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Abbreviations

Abbreviations	Full wording
A&M	Adaptation and Mitigation
CC	Climate Change
CSA	Case Study Areas
DSS	Decision Support System
DT	Digital Twin
ENoLL	European Network of Living Labs
ES	Ecosystem Services
LL(s)	Living Lab(s)
NBS	Nature-Based Solutions
SC-Hub	Stakeholder Community Hub
SE	Stakeholder Engagement
SH(s)	Stakeholder(s)
SIA	System Innovation Approach
TG	Target Groups
WS	Workshop

Key words

Living Labs, Climate Resilience, Co-design and Co-development, Stakeholder Engagement, Geo-design.

Summary

A living lab is defined as a participatory research tool which brings together a collective of heterogeneous key stakeholders to explore a focal issue. In the CARMINE project, Living Labs (LL) are harnessed to collect baseline data and knowledge from Case Study Areas (CSAs) using a participatory multi-actor approach to initiate the co-design of geo-designed Adaptation and Mitigation (A&M) pathways. By integrating local stakeholders' insights on knowledge gaps, user needs, climate risks, and sectoral threats, the project aims to support transformative adaptation planning and develop resilient metropolitan communities. CARMINE establishes a network of eight Living Labs connected to the European Network of Living Labs and a Stakeholder Community Hub (SC-HUB) to promote knowledge exchange, open innovation, and co-development. The methodology described in the current document includes the distribution of a survey to all CSA leaders, identifying significant climate challenges, uncovering ongoing metropolitan climate actions, and assessing stakeholder involvement in participatory activities related to climate change adaptation and mitigation. Furthermore, it reviews data availability and identifies gaps that the CARMINE project can address to enhance climate resilience. To convene to the Living Labs, the stakeholder mapping process is described in detail, starting with creating a long list of potential stakeholders for each CSA, based on key sectors related to the Living Lab climate risks focus(es) and climate change vulnerability groups. The long list is then refined into a short list using an influence/interest matrix, plotting stakeholders based on their power to effect change and their interest in the project. This matrix helps identify core stakeholders who will be invited to participate in the Living Labs. Engaging vulnerable communities is a priority, and their representatives are included despite the challenges. The SH engagement leads to three Workshops which are described in detail in D1.1.

1 Introduction

1.1 Living Labs as a Tool

The concept of Living Lab (LL) which emerged in the early 1990s (e.g., Bajgier et al., 1991) was initially used as an environment where students experienced real-life contexts to offer future solutions to large scale problems and develop future directions in the development of a product. The interest in living labs reemerged in 2006 in the European Commission to promote a common European innovation system based on living labs (Dutilleul et al., 2011).

Living Labs (LLs) are of interest to industries today since they see the potential of rapidly testing innovation for the global market. Today's companies in all industries integrate users in the innovation process, seeing them as a valuable source of feedback and a constant flow of novel ideas in the co design of products or services. The concept of “open innovation” drives user involvement and one form of open innovation is the living labs especially in the technological sector, where technology is co-developed and tested in a physical or virtual real-life context, and users are important informants and co-creators (Kusiak, 2007). Traditionally, users have been involved through the collection of feedback on a company's products and services. However, through the LL process which involves the user in the innovation process, users have become co-creators of value, and the innovation is user-driven (Westerlund & Leminen, 2011). The living labs aspects of the open-innovation model offer to industries a user-centered think tank which can help companies test a product or service before launching it and is therefore of particular interest to many industries today (Liedtke et al., 2012). The success of the LLs depends largely upon the ability to interact with the citizen (as a user, consumer or worker), leveraging the full creativity and potential and capturing the ideas and input of the participants from a large population (Compagnucci et al., 2021).

A Living Lab can be therefore defined as a participatory research tool which brings together a collective of heterogeneous key stakeholders from public and private domains such as academia, public authorities, citizens and businesses in physical or virtual spaces to explore a focal issue. It is used in planning, product design and innovation in which stakeholders collaborate using a variety of provided resources and activities to co-develop, prototype, validate and test innovative solutions for new products, technologies, systems, services, or applications in all phases of their life cycle a real-life context such as cities, city regions, rural areas (Leminen et al., 2012). LLs act as open innovation spaces which foster co-creation with users and the result is expected to better address stakeholder needs. LLs are hence experimentation environments co-creation ecosystems for human-centric research and innovation.

1.2 Living Labs in CARMINE

CARMINE facilitates the gathering of baseline data and knowledge from the CSA level (T1.2) using a participatory multi-actor approach (T1.1, T1.3) to start the co-design process of geo-designed A&M pathways (T1.4) and to support co-development activities (including science-based knowledge and decision-support tools) (WP2, WP3, WP4 and WP6). In Stage 1, the project integrates (i) information and insights reflecting local stakeholders' perspectives (such as knowledge gaps, user needs, major climate risks, challenges, gaps, barriers, and sectoral threats) (TG1, TG2, TG3) towards a unified vision for transformative adaptation planning and resilient

metropolitan communities, gathered through LL and SC-HUB activities (WP1), and (ii) climate, BGP, and SE data to enhance transformative adaptation planning and develop improved A&M pathways.

In WP1, T1.1, CARMINE establishes a network of eight living labs associated with representative MREs, maintaining operational links to the European Network of Living Labs (ENoLL) and a Stakeholder Community Hub (SC-HUB) to promote knowledge exchange and transfer, open innovation, co-design, and co-development for transformative adaptation. In the CARMINE project, the LLs are to be set up from M1 to M48 with lead beneficiary ATH-RC and participants including MeteoRo, MITIGA, UB, CNR, INCDS, PCF, UFR, ATH-RC, NOA, JLU, SDSN, LNH, UoBIR, ICLEI, MBV, NMA, MoDG, BCC, LSW, CAAB, and LUH.

Task 1.1 establishes the LLs in each CSA, identifying and mapping relevant actors to co-identify climate-resilient solutions and co-develop the CARMINE digital tools (the Digital Twin and the Decision Support System). The CARMINE Living Lab will support the development of the R&I roadmap for climate adaptation and resilience (WP6); the geo-design of climate adaptation and mitigation pathways; the design of the CARMINE digital tools. It coordinates the implementation of a Stakeholder Interaction Assessment within the LLs. T1.1 provides training, guidelines, and methodological support for the LL activities (such as co-design workshops, bilateral meetings, and virtual interactions) with the assistance of the SC-HUB (T1.3). Specific mechanisms are planned for engaging vulnerable communities. T1.1 also establishes operational links with the European Network of Living Labs (ENoLL) (WP7). Face-to-face training meetings involving all CSA leaders are scheduled to take place throughout the project every 12 months.

2 Methodology – Setting up the Living Labs

2.1 Case Study Survey/Questionnaire

A survey/questionnaire was distributed to each case study leader to provide a detailed framework for examining the CSA within the broader scope of the CARMINE project, functioning as a systematic tool to gather essential information on climate change hazards, stakeholder engagement, existing climate actions, and relevant data and indicators. It serves as a structured approach to understanding the climate landscape within the CSA and supports strategic decision-making.

More specifically, the survey investigates the specific climate hazards that the LL activities will tackle within the CSA. By identifying these hazards, the survey focuses LL efforts on mitigating and adapting to the most significant climate challenges faced by the local community. The survey then asks CSA leaders to provide current climate actions at the metropolitan level within the CSA, aiming to uncover plans, strategies, and reports detailing past and ongoing efforts to tackle climate risks and adaptation challenges. It also examines specific nature-based solution (NBS) initiatives already in place, such as urban parks or green infrastructure projects, and identifies the policy frameworks and funding mechanisms supporting these climate actions. Additionally, the survey seeks information on existing climate mitigation and adaptation objectives for each CSA, providing insights into the primary goals driving local climate action and predicting the anticipated outcomes of LL activities, thereby highlighting the potential impact and effectiveness of collaborative climate efforts. In assessing stakeholder engagement, the survey evaluates the involvement of stakeholders in participatory activities related to climate change risks, adaptation, and mitigation challenges. It also identifies potential threats or difficulties in the stakeholder engagement process, ensuring proactive mitigation of these challenges and promoting inclusive decision-making. Furthermore, the survey reviews data availability and indicators relevant to climate hazards and risks within the CSA. It explores the identification of key indicators, existing climate impact models, and the availability of critical datasets necessary for understanding climate dynamics. Additionally, it identifies data gaps that the CARMINE project can address, facilitating targeted data collection to enhance climate resilience and adaptation strategies within the CSA. A survey template is provided below (Table 1).

Table 1. Case Study Areas Survey/questionnaire - Template

1. Case Study Area:
1) Name of the Organization leading the CSA:
2) Climate hazards the LL will focus on:
3) CSA climate mitigation goals (if known):
4) CSA climate adaptation goals (if known):
5) Expected Outcomes of the LL:
6) Climate action (s) foreseen if any at this stage:
7) Other on-going initiatives / projects related to climate risks and adaptation:
2. Stakeholder engagement
1) Have stakeholder already been engaged in participatory activities related to climate change risk, adaptation and mitigation challenges?
2) If yes, please describe the stakeholder engagement outputs and results
3) Threats/potential difficulties foreseen as part of the CARMINE stakeholder engagement process:
3. Climate actions
1) Climate action(s) already taken at the metropolitan level, e.g. plans, existing strategies and reports-including contributors (if known) and scale? Please indicate if these plans can be shared with the CARMINE project.
2) Specific nature-based solution actions (e.g., urban parks or forest, green infrastructure, green space strategies, urban agriculture, etc.) already taken at the metropolitan level, e.g. plans, existing strategies and reports-including contributors (if known) and scale?
3) What national or international policy and guidance have been used to develop the climate mitigation and adaptation plans?
4) Are you aware of the available funding mechanisms to be used to implement the mitigation and adaptation actions in the CSA?

4. Data and indicators

1) Have you already identified the relevant indicators of climate hazards that impact the CSA? Y/N

2) What are the existing climate impact models that are currently used by the CSA, if any?

3) Data availability: Are those following data set exist for the CSA? For each, please indicate where/how project partners can access. If permission is needed, please provide an email address for follow-up communication.

Province/region, metropolitan area, and municipality boundaries (.shp/.json format):

Land cover and land use (including locations of parks and buildings, etc):

Meteorological observations (measured in the Metropolitan area) of the variables: temperature, Humidity, Precipitation, evapotranspiration, at hourly and daily temporal scales:

Demographic information, including, if available, total population, population density, age and gender structure, birth and death rate, population and growth rate, life expectancy, ethnic composition, education level, employment and unemployment level, and geographical distribution:

Ecosystems and ecological data:

4) Climate risk data.

5) Data gaps that can be addressed within the CARMINE project.

5. Other Comments:

2.2 Case Study Survey Results

The results of the Case Study Areas Survey identified the primary climate and climate-related challenges that each CSA wants to address within the CARMINE project are presented briefly in Table 2 and more analytically presented hereafter per CSA:

Table 2. Climate Change challenges for each CARMINE CSA

CSA	Challenge(s)
(1) Prague	Air quality
(2) Leipzig	Heat wave and wildfire and their indirect economic effects
(3) Funen - Odense	Flooding
(4) Athens	Heatwaves
(5) Barcelona	Wildfires
(6) Bologna	Heat waves; urban microclimate; population wellness; relationships in the urban environment between pollution and climate
(7) Brasov	Drought
	Extreme events associated with water related hazards Heat waves
(8) Birmingham	Surface water flooding (particularly the interaction with trees and green infrastructure)

2.2.1 Prague (Czech Republic)

Current Status of the Case Study

The Institute of Computer Science of the Czech Academy of Sciences (ICS) is leading the CSA of Prague. The focus is on understanding climate hazards such as air quality and thermal comfort at the local scale. As expected, outcomes of the LLs, ICS lists better understanding of needs and requirements of local stakeholders (for instance, health practitioners, policy makers, urban planners, etc.) and understanding the legal, (socio)economic and other limitations in realization of adaptation measures.

Stakeholder Engagement

Stakeholders in Prague, including the municipality and various institutions, have been engaged in participatory activities related to climate change. However, challenges such as lack of time and understanding of project benefits may hinder full engagement. Despite the availability of climate-related data, there's uncertainty regarding its utilization and collaboration dynamics between academic institutions and private companies. Threats to SE include time constraints and the need for clearer communication regarding project aims and benefits.

Climate Actions

Prague has undertaken various climate actions at the metropolitan level, including the implementation of climate action plans and nature-based solutions (NBS). The adaptation strategy incorporates principles of NBS, with some aspects already implemented in city park revitalization projects. National and international policies, such as the Climate Change Adaptation Strategy and the Strategy on Adaptation to Climate Change in the Czech Republic, have guided the development of climate mitigation and adaptation plans.

Data and Indicators

Prague has identified relevant indicators of climate hazards impacting the city, including extreme heat and air pollution concentrations. Climate impact models, such as the PALM-4U model and epidemiological models, are used to assess the spatial distribution of heat and air pollution and their impact on health variables. Data availability for meteorological observations, demographic information, and land cover and land use is generally good, although gaps exist in ecosystem and ecological data.

2.2.2 Leipzig (Germany)

Current Status of the Case Study

The University of Freiburg leads the CSA of Leipzig. Climate hazards of concern include Wildfires and well-being. Mitigation goals are not reported. Adaptation goals are not reported. Expected outcomes of the LL are not reported.

Stakeholder Engagement

Stakeholders' engagement has not been reported.

Climate Actions

Leipzig has not reported any foreseen climate actions, nor any Climate action(s) already taken at the metropolitan level at this stage.

Data and Indicators

Relevant indicators of climate hazards impacting Leipzig have not been identified. However, it is reported that Digital twins exist, data is given in ISON format. Leipzig has reported that they have 3D data of Leipzig temperature, humidity etc. as well as green areas and lakes.

2.2.3 Funen-Odense (Denmark)

Current Status of the Case Study

The Technical University of Denmark (DTU) is leading the CSA of Odense Funen, focusing on flooding hazards. While climate mitigation goals aim for a 70% reduction of all GHGs by 2030, specific adaptation goals revolve around municipal adaptation plans. The expected outcomes of the Living Lab include active stakeholder participation, although specific climate actions are not yet clear. Ongoing initiatives related to climate risks and adaptation include CROSSEU, ACCREU, and ARSINOE.

