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ASPECT

CASE STUDIES

BOOKLET



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WHAT IS ASPECT ABOUT?

The need for climate information spanning across multiple timescales to support decision-making for adaptation to a changing climate is becoming increasingly evident. Such information has most societal value when it is robust, reliable and relevant to users in a wide range of sectors.

ASPECT is a four-year Horizon Europe project that explores the frontiers of seamless climate information at seasonal to decadal timescales. By delivering continuous and coherent information for the next 30 years, ASPECT simplifies access to information, addressing the challenge of having to interpret multiple and often inconsistent climate products. This facilitates users' uptake of climate information across different timescales, enhancing the management of climate-related risks and enabling better-informed decisions.

ASPECT has worked closely with users across several socio-economic sectors, identified as the project's "**Super Users**", to deliver actionable, accessible, and user-centred information to support climate resilience.

In this Case Studies booklet, we explore our work with these Super Users, deep diving into their individual needs and the tailored information developed.

OUR CASE STUDIES



Co-production of seamless climate information is at the core of the ASPECT project. Through close collaboration with stakeholders from key societal sectors, we have ensured that their needs are understood and met. This results in information that is scientifically robust, actionable, and tailored to real-world applications that can support better informed decisions for climate adaptation and resilience.

Our five **Super Users** come from the agriculture, finance, governance, humanitarian and emergency response sectors, within Europe and beyond. ASPECT researchers have worked closely with the Super Users to co-produce tailored climate information that supports their decision-making and adaptation needs.

Through this series of case studies, we could assess the usability, socio-economic benefits and added value of seamless climate information, exploring its practical applications for adaptation.

Beyond these co-developed prototype services, we have worked to build a community of practice through our User Forums and other activities to bring this information to these sectors and beyond, building capacity and promoting the use of such climate information.

OUR SUPER USERS

The project began working with five key Super Users from a range of sectors to understand their evolving needs and assess the risks they face related to the changing climate. The interactions (periodic bilateral meetings with Super Users) focused on understanding the users’ decision-making context and identifying the information they require for time-scales ranging from the next season up to 30 years ahead. The project has been working on the development and provision of tailored indicators for decisions that Super Users need to take across different timescales.

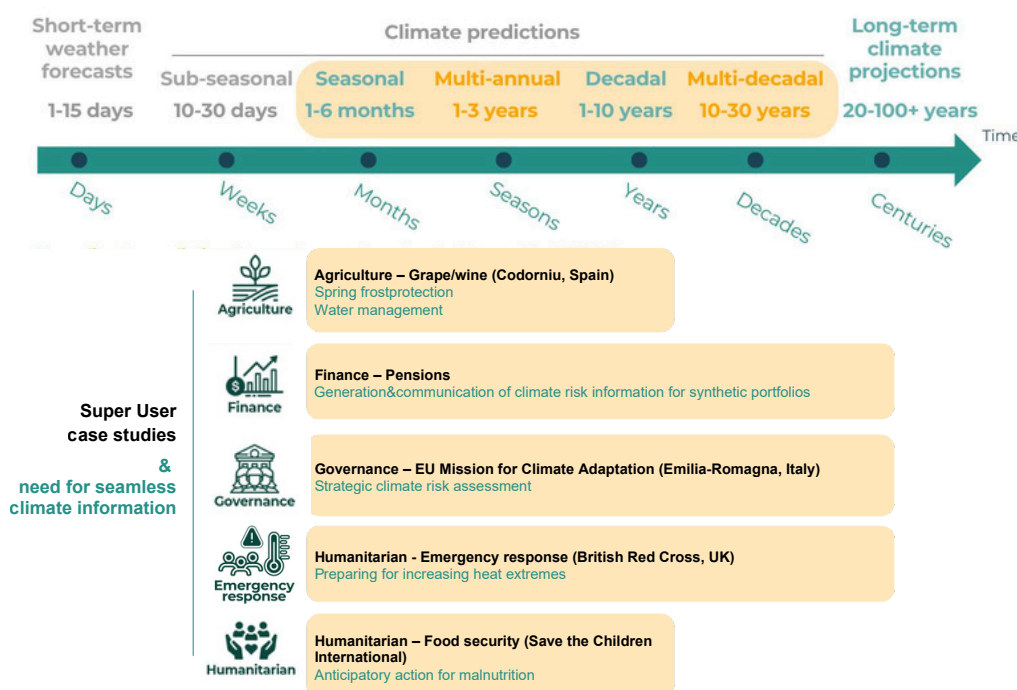
Agriculture / wine: **Codorniu** is a winery based in Catalonia, Spain. Wine production is highly dependent on weather and climate variations, such as frost days and water scarcity.

Finance: For organisations across the pensions sector, understanding climate change risks is key for existing and future investment decisions.

Governance: **Emilia-Romagna** is an Italian region part of the EU Mission on Climate Adaptation. The region is vulnerable to climate change and actively working on climate adaptation strategies.

