

ASPECT researchers also predict **heat extremes**. The maps below show predicted overnight temperatures in the Emilia-Romagna region for the years **2000** (left) and **2030** (right). The legend on the right of each map indicates the temperature range. Yellow shades represent hotter areas, while purple shades indicate cooler areas. For example, in 2000 (left), the area marked by the green circle had nighttime temperatures ranging from 22 to 29 °C.



6. Compared with 2000, is the nighttime temperature in the area marked by the **green circle** on the maps above expected to be hotter or cooler in 2030?

a. Hotter
b. Unchanged
c. Cooler
d. Don't know / Not sure

7. Overall, how hard or easy to understand did you find the information provided above?

a. Very hard
b. Hard
c. Neither hard nor easy
d. Easy
e. Very easy

Section E Quality Evaluation

1. If this information was tailored to your region and according to your organisation's needs, please indicate to what extend you would consider the information provided to be:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Don't know / Not applicable
Suitable format						
Understandable						
Trustworthy						
Accurate						
Usable						
Beneficial to yourself						
Beneficial to your organisation						
Beneficial to your sector						

Section F Usability

1. Please indicate the stage that best reflects how your organisation currently works with climate information.

a. We are unfamiliar with climate information.
b. We understand what climate information is but don't actively use it.
c. We already use climate information.

2. [Display this question if “yes” is selected for F-1] For what purposes does your organisation use climate information? (Optional)

3. Having read the information provided in this survey, please indicate your level of agreement with the extent you would consider it would help your organisation:

*If some of the statements DO NOT apply to your sector, please select "Don't know / Not applicable".

Statements:

a. To **improve** conceptual **understanding** of climate related topics and regional/local issues without having an explicit intention to use the knowledge for any instrumental purpose.
b. To **garner support** for climate action, or to discuss and **communicate** climate issues to regional and local community members.
c. To **inform** practitioner models or **research** activities.
d. To **undertake** broader **planning** activities.
e. To **seek funding** for climate adaptation/mitigation initiatives.
f. To **implement** climate adaptive **actions**, such as to change management and operations, or rules and policies.

Options:

a. Strongly disagree
b. Disagree
c. Neither agree nor disagree
d. Agree
e. Strongly agree
f. Don't know / Not applicable

4. Will the information provided help your organisation in any other way? (Optional)

5. I am not reading this survey. Select "Strongly disagree".
   a. Strongly disagree
   b. Disagree
   c. Neither agree nor disagree
   d. Agree
   e. Strongly agree

Section G Area of improvements

1. [Display this question if total number of “Strongly agree” or “Agree” of question F-3 equal zero and number of “Neither agree nor disagree” is less than 6] Based on the fact that you strongly disagreed or disagreed that the information provided could help your organisation, why are you not interested in using such climate information? (Multiple options may be selected)
   a. Not required to use weather/climate information in my role.
   b. Lack of familiarity with the topic of climate.
   c. Not sure how it could be useful for my organisation.
   d. Difficult to understand.
   e. Not relevant to our timescale of interest.
   f. Not relevant to our geographical scale of interest.
   g. Lack of trust in information source/provider.
   h. Not accurate or reliable enough.
   i. Lack of resources or expertise to use the information.
   j. Other reasons (please provide details) _____
   k. Don't know / Not applicable

2. Could the presented climate information be improved or provided in any of the following ways? (Multiple options may be selected)

a. Available when required.
b. Easier to access.
c. Easier to understand.
d. Better tailored to my organisation's timescale of interest.
e. Better tailored to my organisation's geographical scale of interest.
f. Better tailored to my organisation's needs.
g. More details about the reliability/uncertainty of the information.
h. More accurate/reliable information.
i. Better relationships with service providers/scientists/forecasters.
j. Guidance/Training on using the climate information within our organisation.
k. Guidance/Training on communicating climate information to colleagues/stakeholders.
l. Other incentives are needed to encourage the use of climate information.
m. Other improvements
n. Don't know / Not applicable

3. Could you please provide more details about how this information could be tailored to meet your needs? (Optional)

Section H Willingness to share

1. Would you be willing to share this climate information with others **inside** your organisation?

a. Yes
b. No
c. Don't know / Not applicable

2. [Display this question if “yes” is selected for H-1] Would you be willing to share this climate information with any of the following people in your organisation? (This question is optional and multiple options may be selected.)

a. Executive/Leadership (e.g., Director General, Department Head, Mayor, Senior Official)
b. Manager/Supervisor (e.g., Division Manager, Unit Head, Team Leader)
c. Strategic/Planning (e.g., Policy Officer, Planner, Programme Coordinator)
d. Professional/Technical (e.g., Analyst, Specialist, Engineer, Researcher)
e. Supportive/Entry-Level (e.g., Assistant, Apprentice, Intern / volunteer)
f. Others (Please provide details) _____

3. Would you be willing to share this climate information with others **outside** your organisation?

a. Yes
b. No
c. Don't know / Not applicable

4. [Display this question if “yes” is selected for H-3] Who would you be willing to share this climate information with outside your organisation? (Optional)

Section I More background information

1. Please select the European country in which your organisation is primarily located.

Not applicable (e.g., my organisation does not predominantly operate in one European country)	
Albania	
Andorra	
Armenia	
Austria	
Azerbaijan	
Belarus	
Belgium	

Bosnia and Herzegovina	
Bulgaria	
Croatia	
Cyprus	
Czechia	
Denmark	
Estonia	
Finland	
France	
Germany	
Georgia	
Greece	
Hungary	
Iceland	
Ireland	
Italy	
Latvia	
Liechtenstein	
Lithuania	
Luxembourg	
Malta	
Moldova	
Monaco	
Montenegro	
Netherlands	

North Macedonia	
Norway	
Poland	
Portugal	
Romania	
Russia	
San Marino	
Serbia	
Slovakia	
Slovenia	
Spain	
Sweden	
Switzerland	
Türkiye	
Ukraine	
United Kingdom	
Vatican City	

2. What type of administration do you work for?
    a. Regional Administration (e.g., Region/Province/County)
    b. Local/City Administration (e.g., District/Town/City)
    c. National Government Agency
    d. Public Organisation
    e. Regional Agency
    f. Public Health Authority
    g. Civil Protection
    h. Other (please provide details) _____

3. What is the approximate number of individuals employed in your organisation:
    a. Fewer than 10 employees
    b. Between 10 and 49 employees
    c. Between 50 and 249 employees
    d. More than 250 employees

4. What's the furthest in the future your organisation plans for?
    a. Less than a month
    b. Between 1 month and 6 months
    c. Between 6 months and 1 year
    d. Between 1 and 2 years
    e. Between 2 and 5 years
    f. Between 5 and 10 years
    g. Between 10 and 50 years
    h. More than 50 years
    i. Don't know / Not applicable

If you'd like to hear more about the ASPECT project or be contacted in the future, you can optionally provide your company name and email address. This is entirely voluntary—if you prefer not to share this information, simply click the arrow for 'next' to finish.

Name of your organisation

Your email

We would greatly appreciate it if you could share the link to this survey. with other colleagues or people in your wider networks who may be interested in contributing to our research.

Appendix II Additional results

A2.1 Agriculture sector survey

A2.1.1 Sample composition

More than half of the 94 respondents had between one and five years of professional experience in their current roles, and approximately 30% had between six and ten years of experience.

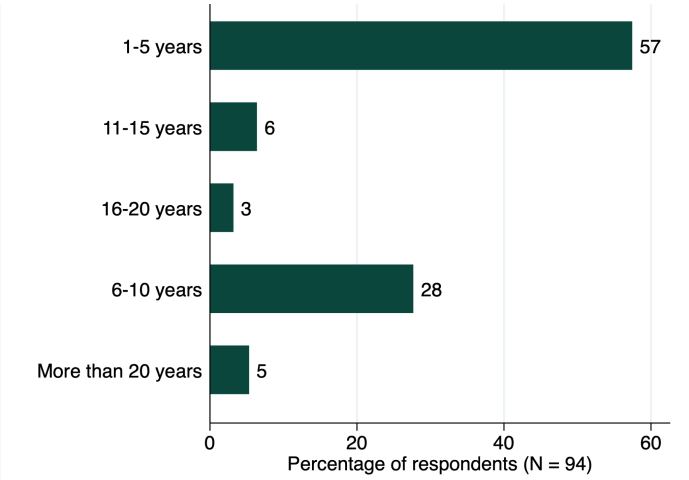


Figure A2-1-1 Respondents' years of professional experience in their current role (Shortest version)

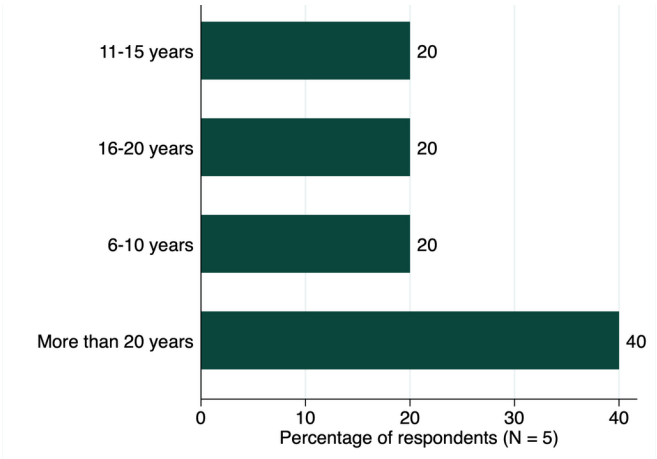


Figure A2-1-2 Respondents' years of professional experience in their current role (Pilot and long surveys)

Most respondents to the shortest survey version (N = 94) reported that their organisations were crop growers or producers within the crop value chain. In addition, 28% identified their

organisations as crop sellers and 21% as crop processors. In the long version of the survey, three respondents answered a similar question specifically concerning the wine sector. All three were grape growers and winemakers; one was also a wine seller and performed other roles. This question was not included in the pilot survey. This question was not included in the pilot version of the survey; therefore, responses were unavailable for two participants.

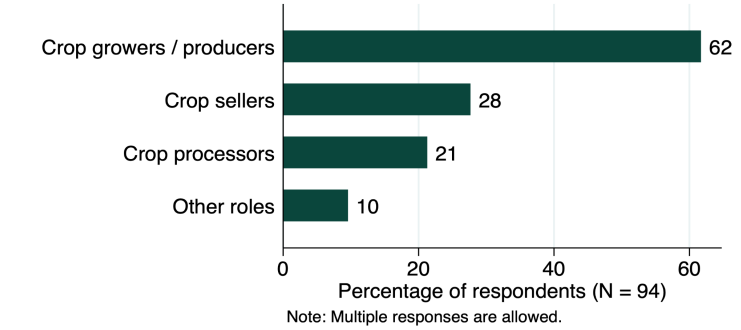


Figure A2-1-3 Organisation's role in the crop value chain

Respondents' organisations were distributed across 20 European countries. The largest proportion was based in the United Kingdom (31%), the main country from which the Prolific sample was recruited. Other well-represented countries included Poland (12%), Spain (10%), Italy (7%) and Portugal (6%), all of which have sizeable populations and significant agricultural sectors.

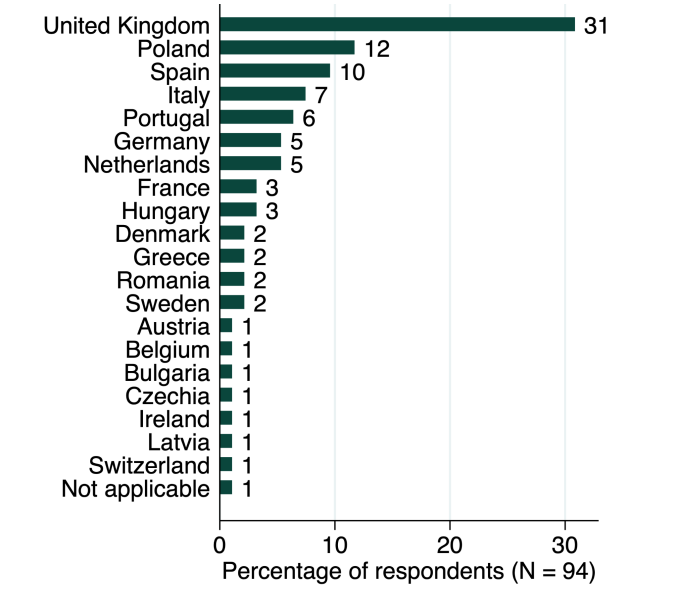


Figure A2-1-4 Respondents' organisations in Europe (Shortest version)

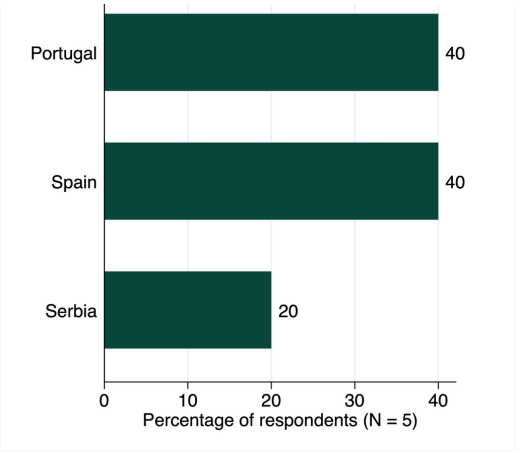


Figure A2-1-5 Respondents' organisations in Europe (Pilot and long surveys)

More than 90% of respondents' organisations operated in the private sector, with 53% classified as private-sector organisations operating at the regional or local level.