Stakeholder Engagement

Stakeholders have been engaged in local studies related to climate change risk, adaptation and mitigation challenges. However, detailed outputs and results of stakeholder engagement are not specified.

Climate Actions

Municipalities have already developed plans for climate actions, though the specifics are not provided. Nature-based solution actions at the metropolitan level require a detailed review of existing plans and policies. National and international policies and guidance for climate mitigation and adaptation plans are sourced from open data and models, while funding mechanisms for implementation are not explicitly known.

Data and Indicators

Indicators of climate hazards impacting Odense Funen depend on the models used, with a focus on risk assessments and damage costs. Various flood models and damage cost models are utilized. Data availability for province/region boundaries, land cover, meteorological observations, and demographic information exists, with detailed digital data available for open-source upload. Climate risk datasets and data gaps to be addressed within the CARMINE project are yet to be determined.

2.2.4 Athens (Greece)

Current Status of the Case Study

The National Observatory of Athens (NOA) as Athens CSA, focuses on understanding climate hazards, particularly heatwaves, and implementing tailored adaptation measures. The primary goal is to enhance urban resilience and reduce heat-related risks through nature-based solutions and innovative urban infrastructures. By leveraging existing scientific data and engaging stakeholders, the initiative aims to co-design effective strategies for mitigating urban heat and promoting climate resilience.

Stakeholder Engagement

Stakeholders in Athens have actively participated in various participatory activities related to climate change. These engagements have facilitated the co-creation of visions and strategies to address urban heat island effects and enhance overall urban resilience. Through workshops and living labs, stakeholders have mapped out key challenges, validated climate threats, and envisioned innovative solutions for the future. Despite potential difficulties such as conflicting interests and logistical challenges, these engagements have fostered collaboration and consensus-building among diverse stakeholders.

Climate Actions

Athens has embarked on several climate actions at the metropolitan level, including the implementation of climate action plans and nature-based solutions. Initiatives like the ARSINOE Project and the Athens Resilience Strategy for 2030 outline comprehensive strategies to mitigate and adapt to climate change. Furthermore, the city has undertaken numerous nature-based solution actions, such as the Attica trilogy, the restoration/preservation of the National Garden of

Athens and the Pedion Areos amongst other initiatives. These efforts underscore Athens' commitment to sustainable urban development and climate resilience.

Data and Indicators

Athens has identified relevant indicators of climate hazards and established data availability for essential climate variables. Meteorological observations (such as temperature, wind speed, Cooling Degrees Days etc.), demographic information (for instance 2021 Census Data), and ecosystem data are data and indicators relevant to CSA Athens. However, there remain gaps in climate risk data, particularly regarding wildfires and droughts. Addressing these data gaps within the CARMINE project presents an opportunity to enhance the city's climate resilience efforts and improve decision-making processes.

2.2.5 Barcelona (Spain)

Current Status of the Case Study

Mitiga Solutions is leading the CSA of Barcelona. This initiative primarily focuses on mitigating the risk of wildfires and heatwaves. The overarching goal is to enhance community resilience and reduce the impact of wildfires through a combination of community engagement, smart land use planning, and forest management strategies. By involving local stakeholders and leveraging scientific expertise, MITIGA aims to develop effective strategies to address wildfire risks in Barcelona.

Stakeholder Engagement

Stakeholders in Barcelona have been actively engaged in participatory activities related to climate change and wildfire risk management. Collaborative efforts have led to the development of the Collserola Wildfire Management Plan, which involves input from various organizations and authorities, including Collserola Natural Park, the Catalan forestry department, fire services, local councils, and civil protection agencies. This inclusive approach ensures that wildfire risk management strategies are developed with input from all relevant stakeholders.

Climate Actions

Barcelona has undertaken several climate actions at the metropolitan level to address wildfire risks and promote resilience. Initiatives such as the Fireprime project (UCPM project) and the Collserola Wildfire Management Plan focus on implementing wildfire risk reduction actions and enhancing community awareness. Additionally, existing initiatives like the Climate Change Adaptation Plan of the Metropolitan Area of Barcelona provide a framework for climate adaptation strategies, including measures to mitigate heatwaves and wildfire risks.

Data and Indicators

Barcelona has identified relevant indicators of climate hazards related to wildfires and heatwaves and has established data availability for essential variables. Climate impact models and risk assessment tools are used to simulate wildfire risk under different climate scenarios and evaluate factors like vegetation type, topography, and historical fire patterns. However, there are opportunities to address data gaps within the MITIGA project, particularly in developing heatwaves and wildfire risk scenarios and improving data accessibility for stakeholders.

2.2.6 Bologna (Italy)

Current Status of the Case Study

CNR and CAAB are leading the CSA of Bologna, focusing on heat waves, urban microclimate, population wellness, relationships in the urban environment between pollution and climate. While climate mitigation goals aim to reduce air pollution and road traffic and their impacts in urban areas, they also aim to improve population wellness. Additionally, as CSA adaptation goals, population health and adaptation of the urban texture to climate change are under consideration. The expected outcomes of the Living Lab include developing strategies for urban delivery, adaptation and regeneration as well as identifying potential new common interests of stakeholders.

Stakeholder Engagement

Stakeholders have already been engaged through various activities such as training courses, projects, national competitions, and regional initiatives focused on climate change mitigation and adaptation.

Potential Difficulties in Stakeholder Engagement

Challenges may include a gradual loss of interest, emergence of unexpected interests, and economic barriers to application. Strategies to address these challenges involve selecting appropriate engagement methods, periodic SWOT analysis, and developing suitable business models.

Climate Actions

At the metropolitan level, the Metropolitan Area Development Plan (MADP) serves as a comprehensive framework for sustainable development, emphasizing environmental protection, urban beauty, and innovation. Additionally, various municipalities within the Metropolitan City have developed Sustainable Energy and Climate Action Plans (SECAPs) to address climate challenges, outlining specific measures for mitigation and adaptation. The Bologna Charter for the Environment, signed during the G7 Environment Summit, underscores the commitment of metropolitan cities to environmental protection and outlines key objectives for sustainable development. Local initiatives, such as the Pact for Work and Sustainable Development and the Pact for Jobs and Climate, further promote business growth, innovation, and sustainability within the region. Lastly, initiatives like the Bologna Climate Mission aim at achieving climate neutrality by integrating transformative approaches across sectors.

Data and Indicators

The CSA leaders in Bologna has identified relevant indicators of climate hazards impacting the region. These indicators include annual cumulative precipitation, maximum summer temperature, average annual temperature, and tropical summer nights, sourced from the Environment and Energy Prevention Agency of the Emilia Romagna Region (ARPAE). Additionally, the Urban Heatwave Thermal Index (UHTI) from CNR Data maps daytime thermal patterns during heatwaves, aiding in quantifying urban temperature variability. The CSA utilizes the Urban Proof toolkit for climate impact assessment, which assesses hazards, vulnerabilities, and adaptive capacities based on IPCC AR5 principles. This toolkit integrates various impact indicators, such as extreme physical discomfort during heatwaves, flood risks, peri-urban fire risks, and electricity

demand for cooling. Data on demographic information and land cover is accessible through regional and municipal geoportals, while meteorological observations are provided by ARPAE hydrometeorological services. The CSA also leverages vulnerability indices and hazard maps developed by IBE-CNR, offering insights into flood risks, fire risks, and electricity demand for cooling, among others. These datasets and tools facilitate informed decision-making for climate adaptation and resilience planning in the Bologna metropolitan area.

2.2.7 Brasov (Romania)

Current Status of the Case Study

The National Institute for Research and Development in Forestry leads the CSA of Brasov. Climate hazards of concern include water scarcity, heavy precipitation, heat extremes. Mitigation goals include reducing the heat island effect, decreasing CO₂ emissions, and promoting sustainable energy and transportation. Adaptation goals involve inter alia soft measures such as promoting cycling and local food supply chains. Expected outcomes of the Living Lab include providing support for a climate-resilient economy, developing alternative tourism strategies, increasing stakeholder capacity, and integrating climate considerations into public investments.

Stakeholder Engagement

Stakeholders have been engaged through various projects and initiatives, including the "The sustainable development of Romania in the European context: from vision to action" project, (Mateescu E., 2023) the DivAirCity City-to-City Twinning Programme¹, and the CLISWELN project². Outputs include the Strategy and Plan for Climate Change Adaptation and collaborative models and tools developed in the CLISWELN project (Tudose et al., 2022).

Climate Actions

Brasov has implemented various climate actions at the metropolitan level, including sustainable mobility plans, sustainable energy actions, noise reduction plans, air quality plans, and sustainable urban development strategies. Soft activities focus on changing citizens' mindsets and promoting alternative means of transportation. Moreover, recently, regional and local authorities from CSA, signed the EU Missions Adaptation to Climate Change alongside other 311 regions and local authorities from 25 EU Member States. The Mission aims to deliver concrete solutions to big societal challenges by linking research and innovation with new forms of governance and collaboration, and stakeholder and citizen engagement. Therefore, it empowers and guides authorities to achieve climate resilience through understanding climate risks, developing pathways for preparation, and implementing innovative solutions by 2030. Grounded on the idea that complex societal challenges require coordinated and interdisciplinary efforts across Europe, the Mission contributes to the delivery of the European Green Deal and the Climate Adaptation Strategy goals³.

¹ <https://networknature.eu/divaircity-city-city-twinning-programme-launch-orvieto>

² <https://ms.hereon.de/clisweln/index.php/en>

³ [EU Missions: Adaptation to Climate Change](#)

Nature-Based Solutions

While large-scale nature-based solutions are represented mainly by peri-urban forests, small-scale solutions like green roofs, green walls, urban agriculture, and permeable areas exist in the city. Plans for implementing nature-based solutions are under revision as part of the Master Plan.

Policy and Guidance

The Strategy and Plan for Adaptation to Climate Change was developed based on the National Strategy for Climate Change Adaptation 2014-2020. Local policies include action plans for noise reduction, air quality, sustainable energy, and sustainable urban development.

Funding Mechanisms

Funding mechanisms include European Funds (e.g., Operational Programmes, EEA grants), National Funds (e.g., National Program Anghel Saligny), Local Funds (county and municipality funds), and Private Funds (from private companies for environmental projects).

Data and Indicators

Relevant indicators of climate hazards impacting Brasov include snow days, freezing days, summer days, maximum rainfall in 24 hours, winter and summer number of tourists, green area percentage, forest surfaces, ecosystem services assessment, and vulnerable groups distribution. Data availability includes province/region boundaries, land cover, meteorological observations, demographic information, and ecosystem data. Data gaps that can be addressed within the CARMINE project include high-resolution climate and land-use data, distribution of vulnerable groups to climate hazards, ecosystem services changes, and nature-based solutions adapted to Brasov.

2.2.8 Birmingham (England)

Current Status of the Case Study

The University of Birmingham, along with Birmingham City Council and the Climate Adaptation team within the West Midlands Combined Authority, is leading the CSA of Birmingham. The focus is on surface water flooding, especially its interaction with trees and green infrastructure due to heavy urbanization. Birmingham City Council aims for Net Zero by 2030 and has a Climate Risk and Vulnerability Assessment. Regionally, there's an adaptation plan produced by the West Midlands Combined Authority. Expected outcomes of the Living Lab include raising awareness, defining adaptation priorities, and integrating adaptation into decision-making.

Stakeholder Engagement

Stakeholders haven't been engaged yet in participatory activities related to climate change risk, adaptation, and mitigation challenges. Potential threats to stakeholder engagement include job security uncertainties at Birmingham City Council.

Climate Actions

Birmingham City Council is committed to Net Zero by 2030 and has a Climate Risk and Vulnerability Assessment. The city is also part of the Carbon Disclosure Programme and has a regional Climate Risk and Vulnerability Assessment with the West Midlands Combined Authority. Nature-based solutions actions include the City of Nature plan and the Birmingham Urban Forest masterplan.

Data and Indicators

Relevant indicators of climate hazards impacting Birmingham include flooding and overheating risks. Existing climate impact models include flood maps from Defra. Data availability for province/region boundaries, land cover, meteorological observations, demographic information, and ecosystems is confirmed. Important hazard and risk datasets include flood risk maps from Defra and UKCP18 climate projections.

Data Gaps

Data gaps that can be addressed within the CARMINE project include surface flood risk modelling, vegetation modelling to understand the role of changing phenology on leaf fall and understanding the role of tree interception during rainfall events.

2.3 Stakeholder Identification and Mapping

Having outlined the primary challenges they aim to address, climate mitigation and adaptation goals as well as their expected outcomes from the Living Labs, the CSA leaders then proceeded to the identification and selection of stakeholders to be invited to the CARMINE CSA LL following a thorough stakeholder mapping methodology.

WP1 leader (ATH-RC) conducted an introductory online workshop to familiarized case study leaders with the stakeholder engagement methodology to be followed within the CARMINE project: the system innovation approach (SIA), the creation of the Living Labs and the methodology for conducting the stakeholder mapping. Additionally, a guideline was provided describing, step by step, how to conduct the stakeholder mapping (Appendix 1). It includes specific templates for developing a long list of stakeholders (Table 3) and identifying vulnerability groups (Table 4).

Table 3. SHs long list mapping template

CSA	Stakeholders Long List					
	Sector (relevant Industry, e.g. public health, tourism, water management)	Category [Business/Industry, Government/Policy Makers, Research/Academia, Local Citizen, NGO/Association]	Name of Stakeholder or Organisation [e.g. National Ministry of Water Resources]	Scale [Local, National, Regional/International]	Existing Contact [Yes/ No]	Comment
CS1						

Table 4. Vulnerable communities identification template

Stakeholders Long List - Vulnerable communities						
Vulnerable communities [which social gpe /	to which hazard [flood / fire / heat / water access / food insecurity....]	temporality [short / mid/ long term]	Name of Stakeholder or Organisation [e.g. National Ministry of Water Resources]	Scale [Local, National, Regional/International]	Existing Contact [Yes/ No]	Comment

Each CSA was emailed individually by the ATH-RC team providing them with the documents and the deadline for submission was set for 15/5. The "vulnerable communities" is a standalone type of stakeholder not related to a sector but to a climate hazard, the temporality refers to when those communities can be considered vulnerable to climate change hazard (now? in the near or far future?).

