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ACCREU

Assessing Climate Change Risk in EUrope

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1. Changes with respect to the DoA

None.

2. Dissemination and uptake

This deliverable presents the ACCREU Digital Handbook, a multimedia website designed to foster the dissemination of project results and engagement with them beyond the research community. ACCREU results need to be accessible to a wide range of actors, including the general public, EU institutions and local actors, and to support long-term climate adaptation and decision-making. The Handbook explains the seven ACCREU Adaptation Decision Types through the project's 15 case studies, combining plain-language texts, key figures, icons, video interviews with ACCREU experts and a glossary. It is hosted by CMCC at adaptation-handbook.accreu.eu and will remain online until 30 November 2031, five years after the end of the project.

3. Short Summary of results

Development of the ACCREU Digital Handbook.

4. Evidence of accomplishment

The present report is evidence of Deliverable 5.9.

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1. Introduction

One of the objectives of the ACCREU project is to enable the effective uptake of the resulting risk and policy assessments by policy makers and practitioners. Another one is to facilitate the dissemination/accessibility and usability of project's results for non-experts (general public). The final goal is to promote easier communication, and possibly, through this, reduce the distance between the communities of researchers, policy makers, practitioners and the general public.

Three main communication tools are set to this purpose:

- A Digital Handbook
- Upgraded Climate Change Impacts and Policy Open Data Catalog
- ACCREU Scenario Explorer

The **ACCREU Digital Handbook** offers a multimedia, narrative-driven guided tour of the main project results, with an emphasis on the monetary estimates of adaptation costs and benefits from the case studies and on the adaptation narratives behind them. It is designed for a broad audience, including non-experts and the general public. The platform includes a video explainer for each theme and a glossary of the technical terms used across its pages, so that users with different backgrounds can follow the content and choose their own path through it.

The **Upgraded Climate Change Impacts and Policy Open Data Catalog** The ACCREU Data Catalog is designed for use by project partners and by external researchers, policy analysts, stakeholders and other users interested in climate-change impacts, adaptation and associated economic and biophysical evidence. It brings together public datasets released through the IIASA Accelerator and established research repositories, including Zenodo, and provides direct links to the underlying data and associated metadata. The datasets can support further research and modelling, and the development of subsequent climate impact and adaptation assessments. The ACCREU Data Catalog provides a central public entry point for discovering and accessing quantitative datasets generated through ACCREU's assessment of climate-change impacts and adaptation.

The catalog utilizes IIASA's Accelerator platform as the project's collaborative data infrastructure and defines a pathway for releasing project datasets through public repositories such as Zenodo.
The resulting ACCREU Data Catalog provides a common interface to navigate and download various project datasets covering agriculture and land use, water, ecosystems and biodiversity, energy, labor, health, coastal impacts, wildfire and the economy. It connects datasets maintained through the IIASA Accelerator with publicly archived datasets in Zenodo, and identifies associated ACCREU deliverables and case studies where applicable.
The catalog therefore provides a persistent and accessible entry point to ACCREU's quantitative evidence base, supporting data discovery, transparency, citation, reuse and continued access beyond the lifetime of the project.

The **ACCREU Scenario Explorer** is conceived as a multi-level, Open Access, interactive tool navigating project quantitative results. It is mainly targeted to non-academic users, policymakers and practitioners. Accordingly, a particular effort in setting language and definitions was made to avoid unnecessary technicalities and increase accessibility. The Explorer focuses on the economic impacts of climate change and the physical, direct drivers leading to those impacts. Results are reported with a sub-national and national resolution, for three combinations of social economic

pathway (SSP) and representative concentration pathway (RCP) scenarios framing ACCREU analysis. Results are displayed through maps and graphs, with downloadable supporting data. A specific section of the explorer is dedicated to showcase adaptation cost and effectiveness.

This deliverable describes the development of the Digital Handbook.

2. THE ACCREU Project and the Digital Handbook

The ACCREU research project aims to contribute to the EU transition toward climate resilience by co-creating actionable knowledge with a broad range of stakeholders that links climate change impacts, adaptation and mitigation with emerging societal challenges. Its scientific output is an integrated socio-economic assessment of future climate risks under various climate scenarios, with specific consideration of the interaction with mitigation and adaptation policies. Particular attention is paid to non-market impacts on biodiversity, ecosystems, and health, poverty, equity, fiscal and financial issues.