Emergency response: **British Red Cross** is a humanitarian charity that supports people in crisis. Their UK resilience teams need to prepare for increasing heat extremes.

Humanitarian: **Save the Children International** is an NGO that aims to use climate information to anticipate and minimise the impact of climate change on the malnutrition of children and mothers in vulnerable areas.



CO-PRODUCTION IN ASPECT

Interaction between the producers and the users of climate information is essential to ensure that the information developed is **useful** and **usable**.

It can help to better understand each other's contexts, needs and limitations, thus **building trust** and **addressing barriers** to the use of climate information, such as uncertainty and perceptions of accuracy and reliability.

A user-centred design approach was followed in the ASPECT project for the **co-production** of knowledge.

Continuous collaboration between scientists and Super Users was established early on in the project, focusing on the **user needs** and **actively involving the users** throughout the process of developing tailored climate information.

In-depth discussions, interviews, workshops, and other participatory activities were carried out to explore the following aspects:

- The users' needs and motivations regarding decision-making and adaptation to climate change in the medium and long term
- Decisions that depend on future climate conditions
- Specific decisions and adaptation measures likely to have the greatest impact
- The potential added value of seamless climate information compared to current existing climate information

The type of information most relevant and useful to users was defined based on the identified needs of each case, developing tailored **climate variables, indicators and risk indices**.

Special attention was placed onto decisions cutting across different timescales, since one of the main aims of the project is to bridge the gap between different prediction systems by providing seamless climate information.

The users also participated in the evaluation of the climate service products developed through continuous feedback on usability and added value.

In the following sections of this booklet, we explore the details of each case study.



CASE STUDY 1:

WINE SECTOR



THE SECTOR

The wine sector is an important pillar of the global economy. In particular, Europe is the world leader in producing, consuming, importing, and exporting wine. In Catalonia, Spain, the wine industry represents the third largest agri-food sector.

Climate is an important factor in wine production, as variations can strongly affect the year-to-year production and quality of wine and grapes. This is due to grapevines requiring specific temperature, precipitation, humidity and solar radiation conditions to develop. Thus, current and future climate conditions pose a major challenge to the sector.

In this context, reliable and timely information on climatic fluctuations can enable wineries to optimise their planning and management of activities over a range of timescales, as well as prepare appropriate adaptation strategies. The needs of the wine sector are mainly related to seasonal and decadal predictions, as grapevines have a lifetime of around 25 years. This information can support short-term decisions such as harvest and disease management, and longer term decisions like water management.

THE USER

Codorniu-Raventós is the oldest wine company in Spain, with more than 470 years of history in the production of quality wines and cava. Based in Catalonia, it owns or directly supervises more than 3,000 hectares of vineyards, making it one of the largest vineyard owners in Europe, and has established 15 wineries in some of the best winegrowing areas in the world.

One of the most relevant wineries of Codorniu is Raïmat, which has been a pioneer in viticultural and winemaking technologies. They have a strong commitment to sustainable viticulture and respect for the land and the environment.

THE CASE STUDY

Climate variability is a major driver of interannual fluctuations in grape yield and wine production for the user. Two main concerns identified are **spring frost protection** and **water management**. This case study thus focused on providing key indicators and climate information across multiple timescales that can support key vineyard management decisions related to these concerns.



Seasonal and decadal forecasts can support operational measures and long-term investments to protect crops against frosts in the spring, while drought predictions can inform production planning, grape sourcing, and long-term crop and variety selection to adapt to water availability.

SPRING FROST PROTECTION



Spring is a critical period for the vine development, as vine buds start growing when the temperatures exceed 10°C. During this period (especially in March and April), frost can occur at night if temperatures drop below zero and there is low humidity and no wind.

Frost can have devastating effects on the vines and their growth. Even one night of frost can affect the whole production, as it may damage existing shoots, and any new shoots will grow less fruit than the original ones.

With reliable climate information, wine producers can prepare for such events by applying management actions to delay bud-break and avoid major damage (e.g. pruning). If frequent frost episodes are expected in the long term, they can also invest in frost prevention systems.

Indicators provided in ASPECT:

- Frost days
- Growing degree days

WATER MANAGEMENT



Vineyard irrigation may or may not be necessary or available depending on the region, season and wine producer. Our user operates irrigated vineyards supported by water reservoirs. During droughts, water restrictions can limit irrigation capacity and directly affect production.

Seasonal predictions on drought duration and occurrence can help in decision-making, for example expecting lower production or deciding whether to buy grapes from other producers.

In the long term, understanding future drought trends can guide crop selection decisions, such as choosing to plant varieties with lower water demand.