2.3.1 Identify long-list of stakeholders

- (i) The process of stakeholder mapping is led by the case study leaders, in collaboration with the case study team and supported by the WP1 team. The starting point is the identification of sectors (e.g. local economic sectors, infrastructure, sensitive ecosystems and biodiversity, and social indicators related to health vulnerability and low response capacity).
- (ii) The second step is to identify the relevant categories of stakeholders representing those sectors.
- (iii) The third is to identify key stakeholders representing those categories.

This initial list of stakeholders maps all potential stakeholders related to climate risk, mitigation and adaptation, and resilience in the case study. The methods used are desk study, literature review, CS leader knowledge of local context, exchange with already known stakeholders.

All these SHs will compose what is called the long list of stakeholders: Identifying key stakeholders within each sector, under different categories (Quintuple Helix: Business/Industry, Government/Policy Makers, Research/Academia, Citizens, NGOs). The long-list of stakeholder is considered "acceptable" (covering wide range of sectors and stakeholder groups related to Climate Change risks and hazards) with the inclusion of a minimum of 30 SHs. This long-list may be further extended based on input from stakeholders during the LL workshops.

Example: For instance, for all tiers of the metropolitan climate change risks and challenges sector in the context of an objective of ecological transition, the following categories of stakeholders could be of relevance: regarding the climate change mitigation and adaptation strategies:

1. Policy makers at local level/municipalities for public health, tourism, water management, health, food and agriculture, water resources, and energy, heat:
 - The ones that work on these issues (local/regional/councillors)
 - Civil servants/policy makers in municipalities, regional administrations, governments that work/design/ participate in discussions on public health, heat, energy-water, agriculture-water, environment-water issues.
 - Strategic managers
2. Local decision makers (e.g. municipalities) Policy makers at national level:
 - regional administrations, governments that work/design/ participate in discussions on metropolitan climate change risks.
3. Irrigation districts or all organisations of water allocation:

- Managers of existing initiatives to which the project can connect
 - Strategic managers
 - Actors that deal with water-heat-fire issues
4. Climate change and Civil Protection Authorities:
 - Strategic managers
 - Actors that deal with climate change issues
 5. Management Authorities
 - Strategic managers
 - that work/design/ participate in discussions on climate change risks
 6. Business/private enterprises and industries on CC A&M
 7. Local, regional or national private enterprises
 8. Environmental NGOs
 9. Tourism activities
 10. Others

2.3.2 Identify short-list of stakeholders

This long list permits the CS leaders to establish a short list through a stakeholder mapping methodology which was due on Month 6 (31 July 2024). The short list will be the basis for inviting stakeholders to be part of Living labs for the first workshop to take place between M09 (October) and M12 (January).

After the completion of the long list, each CSA leader had a one-to-one short meeting with an ATH-RC team member on how to establish the short list. (Table 5):

Table 5. CARMINE Case study SH Mapping Meeting Schedule

CARMINE CSAs	SH Mapping Meetings
Prague	27/05/2024
Leipzig	04/07/2024
Funen-Odense	28/05/2024
Athens	30/05/2024, 05/06/2024, 26/06/2024
Barcelona	14/06/2024
Bologna	29/05/2024 and 05/06/2024

Brasov	30/05/2024
Birmingham	24/05/2024

Initially, the CSA leader is asked to clarify the sectors (for example, “business” is not a sector, but “tourism business” is one). The identification of the short list of stakeholders is done then by establishing, with the collaboration of case study leaders, an ‘influence/interest matrix’ (Figure 1). This is done by plotting the identified stakeholders on a graph which plots Influence vs. Interest. By influence is meant the answer to the question “how much power and capacity the stakeholder has to make a significant impact/to effect change in relation to your risk?” By interest is meant the answer to the question: “how likely the stakeholder is to engage in activities or initiatives relevant to the case study focus? this may be due to resultant benefit or adverse impact”.

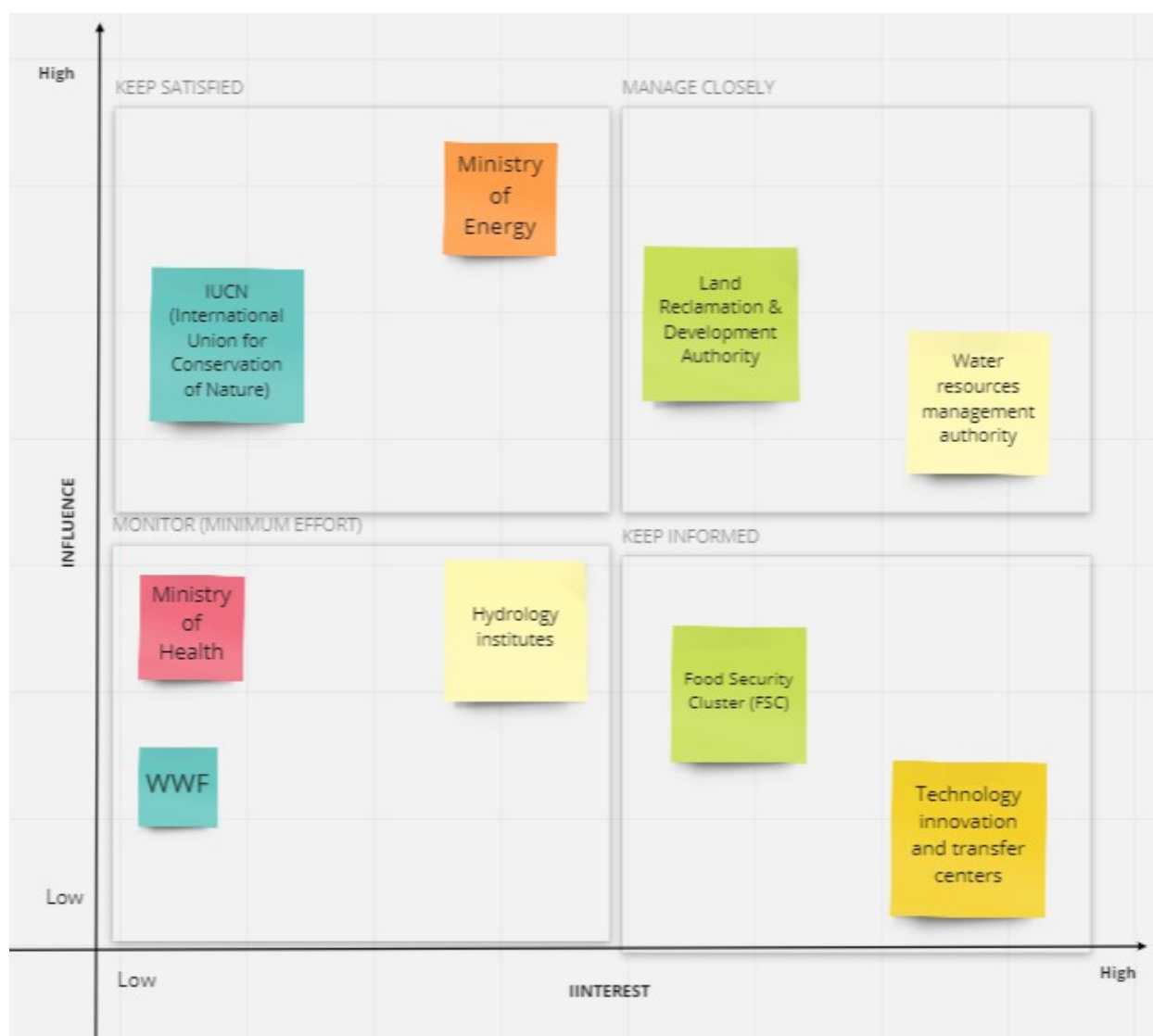


Figure 1. Example of Influence/Interest mapping in progress

CSA leaders are asked to categorize each SH as high/low Influence - high/low Interest on a Miro board provided by ATHENA-RC team for each of the 8 CSAs. CSA leaders are instructed to color code them based on the different categories and use a symbol for each sector (Figure 2). They are told to select 15-20 high Influence/ high Interest and low Influence / high Interest and justify their selection.

Sectors and stakeholder group coding



Figure 2. Colour and symbol coding of categories of SHs and sector for the mapping exercise using MIRO board

There is a validation process for this influence/interest matrix. For this, the initial plotting based on input from project scientists and local partners, is further revised by identified experts (e.g. an external person with stakeholder case study knowledge). On the strength of these results, the short-list of stakeholders can be determined: The stakeholders within the upper right quadrant (high influence/high interest) constitute the core group of stakeholders within the context of the case study and will serve as the basis for recruiting LL participants. In addition to these core stakeholders, consideration is also given to the inclusion of stakeholders at the upper limits of the top left and the bottom right quadrants, especially those that might have high interest but not high impact (for example NGOs or civil society). It is highlighted that age representation is very important to have innovative ideas. Vulnerable communities, which are asked to be identified on

a separate long list, are also to be sought despite the difficulty that this task might endeavour. Their voices should be heard via their representatives. The aim of this exercise is to come down with a list of 15-20 stakeholders with age range and sector representativeness, a list that is dynamic and could change throughout the project as SHs might leave or decide to join as the project evolves. The WP1 team supports the CS leaders in this exercise. With the short list of stakeholders, the recruitment of LL participants can start: Invitations are sent out to selected stakeholders from the short-list to 15-25 participants.

2.4 Results of the Long List Mapping

CSA lead teams develop a long list of stakeholders covering all potential representatives of stakeholder group and sector related to their specific climate change challenge. This long list is expected to include a minimum of 30 stakeholder representatives. The CSA's chapter includes only a snapshot of the stakeholder list. The complete long list of lists of stakeholders can be found, for each CSA, in the appendices of this report.

2.4.1 2.4.1 Prague

Prague SH Engagement Mapping

Prague CSA identified public health, energy air quality, tourism and urban planning as its main sectors represented primarily by government, research academia and NGOs. The complete long list of lists of stakeholders identified in Prague can be found in Appendix 2.

Table 6. Snapshot of Prague CSA long list of SHs mapping

CSA	Stakeholders Long List					
	Sector (relevant Industry, e.g. public health, tourism, water management)	Category [Business/Industry, Government/Policy Makers, Research/Academia, Local Citizen, NGO/Association]	Name of Stakeholder or Organisation [e.g. National Ministry of Water Resources]	Scale [Local, National, Regional/International]	Existing Contact [Yes/ No]	Comment
CS1						
CSA1 (Czech Republic (ICS))	climate change adapt	Government/Policy M	City of Prague, Depar	Regional	Yes	
	climat change/public	Government/Policy M	Central Bohemian Re	Regional	No	
	climate change adapt	Government/Policy M	Ministry of Environme	Regional	No	National level
	crisis management	Government/Policy M	City of Prague, Depar	Regional	No	
	public health	Government/Policy M	City of Prague, Depar	Regional	No	
	transport (air quality)	Government/Policy M	City of Prague, Depar	Regional	No	
	public health	Government/Policy M	National Public Healt	Regional	Yes	
	public health	Government/Policy M	Prague Emergency De	MunicipalOrganizatio	Yes	
	urban planning	Government/Policy M	The Prague Institute	MunicipalOrganizatio	No	
	Prague data managen	Government/Policy M	Operator ICT (Martin	MunicipalOrganizatio	No	
	air quality	Business/Industry	Dopravní podnik Hl.m	MunicipalOrganizatio	No	
	biometeorological mo	Government/Policy M	Czech Hydrometeorol	Regional	Yes	
	climate services	Research/Academia	Department of Atmos	Regional	Yes	
	public health	Research/Academia	Palacky University of	Regional	Yes	
	public health	Research/Academia	Recetox, Masaryk Un	Regional	No	
	urban planning	Research/Academia	Czech Technical Univ	Regional	Yes	
	air quality monitoring	Research/Academia	Czech Hydrometeorol	Regional	No	
	gerontology/populatio	NGO/Association	Gerontology centre -	MunicipalOrganizatio	No	
	climate services NGO	NGO/Association	Fakta o Klimatu (Mila	Regional	No	
	think-thank	NGO/Association	Institut pro evropskou	Regional	No	

The vulnerable communities are represented mainly by ageing population, children, outdoor workers but also tourists (Table 7):

Table 7. Prague vulnerable communities of SHs

Vulnerable communities [which social group /]	To which hazard [flood / fire / heat / water access / food insecurity....]	Temporality [short / mid/ long term]	Name of Stakeholder or Organisation [e.g. National Ministry of Water Resources]	Scale [Local, National, Regional/ International]	Existing Contact [Yes/ No]	Comment	
elderly	heat	Increasing due to population ageing	Gerontology centre - Prague 8 (Iva Holmerová)		No		
children	heat	Prolonged warm season increases the risk of heat stress/illness at school, several field measurement campaigns showed high risk of heat stress at playgrounds	kindergartens, schools, parents (Facebook groups or similar)	Local	No		
outdoor workers	heat	Increasing risk of heat stress for outdoor workers in summer months => lower labour productivity	Construction companies	Regional	No		
residents of large apartment blocks	heat	mid to long term - most apartment blocks in Prague, especially those constructed during the communist times, are not adapted to higher temperatures	housing associations (associations of apartment owners)	Local	No		

		(no central AC, poor insulation, design for cold, not heat)					
downtown residents	heat, air pollution, poor ventilation	increasing risk due to urban heat island effect	? Central districts (Prague 1,2,3...)		No		
tourists	heat, air pollution				No		

CSA Prague Short list of SHs mapping

CSA Prague identified most of its SHs in the high Interest low and high influence matrix and very few in the low interest low influence matrix. Most of the identified government and policy makers are placed in the top right quadrant and as expected the NGOs and citizen groups are in the high interest low influence section. Only one group of SHs were placed in the low interest-low influence sector coming from the Housing sector (Figures 3, 4).