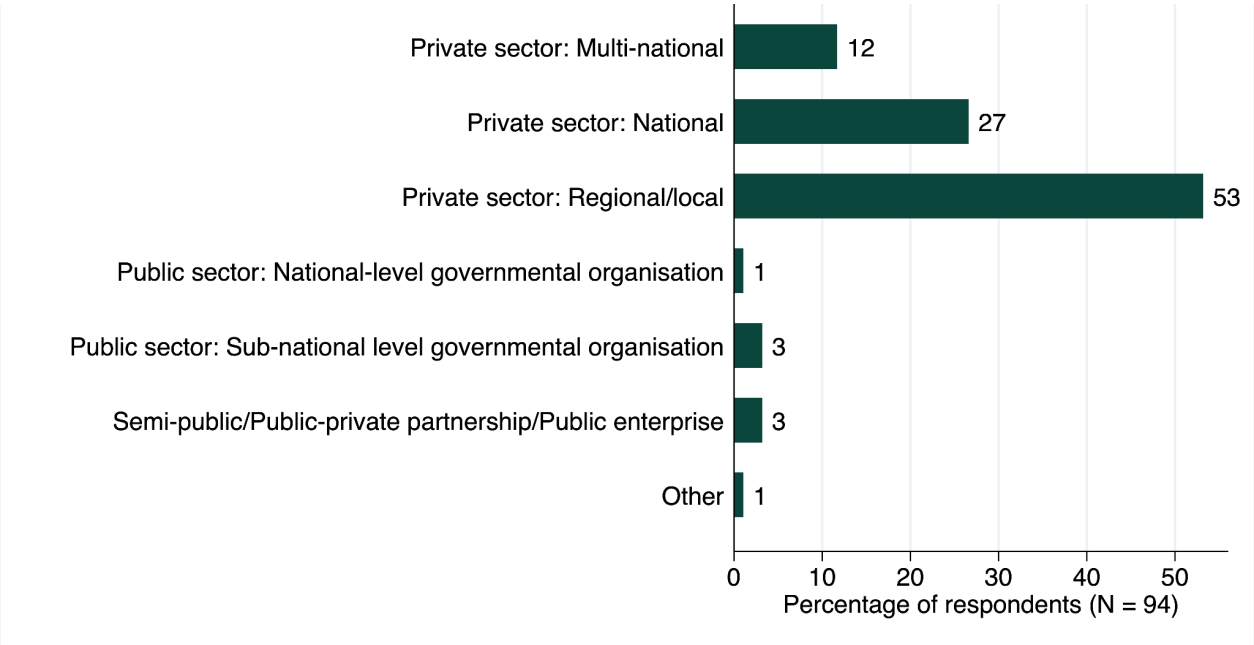


Figure A2-1-6 Sector classification of respondents' organisations (Shortest version)

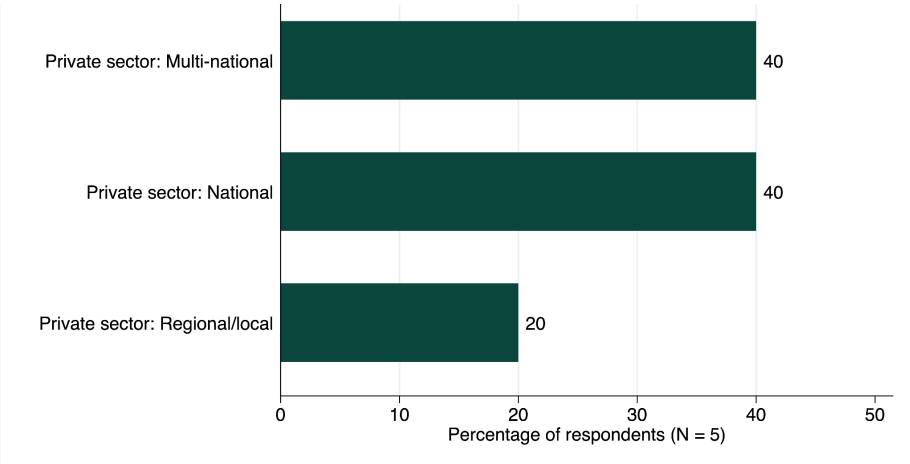


Figure A2-1-7 Sector classification of respondents' organisations (Pilot and long surveys)

Nearly half of the organisations operated at the local scale, for example, at the district, town, or city level. 22% operated at the subnational level and a further 22% at the national level. Fewer than 15% operated across broader geographical scales, such as multiple European countries or globally.

Of the 97 respondents who completed the shorter survey versions, 53 reported knowing the area of land managed under cultivation by their organisations. The reported areas varied considerably, ranging from 0.01 to 13,500 hectares, with a mean of 361.4 hectares and a standard deviation of 1,855.8 hectares. This question was not included in the pilot survey.

The long survey version also asked respondents to estimate their organisations' annual revenue in 2024. Of the three respondents, one did not know the organisation's revenue, one reported an annual revenue of RSD 20 million, and the other reported €4 million.

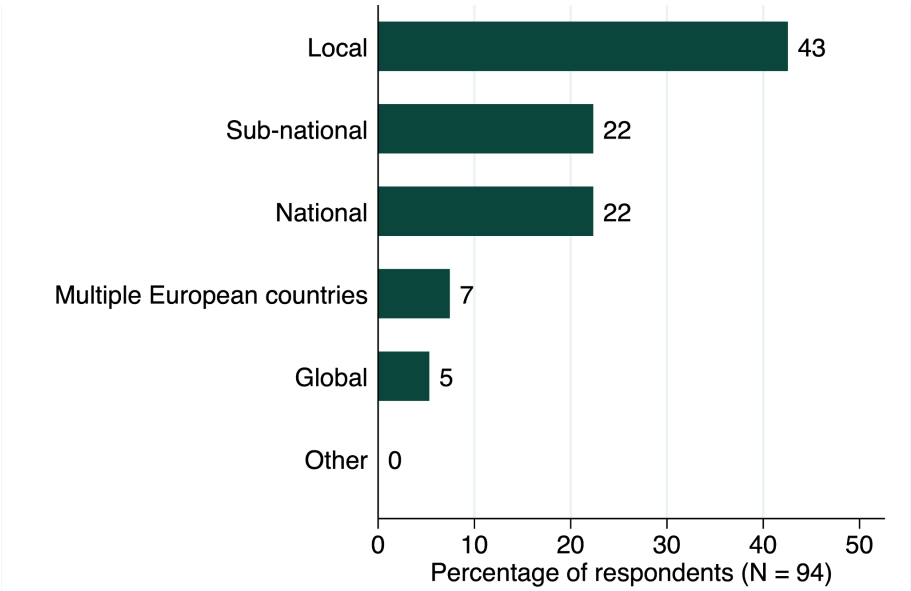


Figure A2-1-8 Geographical scale of organisation operations (Shortest version)

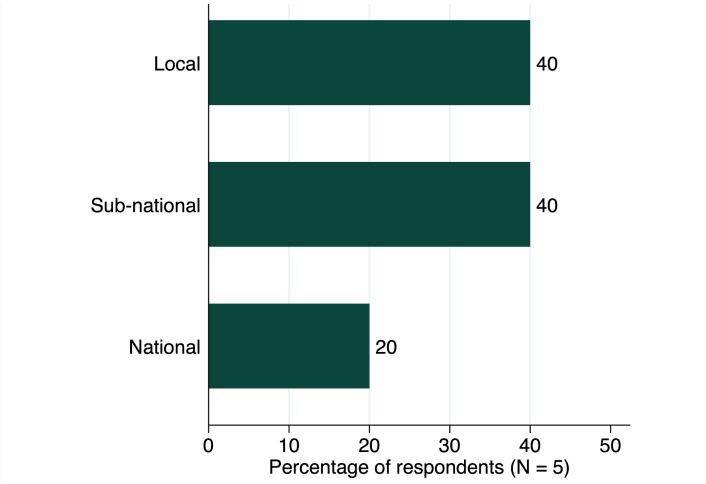


Figure A2-1-9 Geographical scale of organisation operations (Pilot and long surveys)

62% of the organisations were small businesses with fewer than 50 employees. A further 22% were medium-sized organisations, while 16% were large organisations with 250 or more employees.

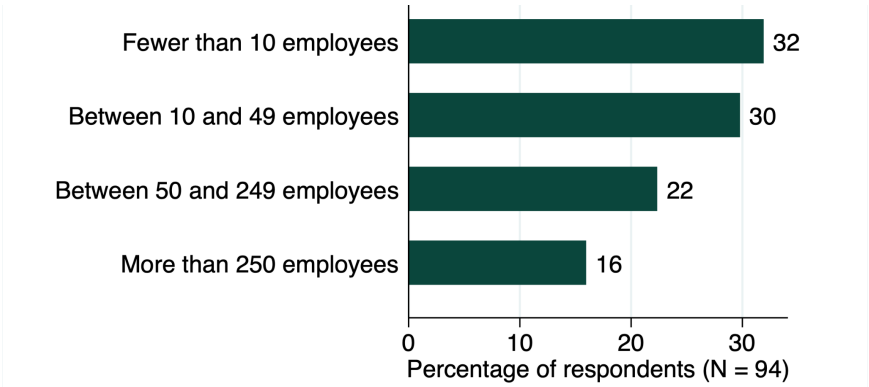


Figure A2-1-10 Number of individuals employed in their organisations (Shortest version)

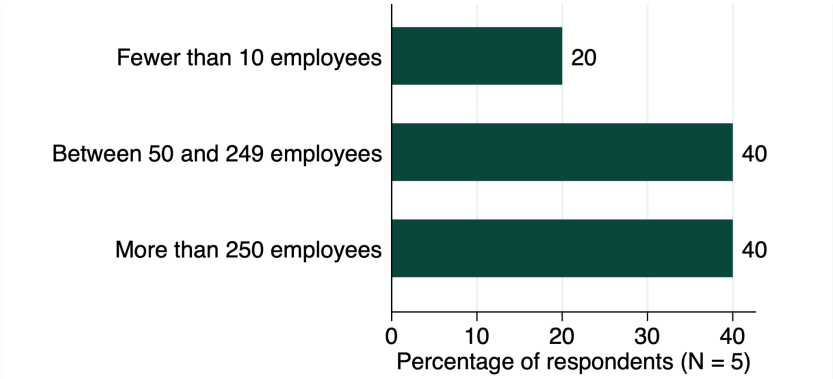


Figure A2-1-11 Number of individuals employed in their organisations (Pilot and long surveys)

The organisations' longest planning horizons varied from less than a month to up to 50 years. More than half had a medium-term planning horizon of between one and five years, 26% planned up to 12 months ahead, and 15% planned more than five years ahead, with 3% planning as far as 10 to 50 years into the future.

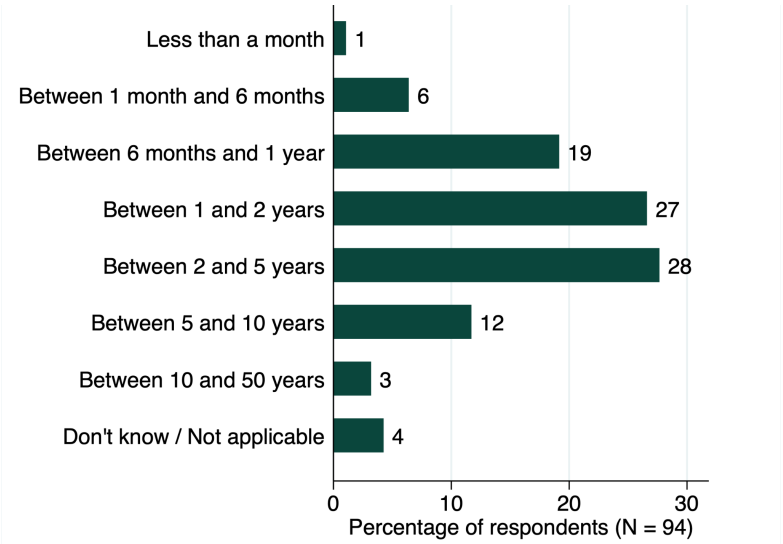


Figure A2-1-12 Respondents' organisations longest planning horizon (Shortest version)

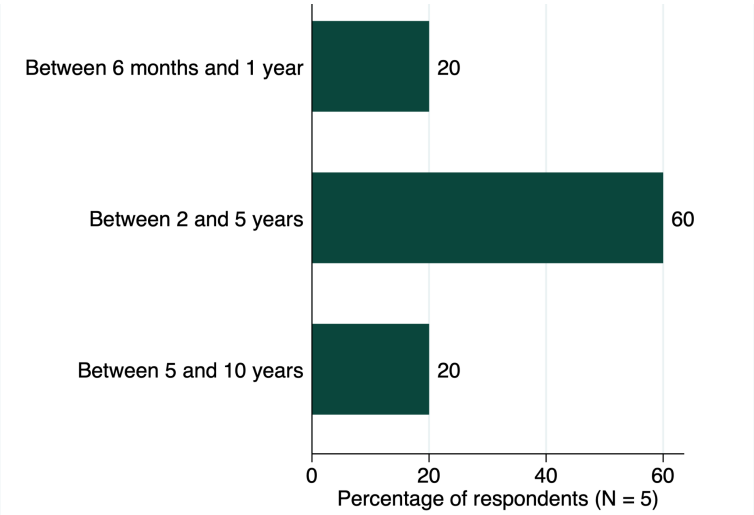


Figure A2-1-13 Respondents' organisations longest planning horizon (Pilot and long surveys)

A2.1.2 Understanding (wine sector respondents)

50% of the wine sector respondents found the provided information easy or very easy to understand.

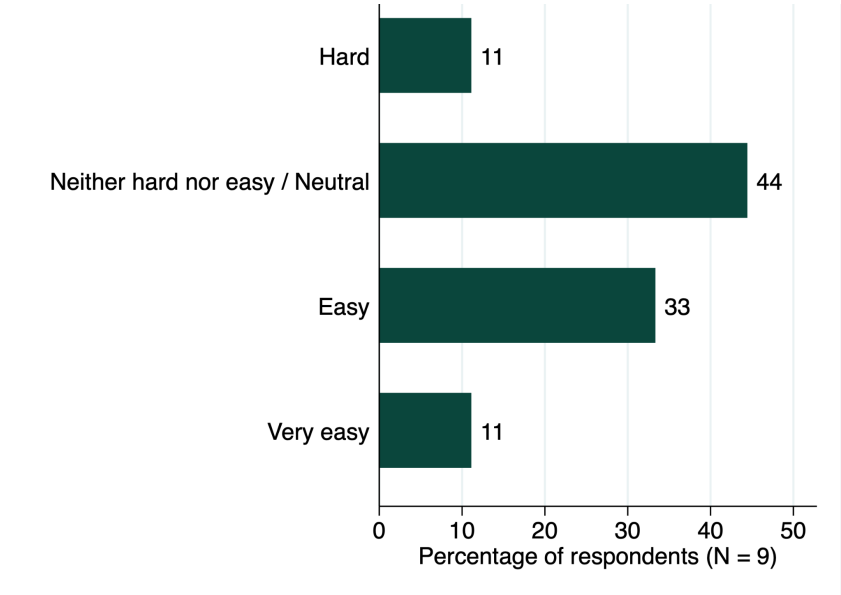


Figure A2-1-14 Understandability of the information provided (Shortest version)

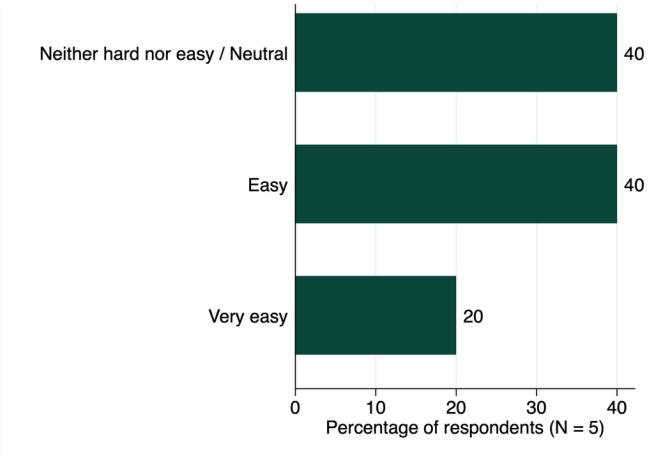


Figure A2-1-15 Understandability of the information provided (Pilot and long surveys)

Among the five respondents to the long and pilot versions of the survey who read the full bulletin before answering the questions, four felt that the balance between text and images was appropriate, while one felt that the bulletin contained too much text.