A distinctive feature of ACCREU is the co-design process engaging stakeholders at all governance levels to identify practical solutions for mainstreaming climate resilience in areas such as land use, water, health, infrastructure, and justice. Important components of this process are applied case studies across Europe, including Italy, Spain, the Netherlands, Germany, Sweden, and the UK.

The aim of the ACCREU digital handbook is to make all this information not only accessible, but also interpretable and possibly useful to a non-expert public.

3. Objectives of the Digital Handbook

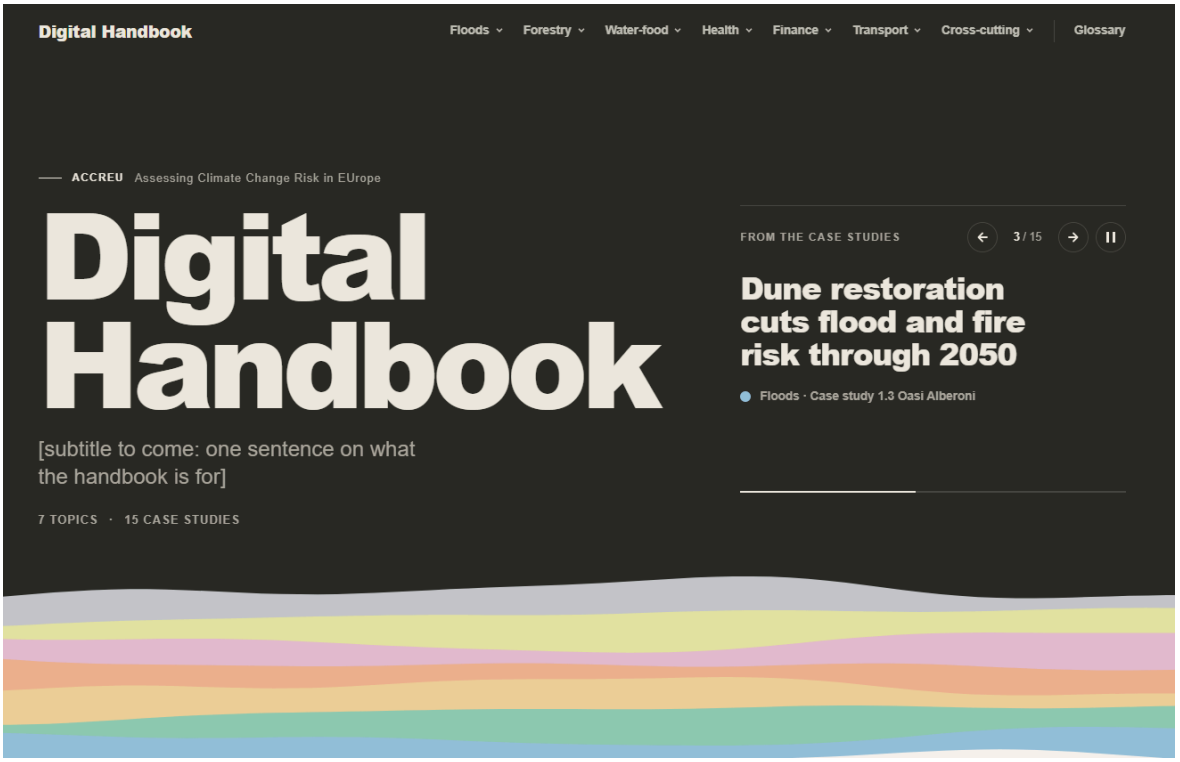
In its effort to “engage” the general public, which is its main purpose of this product, the ACCREU Digital Handbook also contributes concretely to support the understanding and the implementation of the EU Mission on Adaptation to Climate Change. The Handbook provides a highly visual, user-friendly, website that, thanks to the practical examples coming from the 15 case studies implemented throughout the ACCREU project, can explain the themes of the Mission.

The Handbook is therefore able to guide non-experts through the concepts of climate change impact and risk economic assessment, available adaptation opportunities, real life examples, supported by engaging infographics, videos and interviews.