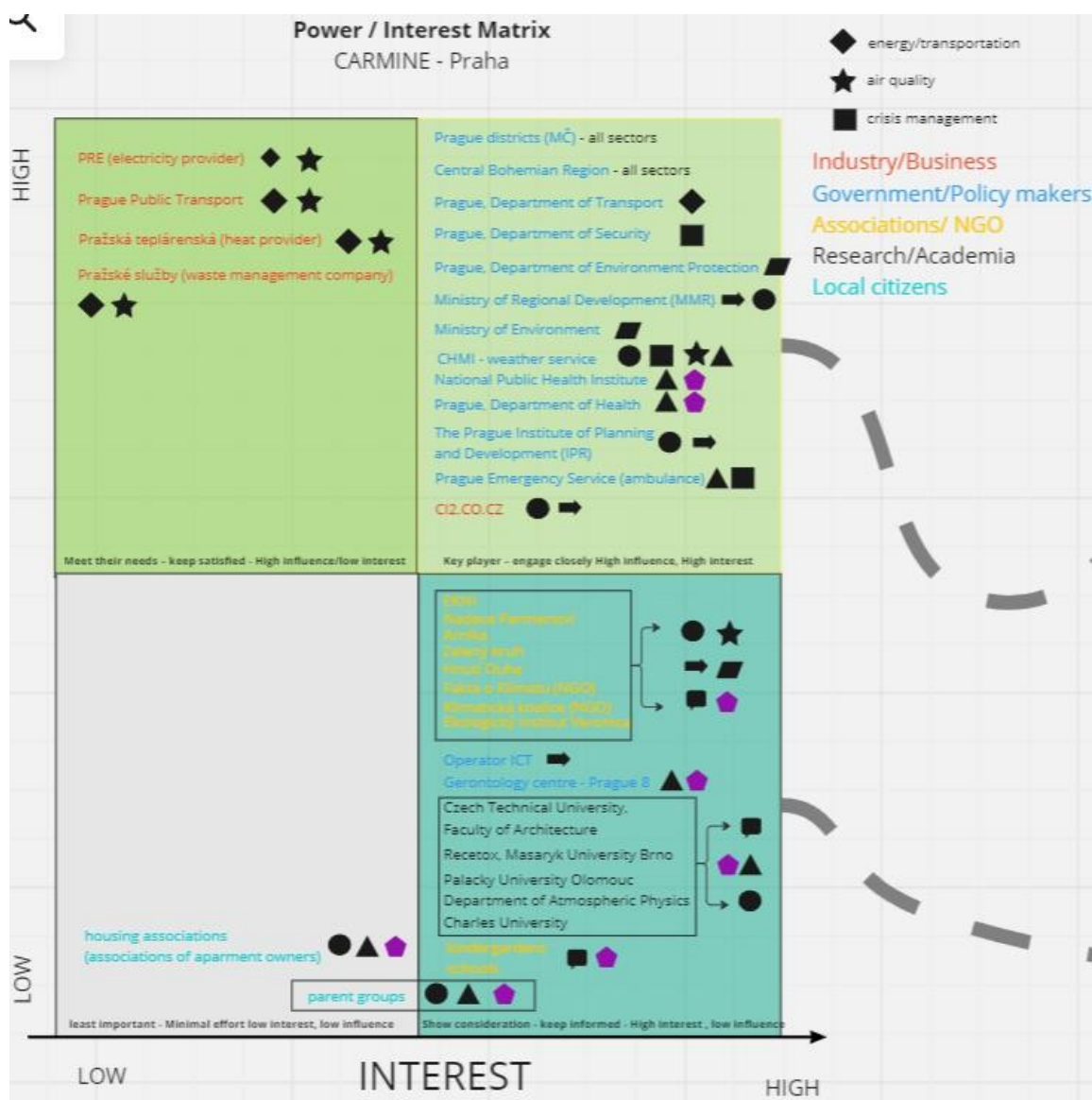


Figure 3. Prague short list of SHs mapping using the Influence /Interest matrix

	Organisation to be involved	Justification: why is it selected?
High Influence - High Interest	City of Prague - Department of Environment	This is the key stakeholders, Maria Kazmukova has been engaged in adaptation strategies for Prague, has been organising meetings with researchers
	City of Prague - Department of Health	Health is on of the key sectors that may be impacted by climate change and extreme heat. Adaptation of the health facilities and health care policies is important for improved resilience of the city.
	Prague Emergency Service	We have obtained data on ambulance outcalls and we are planning to analyze the impact of heat stress.
	Ministry of Regional Development	Key stakeholder in the city and landscape development on the national level, may facilitate easier communication between Prague and Central Bohemia Region.
	Prague districts (departments of health, urban planning, transport, environment)	Govern the urban development on the local level - greenery management, microscale urban planning etc.
	The Prague Institute of Planning and Development	The main institute in Prague that prepares the Metropolitan Plan, can implement new adaptation and mitigation strategies to the real urban development plan.
	National Public Health Institute	Provides service and information about public health risks at the national level to the government => participates/can influence the preparation of new public health policies etc.
	City of Prague - Department of Security	Crisis management and planning at the city level.
	CHMI (air quality, biometeorology)	Governmental institute - very interested in the topic of climate change adaptation, fruitful collaboration of various projects, prepares materials on CC adaptation for the Government
Low Influence - High Interest	Operator ICT	Manages and provides data of the Prague Metropolitan Area that can be useful for research activities.
	Gerontology centre	protection of elderly during heatwaves, can provide valuable insight, do not participate on health policies (do not have an executive power)
	Research/Academia (Charles University, University Olomouc, Czech Technical University)	Very interested in the topic of climate change adaptation, fruitful collaboration on various projects, low influence/interest in the executive power.
	NGOs - Klimatická koalice, Fakta o klimatu, Hnutí Duha, Nadace Partnerství	very engaged in the topic of climate change adaptation, organize debates, provide information to general public, participate on regulations and laws with politicians, but do not have a real executive power.
	schools and kindergardens	Might be interested in the protection and adaptation of the facilities to heat stress, but have zero influence on the local or regional governments
	parent groups / citizens	Might be interested in the protection of the playgrounds/city to heat stress, but have low influence on the local or regional governments - mainly on their own properties

Figure 4. Prague selection and justification of LL participants

2.4.2 Leipzig:

Leipzig SHs engagement mapping

Real estate was one of the most prominent sectors that Leipzig identified, followed by energy, tourism, agriculture and construction. CSA Leipzig has eventually identified two types of climate challenges both physical risks (heatwaves and wildfires) and transition risks (house prices as an indirect effect of the physical risks) so the long list of SHs reflects this duality (Table 8). The complete long list of stakeholders identified in Leipzig can be found in Appendix 3.

Table 8. Snapshot of Leipzig CSA long list of SHs mapping

Stakeholders Long List					
Sector (relevant Industry, e.g. public health, tourism, water management)	Category [Business/Industry, Government/Policy Makers, Research/Academia, Local Citizen, NGO/Association]	Name of Stakeholder or Organisation [e.g. National Ministry of Water Resources]	Scale [Local, National, Regional/International]	Existing Contact [Yes/ No]	Comment
Administration	Government/Policy Maker	Digital City Unit (City of Leipzig)	Local	Yes	
Administration	Government/Policy Maker	Office for Geoinformation and Soil Planning (City of Leipzig)	Local	Yes	
Utility	Business	Wasserwerke Leipzig (water)	Local	Yes	
Research	Research/Academia	Scads.ai Leipzig (Center for Scalable Data Analytics and Artificial Intelligence)	Local	Yes	
Real Estate	Business/Industry	Leipziger Wohnungs- und Immobilienamt (LWI)	Local	Yes	
Real Estate	Research/Academia	DIA – Deutsche Immobilien Akademie Freiburg	National	Yes	
Financial	Business/Industry	Deka Investment GmbH	National	Yes	
Financial	Business/Industry	HanseMerkur Holding GmbH	National	Yes	
Real Estate	NGO/Association	Bundesverband für die Immobilienwirtschaft BVFI	National	No	

CSA Leipzig identified the vulnerable communities mainly among the elderly, the low-income households, the people with disabilities as those affected by the rise of the real estate prices as an indirect effect of the physical risks and the forest owners as being directly impacted (Table 9).

Table 9. Leipzig vulnerable communities of SHs

Stakeholders Long List - Vulnerable communities						
Vulnerable communities [which social gpe]	To which hazard [flood / fire / heat / water access / food insecurity....]	Temporality [short / mid/ long term]	Name of Stakeholder or Organization	Scale [Local, National, Regional/International]	Existing Contact [Yes/ No]	Comment
Low-Income households	Real Estate prices and rents / heatwaves / flooding	Short and long-term	<i>Deutscher Mieterbund - Mieterverein Leipzig e.V.</i>	Local	No	These residents are more susceptible to housing instability due to rising real estate prices and may lack the resources to implement necessary adaptations to mitigate physical risks.
Elderly Residents	Real Estate prices/ heatwaves/ access to nearby grocery stores	long-term	<i>Haus und Grund</i>	Local	No	Older adults are particularly vulnerable to the health impacts of heatwaves and may live in homes that are not well-adapted to withstand extreme temperatures or other climate-related events.
Social Housing Residents	Real Estate Pricing	long-term	<i>DIA – Deutsche Immobilien Akademie Freiburg</i>	Local	Yes	Individuals living in social or public housing often have limited means to move or improve their living conditions, making them more vulnerable to the impacts of both increasing real estate prices and environmental risks.

People with Disabilities	Floods/ Wildfires/ Heatwaves/ access to nearby grocery stores	long-term	<i>Landkreis Leipzig</i>	Local	No	This group may face significant challenges during emergency situations such as wildfires or heatwaves and may have specific housing needs that are not met by the broader housing market.
Children and Families	Real Estate Prices	long-term	<i>DIA – Deutsche Immobilien Akademie Freiburg</i>	Local	Yes	Families with children, especially those with single parents, may find it difficult to secure affordable, safe housing and may be more affected by school closures or disruptions caused by environmental hazards.
Forest Owners	Wildfires, droughts, heatwaves	short	Sächsischer Forstverein	Local	No	Forests are highly susceptible to wildfires, droughts, and heatwaves, which can cause extensive damage, reduce biodiversity, and degrade land quality. This makes forest owners particularly vulnerable to environmental hazards.

In the Interest/Influence matrix, CSA Leipzig decided to merge the two types of climate challenge into one and identify SHs for both. Nevertheless, the Real Estate sector seems to be prevailing. (Figures 5, 6):

CSA Leipzig short list of SHs mapping

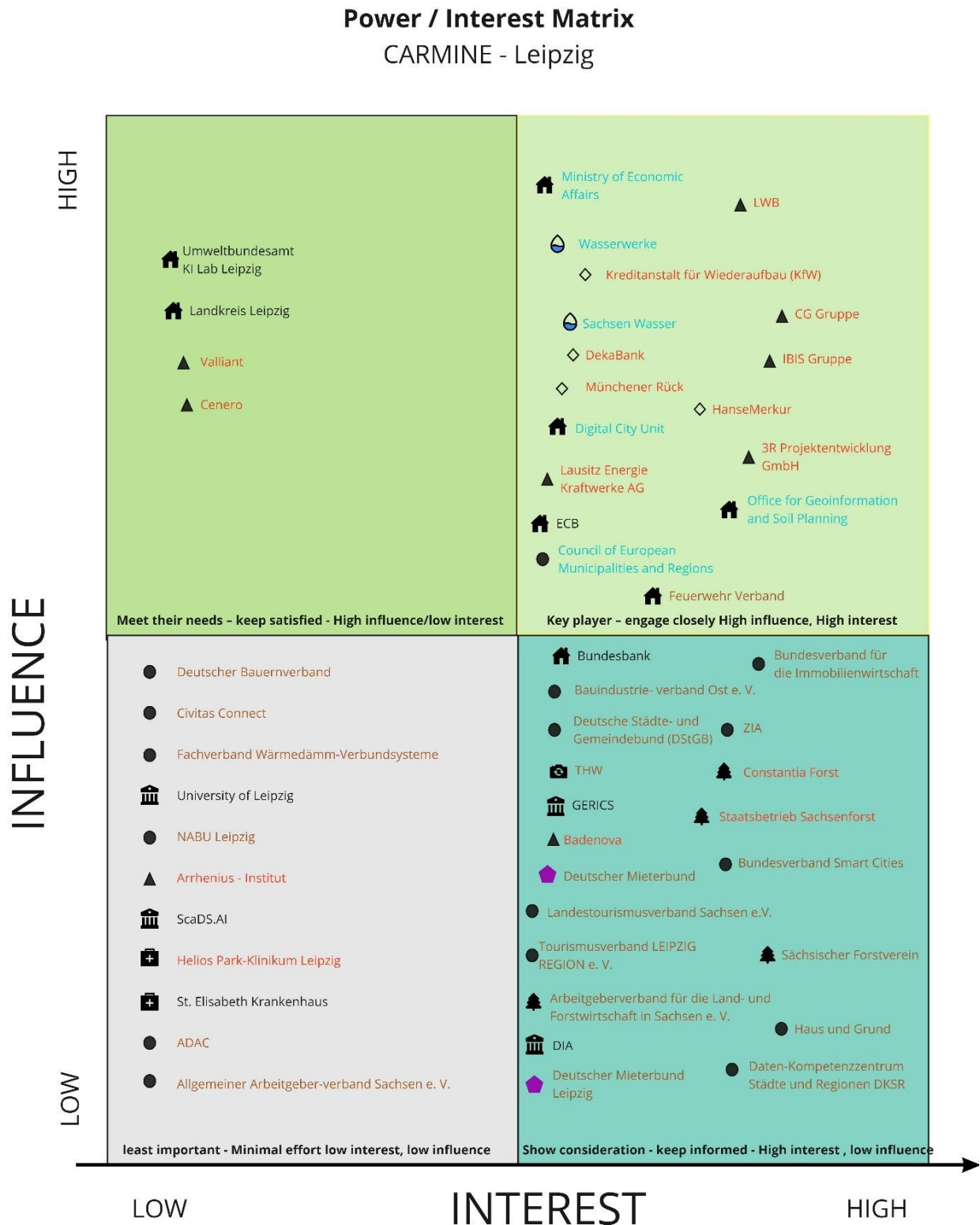


Figure 5. Leipzig short list of SHs mapping using the Influence /Interest matrix (below)

	Organisation to be involved	Justification: why is it selected?
High Influence - High Interest	LWB	Due to its significant role in urban planning and housing policy development in Leipzig, LWB is a key player. As a major housing provider, LWB's commitment to creating sustainable and resilient neighborhoods directly influences property values and helps mitigate the impacts of physical risks such as wildfires and heatwaves.
	CG Gruppe	The CG Gruppe is a major real estate developer in Leipzig, actively shaping the city's urban landscape. Their investments in sustainable and resilient construction projects demonstrate a strong interest in mitigating the impacts of physical risks like wildfires and heatwaves, thereby influencing property values.
	Kreditanstalt für Wiederaufbau (KfW)	KfW is a key player in the topic of real estate prices and physical risks to its role in financing sustainable development projects and providing loans for energy-efficient and resilient building renovations. KfW's investment in initiatives that mitigate the impacts of physical risks such as wildfires and heatwaves directly influences real estate values.
	Wasserwerke Leipzig	The Wasserwerke Leipzig is a key player in the topic of real estate prices and physical risks due to its critical role in managing water resources and infrastructure, which are vital in mitigating the effects of flooding and heatwaves. Their efforts in ensuring sustainable water supply and implementing flood protection measures directly impact property values and enhance the resilience of the city's real estate to environmental risks.
	Office for Geoinformation and Soil Planning	The Office for Geoinformation and Soil Planning is a key player due to its critical role in land use planning, soil management, and geographic information systems, which are essential for assessing and mitigating risks like wildfires and heatwaves. Their expertise in analyzing and managing land resources directly influences urban development and property values, ensuring that real estate investments are resilient and sustainable.
	DekaBank	DekaBank is a key player due to its role in financing real estate projects and managing investment portfolios that are affected by physical as well as transition risks. Their focus on sustainable and resilient investment strategies ensures that real estate developments are better equipped to handle physical risks like wildfires and heatwaves, thereby stabilizing and potentially increasing property values.
	HanseMerkur	HanseMerkur is a key player due to its role in providing insurance products that protect against property damage from events such as wildfires and heatwaves. Their involvement in risk assessment and management directly influences the real estate market by stabilizing property values and encouraging resilient building practices through their underwriting policies.
	ECB	ECB is in charge of the monetary policy, which affects interest rates and mortgage conditions, thereby impacting real estate market dynamics. The ECB's focus on climate-related financial risks underscores its interest in ensuring that the real estate sector is resilient to physical risks such as wildfires and heatwaves.