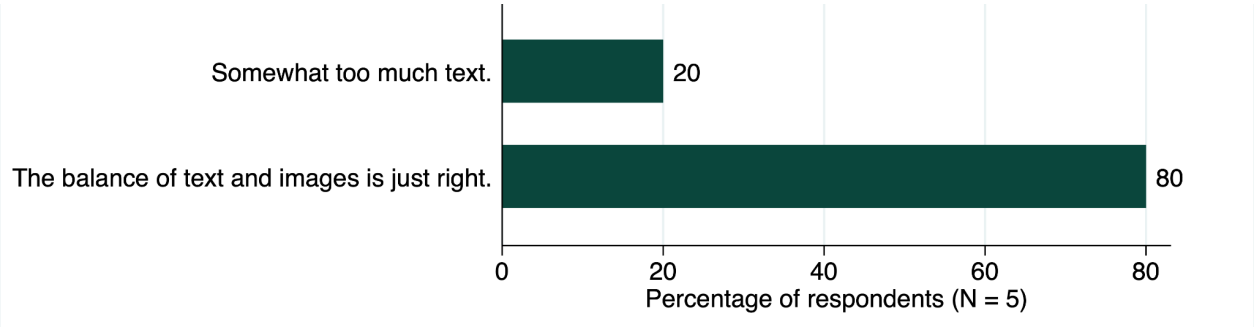


Figure A2-1-16 Balance of text and images of the information provided (Pilot and long surveys)

Among the nine wine sector respondents recruited through Prolific, more correctly interpreted the decadal prediction than the seasonal predictions.

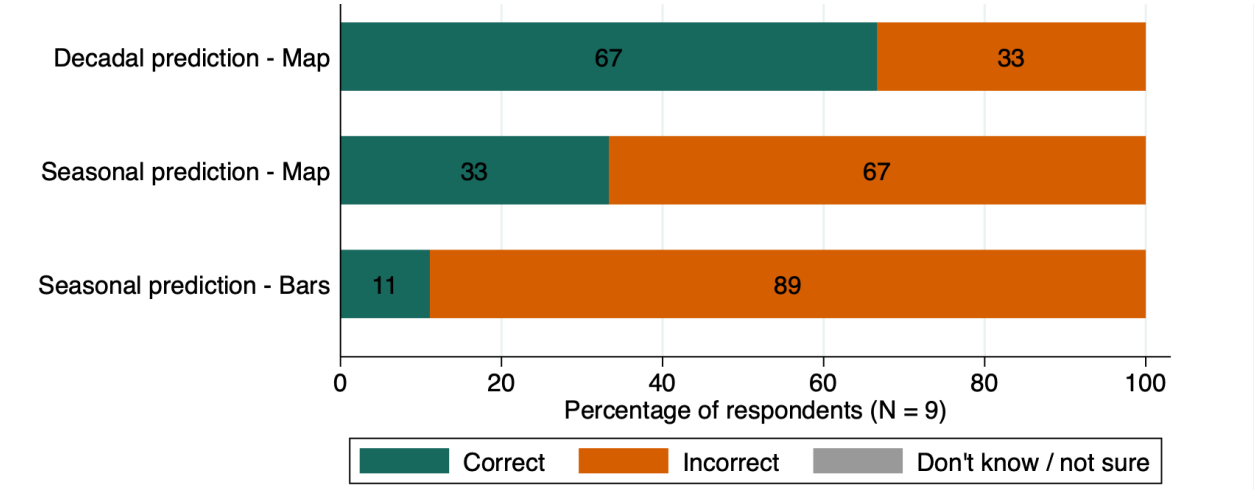


Figure A2-1-17 Understanding of specific content provided (Shortest version)

The long and pilot versions of the survey included additional questions assessing respondents' understanding of the information. The results were consistent with those from the shortest version: some respondents experienced difficulty interpreting the tercile categories and prediction quality presented in both the seasonal prediction maps and bar charts.

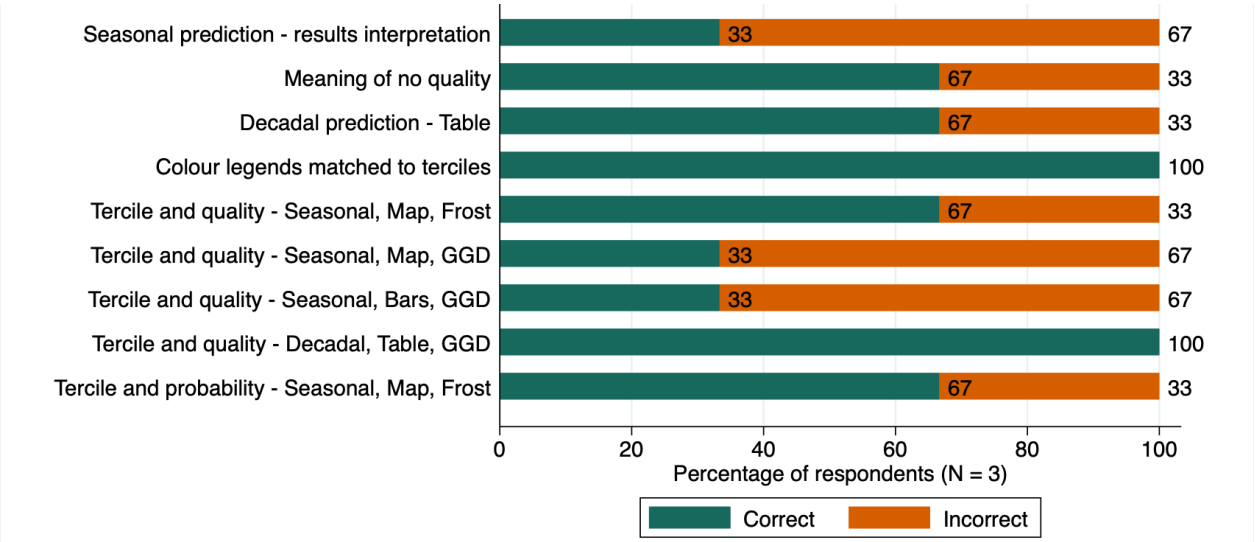


Figure A2-1-18 Understanding of specific content provided (Long Version)

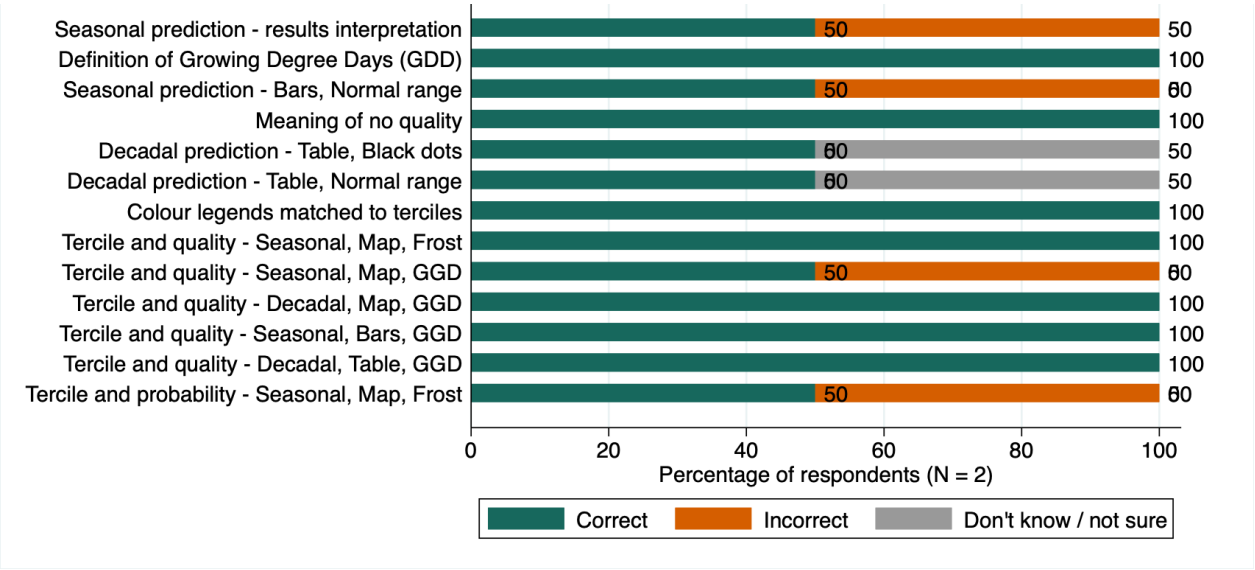


Figure A2-1-19 Understanding of specific content provided (Plot Version)

A2.1.3 Quality Evaluation (wine sector respondents)

The results of the nine wine sector respondents from the Prolific platform were shown below. The two highest-ranked criteria and the lowest-ranked criteria remained the same as in the full sample, while “trustworthy” and “beneficial to yourself” ranked higher.

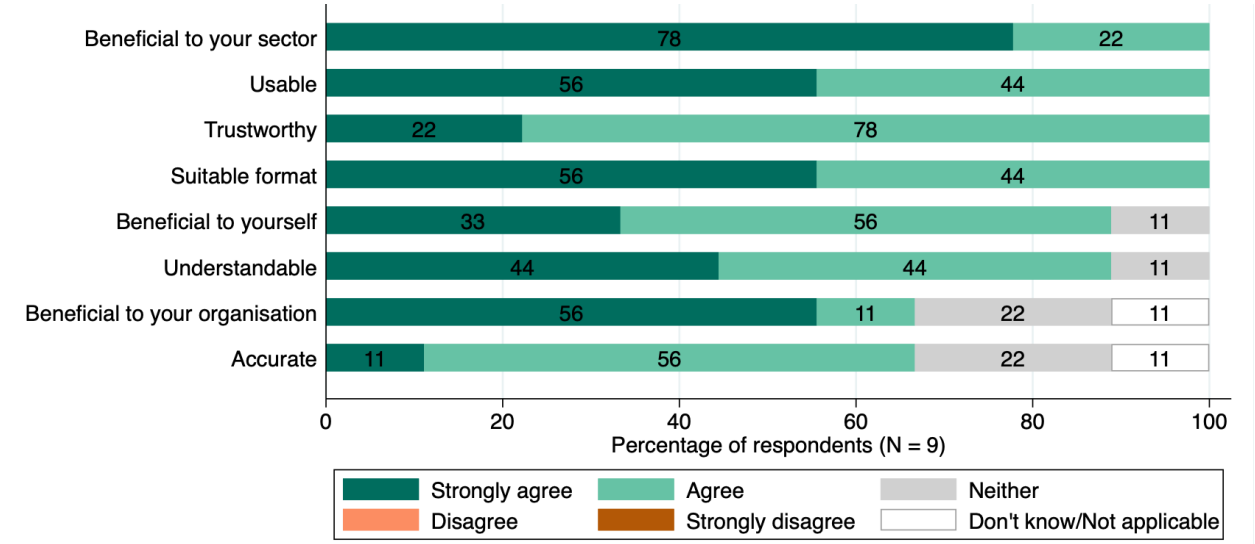


Figure A2-1-20 Perception of the information quality (Shortest version)

Respondents of the longer version surveys (N = 5) assessed the quality of the bulletin positively in general, among whom accuracy and trustworthiness also received the lowest levels of agreement, which is in line with the short survey results.

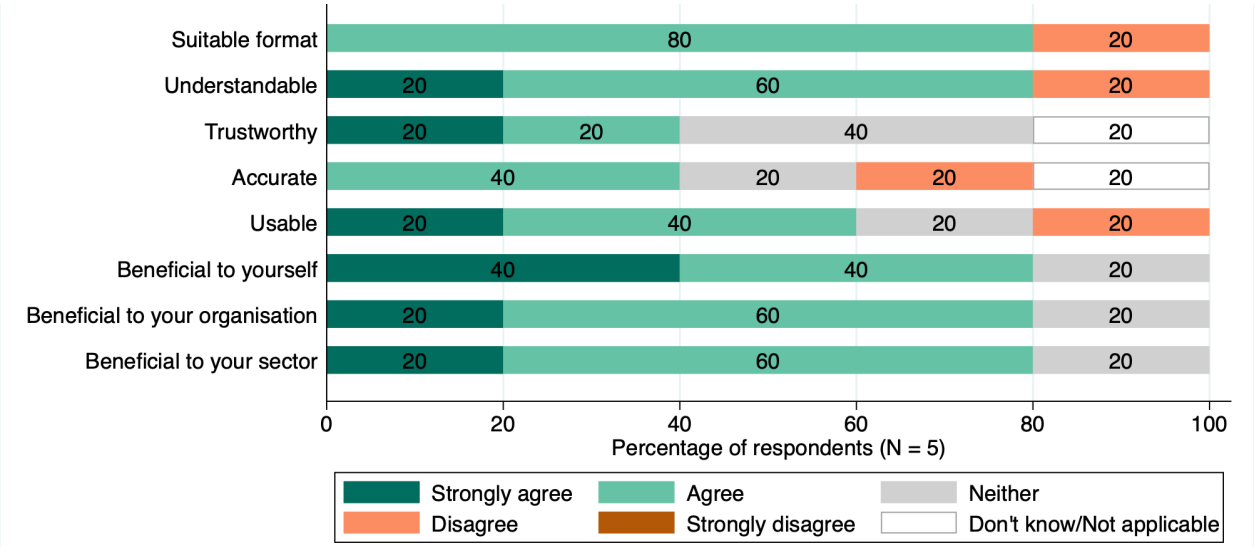


Figure A2-1-21 Perception of the seasonal information quality (pilot and long surveys)

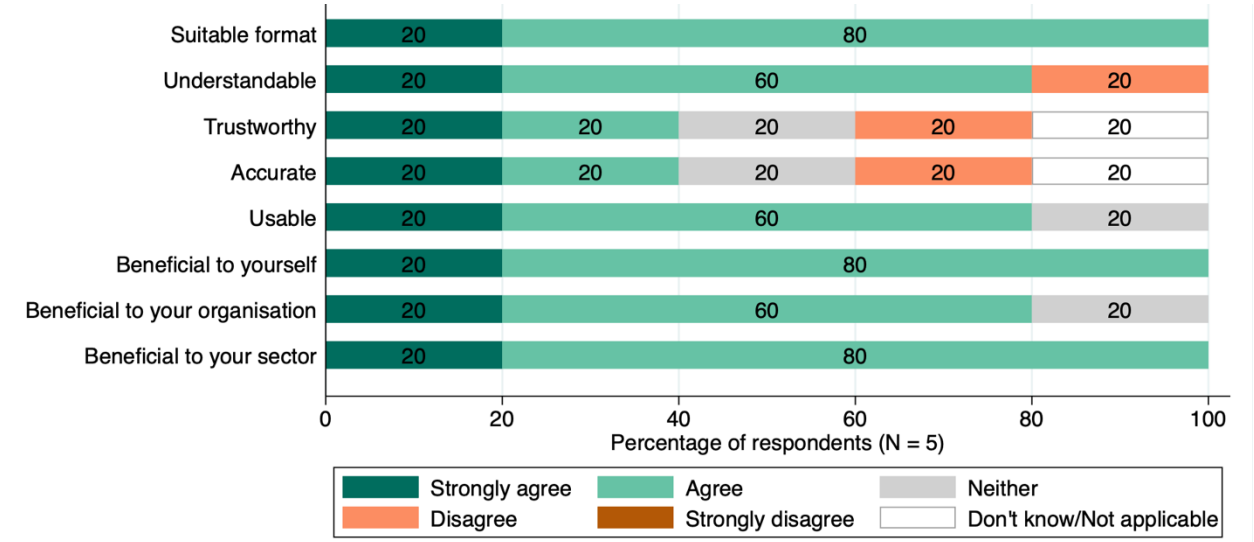


Figure A2-1-22 Perception of the decadal information quality (pilot and long surveys)

A2.1.4 Usability for decision making (wine sector respondents)

Among the five respondents to the longer survey versions, four reported that their organisations already used climate information. These respondents were also asked about the factors driving its use. The two most frequently selected drivers, chosen by all four respondents, were climate adaptation policies and resource optimisation.