4. Structure of the Handbook

The ACCREU Digital Handbook is organised around the 15 ACCREU case studies and the seven Adaptation Decision Types that frame the project's research, which are also sub-themes of the EU Mission on Adaptation to Climate Change. On the website, the Adaptation Decision Types appear as seven topics: Floods, Forestry, Water-food, Health, Finance, Transport and Cross-cutting. Each topic groups two or three case studies, so that readers can move from the broad picture to concrete examples.

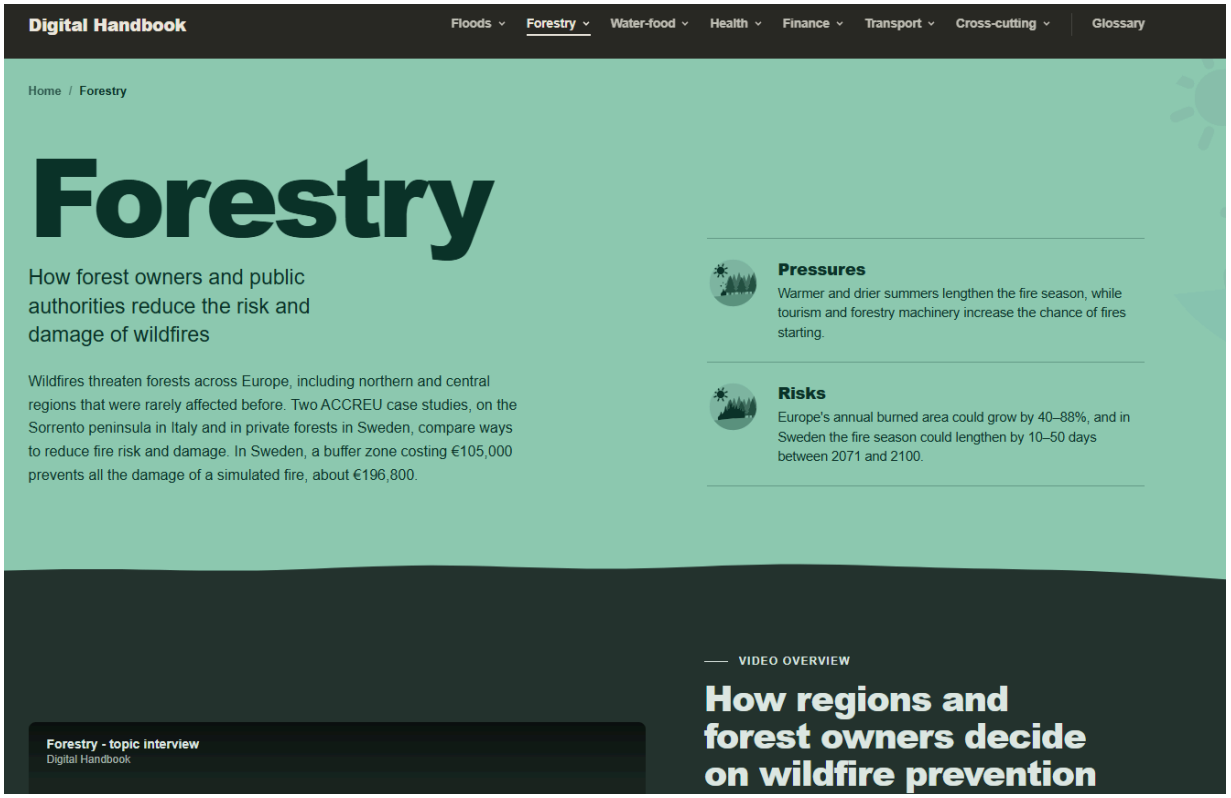
The homepage is the entry point. A rotating panel shows one key finding from each case study and links directly to its page. A menu at the top of every page leads to the seven topics, their case studies and the glossary.