Figure 6. Leipzig selection and justification of LL participants (1)

Low Influence - High Interest	Bundesverband für die Immobilienwirtschaft	The BVFI has a high interest due to its role in representing the interests of real estate entrepreneurs, investors, and brokers who are directly affected by real estate prices as well as by natural disasters. However, its influence is relatively low compared, as it primarily focuses on advocacy and support rather than directly implementing policy changes or large-scale mitigation measures.
	ZIA	The Zentraler Immobilien Ausschuss (ZIA) has a high interest in real estate prices and physical risks, as it represents a wide range of stakeholders within the real estate industry who are directly impacted by these factors. However, its influence is relatively low as it primarily serves as an advocacy group without direct regulatory or financial power.
	Constantia Forst	Constantia Forest has a high interest in wildfires due to its focus on forestry. However, its influence may be considered low in terms of broader policy or regulatory impact, as it primarily operates at the local level without extensive reach or authority to enforce widespread mitigation measures.
	Haus und Grund	Haus & Grund represents individual property owners and landlords who have a high interest in real estate prices and physical risks, as these directly impact their properties. However, its influence is relatively low compared to larger real estate developers or governmental bodies, as it primarily focuses on providing support and advocacy for individual property owners.
	Deutscher Mieterbund	The Deutscher Mieterbund represents tenants' interests and has a high interest in real estate prices and physical risks, as these factors directly affect housing affordability and safety for renters. However, its influence is relatively low, as it is devoted to the advocacy of tenant rights and protections.
	DIA	The Deutsche Immobilien Akademie (DIA) focuses on professional training and education in the real estate sector, indicating a high interest in understanding real estate prices and physical risks. Being an education institute, the influence on regulatory or operational entities with authority is naturally limited.
	Staatsbetrieb Sachsenforst	Staatsbetrieb Sachsenforst, as a state-owned forestry agency, demonstrates a high interest in real estate prices and physical risks due to its responsibility for managing forested areas susceptible to natural hazards. Sachsenforst's operational scope revolves around forest management and conservation.
	Bundesbank	The Bundesbank identifies and assesses risks to the stability of the financial system as part of its macroprudential mandate. It is therefore very interested in real estate price trends. However, the Bundesbank has lost influence at the expense of the ECB.
	Bundesverband Smart Cities	The Bundesverband Smart Cities represents municipalities and organizations focused on advancing digital and sustainable urban development, indicating a high interest in topics like real estate prices and physical risks. The Bundesverband is concerned with promoting smart city initiatives rather than directly shaping policies or implementing mitigation measures.

Figure 7: Leipzig selection and justification of LL participants

2.4.3 Funen-Odense

CSA Odense long list of SHs mapping

Odense, according to the climate challenge of flooding, identified as its main sectors urban planning, coastal protection and industry and tourism with representatives coming equally from government and policy, NGOs and business and industry (Table 10). The complete long list of list of stakeholders identified in Funen-Odense can be found in Appendix 4.

Table 10. Snapshot of Funen-Odense CSA long list of SHs mapping

CSA	Stakeholders Long List					
	Sector (relevant Industry, e.g. public health, tourism, water management)	Category [Business/Industry, Government/Policy Makers, Research/Academia, Local Citizen, NGO/Association]	Name of Stakeholder or Organisation [e.g. National Ministry of Water Resources]	Scale [Local, National, Regional/International]	Existing Contact [Yes/ No]	Comment
CS3	Urban planning	Government/Policy	Municipality of Odense	Local	Yes	HH
	Urban planning	Government/Policy	Municipality of Svendborg	Local	Yes	HH
	Geodata collaboration	Government/Policy	Geo Fyn	Regional	Yes	LH
	Water management	Government/Policy	VandCenterSyd	Local	Yes	HH
	Tourism	NGO/Association	Destination Fyn	Regional	No	LH
	n/a	NGO/Association	KL	MunicipalOrganization	Yes	HH
	Industry/Tourism	Business/Industry	Odense Port	Local	No	HH
	Industry/Tourism	Business/Industry	Svendborg Port	Local	No	HH
	Urban planning	Government/Policy	Municipality of Middelfart	Local	Yes	HH
	Urban planning	Government/Policy	Municipality of Kerteminde	Local	Yes	HH
	Urban planning	Government/Policy	Municipality of Nyborg	Local	Yes	HH
	Industry	Business/Industry	ErhvervsFyn	Regional	No	LH
	Urban planning	Government/Policy	Municipality of Assens	Local	No	HH
	Urban planning	Government/Policy	Municipality of Nordfyns	Local	No	HH
	Urban planning	Government/Policy	Municipality of Faaborg-Midtfyn	Local	No	HH
	Industry/Tourism	Business/Industry	Assens Port	Local	No	HH
	Industry/Tourism	Business/Industry	Middelfart Port	Local	No	HH
	Industry/Tourism	Business/Industry	Kerteminde Port	Local	No	HH
	Industry/Tourism	Business/Industry	Nyborg Port	Local	No	HH
	Industry/Tourism	Business/Industry	Bogense Port	Local	No	HH
	Industry/Tourism	Business/Industry	Faaborg Port	Local	No	HH
	Urban planning	Government/Policy	Municipality of Langeland	Local	No	HH

CSA Odense identified as vulnerable communities the citizens living nearby the areas affected by flooding (Table 11).

Table 11. Odense vulnerable communities of SHs mapping

Vulnerable communities [which social group /	To which hazard [flood / fire / heat / water access / food insecurity]	Temporality [short / mid/ long term]	Name of Stakeholder or Organisation [e.g. National Ministry of Water Resources]	Scale [Local, National Regional/International]	Existing Contact [Yes/ No]
Spodsbjerg citizens	Flooding	short, mid and long	Spodsbjerg Digelag	Local	Yes
Nab Strand citizens	Flooding	short, mid and long	Nab Strand Digelag	Local	Yes
Lowland citizens	Flooding	short, mid and long	Digelaget for Dalbybugten	Local	No
The North Funen Coastal Protection, Dike and Pump Layer	Flooding	short, mid and long	Det Nordfynske Kystsikrings-, dige- og pumpelag	Local	Yes
Citizens living in Seden Strandby	Flooding	short, mid and long		Local	Yes
Langelands citizens	Flooding	short, mid and long	Hou Digelag	Local	Yes

CSA Funen-Odense short list of SHs mapping

Research and academia are underrepresented in the matrix, with only one stakeholder included. Broader involvement from this sector is necessary for more comprehensive analysis and solutions. Most of the SHs come from the Government categories (Figures 8, 9).

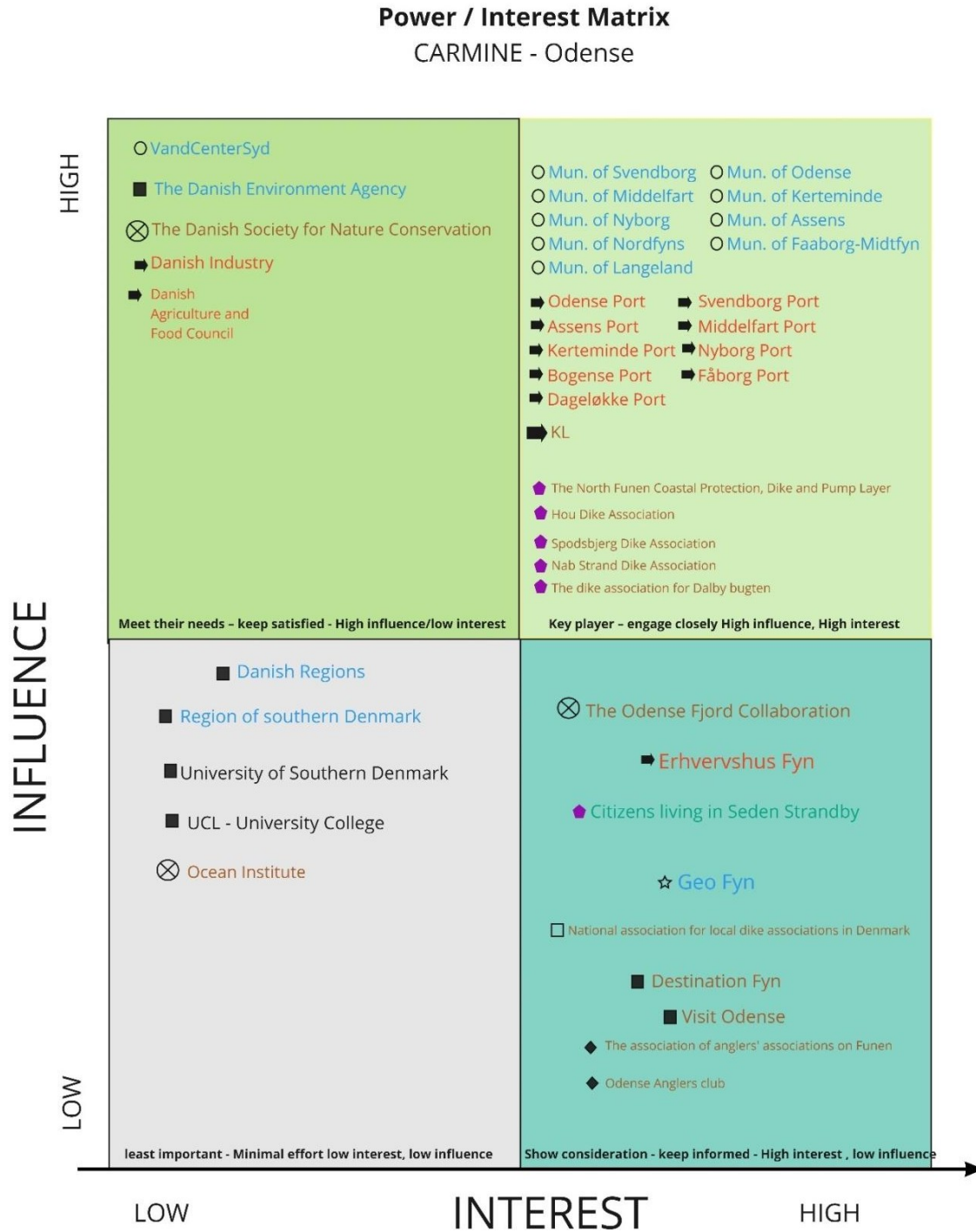


Figure 8. Odense short list of SHs mapping using the interest/influence matrix (below)

	Organisation to be involved	Justification: why is it selected?
High Influence - High Interest	Municipality of Odense	Overall responsible for climate adaptation and for planning
	Municipality of Svendborg	Overall responsible for climate adaptation and for planning
	KL	Association of municipalities in Denmark. High political influence.
	Odense Port	High influence on development activities in the harbor, including industry
	Svendborg Port	High influence on development activities in the harbor, including industry
	The Danish Society for Nature Conservation	High political influence.
	The Danish Environment Agency	Regional/national authority for environmental conditions in Denmark
	The North Funen Coastal Protection, Dike and Pump Layer	Association that maintains existing coastal protection and make decisions on future investments.
Low Influence - High Interest	Geo Fyn	Geo-data collaboration across all Fünen municipalities.
	Destination Fyn	Non-profit Tourism organization owned by all municipalities on Fünen.
	Erhvervshus Fyn	Association of companies on Fünen. Supports development and growth of companies.
	National association for local dike associations in Denmark	Supports knowledge sharing among local dike associations in Denmark
	The association of anglers' associations on Funen	Common interest in high quality water systems that supports optimal angling conditions on Fünen.
	Citizens living in Seden Strandby	Association of local citizens living in highly exposed area towards flooding
	The Odense Fjord Collaboration	Collaboration that will locally find and implement activities in the fjord and in the catchment area, which together will get the water environment in good ecological condition.

Figure 9. Odense selection and justification of LL participants

2.4.4 Athens

Athens SH Engagement Mapping

The CSA Athens developed an extensive long list of SHs (Table 12), predominantly coming from the environment and urban innovation sector, but also the health sector, tourism and energy sectors with a good representation of government, NGOs, local authorities, citizen groups and NGOs. The complete long list of lists of stakeholders identified in Athens can be found in Appendix 5.