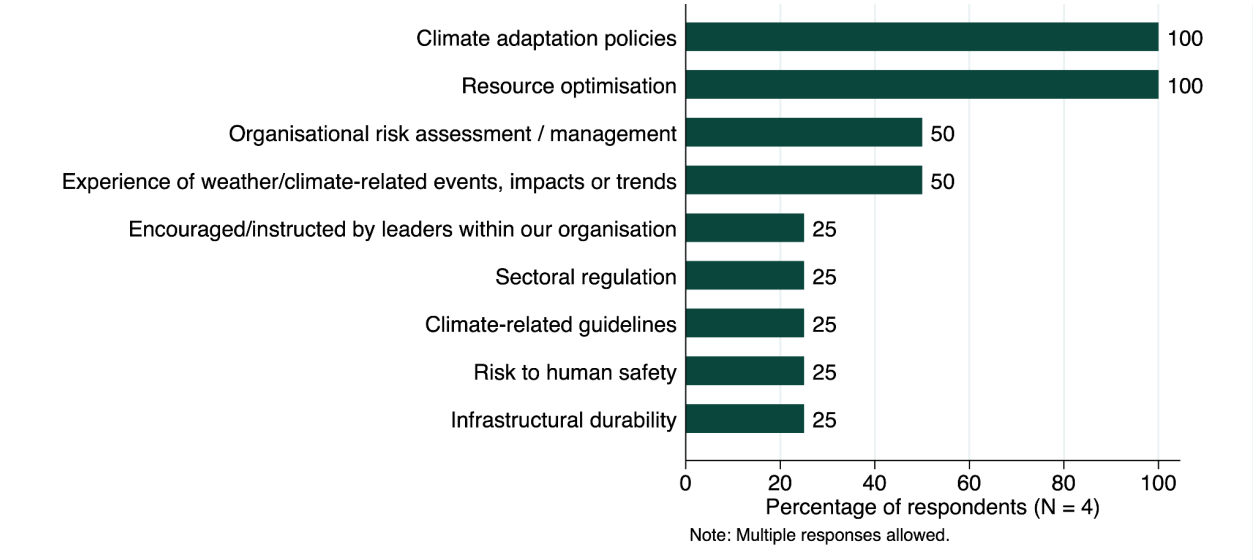


Figure A2-1-23 Drivers of climate information use (Pilot and long surveys)

They were presented with 14 detailed statements across the six categories of climate information use. All five agreed or strongly agreed that the provided information could help their organisations understand the conditions contributing to management challenges, develop climate-change or other resource-planning documents, retrofit existing infrastructure, or undertake new infrastructure projects. However, most were uncertain whether it could help their organisations secure funding or assess financial needs, understand the current state of scientific knowledge, change rules, regulations, or standards, or inform models and practitioner-led research more broadly.

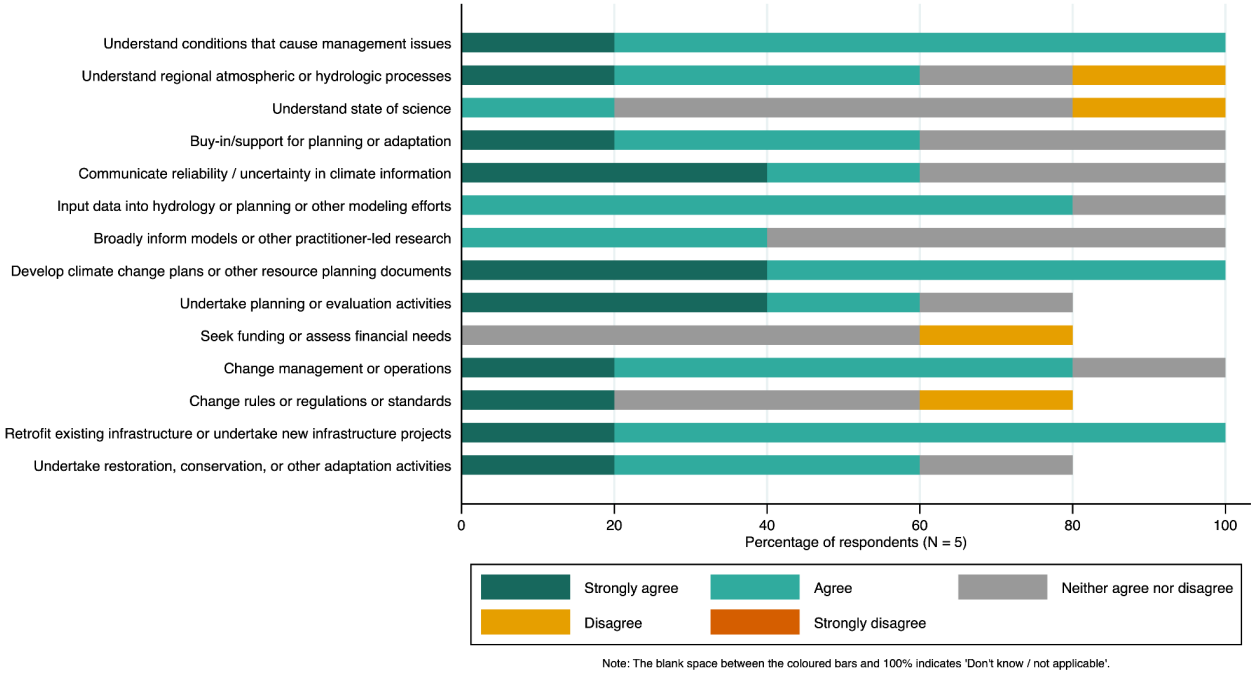


Figure A2-1-24 Potential use of the provided climate information (Pilot and long surveys)

The five respondents to the longer survey versions were also asked how frequently they would prefer to receive each type of information. For seasonal predictions, one respondent preferred weekly updates, three preferred monthly updates, and one preferred quarterly updates. For decadal predictions, four preferred annual updates and one preferred quarterly updates.

They were also asked how much their organisations would be willing to pay annually for seasonal and decadal climate information covering their geographical area. Only one of the five respondents was willing to pay, indicating a maximum annual amount of €250 for seasonal predictions and €300 for decadal predictions.

The results for the nine wine sector respondents from the Prolific platform were shown below.

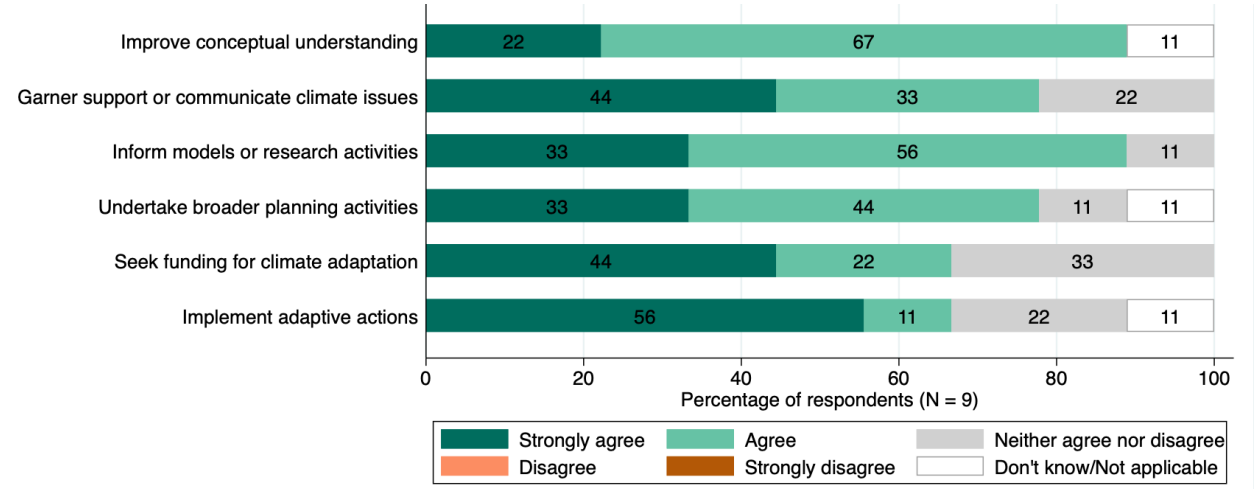


Figure A2-1-25 Potential use of the provided climate information (Shortest version)

A2.1.5 Improvements required (additional questions)

The ranking of the areas of improvement for the nine wine sector respondents is shown below.

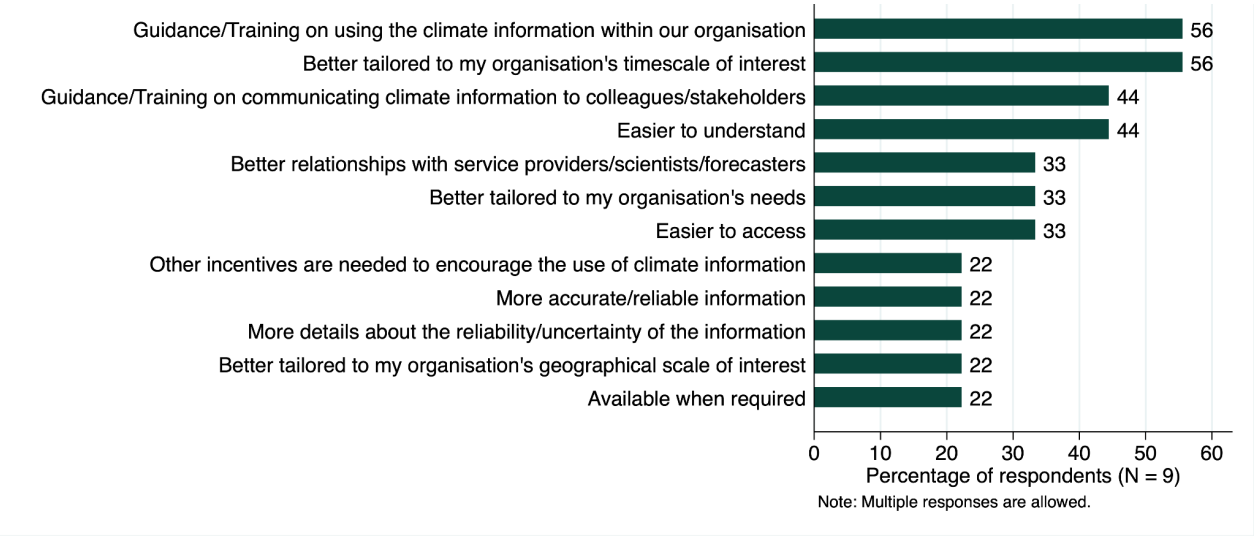


Figure A2-1-26 Areas of improvements for the provided information (Shortest version)

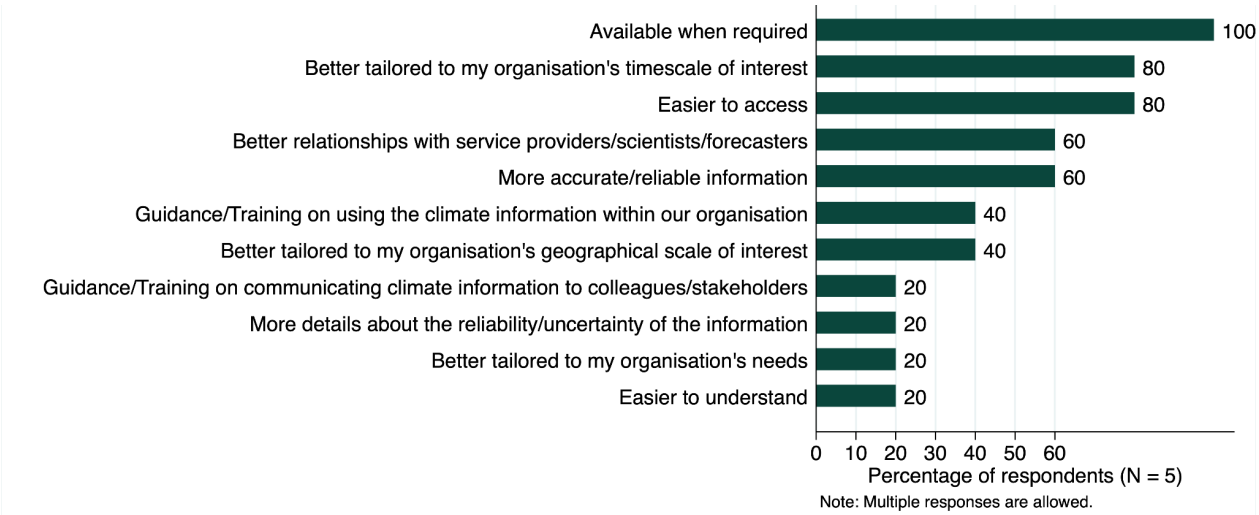


Figure A2-1-27 Areas of improvements for the provided information (Pilot and long surveys)

Regarding presentation formats, more than half of the respondents preferred maps to bar charts for seasonal predictions, while 28% liked both formats. Respondents to the longer versions of the survey were asked a similar question about decadal predictions, and most of the five respondents preferred the use of both maps and time-series tables.

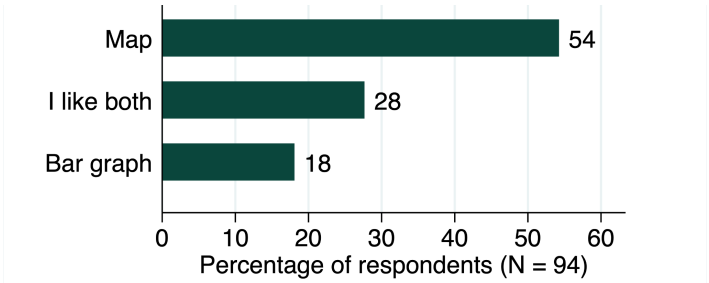


Figure A2-1-28 Preferred presentation format for seasonal predictions (Shortest version)

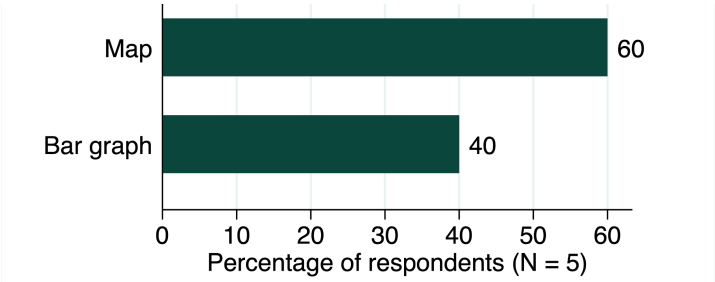


Figure A2-1-29 Preferred presentation format for seasonal predictions (Pilot and long surveys)

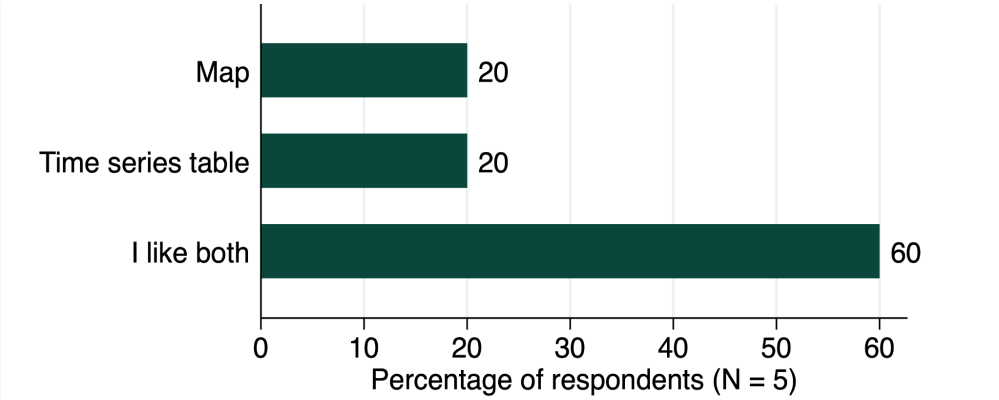


Figure A2-1-30 Preferred presentation format for decadal predictions (Pilot and long surveys)

In the shortest version of the survey, decadal predictions were presented only as maps, and respondents were asked whether they considered this format suitable. Overall, 94% liked the map format, while only 6% suggested using alternative visualisations. In an open-ended response, one respondent recommended displaying the indicator's normal range directly on the map, for example by adding an explanatory label.