Indicators provided in ASPECT:

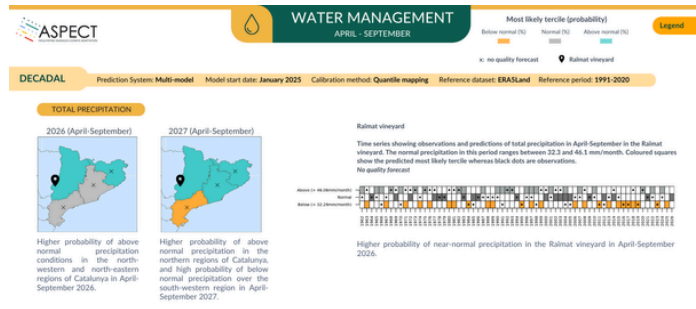
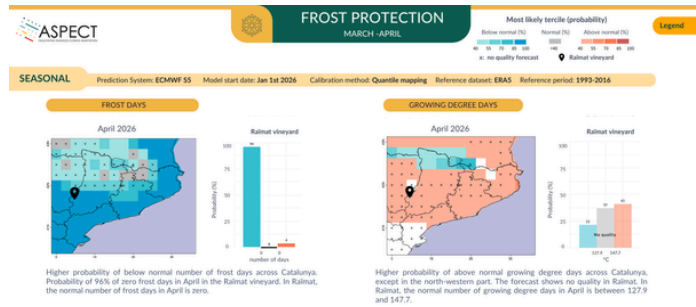
- Precipitation
- Temperature
- SPEI (drought index)
- Heatwaves
- Growing degree days



THE CLIMATE SERVICE PROTOTYPE

Through close collaboration with the user, a climate service prototype was co-developed that covers the needs of both technical and non-technical profiles:

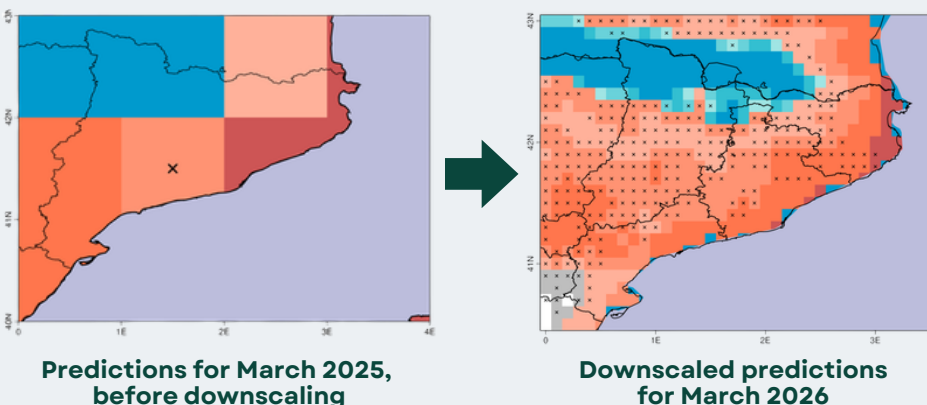
- an **interactive web-app** (“Shiny app”) with maps and graphs of forecasts and skill
- a **bulletin** (PDF document) that combines maps, tailored indicators, and a user guide on how to interpret the forecasts.



Screens from the bulletin developed for our Super User. Examples shown from the user guide, and seasonal / decadal predictions of indicators presented in the form of maps and plots.

The service provides high-resolution data for Catalonia region, where the user is located. One of the goals of ASPECT is to provide such information in a **seamless** manner, i.e. combining outputs from different state-of-the-art seasonal and decadal prediction systems, as well as provide **downscaled data** (i.e. higher resolution at the user’s region).

Continuous feedback and iterations ensured that the information is presented in a way that is clear, understandable and useful. This climate information is beneficial not only to the user, but also to the viticulture and agriculture sector as a whole, supporting a range of operational and long-term decisions.



IMPROVING THE TAILORED CLIMATE INFORMATION

An example of seasonal predictions (ECMWF SEAS5) for the growing degree days in Catalonia (Spain) is shown. Before ASPECT downscaling approaches were applied, the spatial resolution was at 1° (left), while downscaled data provided the user with higher resolution information, at 0.1° spatial resolution (right).

CASE STUDY 2:

FINANCE SECTOR (PENSIONS)



THE SECTOR

Climate change brings about more frequent and intense extreme weather events, with a range of socio-economic impacts (e.g. damages to infrastructure) and significant economic losses. Nevertheless, some parts of the finance sector are still in the early stages of understanding, evaluating and taking into consideration the **risks climate change poses to existing and future investments**.

Within this sector, pension funds play an important role, as they manage large volumes of long-term assets on behalf of current and future retirees. **Pension funds are particularly vulnerable to climate-related risks** due to their long investment horizons, diversified portfolios (e.g. across the transport, infrastructure, manufacturing and other sectors) and geographically diverse nature (e.g. global coverage). The physical risks associated with climate change can affect the value and performance of such investments. However, the pensions sector still has a relatively low appreciation of current and future climate risks, with numerical estimates of risk not typically included in their risk assessments.