Table 12. Snapshot of Athens CSA long list of SHs mapping

Stakeholders Long List					
Sector (relevant industry, e.g. public health, tourism, water management)	Category [Business/Industry, Government/Policy Makers, Research/Academia, Local Citizen, NGO/Association]	Name of Stakeholder or Organisation [e.g. National Ministry of Water Resources]	Scale [Local, National, Regional/International]	Existing Contact [Yes/ No]	Comment
Environment, Urban projects	Foundation	Onassis Foundation	National		
Environment, Urban projects	Foundation	Foundation Stavros Niarchos	National		
Environment, Urban, Innovation	Foundation	Bodossaki Foundation	National		
Urban development	Real Estate Company	Lambda Development	National		
Environment, urban	Government	Ministry of Environment & Energy	National		Athens Climatic Forum
Climate Change, urban	Network of municipalities	Climattica	Regional		Mission Adaptation
Climate Change	Hub	CCHUB	National		Mission Adaptation
Environment, Urban, Innovation	Project	CoolHub EATA	Local		Athens Climatic Forum
Environment, Urban, Innovation	Local authority company	EATA	Local		Athens Climatic Forum
Environment, Urban, Innovation	Local authority company	DAEM	Local		
Green projects	Research/Academia	Agricultural University of Athens	National		Athens Climatic Forum
Climate Change, urban	Forum	Athens Climatic Forum	Local		Athens Climatic Forum
Climate Change, urban	Forum	Youth Athens Climatic Forum	Local		Athens Climatic Forum

The vulnerable communities are identified from the different KAPI (Centres for elderly groups in the different municipalities), as well as NGOs that work with refugees and municipalities that host lower socioeconomic level communities mainly in West Attica (Table 13).

Table 13. Athens vulnerable communities of SHs

Stakeholders Long List - Vulnerable communities						
Vulnerable communities	to which hazard	temporality [short / mid/ long term]	Name of Stakeholder or Organization	Scale [Local, National, Regional/International]	Existing Contact [Yes/ No]	Comment

seniors, people with underlying conditions/chronic conditions	heat	short-mid	<i>People's Hospital - Geriatrics</i>	<i>Regional</i>		<i>For medical perspective on seniors and extreme heat</i>
pregnant women	heat	short-mid	<i>Association of Obstetricians and Gynecologists of Greece</i>	<i>National</i>		<i>Addresses extreme heat impacts pregnant women, and response actions.</i>
pregnant women, mothers, workers/labourers	heat	short-mid-long	<i>Ministry of Social Cohesion and Family</i>	<i>National</i>		(https://ekka.org.gr/index.php/en/) Focus on vulnerable populations, crucial for addressing extreme heat impacts on mothers and pregnant women. Also manages workers' health and safety legislation.
multiple	heat	short-mid	Red Cross			<i>Extensive experience in disaster response and humanitarian aid, crucial for providing immediate assistance and long-term support to those affected by extreme heat. Knowledge of and connections with vulnerable groups.</i>
migrant and refugee women and children	heat	short-mid	Melissa Network	Local		To connect with diverse network of migrant and refugee women and incorporate cultural considerations, considerations for those with language barriers, etc.
seniors	heat	short-mid	KAPI - ΚΑΠΗ	Municipal Organizations		Any contact that communicates with all the ΚΑΠΗ in the metro area? [AB note] To understand their current and potential role as cooling centers and orgs that do outreach to isolated seniors.

workers/laborers	heat	short-mid-long	Ministry of Labor and Social Affairs, Directorate for Occupational Health and Safety	Regional		Considerations of different groups of workers affected by heat (construction workers, kitchen staff esp in small restaurants, others working outdoors, etc), and relevant regulations/protectations that need to adapt.
multiple	heat	short-mid	Civil Protection Attica Regional Authority	Regional		Find a contact person involved in emergency warning and alert systems.
newcomers - migrants and refugees	heat	short-mid	Athens Coordination Centre for Migrant and Refugee Issues (ACCMR)	Local	yes	They coordinate and communicate with a network of orgs/gov agencies that represent or offer services for migrant/refugee/newcomer residents, or manage/connect with any camps that may still exist in metro Athens.
multiple	heat	short-mid	EKAB National Centres for Emergency Care and ambulances			Emergency medical response and ambulances.
multiple, including newcomers and homeless/unhoused	heat	short-mid	Reception and Solidarity Centre of the Municipality of Athens	Local	Yes	https://kyada-athens.gr/
multiple	heat	short-mid	PRAKSIS	Regional		(https://praxis.gr/) Comprehensive support and advocacy for vulnerable social groups, essential for providing medical and humanitarian aid to those affected by extreme heat.

multiple	heat	short-mid	Public Benefit Municipal Management of Piraeus	Local		https://kodep.gr/
multiple	heat	short-mid	Group for UNESCO Piraeus & Islands	<i>Regional</i>		https://www.unescopireas.gr/index.php
workers/laborers	heat	short-mid	Ministry of Interior	<i>National</i>	No	Ministry issues circular during extreme heat about worker safety for public sector employees, in communication with Hellenic National Meteorological Service and Ministry of Climate Crisis and Civil Protection

CSA Athens Short list of SHs

CSA Athens identified more categories than the ones provided, adding Foundation, Forum/Project and Consultant. Athens CSA identifies an extensive list of SHs in the high interest high Influence matrix and includes the vulnerable communities in the high interest low influence (Figure 9). The high interest/high influence matrix which has a good representation in the sections of interest is followed by the justification for the selection. Some prominent foundations such as the Onassis, Bodossakis and Niarhos Foundations are placed in the low influence quadrant of the matrix since, despite having the resources, they are not part of the final policy-making process for the implementation of specific action plans (Figure 10).

Power / Interest Matrix CARMINE - Athens

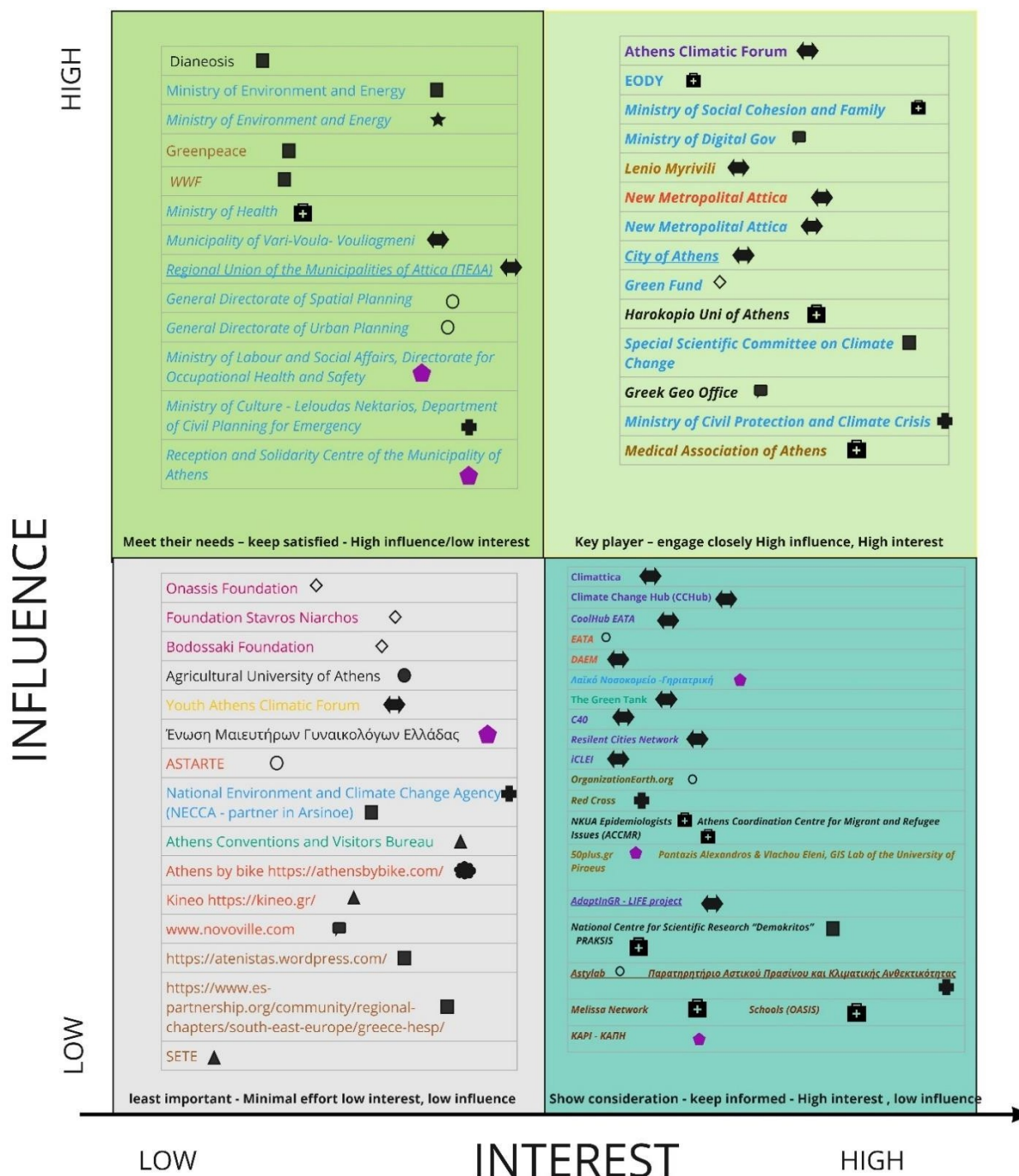


Figure 10. Athens short list of SHs mapping using the influence/interest matrix (below)

	Organisation to be involved	Justification: why is it selected?
High Influence - High Interest	Athens Climatic Forum	Uniting diverse stakeholders to achieve climate neutrality, crucial for addressing extreme heat collaboratively.
	National Public Health Organisation (EODY)	Expertise in public health, vital for managing health impacts of extreme heat.
	Ministry of Social Cohesion and Family	Focus on vulnerable populations, crucial for addressing extreme heat impacts on mothers and pregnant women. Manages workers' health and safety legislation.
	Ministry of Digital Governance	Expertise in digital solutions, influencing policymakers to adopt innovative heat management strategies through demonstrated technological efficacy and data-driven insights.
	Eleni (Lenio) Myrivili	Global Chief Heat Officer, a global influencer on Heat with experience in co-designing solutions for heat with stakeholders. Former Vice-Mayor of Athens.
	New Metropolitan Attica SA	Executing key projects and studies on urban interventions and sustainable development, vital for implementing and monitoring innovative solutions to extreme heat.
	City of Athens	Influential role and extensive experience in green interventions, crucial for tackling the city's top challenge of extreme heat.
	Green Investment Fund	Supporting environmental protection and development projects, essential for funding and implementing measures to address extreme heat and support environmental policy.
	Harokopio University of Athens	Expertise in demography and socioeconomic analyses, vital for understanding the impacts of extreme heat on different population groups.
	Climate Change Impacts Study Committee	Interdisciplinary expertise and extensive research on the economic, social, and environmental impacts of climate change, essential for comprehensive analysis and solutions to extreme heat.
	Greek GEO Office	Role in Earth Observation and coordination, essential for providing data and fostering synergies among stakeholders to address extreme heat effectively.
	Ministry of Civil Protection and Climate Crisis	Authority in managing climate-related emergencies, crucial for developing and implementing strategies to mitigate the impacts of extreme heat.
	Medical Association of Athens	Medical expertise, crucial for addressing health impacts and providing guidance on mitigating the effects of extreme heat on public health.

Low Influence - High Interest	Climattica	A network of regions and municipalities in the CSA, providing an interactive platform for sharing information, data, and best practices, essential for collaborative efforts to address extreme heat.
	Climate Change Hub	International collaboration and focus on climate transformation and recovery, crucial for promoting societal engagement and strengthening environmental democracy to address extreme heat.
	EATA / DAEM	Promoting innovation and sustainable urban management, vital for enhancing Athens' resilience to extreme heat while boosting the city's image and social cohesion.
	Geriatrics Dpt of "Laiko" Hospital	Expertise in elderly care, crucial for addressing the specific health impacts of extreme heat on older populations.
	The Green Tank	Developing policy solutions for sustainable development and climate change adaptation, crucial for fostering informed public debate and collaboration to address extreme heat.
	International City Networks (C40, Resilient Cities Network, ICLEI)	Global expertise and resources in urban resilience and sustainability, essential for sharing best practices and innovative solutions to tackle extreme heat in Athens.
	Organisation Earth	Community-driven approach to sustainable development and resilience, crucial for engaging diverse stakeholders in addressing the impacts of extreme heat.
	Red Cross	Extensive experience in disaster response and humanitarian aid, crucial for providing immediate assistance and long-term support to those affected by extreme heat.
	50plus Hellas	Focus on improving the quality of life for those over 50, crucial for addressing the specific needs and vulnerabilities of older adults during extreme heat events.
	AdaptInGR (LIFE project)	Pivotal role in implementing Greece's National Adaptation Strategy and Regional Adaptation Action Plans, essential for developing comprehensive measures to combat the impacts of extreme heat.
	Astylab	Mission to enhance city life through human-centered design and innovation, crucial for developing urban technological solutions and fostering new approaches to mitigate extreme heat.
	Melissa Network	Focus on empowering migrant and refugee women, essential for addressing the specific vulnerabilities and fostering resilience among these communities in the face of extreme heat.
	"Friendship clubs"	Offering air-conditioned spaces and social support, essential for protecting seniors from extreme heat and fostering community resilience.
	Athens Coordination Center for Migrant & Refugee Issues (ACCMR)	Coordinating integration policies and support for migrants and refugees, crucial for addressing their specific needs and ensuring resilience during extreme heat.
	PRAKSIS	Comprehensive support and advocacy for vulnerable social groups, essential for providing medical and humanitarian aid to those affected by extreme heat.
	Consultant Maria Sitzoglou	Expertise in creating resilient and inclusive urban environments, crucial for ensuring that extreme heat solutions are effectively integrated into urban planning and public participation processes. Schools (OASIS type) projects.

Figure 11. Athens selection and justification of LL participants

2.4.5 Barcelona

Barcelona SH Engagement Mapping

A variety of sectors were identified by the Barcelona CSA including wildfires, nature conservation, forest management, wildlife protection, tourism, water management, urban development (Table 14). The main representatives are government and policy makers and less so NGOs and research academia. The complete long list of lists of stakeholders identified in Barcelona can be found in Appendix 6.