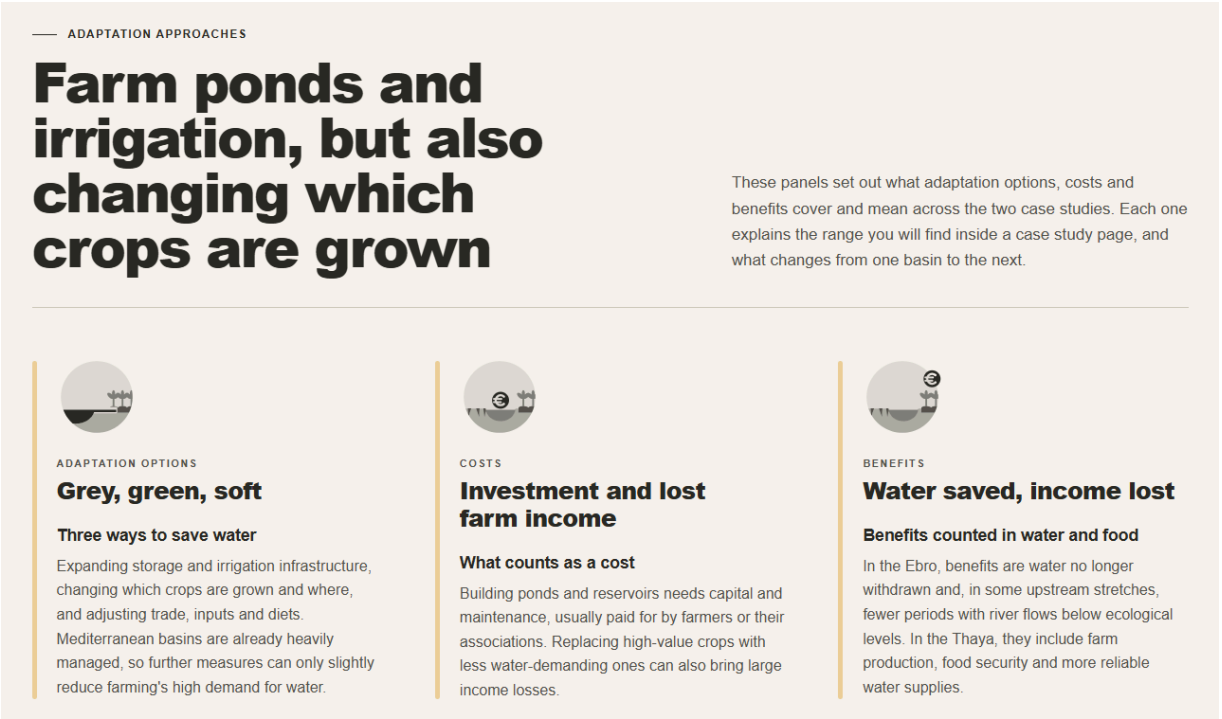


Each topic page explains in plain language what is at stake in that area and how ACCREU research addresses it. It opens with a short summary and key figures, followed by a video interview with an ACCREU expert, the main pressures and challenges, and the adaptation options with their costs and benefits.

Cards then introduce the related case studies, and the page closes with lessons learnt, barriers, pathways forward, a glossary and references. All topic pages share the same structure, and each has its own colour.

Each case study page follows a common template. It opens with a summary of the main results and icons with key messages on pressures, risks, adaptation options, costs and benefits. Detailed sections then cover the context, methods, scenarios, stakeholders, barriers and replicability.





5. Texts

The texts for each section and subsection of the web pages were drawn from ACCREU research outputs, mainly the case study reports, the synthesis documents for each Adaptation Decision Type and the interviews with ACCREU experts. The developers drafted and finalised the texts in an iterative process, with the support of the CMCC team and, when needed, of the ACCREU partners responsible for each part of the research. The iterations aimed to collaboratively (1) select the most relevant findings to highlight, (2) identify the most informative visual material, such as maps, tables and icons, and adapt it where needed to support the communication of those findings, and (3) translate academic jargon into plain, accessible language without altering the

main messages or the scientific rigour. Technical terms were kept to a minimum, and those that remain are explained in the glossary.

6. Multimedia and Graphics

The visual design of the ACCREU Digital Handbook follows three principles: coherence, elegance and uniformity. All pages are built from the same small set of elements and layouts, so readers learn how the Handbook works on the first page they visit and find the same logic everywhere else. The design is sober and uncluttered, leaves space to texts and figures, and stays consistent with the wider visual identity of the ACCREU project. Colour helps readers find their way. Each of the seven topics has its own colour, which marks its page and the elements linked to it across the site.