Systemic change is thus essential to **integrate the use of climate information into investment decisions**, and move the finance sector toward sustainability and socially beneficial outcomes. Climate information can support pension funds in better assessing and managing climate risks, and **ensuring the resilience of their portfolios**. This would help achieve sustained long-term income from such investments, ensuring that they can pay pensions now and in the future.

THE USER

Pensions and finance sector experts were consulted in the project, providing insight into the sector and its needs. One of these experts was also a member of the Centre for Greening Financial Investments, a UK-based research initiative aiming to accelerate the adoption and use of climate information by financial institutions internationally.

THE CASE STUDY

A lack of transparent, robust and decision-useful tools for climate risk assessment was identified in the finance sector. This can hinder pension trustees and asset managers from making climate-informed decisions related to adaptation.

Reliable climate information and expertise on how to use this are needed for effective risk management of physical climate risks. There is concern that some products currently available in the market are of uncertain scientific robustness and suitability for decision-making, or do not provide sufficient information on the range of possible climate futures.

This case study aimed to guide meaningful change in the sector, and had the following specific objectives:

Educate and increase awareness on physical climate risks and their implications on investments among pension trustees and asset managers

Encourage trustees to include physical climate risk assessments in investment decision-making

Demonstrate how climate risk assessments can support better informed investment decisions

Reveal the potential underestimation of financial risks when future climate information is not considered

Develop an illustrative framework to assess physical risk across portfolios of assets with an idealised example for flooding

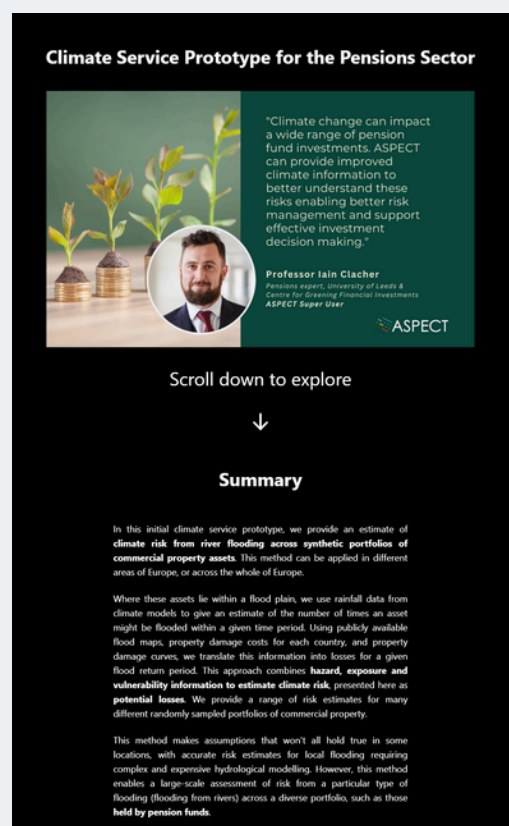
Encourage investment in adaptation to build climate resilience

EDUCATING & RAISING AWARENESS

A [website](#) targeted at decision makers in the pensions sector (i.e. pensions trustees) was created. This provides educational content on physical climate risks and the use of seamless climate information.

This information aimed to help trustees in discussions with climate service providers who they might employ to provide risk assessment products. Ultimately, this would leverage societal change by encouraging trustees to take decisions to further assess climate risk quantitatively.

The website was built with accessibility and those without a technical background in mind, avoiding scientific jargon and keeping key messages concise and clear.



Climate Service Prototype for the Pensions Sector

"Climate change can impact a wide range of pension fund investments. ASPECT can provide improved climate information to better understand these risks enabling better risk management and support effective investment decision making."

Professor Iain Clacher
Pensions expert, University of Leeds &
Centre for Greening Financial Investments
ASPECT Super User

ASPECT

Scroll down to explore

↓

Summary

In this initial climate service prototype, we provide an estimate of **climate risk from river flooding across synthetic portfolios of commercial property assets**. This method can be applied in different areas of Europe, or across the whole of Europe.

Where these assets lie within a flood plain, we use rainfall data from climate models to give an estimate of the number of times an asset might be flooded within a given time period. Using publicly available flood maps, property damage costs for each country, and property damage curves, we translate this information into losses for a given flood return period. This approach combines **hazard, exposure and vulnerability information to estimate climate risk**, presented here as **potential losses**. We provide a range of risk estimates for many different randomly sampled portfolios of commercial property.