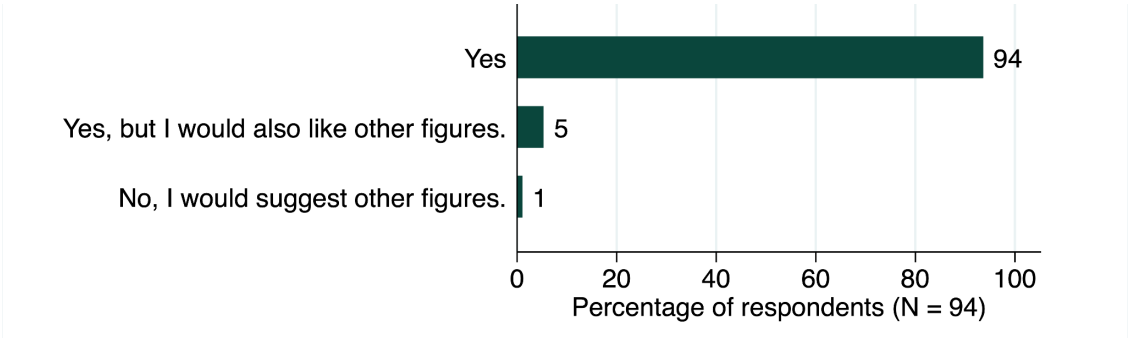


Figure A2-1-31 Preference of the map format for decadal predictions

Among the 99 respondents, 40% preferred decadal predictions extending two years into the future, consistent with the horizon of the information provided in the survey. A three-year horizon was preferred by 35%, followed by a one-year horizon (22%). Only 2% preferred predictions extending beyond three years.

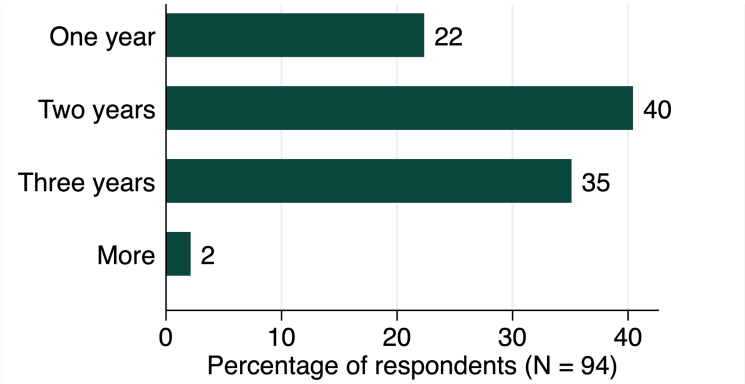


Figure A2-1-32 Preferred prediction horizon for decadal predictions (Shortest version)

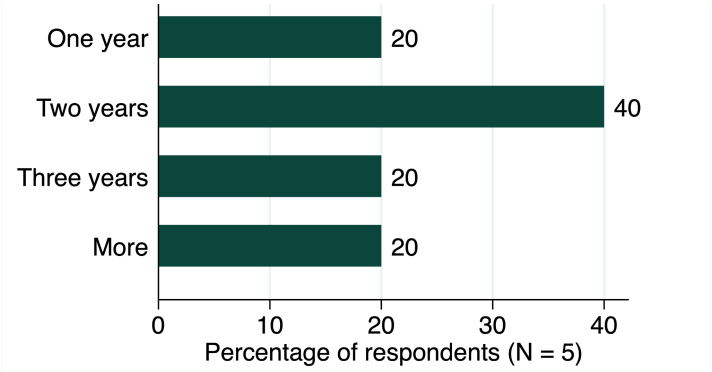


Figure A2-1-33 Preferred prediction horizon for decadal predictions (Pilot and long surveys)

Respondents to the longer versions of the survey were also asked about their preferences concerning the definition of indicators, the choice of reference periods, and the presentation of probabilities and prediction quality. All five respondents considered a baseline temperature of 10°C suitable for their crops or grapes. Both respondents who answered the pilot survey considered the 1993–2016 reference period used for seasonal predictions, and the 1991–2020 reference period used for decadal predictions, to be suitable. Of the two respondents asked whether more or fewer categories should be used instead of the current terciles of below-normal, normal, and above-normal conditions, one preferred to retain the tercile categories, while the other preferred the use of a specified threshold. All five respondents considered a quantitative score, such as a percentage from 0% to 100%, useful for communicating prediction quality in the time-series table of decadal predictions. Four of the five respondents considered a symbol, such as a traffic-light indicator, useful for communicating prediction quality in the time-series table, while one did not.

Respondents were also asked an optional question about which additional climate-related indicators they would like to receive and in what formats. Twenty-four respondents answered this question. The most frequently mentioned indicators included precipitation-related measures, such as accumulated rainfall, the number of rainy days, precipitation levels, relative humidity and

moisture levels; temperature-related measures, such as daily maximum and minimum temperatures, average growing-season temperatures, local and global temperatures, temperature trends over time, the number of heatwave days, and beneficial growing degree days, including those calculated using the Gladstones method; drought occurrence and severity; evapotranspiration measured in millimetres; wind conditions; climate information for periods preceding frost; the likelihood of summer hailstorms; bioclimatic indicators; and long-term climate trends. Suggested presentation formats included maps, histograms, and trend charts.

A2.2 Financial (pensions) sector survey

A2.2.1 Sample composition

Most respondents were from the United Kingdom, with additional respondents from Poland, the Netherlands, and other ten European countries.

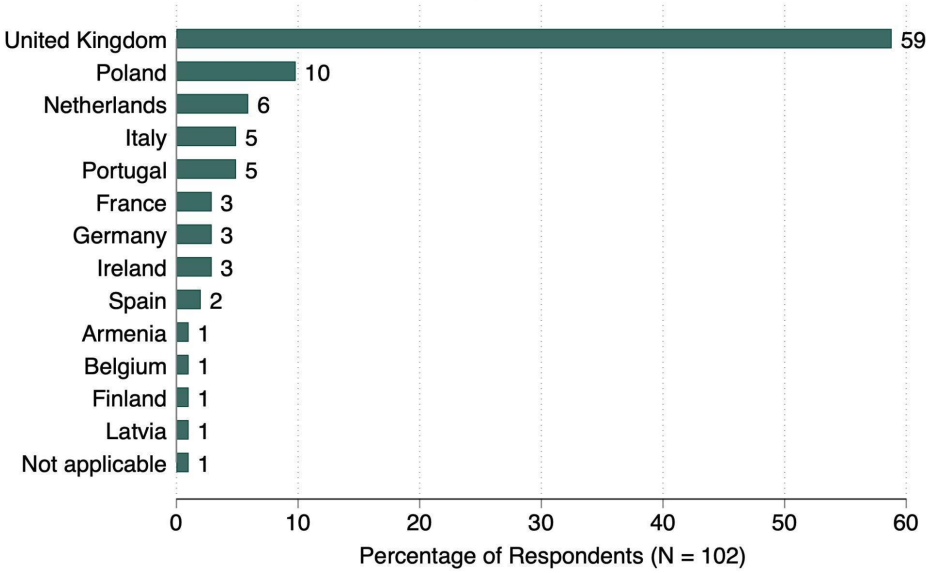


Figure A2-2-1 Respondents' organisations in Europe

Around half of these respondents' organisations had a longest planning horizon of either 2-5 years or 5-10 years, while around 20% reported horizons of less than 2 years or longer than 10 years, respectively.

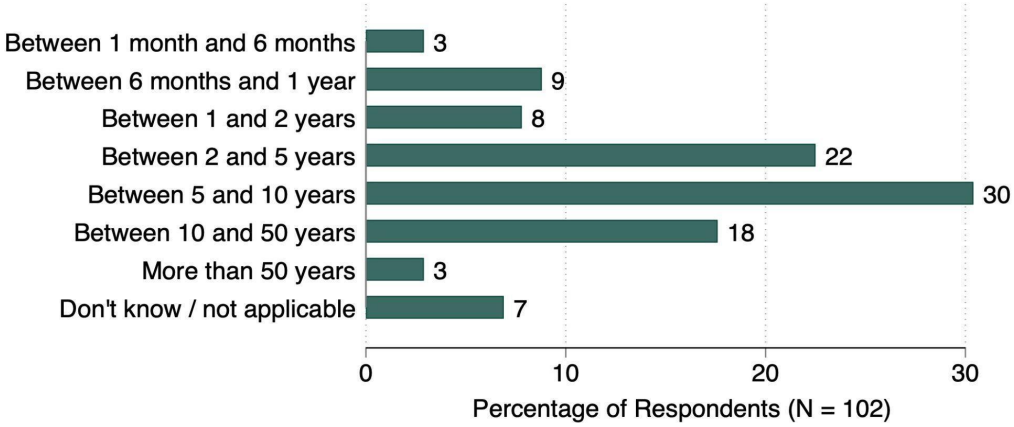


Figure A2-2-2 Respondents' organisations longest planning horizon

Around half of the respondents had 1-5 years of experience in their current role, 22% had 6-10 years of experience, and 4% had more than 20 years of experience.

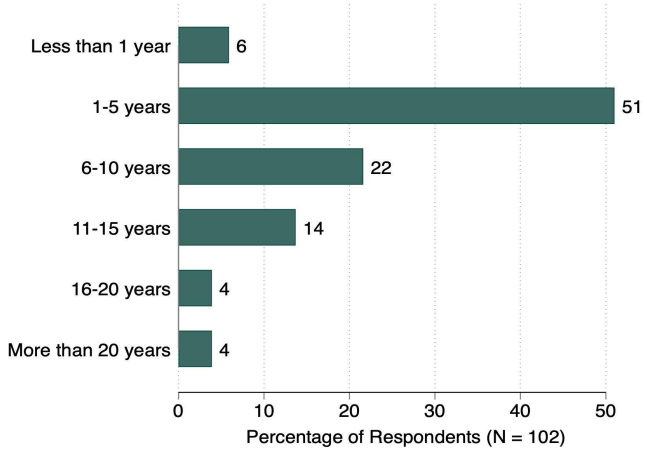


Figure A2-2-3 Respondents' years of professional experience in their current role.

Among the 67 respondents from the broader financial sector, 40% reported that their organisations operated at the national level, while another 40% operated at the global level and 19% operated across multiple European countries. 90% of respondents from the broader financial sector reported that their organisations were in the private sector and 10% were in the public sector.

Among the 35 respondents who worked with pension funds, most were asset managers or investment consultants. The remaining respondents were in other roles, pension fund managers, actuaries or pension fund trustees.

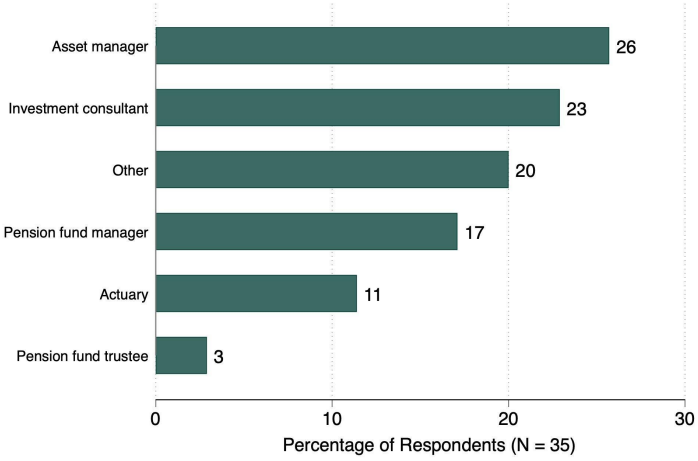


Figure A2-2-4 Respondents' primary roles in the pension sector

Around half of the pension-sector respondents managed global investment portfolios, followed by portfolios spanning multiple European countries, national portfolios, and portfolios at other geographical scales.

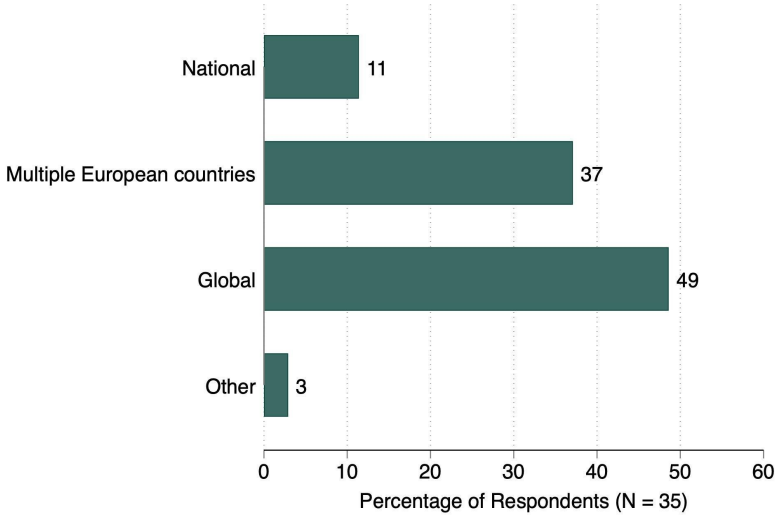


Figure A2-2-5 Geographical scale of pension-sector respondents' investment portfolios

83% of pension-sector respondents were involved with a pension scheme linked to the private sector, 9% worked with pension schemes in the public sector, and 6% worked with pension schemes linked to an international organisation, such as a United Nations agency or the European Commission.

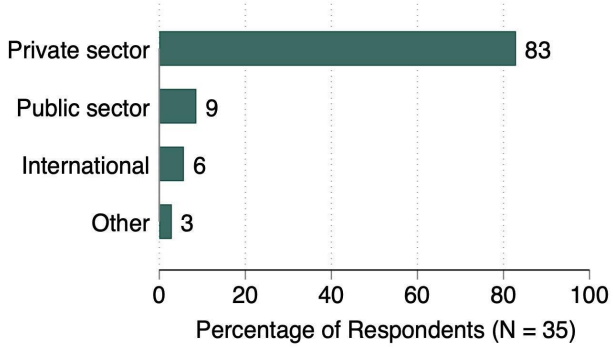


Figure A2-2-6 Sector classification of the pension funds they were involved

When asked about the largest scheme with which they were involved, 19 of the 35 pension-sector respondents reported that their largest fund was based in the UK. Other respondents mentioned Germany, Spain, and other 8 countries.