Readers can tell at a glance which area of adaptation they are exploring, while the shared layout keeps the seven topics visibly part of one product. Icons form the second layer of the system. A dedicated set was drawn for the Handbook in a single, simple style, with literal images that need no explanation.

On topic pages, icons introduce the main pressures and risks, and in the case study cards they show the main adaptation option of each case. Icons also carry the key messages of each case study. These are five short statements, each paired with an icon, that sum up the pressures in the area, the main risks, the adaptation options, their costs and their benefits.
They give readers the essence of a case study at a glance and are reused in the topic pages, so that each case is presented consistently across the Handbook.

PRESSURES IN THE AREA

The Basque Country has warmed over 1°C since 1971

Since 1971, the Basque Country has already warmed by more than 1°C in average daily temperature, in line with global and European warming trends. Climate projections show this upward trend will continue, with higher minimum and maximum temperatures, more summer days and days above 35°C, and more frequent, longer heatwaves, intensifying climate-related health risks.

CURRENT AND FUTURE RISKS

Heatwaves increasingly threaten health and safety region-wide

This warming trend is expected to increase heat-related illness and deaths, worsen cardiovascular and respiratory conditions, raise risks of skin and vector-borne diseases, and reduce overall comfort. It also exacerbates poor air quality and contributes to more intense floods and landslides, compounding health and safety risks for vulnerable groups.

ADAPTATION OPTIONS

An annual heat plan built on early warning and coordination

The Basque plans include a wide range of current and future adaptation options, which can be grouped by how intrusive they are. Green measures focus on making cities more resilient through green infrastructure and nature-based solutions. Grey measures strengthen buildings and critical infrastructure in the face of climate risks, for example through energy-efficiency retrofits in homes and service buildings supported by grant programmes, energy certification schemes that improve building ratings, and mandatory inspections and audits that encourage upgrades and better heat comfort. Soft measures include early-warning systems,

COSTS

€400,000 a year funds coordination and heat-alert response

The cost of the Basque Heat Action Plan is estimated at about €400,000 per year: roughly €300,000 for governance, coordination, the heat portal, awareness campaigns, training, and monitoring, plus €100,000 as an activation budget for around 10 heat-alert days. These costs mainly cover planning and oversight, public communication, outreach to vulnerable groups, occupational protection measures, and monitoring and evaluation, rather than infrastructure investments. Because climate adaptation in the Basque Country is implemented through many separate projects and programmes, not a single fully costed plan, both costs and benefits are difficult to quantify precisely and the reported figures should be seen as conservative.

BENEFITS

€275 saved for every €1 spent on the plan

The Basque Heat Plan delivers very large health benefits relative to its cost. From 2026 onwards, it is estimated to avoid around €120 million per year in mortality and morbidity costs, including hospitalisations and emergency visits, and to prevent about 90 deaths annually. These figures mainly reflect the documented effectiveness of early-warning and response systems in reducing heat-related mortality; co-benefits from measures such as urban greening, building rehabilitation and better land-use planning are acknowledged but not quantified, because their health impacts and costs are not yet systematically tracked.

7. Infographics, Factsheets and Data

The Description of the Action foresees, within Work Package 5, two infographics and two factsheets covering the project outputs, including the results of the analysis of the seven Adaptation Decision Types. The ACCREU Digital Handbook fulfils this requirement and applies it to each of the seven Adaptation Decision Types. All products were developed under the direction of the CMCC team, through the collaborative process described in section 5.

The infographic content is integrated into the topic pages. Instead of two stand-alone infographics, the data and figures available for each Adaptation Decision Type are presented visually on the corresponding page, through key figures, icons and panels on pressures, risks, adaptation options, costs and benefits. This makes the results readable at a glance and keeps them next to the texts that explain them. Each topic page has its own visual identity, based on the colour system described in section 6, while sharing the layout and graphic elements that make the Handbook recognisable as one product and consistent with the wider ACCREU identity.

In the same way, the two factsheets have been developed into a series of seven, one for each Adaptation Decision Type. Each topic page is also available as a compact PDF document, so that its content can be shared, printed and read offline. Together, the seven factsheets offer an overview of the project results across all the Adaptation Decision Types.