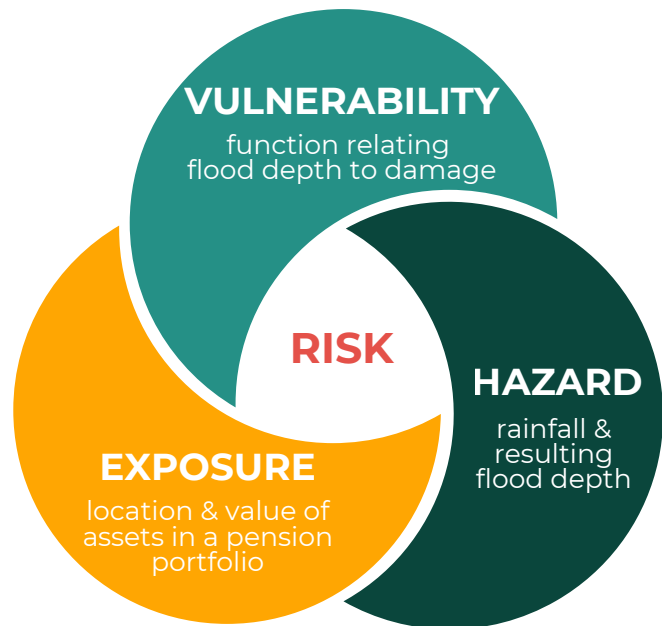
This method makes assumptions that won't all hold true in some locations, with accurate risk estimates for local flooding requiring complex and expensive hydrological modelling. However, this method enables a large-scale assessment of risk from a particular type of flooding (flooding from rivers) across a diverse portfolio, such as those held by pension funds.

A RISK METHODOLOGY

The main focus of this case study has been the development of a **transparent, robust and decision-useful framework for assessing physical climate risk** designed for the pensions sector, and potentially useful for the wider financial sector.

This involved a **methodology for estimating riverine flood risk for idealised pension portfolios of assets** (demonstrated with commercial buildings). To estimate the risk in the financially relevant “Expected Annual Damage” metric, the components considered include vulnerability, hazard, and exposure.

By combining these elements, it is possible to produce **flood risk estimates** that are linked to both location and financial impact. These can be shown as summary plots, maps, statistics and other formats.



This approach provides a **flexible framework that can be applied to different datasets, time periods, and geographical contexts**, and is demonstrated using fully open-source information and data. This framework, along with caveats and limitations of the approach, are described in a [study](#).

The risk methodology was applied to high-resolution projections of historical and future climate to highlight idealised current and future risk. Flood risk from extreme rainfall was shown to be already relevant for commercial property assets and is projected to increase under future climate conditions.

Such information can help influence decision making by demonstrating a potential use to raise awareness of climate related risk. Our demonstration of the method explores options for risk reduction like investing in adaptation, and encourages the pension sector to consider climate risk in their investments.

A HACKATHON

As part of engagement with the wider financial sector, ASPECT contributed expertise to a [hackathon](#) focused on challenges for the reinsurance sector. ASPECT’s involvement enhanced the use of decadal information, including providing training and support.

The training helped raise awareness of decadal predictions and how to use them within the wider financial community. It revealed useful [learnings](#) about using climate information for reinsurance challenges, especially the importance of sharing learnings across research and industry.



CASE STUDY 3:

GOVERNANCE SECTOR



THE SECTOR

Current and future climate conditions pose a major challenge for governance. As extreme events are becoming more prevalent, they can affect a range of regional planning and decision-making areas, such as water management, infrastructure, public health and land-use planning. Thus, **climate adaptation is becoming a key priority for public administrations and regional governments** across Europe. Initiatives such as the EU Mission on Adaptation to Climate Change and the EU Climate Law are encouraging regions to **strengthen their resilience to the impacts of climate change** and integrate adaptation into planning and decision-making processes.

Climate information can help public authorities better understand climate risks, assess vulnerabilities and design effective adaptation strategies. Adaptation planning must comply with different policies, and relies on climate-risk assessments that involve examining long-term trends and integrating social, economic and environmental analyses to determine climate impacts. The needs of the governance sector are mainly related to climate predictions and projections across different timescales.

THE USER

ARPAE (Agenzia Regionale per la Prevenzione, l'Ambiente e l'Energia dell'Emilia-Romagna) is a public research agency based in the **Emilia-Romagna region, Italy**. It provides scientific and technical expertise for environmental protection, sustainable development and energy policy. ARPAE's activities include environmental monitoring, supporting energy initiatives, and offering technical guidance to public administrations and private organisations.

ARPAE plays a central role in producing climate knowledge and supporting adaptation planning and decision-making in the region. The agency produces climate predictions, projections, and statistical downscaling methods, and thus represents a highly specialised user with advanced technical expertise. ARPAE also operates within Emilia-Romagna's climate-innovation ecosystem, one of the leading regional hubs for climate adaptation in Europe.

THE CASE STUDY

Working closely with ARPAE, the most relevant climate risks and decision needs for the Emilia-Romagna region were explored. The two key climate challenges identified were **extreme heat** and **severe rainfall events**. Recent heatwaves and floods highlighted the increasing impacts of climate change in Emilia-Romagna. Thus, ARPAE requires advanced climate information to respond to the adaptation priorities of the region.



EXTREME HEAT

Extreme heat is one of the defining climate challenges for Emilia-Romagna, as **heatwaves** are becoming longer and more prevalent. Due to the region's geography, warm air is trapped in the flat basin, preventing nighttime temperatures from dropping, thus the heat burden accumulates day after day.