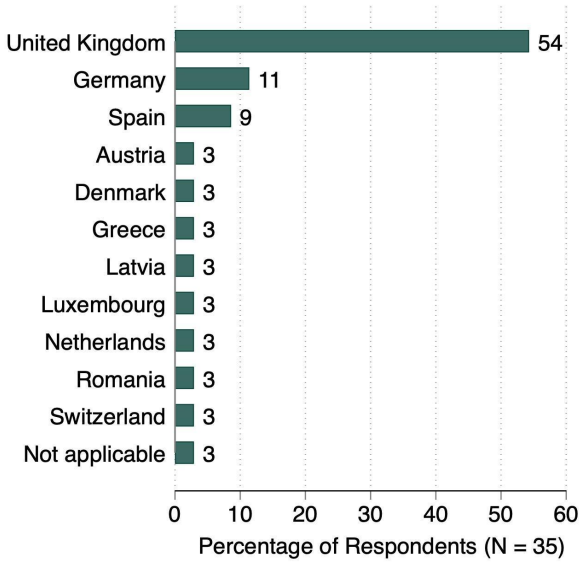


Figure A2-2-7 Country of the largest scheme they were involved

The assets of the largest schemes with which respondents were involved ranged from less than €30 million to over €1 billion. Most respondents selected either €30-70 million or €100-500 million.

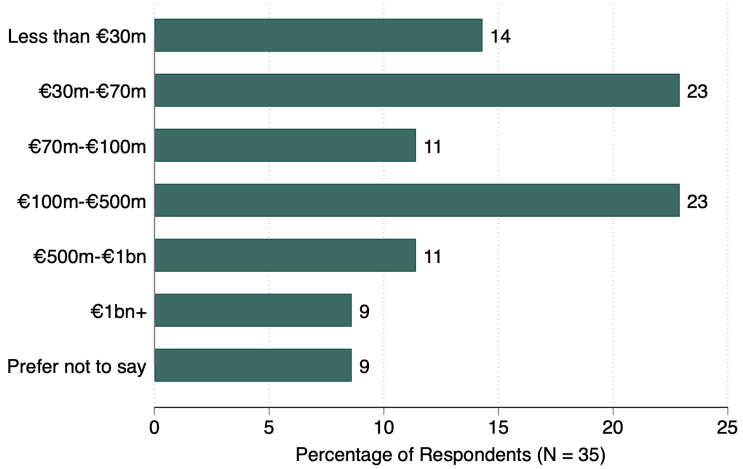


Figure A2-2-8 Assets under management of the largest scheme they were involved

26 of them (74%) reported that some form of climate information is used in the investment decision-making process for the largest scheme they managed.

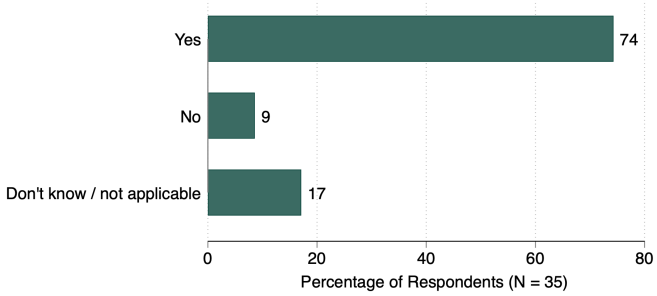


Figure A2-2-9 Use of climate information in investment decision making for the largest scheme they were involved

All respondents were also asked to rank the top five sectors of the economy they think will be most affected by physical climate impacts. For analysis, the sector ranked first was assigned a score of 5, while the fifth-ranked sector received a score of 1. Sectors not selected were assigned a score of 0. Figure A2-2-10 presents the average scores for each sector, with error bars indicating standard deviations. “Agriculture, forestry, and fishing” has the highest average score, followed by “Water supply, sewerage, waste management, and remediation activities”, and “Electricity, gas, steam, and air conditioning supply”.

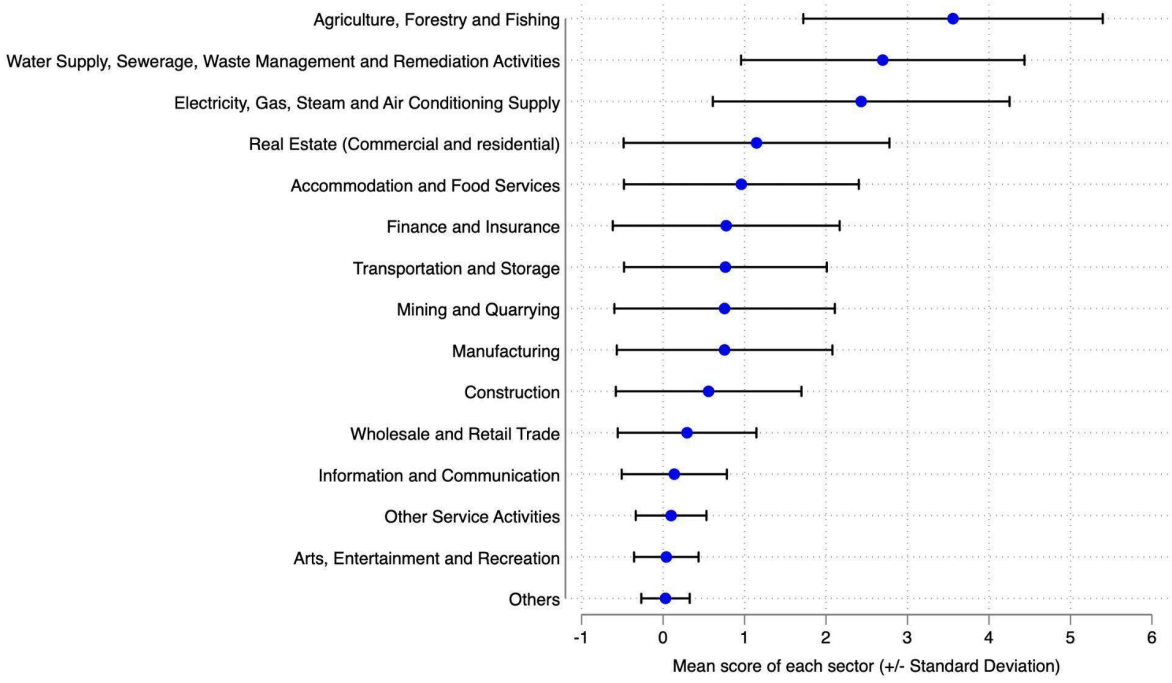


Figure A2-2-10 Top five sectors that most affected by physical climate impacts

A2.2.2 Understanding (pension sector respondents)

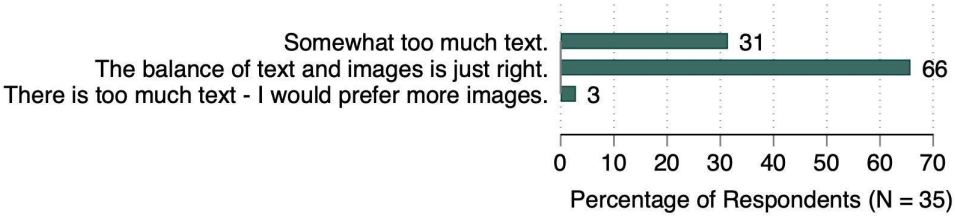


Figure A2-2-11 Balance of text and images of the information provided (pension-sector respondents)

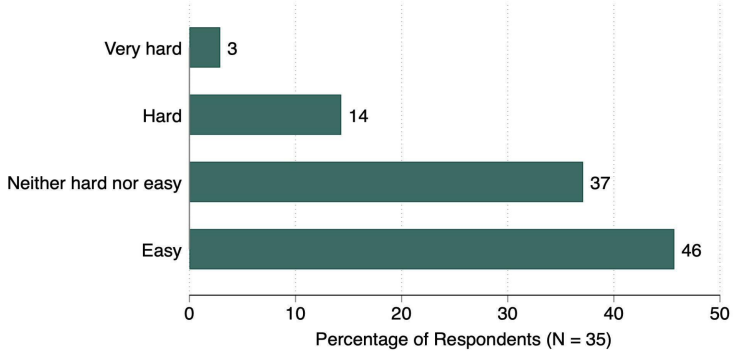


Figure A2-2-12 Understandability of the information provided (pension-sector respondents)

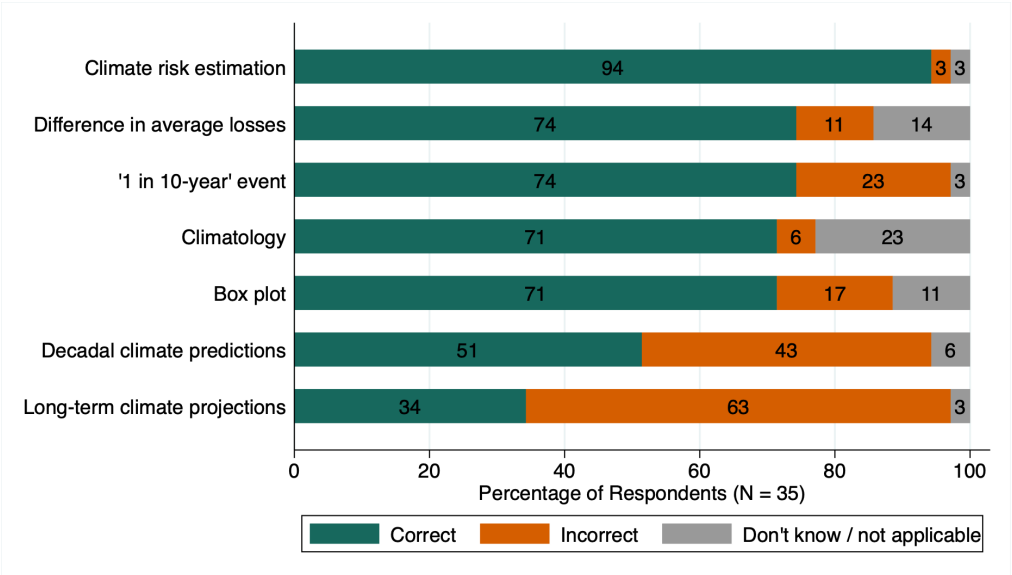


Figure A2-2-13 Understanding of specific content provided (pension-sector respondents)

A2.2.3 Quality Evaluation (pension sector respondents)

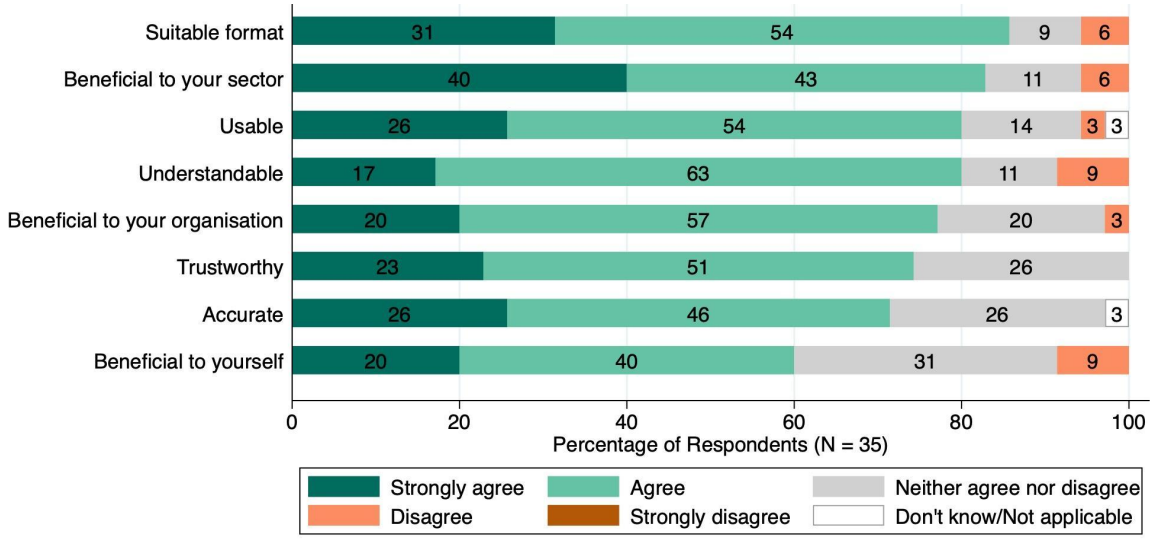


Figure A2-2-14 Perception of the prototype quality (pension-sector respondents)

A2.2.4 Usability for decision making (pension sector respondents)

The five respondents recruited through ASPECT's own network were asked an additional question about the current stage of climate information use in their organisations. 3 respondents who already used climate information answered this question. All three reported using climate information to inform practitioner models or research activities. However, there was no common view regarding the other five types of information use. In particular, none reported using climate information to seek funding for adaptation or to evaluate financial implications.

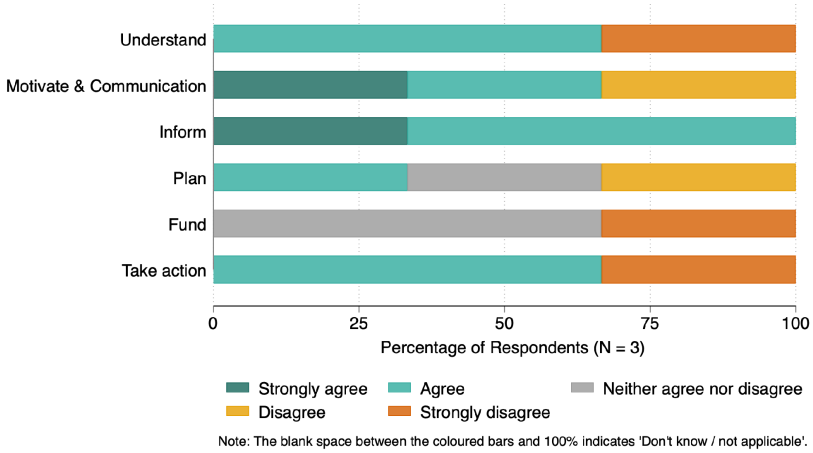


Figure A2-2-15 Typology of current use of climate information (Plot respondents)

They were then asked about fourteen sub-categories of information use, which follows the typology of climate information use introduced by Jagannathan et al. (2023). For most sub-categories, the five pension-sector respondents selected *"Neither agree nor disagree"* or *"Don't know/Not applicable,"* indicating that they are still uncertain about how this new information could benefit their organisations at this stage.