8. Other Visual Elements

A system of icons describes the elements that recur across the case studies, helping readers grasp key facts, figures and themes quickly. Each case study is summarised by five icons, one for each step of its story: pressures in the area, current and future risks, adaptation options, costs and benefits. Every icon is paired with a key message of five to ten words. Each icon was composed starting from a literal description of what it represents, written from the case study texts, and then drawn in a common graphic style, so that the whole set reads as one family. The system was defined collaboratively by CMCC and the developers, and the same icons return in the case study cards of the topic pages.

9. Videos

Work Package 5 foresees three videos on the topics selected for the project and four video interviews with experts selected by the CMCC team. The developers reorganised the design, production and editing of these seven products into seven short videos, one for each Adaptation Decision Type, so that every topic page hosts its own video.

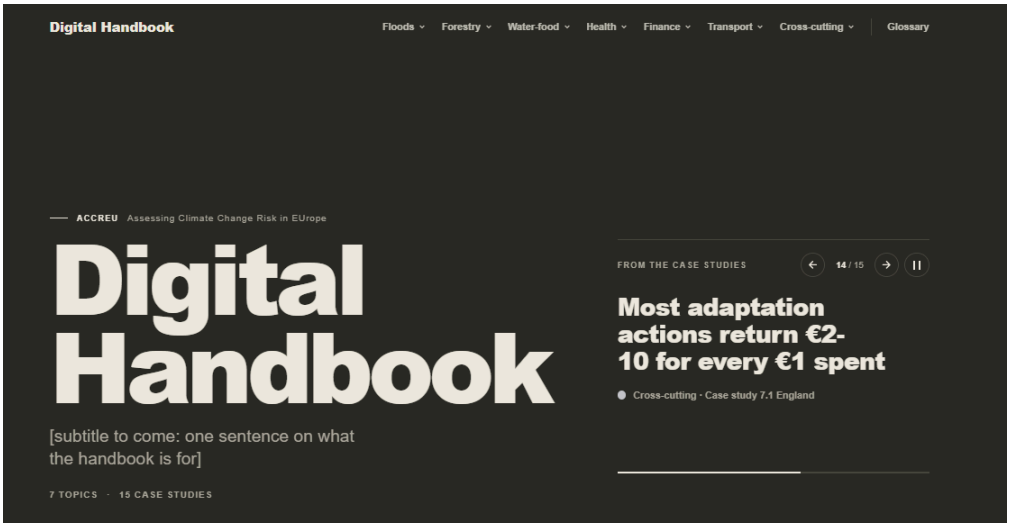
Each video follows the thematic structure of the topic pages. It introduces the Adaptation Decision Type, then presents the common and recurring problems, the opportunities for adaptation and the key results of the project. Where feasible, figures supported by key messages and glimpses of the case studies were added during editing. The questions for each expert were prepared together with the CMCC team and the interviewees, to make sure that all the planned content was covered. The interviews were filmed during two dedicated trips, in which the developers met the experts attending local meetings of the project.

All videos were produced and exported in a format suitable for embedding on CMCC channels and social media. Each is accompanied by a short text that directs viewers to the relevant content of the website.

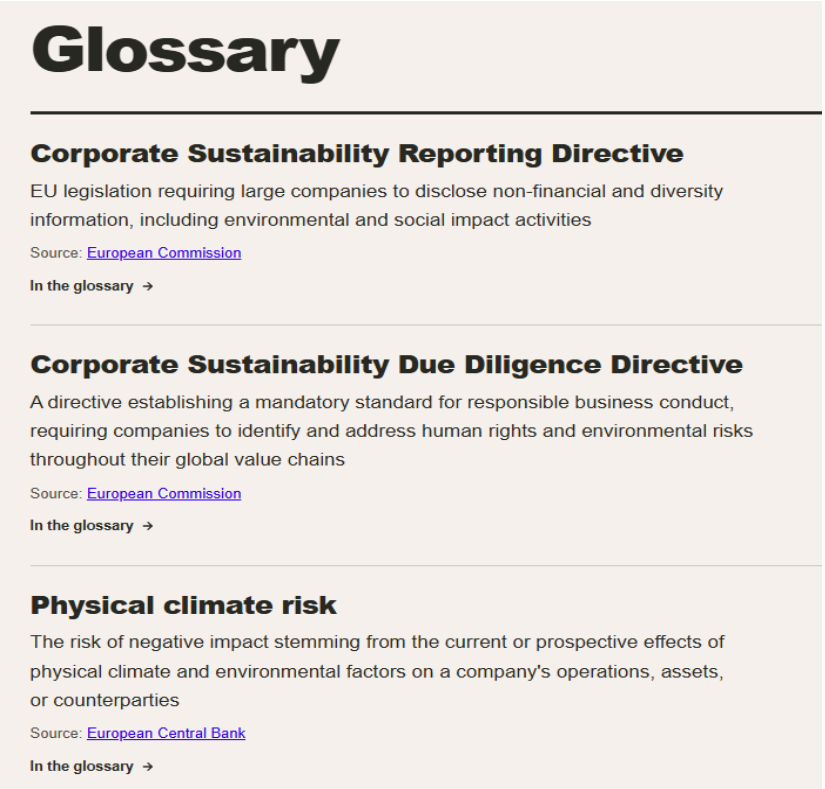
10. The ACCREU Adaptation Digital Handbook