Cities like Bologna, Modena and Ferrara experience the strongest impacts due to their dense built environment that amplifies temperatures, known as the **urban heat-island effect**. Extreme heat episodes can pose serious health risks, in particular for vulnerable populations, leading to increased hospital admissions. Other impacts include higher energy demand, and challenges for the agriculture sector.



EXTREME RAINFALL

Severe rainfall events are becoming more frequent, longer and widespread in Emilia-Romagna, increasing **flood risk** across the region.

Intense storms (particularly in spring and autumn) can produce **large amounts of rain in a short time**, overwhelming drainage systems in cities, like Bologna, Cesena, Forli, Modena and Ravenna. These episodes can cause rapid surface flooding and damages to critical infrastructure. In rural and mountainous areas, steep slopes further accelerate runoff towards low-lying areas and agricultural land.

In 2023, severe floods in the region resulted in great economic damage, landslides, population displacements and loss of human lives. Such events have shown that heavy rainfall is a key driver of the regional climate risk.

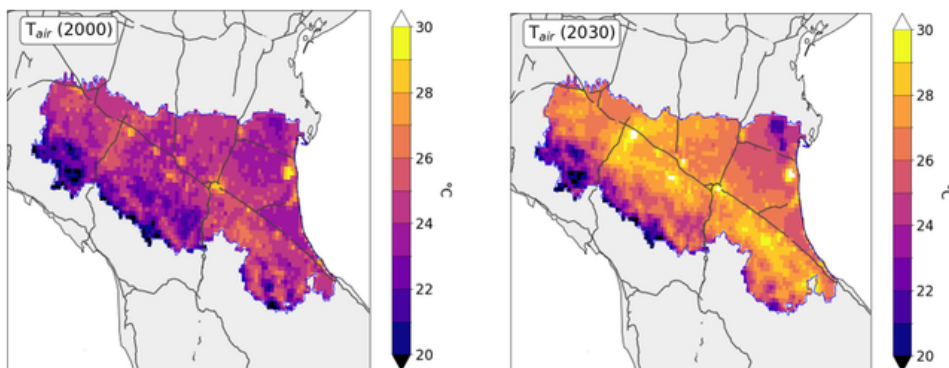
AN EXPLORATORY STUDY

An **exploratory study** was co-developed with ARPAE. The aim was to assess how seamless climate predictions can support strategic and operational water resources management. We worked to obtain datasets from the user, and incorporate their expertise and continuous feedback in the analysis, methodologies, indicators and visualisations developed. This ensured that the outputs were relevant for realistic regional governance needs and aligned with the existing decision-making processes of the region.

The co-production process focused on ensuring the usability of the climate information by refining outputs according to the spatial scales, decision contexts and communication preferences suggested by the user.

Overall, we focused on three technical components aligned with the adaptation priorities of the Emilia-Romagna Region. These components span the present day out to the next 30 years, covering the ASPECT timespan, and are the following:

- **high-resolution** climate modelling
- **statistical downscaling** of climate predictions to regional planning scales, and
- the **application of climate projections** in hydrological models.



Example of downscaling applied to show the mean nighttime temperature in recent (2000, left) and future climate (2030, right) in Emilia-Romagna region.

The climate information was delivered in a variety of formats (such as synthesis reports, datasets, forecast maps and figures, skill maps and probability charts), ensuring transparency, reproducibility, and user-friendliness of the information.

Why this approach?

- Providing **decision-relevant** climate information
- Linking climate science to **real planning needs**
- Supporting **adaptation** and risk management



CASE STUDY 4: EMERGENCY RESPONSE



THE SECTOR

Emergency response refers to immediate action to support those affected by crises or disasters. This includes providing **assistance during extreme weather events**, such as heatwaves, floods and fires. With the growing occurrence of such events, there is increased operational pressure and demand for such services.

Climate information is crucial in helping emergency responders **prepare, adapt and build resilience** to the impacts of extreme events. However, emergency response organisations are still at the early stages of building climate-informed decision making into their planning.

Understanding hazard combined with vulnerability and exposure is particularly important in order to prioritise vulnerable populations that are most affected and allocate resources effectively during emergencies. Responders may have limited or misinformed climate knowledge, affecting their understanding of why and how climate change impacts response operations now and in the future.

In the United Kingdom, increasingly common hot summers and heatwaves have brought an increased focus on **heat-related emergency response**.

THE USER

The **British Red Cross** is a humanitarian organisation that supports people in crises. The organisation is experienced at responding to flooding, but increasingly recognises the potential implications of a growing number of heat-related emergency responder callouts, alongside other related hazards such as fire.

The British Red Cross expects that **climate-sensitive decisions** will increasingly need to be made throughout the organisation, for instance related to supplies, recruitment, workwear, and rest centres. Thus, accessible climate information is crucial to support their decision-making around preparation for future extreme heat.