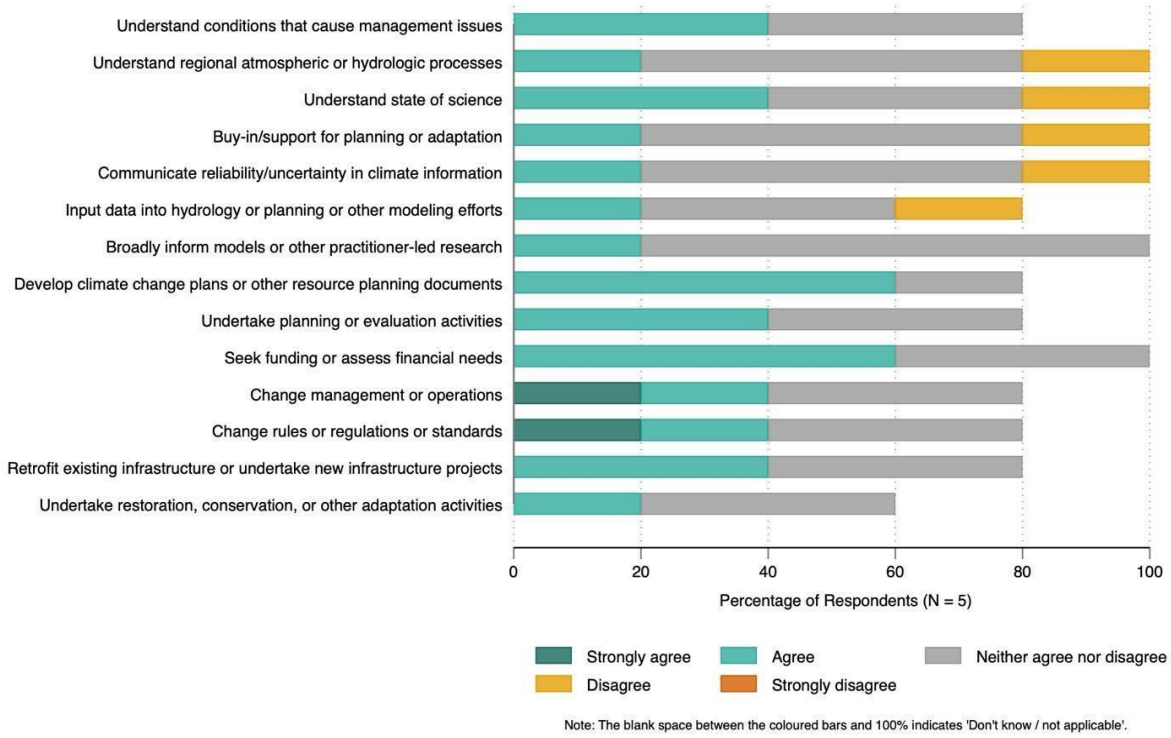


Figure A2-2-16 Potential use of the provided climate information (ASPECT network respondents)

They were also asked about their willingness to pay for such kind of climate information. But all five respondents were unsure whether their organisations would be willing to pay for it.

A2.3 Temperature predictions survey

A2.3.1 Sample composition

Respondents' organisations were distributed across 12 European countries. More than half were based in the United Kingdom (53%), followed by Germany (12%). Italy, Poland, and Portugal each accounted for 5% of the sample, while Ireland and Spain each accounted for 4%. Other countries include the Netherlands, France, Greece, Romania, and Slovakia.

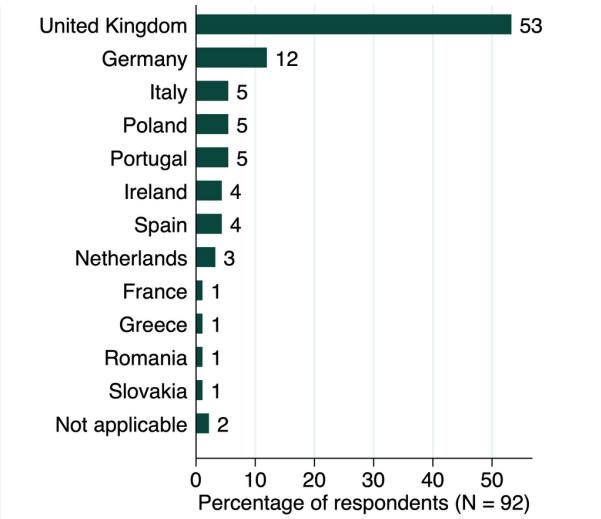


Figure A2-3-1 Respondents' organisations in Europe

Most respondents had worked in their current roles for one to five years (37%), followed by six to ten years (27%). A further 18% had more than 20 years of experience, 11% had 11–15 years, and 7% had 16–20 years of professional experiences in their current roles.

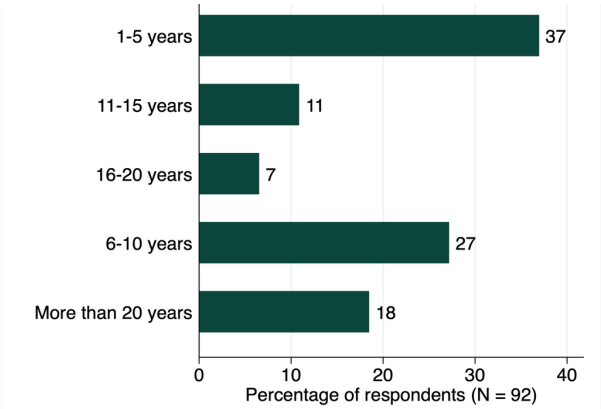


Figure A2-3-2 Respondents' years of professional experience in their current role.

Regarding geographical scope, 43% of respondents worked for organisations operating at the local level, such as districts, towns, or cities. A further 37% worked for organisations operating nationally, while 20% represented organisations with a global scope.

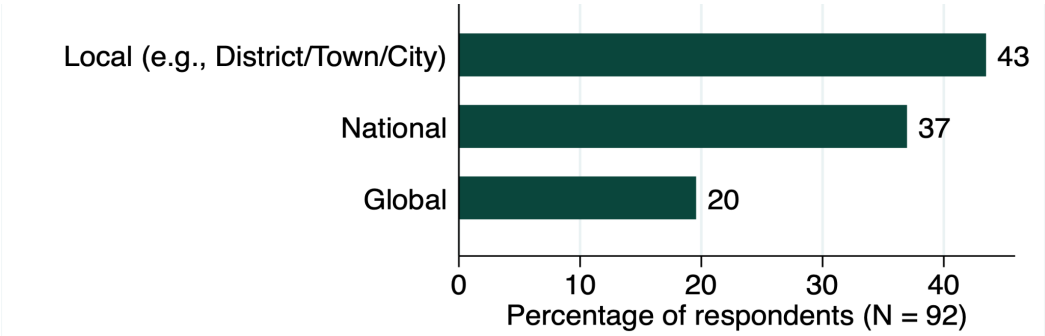


Figure A2-3-3 Geographical scope of respondents' organisations

Most respondents worked for large organisations. 61% reported that their organisations employed more than 250 people. A further 28% worked for medium-size organisations with 10 to 249 employees, and 11% for small organisations with fewer than 10 employees.

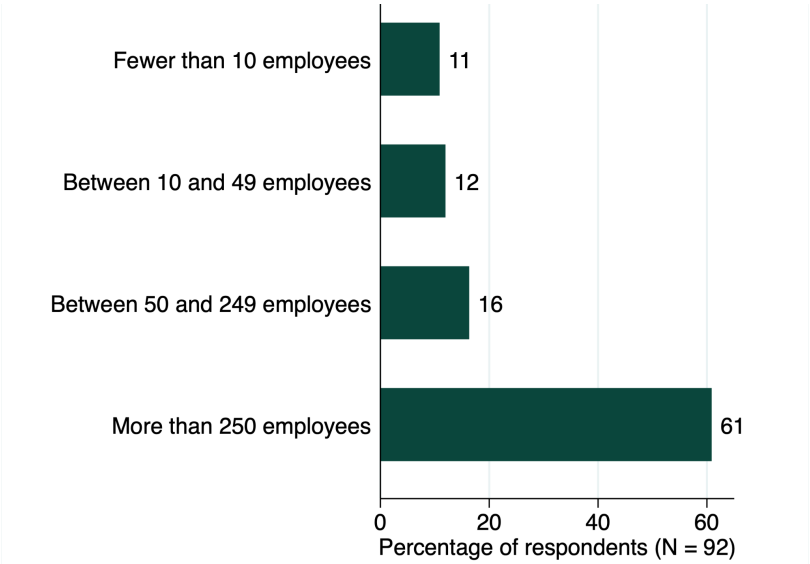


Figure A2-3-4 Number of employees of respondents' organisations

The most frequently reported organisational planning horizon was between two and five years. 13% of the respondents reported short planning horizons of up to one year. 14% reported that their organisation plans more than more than ten years ahead, with 5% reported horizons exceeding 50 years. Of the 13 respondents (14%) who did not know their organisations' longest planning horizon, most of them had a relatively short experience of 1–5 years in their current roles

(seven), worked for large organisations with more than 250 employees (ten), and worked for organisations operating at a local scale (eight).

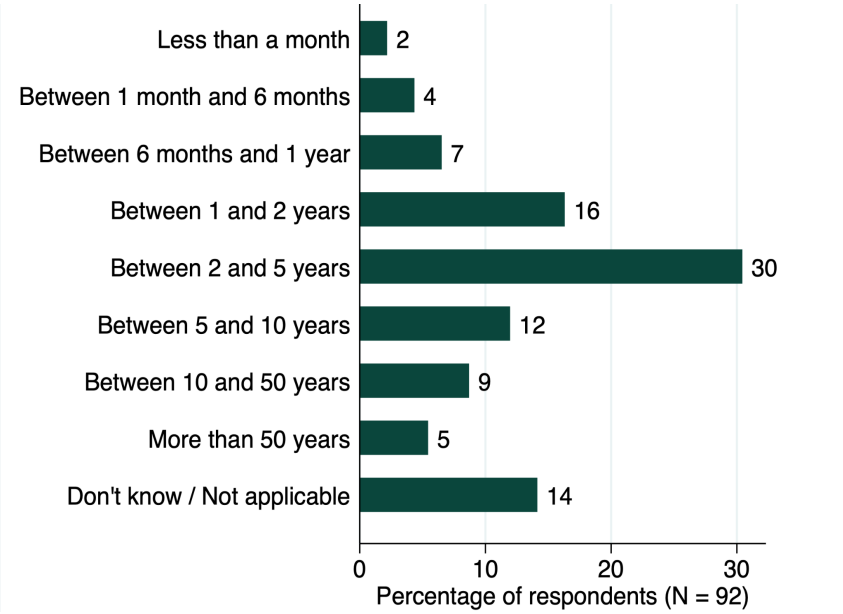


Figure A2-3-5 Organisations' longest planning horizons

A2.3.2 Understanding (emergence response/humanitarian respondents)

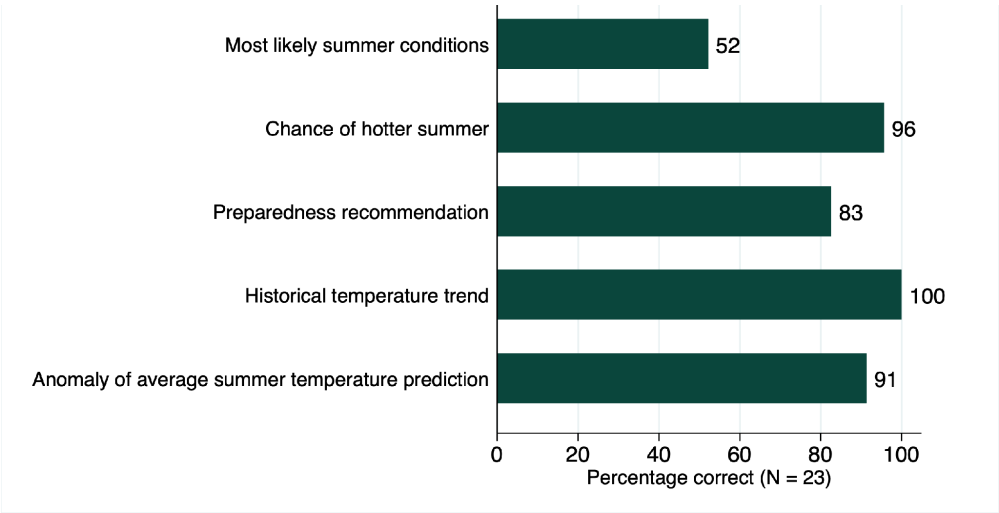


Figure A2-3-6 Understandability of the information provided (emergence response/humanitarian respondents)

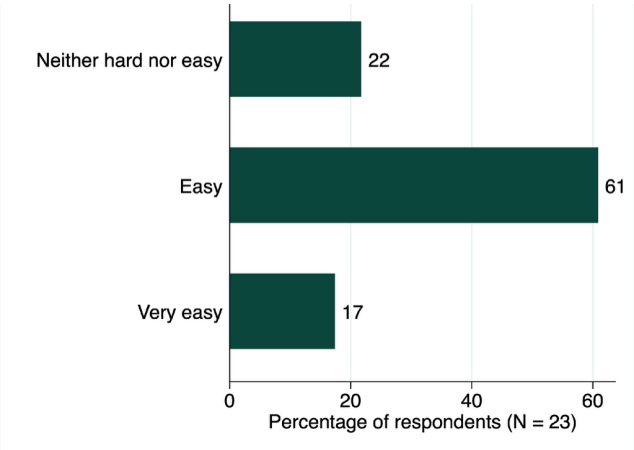


Figure A2-3-7 Ease of understanding of the climate information provided (emergence response/humanitarian respondents)

A2.3.3 Quality Evaluation (emergence response/humanitarian respondents)

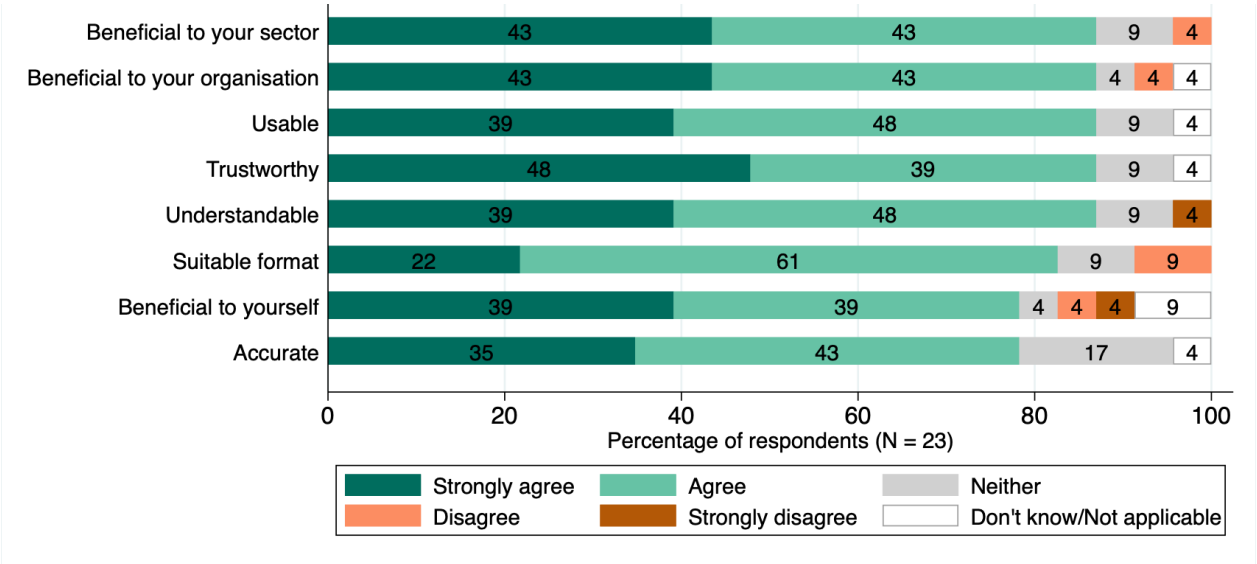


Figure A2-3-8 Quality evaluation of climate information provided (emergence response/humanitarian respondents)