Table 14. Snapshot of Barcelona CSA long list of SHs mapping

CSA	Stakeholders Long List					
	Sector (relevant industry, e.g. public health, tourism, water management)	Category [Business/Industry, Government/Policy Makers, Research/Academia, Local Citizen, NGO/Association]	Name of Stakeholder or Organisation [e.g. National Ministry of Water Resources]	Scale [Local, National, Regional/International]	Existing Contact [Yes/ No]	Comment
CS1						
BCN	Civil Protection	Government/Policy Makers	Barcelona Fire Service	Local	Yes	
BCN	Civil Protection	Government/Policy Makers	Catalan Fire Service	Regional	Yes	
BCN	Civil Protection	Government/Policy Makers	Catalan Civil Protection	Regional	Yes	
BCN	Natural resources management	Government/Policy Makers	Collserola Natural Park	Regional	Yes	
BCN	Public management	Government/Policy Makers	Barcelona Metropolitan Area	Regional	Yes	
BCN	Public management	Government/Policy Makers	Barcelona provincial council	Regional	Yes	Civil protection, rural development and urban areas
BCN	Forest management	Government/Policy Makers	Catalan Forest Service	Regional	Yes	Public areas
BCN	Wildfire prevention	Government/Policy Makers	Wildfire prevention service	Regional	Yes	
BCN	Forest management	Government/Policy Makers	Forest property center	Regional	Yes	Private areas
BCN	Nature conservation	Government/Policy Makers	Catalan Rangers	Regional	Yes	
BCN	Climate	Government/Policy Makers	Catalan Office of Climate Change	Regional	Yes	
BCN	Weather	Government/Policy Makers	Catalan Meteorological Service	Regional	No	Can manage to get the contact
BCN	Water management	Government/Policy Makers	Water Agency	Regional	No	
BCN	Agroforestry	Research/Academia	IRTA	Regional	Yes	
BCN	Local authority	Government/Policy Makers	Barcelona local council	Local	Yes	
BCN	Local authority	Government/Policy Makers	Sant Cugat local council	Local	Yes	
BCN	Local authority	Government/Policy Makers	Cerdanyola local council	Local	No	Can manage to get the contact
BCN	Local authority	Government/Policy Makers	Esplugues local council	Local	No	Can manage to get the contact
BCN	Local authority	Government/Policy Makers	Molins de rei local council	Local	No	Can manage to get the contact
BCN	Local authority	Government/Policy Makers	Montcada local council	Local	No	Can manage to get the contact

As vulnerable communities were identified all the local communities in the Collserola area which is the area most affected by the wildfires (Table 15).

Table 15. Barcelona vulnerable communities of SHs

Stakeholders Long List - Vulnerable communities						
Vulnerable communities	To which hazard	Temporality	Name of Stakeholder or Organisation	Scale [Local, National, Regional/International]	Existing Contact [Yes/No]	Comment
Collserola communities	Wildfires	short, mid and long term	Neighbours associations	Local	No	Pending to decide which communities we involve through the local councils
Torre Baro	Wildfires	short, mid and long term	Neighbours associations	Local	No	Pending to decide which communities we involve through the local councils
- Mas Guimbau	Wildfires	short, mid and long term	Neighbours associations	Local	No	Pending to decide which communities we involve through the local councils
- Mundet	Wildfires	short, mid and long term	Neighbours associations	Local	No	Pending to decide which communities we involve through the local councils
- Sant Genis dels Agudells	Wildfires	short, mid and long term	Neighbours associations	Local	No	Pending to decide which communities we involve through the local councils
- Mas Sauro	Wildfires	short, mid and long term	Neighbours associations	Local	No	Pending to decide which communities we involve through the local councils
- Ciutat Meridiana	Wildfires	short, mid and long term	Neighbours associations	Local	No	Pending to decide which communities we involve through the local councils
- Tibidabo	Wildfires	short, mid and long term	Neighbours associations	Local	No	Pending to decide which communities we involve through the local councils
- Vallvidrera	Wildfires	short, mid and long term	Neighbours associations	Local	No	Pending to decide which communities we involve through the local councils
- Rectoret	Wildfires	short, mid and long term	Neighbours associations	Local	No	Pending to decide which communities we involve through the local councils
- Les Planes	Wildfires	short, mid and long term	Neighbours associations	Local	No	Pending to decide which communities we involve through the local councils
- Sol i Aire	Wildfires	short, mid and long term	Neighbours associations	Local	No	Pending to decide which communities we involve through the local councils
- La Floresta	Wildfires	short, mid and long term	Neighbours associations	Local	No	Pending to decide which communities we involve through the local councils

- Valldoreix	Wildfires	short, mid and long term	Neighbours associations	Local	No	Pending to decide which communities we involve through the local councils
- Montflorit	Wildfires	short, mid and long term	Neighbours associations	Local	No	Pending to decide which communities we involve through the local councils
- La Rierada	Wildfires	short, mid and long term	Neighbours associations	Local	No	Pending to decide which communities we involve through the local councils
- Sant Bartolomé de la Cuadra	Wildfires	short, mid and long term	Neighbours associations	Local	No	Pending to decide which communities we involve through the local councils
- Colònia de Montserrat	Wildfires	short, mid and long term	Neighbours associations	Local	No	Pending to decide which communities we involve through the local councils
Residencia Collserola	Wildfires	short, mid and long term	Neighbours associations	Local	No	https://www.residenciacolserola.es/
Residencia edelweiss Vallvidrera	Wildfires	short, mid and long term	Neighbours associations	Local	No	https://residenciasedelweiss.com/es/residencia-ancianos-barcelona/
Residència Mas Sauró	Wildfires	short, mid and long term	Neighbours associations	Local	No	https://www.barcelona.cat/ciutatcuidadora/es/espacio-barcelona-cuida/servicios-recursos/detalle/residencia-mas-sauro_99400396989

CSA Barcelona short list of SHs mapping

For Barcelona, the sectors which are directly impacted like Tourism and Water suppliers are identified as high interest low influence though category. Special attention to the Collserola communities in that quadrant which is the identified vulnerable community of Barcelona (Figures 12, 13).

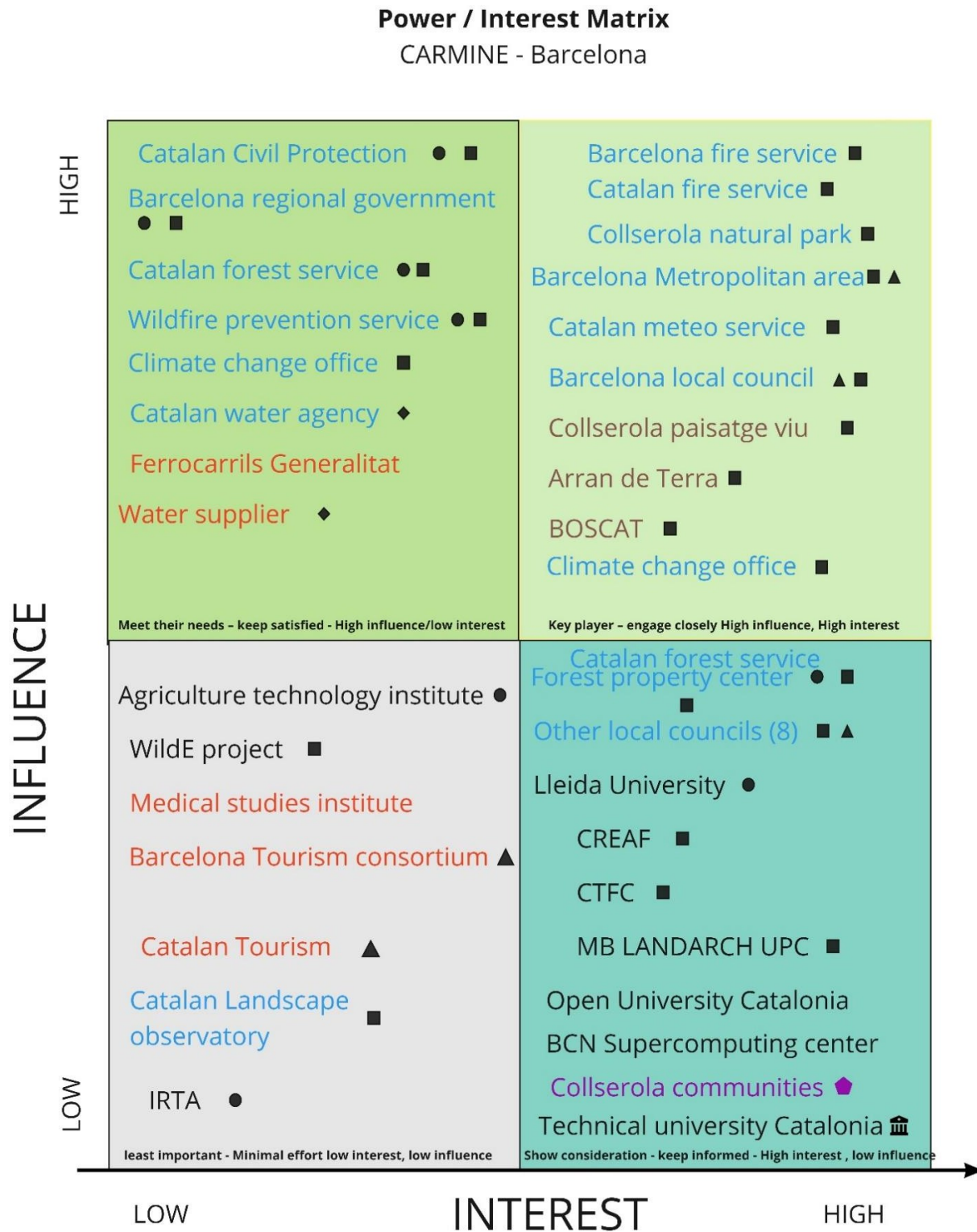


Figure 12. Barcelona short list of SHs mapping using the influence/interest matrix (below)

	Organisation to be involved	Justification: why is it selected?
High Influence - High Interest	Barcelona fire service	Wildfire authority
	Catalan fire service	Wildfire authority
	Collserola natural park	Forest management
	Barcelona Metropolitan area	Regional authority coordinating different administrations
	Catalan meteo service	Meteorological data and processing
	Barcelona local council	Local authority, citizens and civil protection
	Climate change office	Climate change data and solutions
	BOSCAT	Forest owners
	Arran de Terra	non-profit associate work cooperative
	Collserola paisatge viu	non-profit associate work cooperative
Low Influence - High Interest	Forest property center	Climate credits
	Other local councils	Local authority, citizens and civil protection
	Catalan water agency	Water management
	Water supplier AGBAR	Water management
	MB LANDARCH UPC	Landscape architecture
	Open University Catalonia	Social risk
	BCN Supercomputing center	Climate Modelling
	Collserola communities	They are directly impacted
	Catalan Tourism	They are directly impacted
	Barcelona Tourism consortium	They are directly impacted

Figure 13. Barcelona selection and justification of LL participants

2.4.6 Bologna

Bologna SH Engagement Mapping

For Bologna the main sectors identified were food, agriculture, energy, transportation, services, industry and education (Table 16). The categories were government, industry and business and academia. The complete long list of list of stakeholders identified in Bologna can be found in Appendix 7.

Table 16. Snapshot of Bologna CSA long list of SHs mapping

Stakeholders Long List					
Sector (relevant Industry, e.g. public health, tourism, water management)	Category [Business/Industry, Government/Policy Makers, Research/Academia, Local Citizen, NGO/Association]	Name of Stakeholder or Organisation [e.g. National Ministry of Water Resources]	Scale [Local, National, Regional/International]	Existing Contact [Yes/ No]	Comment
Government	Government/Policy	ANCI - National Association of Italian Municipalities	Municipal	Yes	National level - already engaged
Services	NGO/Association	Fondazione Sempre Insieme Onlus	Regional	Yes	already engaged
Electric sector	Business/Industry	Antonio Ruberto - electric mobility consultant	Regional	Yes	already engaged
Services	NGO/Association	Consumerismo	Regional	Yes	National level
Public health	Government/Policy	AUSL Bologna - Local Health Authority	Municipal	Yes	
Insurance sector	Business/Industry	ANIA	Regional	Yes	National level - already engaged
Mobility and transport	Business/Industry	COTABO	Local	Yes	

The vulnerable communities identified were the elderly, children, people with disabilities and chronic diseases (Table 17).

Table 17. Bologna vulnerable communities of SHs

Stakeholders Long List - Vulnerable communities						
Vulnerable communities	To which hazard	Temporality [short / mid/ long term]	Name of Stakeholder or Organization	Scale [Local, National, Regional/International]	Existing Contact [Yes/ No]	Comment
physical disables	heatwave, floods, pollution	from short to long term	Fondazione Sempre Insieme Onlus	Regional	Yes	already engaged
fragile population and mental health	heatwave, pollution	from short to long term	AUSL Bologna - Local Health Authority	Municipal Authorities	Yes	
physical disables	heatwave, floods, enhanced precipitation	from short to long term	COTABO	Local	Yes	
fragile population and physical disables	heatwave, floods, pollution	from short to long term	Lega COOP	Regional	No	

CSA Bologna short list SHs mapping

Most of the Bologna SHs are in the two right side quadrants coming mostly from the business/industry sector. The research/academia sector currently includes 5 stakeholders that are research/academia: University of Bologna, Bologna Business School and two clusters and two different departments of University of Bologna, as to differentiate the departments and note that they are both interested/important stakeholders for this project. Some sectors, though they appear irrelevant they do make sense form particular SHs. For example, Italmercati is indeed a business from the food industry which has to do with accessibility to services (markets) for vulnerable people during heatwaves (Figure 14).

All activities in the service sector are, for example: retail, banking, hotels, real estate, education, health, social services, IT services, leisure, media, communications, electricity, gas and water, food, etc. Hence, for example SH ANCI gives information/education services; Fondazione Sempre Insieme Onlus makes services for disabled; Consumerismo makes consumer protection, etc. therefore they are classified as "Services" instead of "Industry" (Figure 14).