THE CASE STUDY

It was identified that the British Red Cross faces **challenges in embedding climate resilience planning** across the organisation due to limited climate knowledge and ability to quickly access appropriate information, as well as their capacity to link such information to operational decisions around emergency response and future planning.

ASPECT thus aimed to support climate-informed decision-making in the organisation by offering targeted training and educational resources seamlessly across the seasonal to climate timescales. Our collaboration has helped provide practical ways to access user-friendly and reliable sources of climate data and information, with the ultimate aim of **building resilience to heat events**.

Heat-related climate information products were co-produced that span from the climate of today, to next summer and decades in the future. These products mainly involved a **training module** and an **educational website**.

TRAINING EMERGENCY RESPONDERS & OPERATIONAL MANAGERS

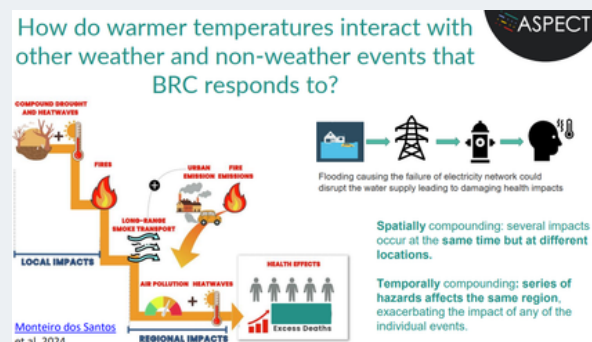
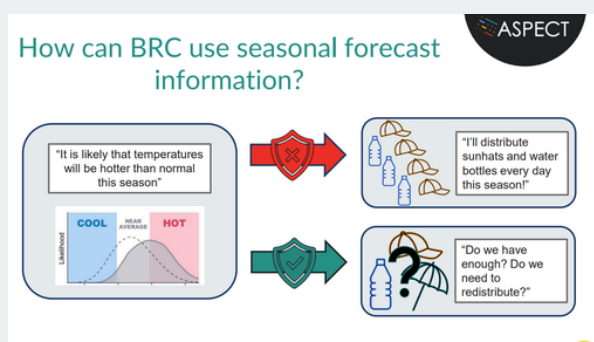
An in-person workshop was delivered in spring 2025 at a National Emergency Response meeting in the UK, aiming to:

- improve understanding and application of climate information for emergency response, and
- support the integration of climate information into operational planning.

The training materials were co-produced with British Red Cross staff to ensure they were delivered at an appropriate level, covered topics of relevance, and ensuring the sessions were engaging.

The sessions included an introduction to interpreting seasonal forecasts, and practical information to give responders hands-on experience accessing and using climate information for the UK (specifically using the Met Office Local Authority Climate Service Explorer).

Following the training, participants reported increased confidence in interpreting seasonal forecasts and using climate tools to support decision-making. Examples from the material presented are shown below.



AN EDUCATIONAL WEBSITE

We worked together with the user to develop a website tool to build capacity and knowledge among emergency responders. The aim of this tool is to promote preparedness and **build resilience against increasing extreme heat** in the UK.

The website enables users to seamlessly access and interpret climate information, from present-day observations to seasonal forecasts and longer-term climate projections.

This tool aims to **support decision-making around climate adaptation** and act as a trusted source of **user-friendly climate data and information**. ASPECT helped the British Red Cross share the website with staff and volunteers through meetings and newsletters. Feedback helped further improve the website, as well as understanding when it will be used, for example for preparation decisions by operational teams and by community education teams. The website was also shared with a broader potential user group (e.g. through a Met Office blog).

The website helps explore climate information, including the following topics:

Our climate

Using data from the last 20 to 30 years can help understand and prepare for extreme heat events in the future

Next 3 months

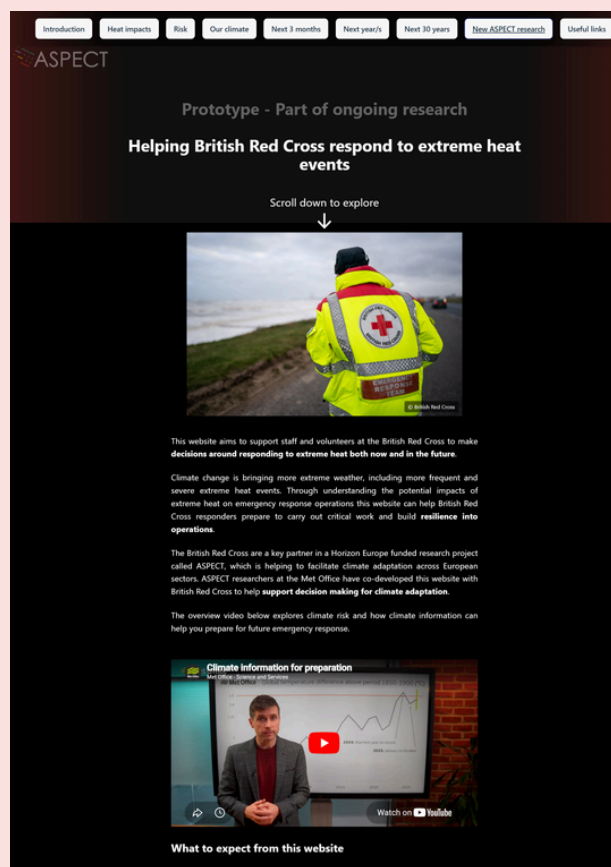
Seasonal forecasts can help understand if the chance of an upcoming warm spring or summer is higher than normal