10.1 Landing page and structure

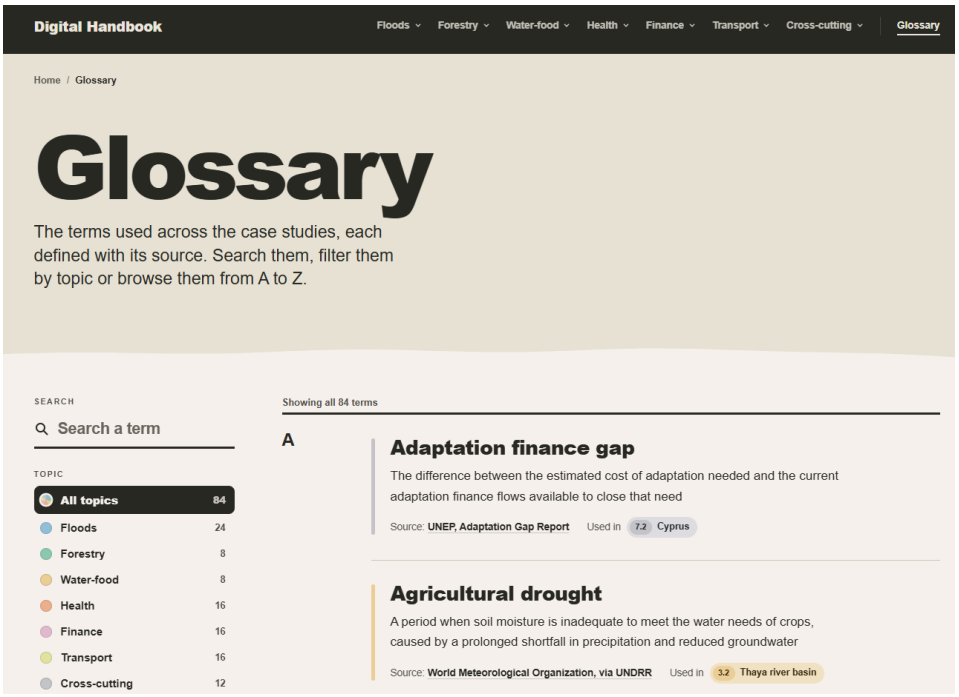
The landing page of the Digital Handbook includes a rotating panel summarizing the main highlights for each case study, and providing a direct link to each case study. Case studies can also be accessed from the menu on top.



The Handbook offers **glossaries** at two levels. On each case study page, a glossary explains the technical terms used in the text, so that readers can follow the case without specialist knowledge. Definitions are taken from authoritative institutional sources, such as the Intergovernmental Panel on Climate Change, United Nations agencies and EU institutions, and each one cites its source. When a term recurs in several case studies, it keeps the same definition and source, so that the Handbook speaks one consistent language.



The global glossary, accessible from the main menu, brings together all the terms defined across the Handbook in a single page. It works two ways, as a cross-cutting reference, but readers can also use it to browse and filter case studies as well.