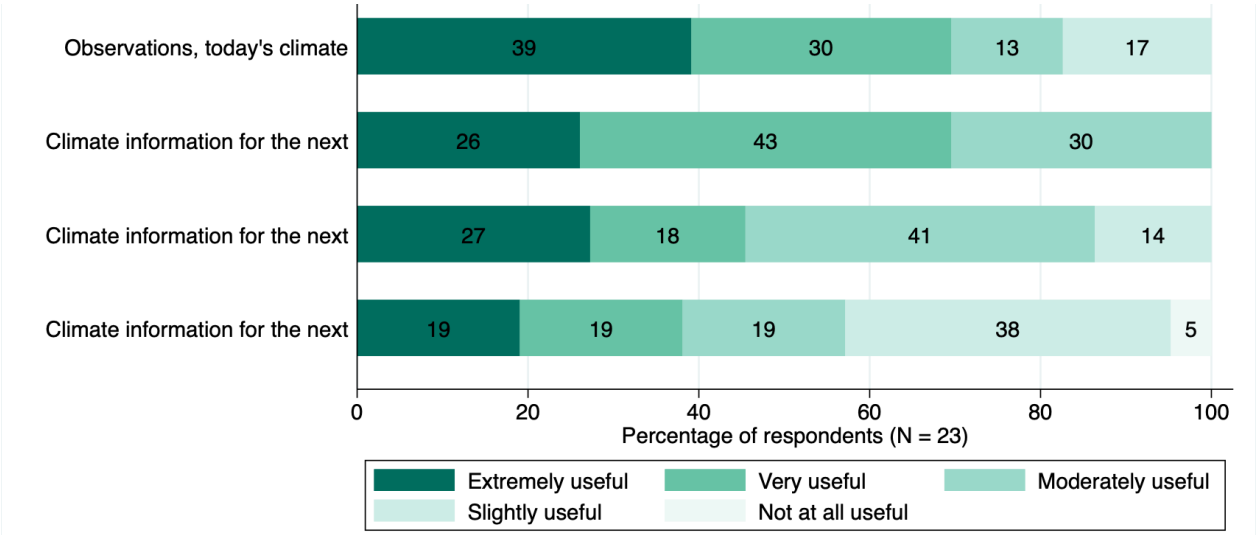


Figure A2-3-9 Usefulness of climate information in different timescales (emergence response/humanitarian respondents)

A2.3.4 Usability for decision making (emergence response/humanitarian respondents)

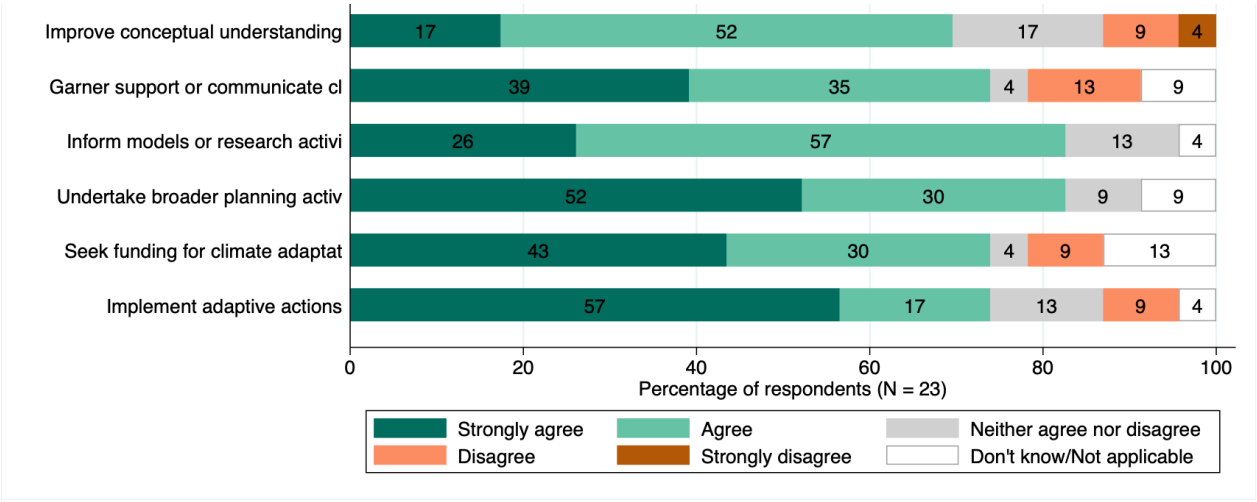


Figure A2-3-10 Organisations' potential use of the climate information provided (emergence response/humanitarian respondents)

A2.3.5 Improvements required (emergence response/humanitarian respondents)

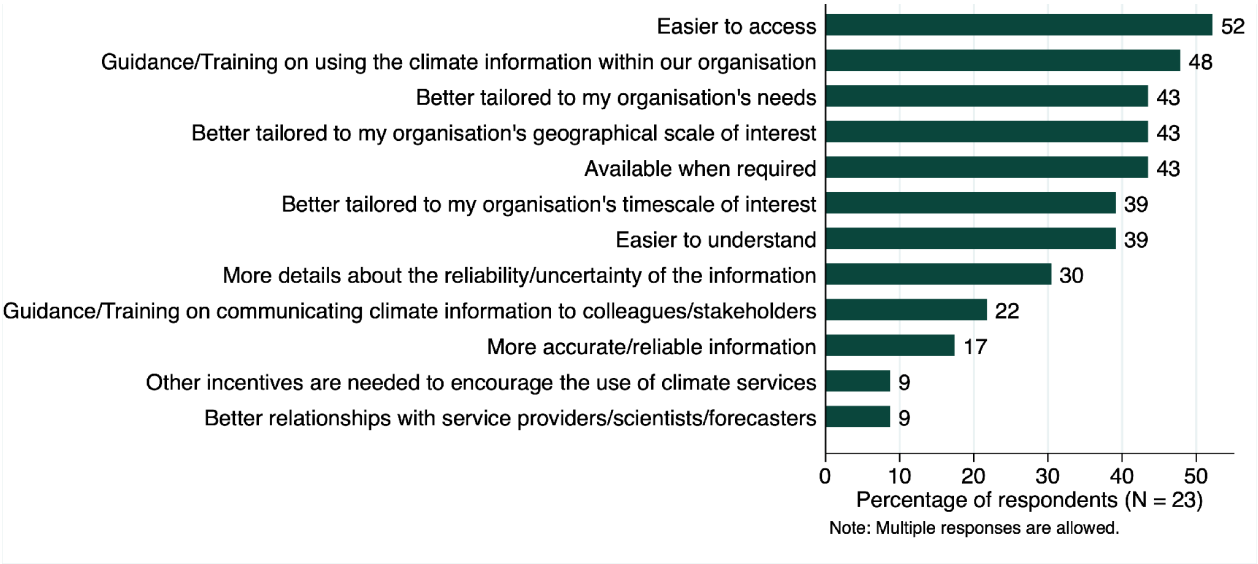


Figure A2-3-11 Improvements required for the provided climate information (emergence response/humanitarian respondents)

A2.4 Governance sector survey

Most respondents (51%) had between one and five years of professional experience in their current roles, while 25% had between six and ten years of experience. Fewer than one-quarter of respondents had more than 10 years of professional experience in their current roles.

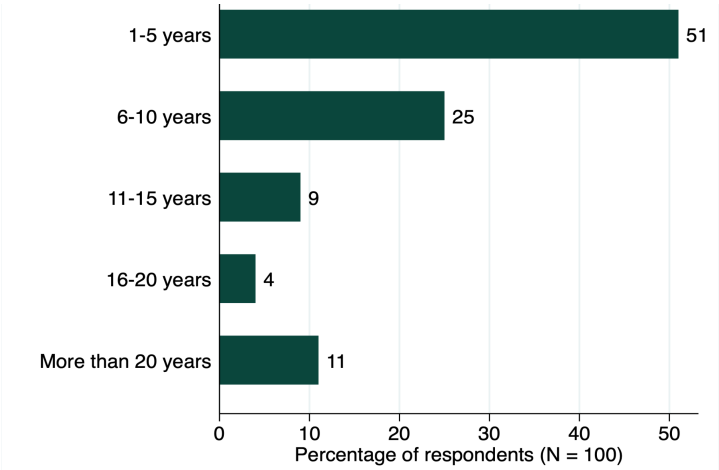


Figure A2-4-1 Respondents' years of professional experience in their current role.

Respondents' organisations were distributed across 13 European countries. The largest proportion was based in the United Kingdom (37%), followed by Germany (12%), the Netherlands (9%), Portugal (8%), Poland (7%), France (6%), and Spain (6%). Smaller proportions were based in Italy, Hungary, Ireland, Greece, Belgium, and Sweden.

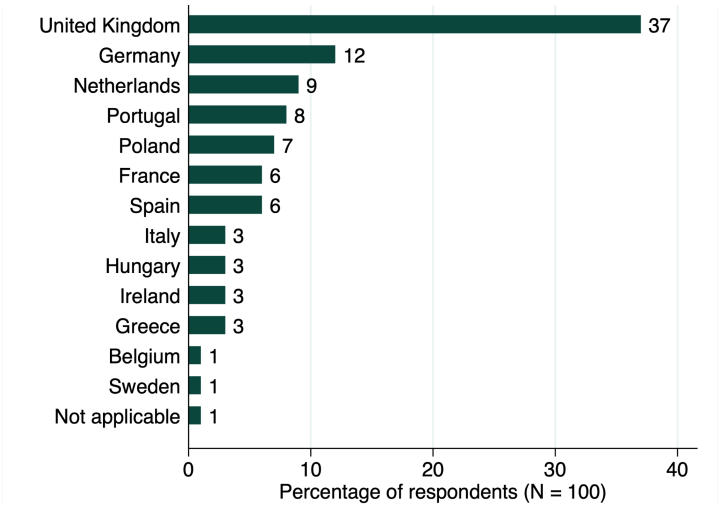


Figure A2-4-2 Location of respondents' organisations in Europe

One-third of respondents worked in national or central government (33%), while 28% worked in municipal or local government. Regional governments and public agencies or regulatory bodies each accounted for 14% of the respondents. Smaller proportions worked for public-owned companies or enterprises (6%) and provincial or metropolitan authorities (5%).

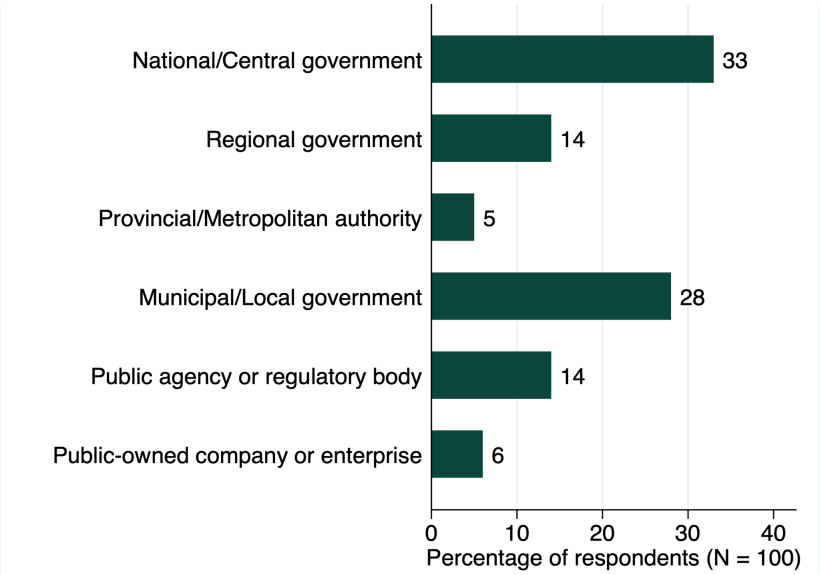


Figure A2-4-3 Level of government respondents worked

81% of the respondents worked for large organisations with more than 250 individuals employed in the organisation. 18% of the respondents worked for medium-size organisations with 50 to 249 employees, and only 11% for small organisations with fewer than 50 employees.

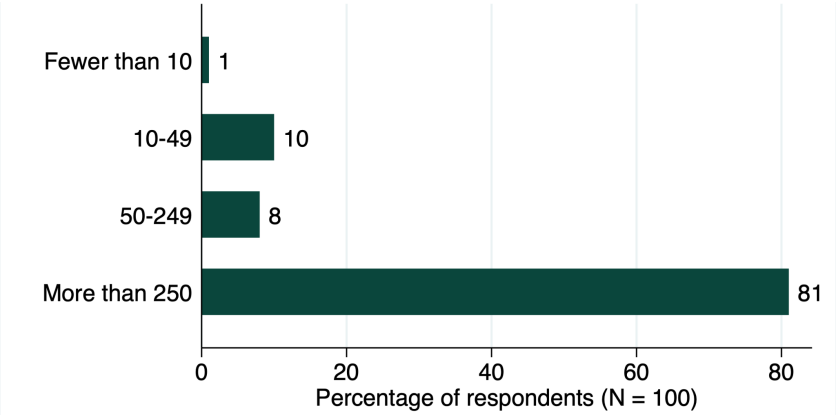


Figure A2-4-4 Number of individuals employed in their organisations

The organisations' longest planning horizons varied considerably. The most common planning horizon was between five and ten years (28%), followed by two to five years (20%) and 10 to 50

years (14%). 11% of the organisations had a short-term planning horizon of up to one year, and only 4% planned more than 50 years ahead.

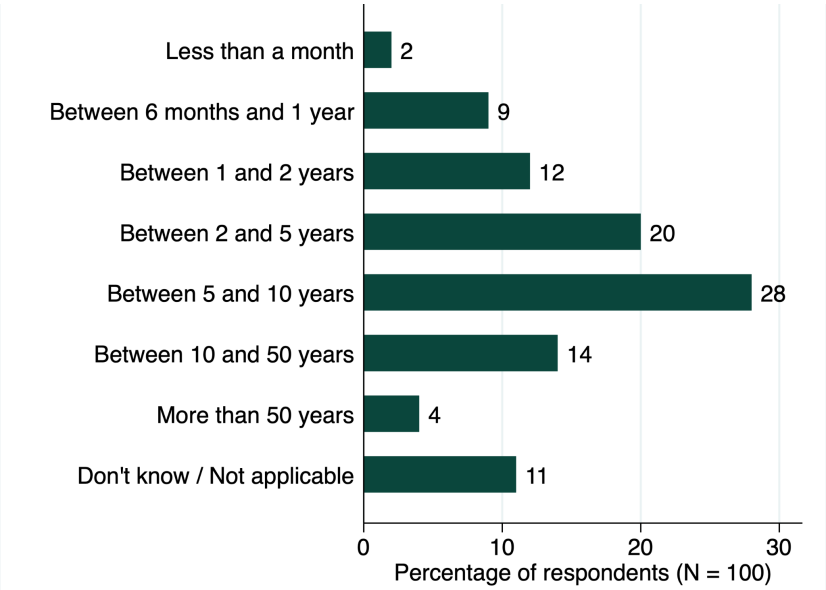


Figure A2-4-5 Respondents' organisations longest planning horizon