Upcoming years

Climate predictions of future hot summers can help prepare and plan for the years ahead

Next 30 years

Climate projections look at changes over longer periods of time, helping us build resilience to future extremes.



CASE STUDY 5:

HUMANITARIAN SECTOR



THE SECTOR

The humanitarian sector **supports vulnerable populations** before, during and after crises. Extreme weather events like droughts and floods increase the need for humanitarian action, as they can affect the livelihoods of already vulnerable regions, increase food insecurity, and worsen health and nutrition conditions. In particular, **children's health and development** can be affected due to the impacts of climate change, especially in regions already facing significant **poverty and food insecurity**.

In this context, climate information can support **preparedness and anticipatory action** by helping organisations identify climate-related risks before they occur and take early measures to reduce their impacts. Seasonal and decadal predictions can help inform decisions related to food security and nutrition, ensuring appropriate resource allocation and adaptation planning.

By integrating climate information into humanitarian planning, organisations can take a more proactive approach to **reduce vulnerability and build resilience** against future climate risks.

THE USER

Save the Children International is an international non-governmental organisation that works in 115 countries to improve the lives of children by providing humanitarian aid, supporting their health, education, and safety, and advocating for their rights.

Save the Children uses climate information from multiple international, regional, and national sources to anticipate food and income deficits in future consumption periods.

THE CASE STUDY

Food insecurity and malnutrition are strongly influenced by climate, especially in regions that experience water scarcity and droughts. In this case study, ASPECT worked closely with Save the Children to develop tailored climate information for **Malawi**. This information aimed to improve understanding of drought impacts on livelihoods and better-inform anticipatory action to reduce the population's vulnerability to food insecurity.

The **affordability of a nutritious diet** is a proxy for food (in)security. This can help assess how climate shocks like droughts can affect household food and income availability.

Climate information at different timescales was provided about the conditions expected in Malawi during the **rainy seasons**, as well as whole **consumption years**.

In the short to medium term, this information can help identify appropriate interventions to ensure households can cope with climate shocks, and maintain basic food and income needs.

Over longer timescales, it can support nutrition-sensitive adaptation planning and guide strategic agricultural decisions, such as crop selection and diversification. For instance, if drought conditions are expected, promoting drought-tolerant or low-water-demand crops may strengthen resilience and reduce future food and income deficits.



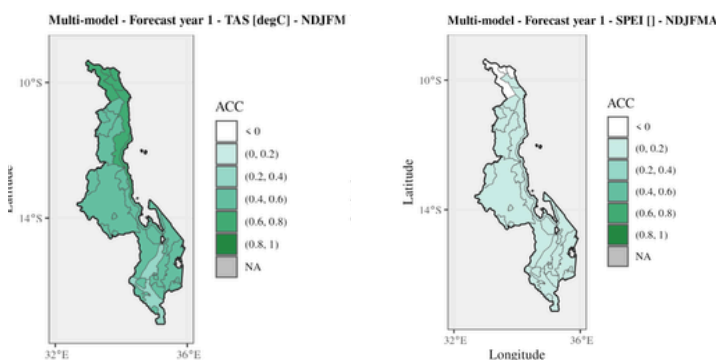
THE CLIMATE SERVICE PROTOTYPE

Through close collaboration with Save the Children International, the co-developed climate information was delivered through interactive and static user-friendly products to cover different user needs and technical backgrounds.

First, a **climate bulletin** was co-developed that included probabilistic forecasts for **El Niño-Southern Oscillation (ENSO)**, correlated with local climate conditions in Malawi, such as **temperature, precipitation and a drought indicator** (known as standardised precipitation and evapotranspiration index - SPEI). In addition, maps over livelihood zones in Malawi were provided, tailored to the next rainy seasons. A concise summary, background information on the forecasting methodology, and guidance on forecast interpretation were also included.

Screens from the bulletin developed for our Super User. Examples shown from the user guide, and seasonal-to-decadal predictions.

Additionally, the information was delivered through an **interactive web-app** (“Shiny app”). This included a series of maps and graphs of forecasts, along with skill information, allowing the user to explore the complete dataset.



Example of maps shown in the Shiny app for temperature (left) and SPEI (right) predictions for the rainy season in Malawi.



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Project partners