10.2 Case study pages

This section explains how the Digital Handbook is organized by focusing on two specific case studies:

1) A cross cutting case study “Costing England’s Third National Adaptation Programme”
2) A Socially Just Heat Adaptation Plan in Bremen, Germany

Each case study opens with a short summary of the main results. For example, the page presents the two selected, illustrative case studies as follows:

A Socially Just Heat Adaptation Plan in Bremen, Germany - this case study focuses on the federal state of Bremen in northern Germany, a region marked by high unemployment, socio-economic disparities and low life expectancy compared with other German states. Facing rising temperatures and prolonged heat waves, Bremen adopted a Heat Action Plan in 2024, covering risk communication, extreme event management, urban development and monitoring. Annual costs are approximately estimated at € 510.000, against benefits of € 50 million per year in terms of avoided deaths and illness.

Costing England’s Third National Adaptation Programme (NAP3) - UK climate policy requires regular climate-risk assessments and national adaptation programmes. Most recently, the third National Adaptation Programme has been published. The ACCREU research team worked with United Kingdom Government departments to estimate the costs of the adaptation measures in the third National Adaptation Programme, estimating that these would cost around 9 billion pounds per year in England. It also estimated that almost all the main adaptation measures had positive economic benefit-cost ratios above one, meaning their societal benefits exceed their costs.

Each case study then presents key data in terms of existing pressures in the area, current and future risks, adaptation costs and benefits, when available. For example, in the case of the UK National Adaptation Plan, flooding, water scarcity and heat are mentioned as main hazards increasingly threatening England. Further down, more details are provided on the location, the calculation of costs and benefits, the stakeholders that have been involved, the main barriers, conditions, climate and socio-economic scenarios, CBA conditions, and replicability. For example, in the case study of the NAP3, the section on Conditions describes how NAP3's climate-proofing focus is mostly on new infrastructure. The much larger challenge - retrofitting the existing stock of public and private infrastructure - is largely unaddressed and will likely require substantially higher costs. NAP3 funds climate-proofing for only 10–20 hospitals currently being built or refurbished, out of roughly 1,100 hospitals in the UK. There is a significant opportunity to embed adaptation into new government infrastructure spending programmes via climate-proofing - i.e., new-build programmes are a natural, lower-cost entry point for adaptation compared with retrofitting. On the CBA conditions, the Handbook explains how the cost/benefit estimates for each climate scenario were fed into the University of Graz's CGE COIN model to assess macroeconomic and public-finance effects. The section on Replicability explains how this UK exercise could act as a template for other countries to follow to cost their NAPs. The macroeconomic methodology applied here is designed to be portable across national contexts. National adaptation programmes across Europe will need similar scaling up, and it's critical for governments generally to start costing their national adaptation plans and assessing economic/fiscal costs and benefits

In the case of the Socially Just Heat Adaptation Plan in Bremen, Germany, the context section describes the high vulnerability of the case study, characterized by a high share of migrants of all Federal States and a relatively low life expectancy, ranking 14 out of 16 Federal States. Heat is an important emerging threat, with average annual temperatures having increased by over 1.6°C since 1881, and the number of hot days above 30°C over the last 50 years - from 23 to 30 days in Bremen city. Current and future risks also identify the main vulnerable groups.

In terms of adaptation options, the regional government has mapped where climate risks are highest and combined this with information on who is vulnerable, identifying hotspots and targeting measures at those most exposed to heat stress: pregnant women, parents, babies, the elderly, drug users, the socially isolated, people without housing and outdoor workers. Measures are delivered with existing multipliers such as schools, social and health care facilities, neighbourhood outreach centres and volunteering initiatives. Examples include:

- Grey measures: cooling in health service buildings, cooling rooms, drinking water provision, seasonal shading.
- Green measures: nature-based transformation of public spaces, tree planting, creating and maintaining parks and green spaces.
- Soft measures: heat awareness campaigns for vulnerable groups, an online heat portal, staff training, networking, and communication of cooling options.

The case study points at a BCR of 73-105 associated with the Heat Action Plan - including includes fixed coordination (€250,000–276,000), risk communication, information and awareness (€96,000–120,000), management during extreme events (€147,000–174,000), and monitoring and evaluation (€12,000) costs. Every euro invested generates between 73 and 105 euros in health benefits. Productivity losses and wider co-benefits are excluded, so these figures are conservative.