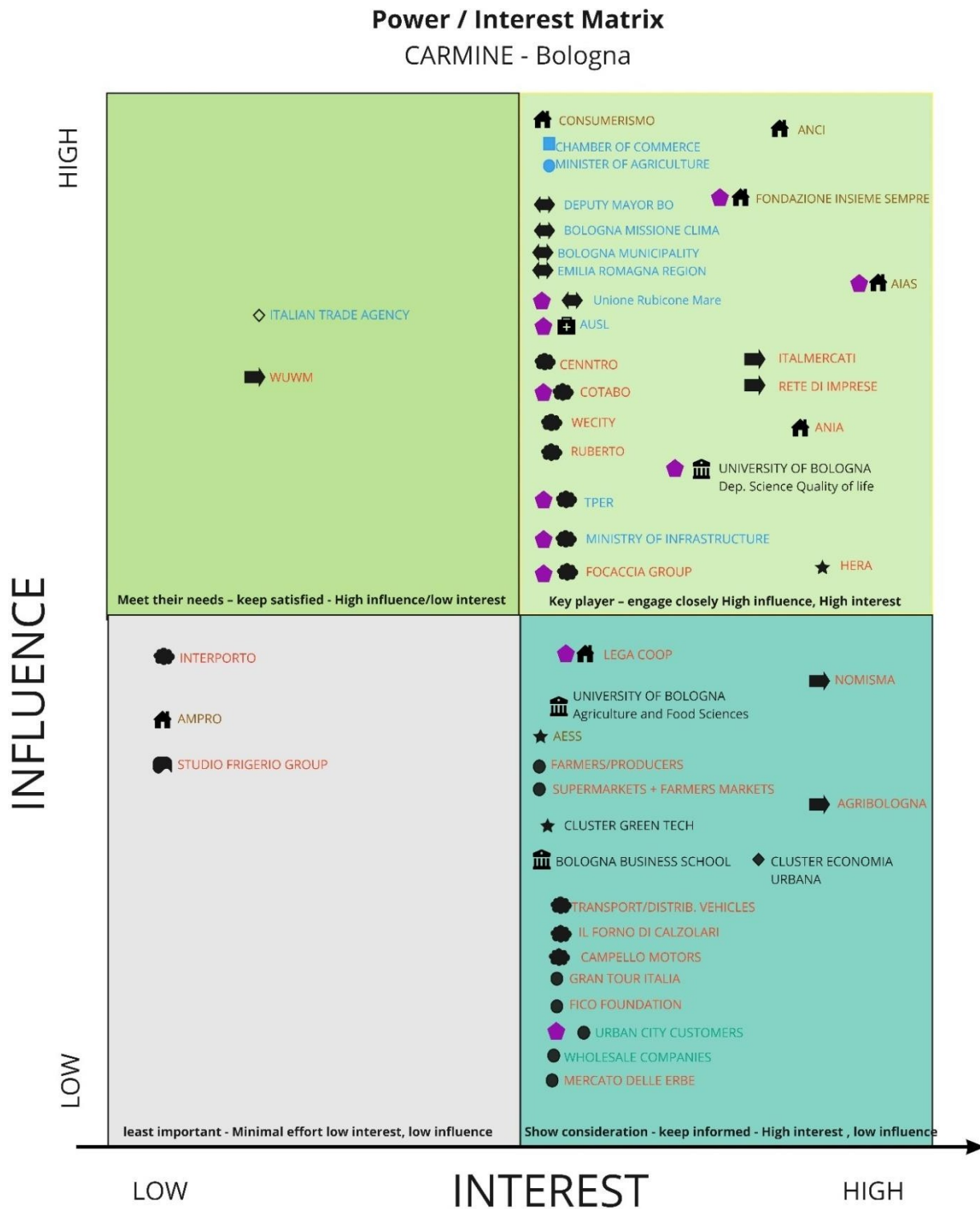


Figure 14. Bologna short list of SHs mapping using the influence/interest matrix (1)

High Influence - High Interest	Organisation to be involved	Justification: why is it selected?
	ANCI	Association that provides guidance for Italian Municipalities.
	AUSL	Devoted program on fragile population.
	BOLOGNA MUNICIPALITY	CAAB is governed by Municipality of Bologna.
	EMILIA ROMAGNA REGION	As a majority public company, CAAB works closely in conjunction with Regione Emilia-Romagna to fulfill city and regional initiatives.
	ANTONIO RUBERTO	Professional interested in the concept of Transit-Oriented Development (TOD).
	AIAS	National Association devoted to services for disabled people.
	CONSUMERISMO	Association that works on behalf of consumers.
	BOLOGNA MISSIONE CLIMA	Deeply invested in climate action, climate mitigation and linked with local citizens.
	ITALMERCATI	Wholesale business market network across the country and closely affiliated with CAAB.
	CENNTRO	Leader in designing and distributing all electric, urban delivery vehicles.
	RETE DI IMPRESE	Wholesale business network association, closely affiliated with CAAB.
	TPER	Transportation agency for Emilia-Romagna and services all public transport needs of the region.

Figure 15. Bologna selection and justification of LL participants (1)

Low Influence - High Interest	Transport/Distrib. vehicles	Responsible for transporting the fruits and vegetables from producers to the wholesale markets and then directly to the suppliers and consumers.
	UNIVERSITY OF BOLOGNA	Public research institution that is concerned with a variety of topics and initiatives related to climate change and climate resiliency. Closely affiliated with CNR and CAAB.
	FARMERS/PRODUCERS	Producers of the locally-grown fruits and vegetables of the region.
	AGRIBOLOGNA	One of the largest producers and wholesalers with a market stall at CAAB.
	CLUSTER ECONOMIA URBANA	Associations Network interested on new City planning and design models that improve the quality of life
	CLUSTER GREEN TECH	Associations Network that collaborate, through an open innovation approach, in the fields of energy and sustainable development
	MERCATO DELLE ERBE	A market of shops that sell fresh produce, meats, cheeses and artisanal goods. Recently acquired by CAAB to directly sell fruits, vegetables and fish/seafood from its wholesale markets to consumers.
	SUPERMARKETS + FARMER MARKETS	Buyers and suppliers of the locally-produced fruits and vegetables.
	FICO FOUNDATION	Will be the hub for the in-person Living Labs and the association to spread education/awareness.
	GRAND TOUR ITALIA	Will be the hub for the in-person Living Labs.
	LEGA COOP	Regional Association of Associate Cooperatives that protects their interests
	URBAN CITY CUSTOMERS	Interested in the collection and delivery of local food products. Are part of the vulnerable/fragile populations.
	WHOLESALE COMPANIES	Producers and wholesale companies of the locally-grown fruits and vegetables. Have market stalls within CAAB.
	NOMISMA	Economic Institution interested in territorial planning

Figure 16. Bologna selection and justification of LL participants (2)

2.4.7 Brasov

CSA Brasov SH Engagement Mapping

Forest administration, water management, environment, tourism, education, research and biodiversity are the main sectors represented by government, NGOs and local citizen groups in the city of Brasov (Table 18). The complete long list of list of stakeholders identified in Brasov can be found in Appendix 8.

Table 18: Snapshot of Brasov CSA longlist of SHs mapping

Stakeholders Long List					
Sector (relevant Industry, e.g. public authority)	Research/Academy	Name of Stakeholder or Organisation	Scale	Existing Contact	Comment
Water management	Business/Industry	Water Company	Local	Yes	
public authority	Government/Police	Brasov Metropolitan Agency	Local	Yes	
Water management	Government/Police	Brasov Water Water Management System	Local	Yes	
Forest administration	Business/Industry	ROMSILVA State Forest Administrator	National	No	
Forest administration	Business/Industry	KRONSTADT RA Forest Administrator	Local	Yes	
Environmental management	Government/Police	APM Brasov Environmental Protection	Regional	No	
public authority	Government/Police	Sacele City Hall	Local	Yes	
Water management, Land use	Business/Industry	ANIF National Agency for Land	Regional	No	
public authority	Government/Police	CJBv County Council of Brasov	Regional	Yes	
consultancy	NGO/Association	Brasov Agency for Sustainable	Regional	Yes	
Biodiversity conservation	NGO/Association	WWF	National	Yes	
Education/research	Research/Academy	UNITBV University Transilvania of Brasov	Local	Yes	
Environment	Government/Police	ANANP National Agency for Natural	Regional	No	
Environment	NGO/Association	AAANP ASSOCIATION OF PROTECTED	National	No	
Tourism	NGO/Association	Association for the Promotion and	Local	No	
Hazard management	Government/Police	Inspectorate for Emergency Situations	Local	No	
Advocacy	NGO/Association	Association Smart City Brasov	Local	No	
Energy	NGO/Association	ABMEE Energy Management and	Local	Yes	
Transport	Business/Industry	RAT BV Public Transport Operator	Local	Yes	
public authority	Government/Police	DJS-BV BRASOV COUNTY STATISTICS	Regional	No	
Environmental management	Government/Police	GNM NATIONAL ENVIRONMENTAL GUARD	Regional	No	
citizen association	Local Citizen	G.I.C.V.B. Vulcan civic initiative group	Local	No	
citizen association	Local Citizen	Brasovul Civic	Local	No	
public authority	Government/Police	Brasov City Hall	Local	Yes	
Environment	NGO/Association	PROPARK	Local	No	
Environment	NGO/Association	ARR RANGER ASSOCIATION FROM	National	Yes	
Environment	NGO/Association	Conservation Carpathia	Regional	No	
Waste management	Business/Industry	BRAICATA BRASOV	Local	No	

The elderly, children and marginalized communities are the main vulnerable populations identified (Table 19).

Table 19. Brasov vulnerable communities of SHs (below)

Stakeholders Long List - Vulnerable communities						
Vulnerable communities	To which hazard	Temporality [short / mid/ long term]	Name of Stakeholder or Organization	Scale [Local, National, Regional/ International]	Existing Contact [Yes/ No]	Comment
marginalized groups	water access / food insecurity	long term	das bv	local	yes	
elderly population	water access / food insecurity/ air pollution/heat waves	long term	das bv	local	yes	
informal settlements	water access / food insecurity	long term	das bv	local	yes	
children (low income families)	water access / food insecurity/polution	long term	das bv	local	yes	
energy vulnerable community	consequnces on helth	long term	das bv/ brasov municipality	local	yes	
people with disabilities	water access / food insecurity	long term	das bv/ directorate of social assistance and child protection brasov	local	yes	

CSA Brasov short list of SHs mapping

Power / Interest Matrix CARMINE - Brasov

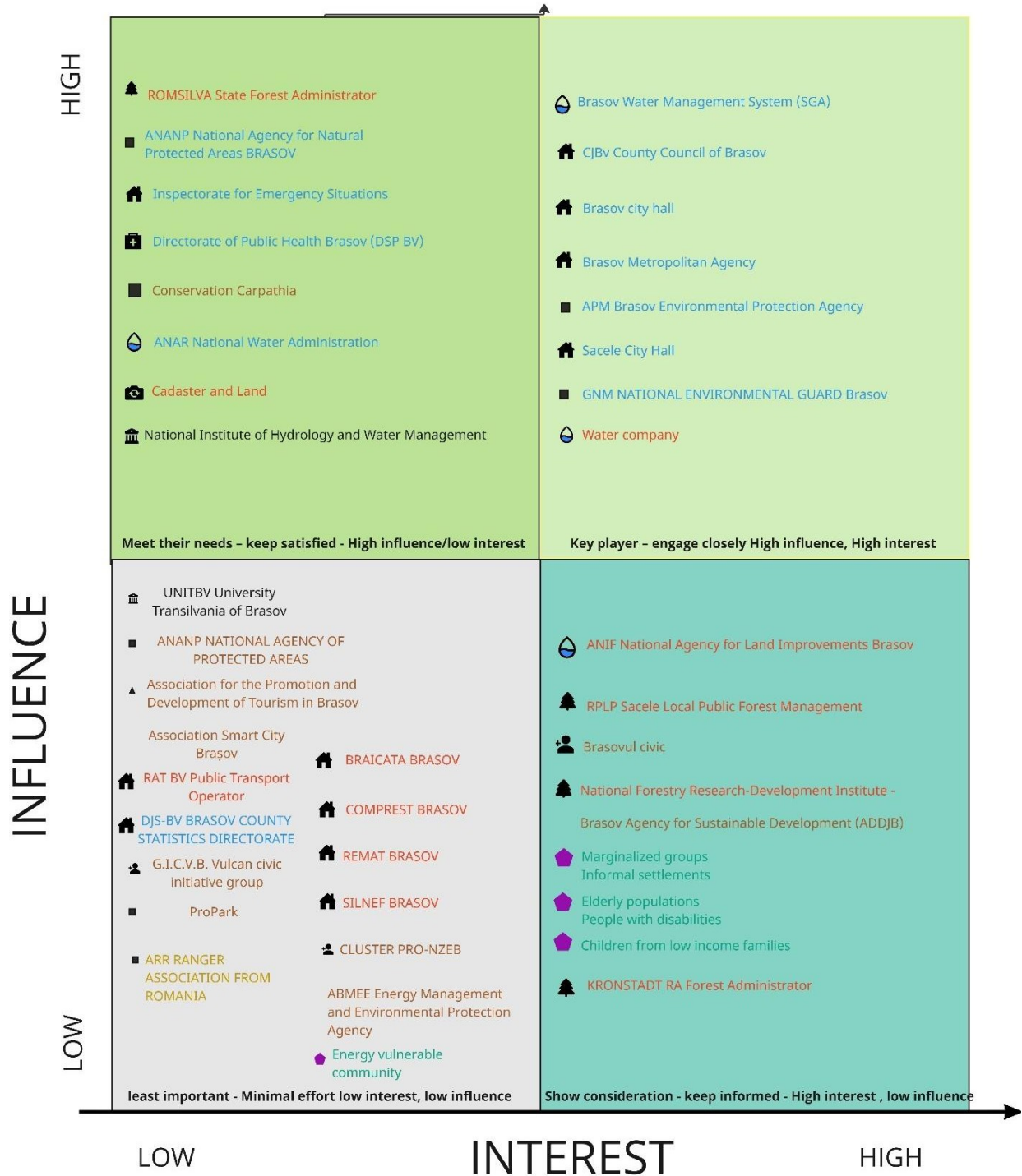


Figure 17. Brasov short list of SHs mapping using the influence/interest matrix

	Organisation to be involved	Justification: why is it selected?
High Influence - High Interest	Brasov Water Management System (SGA)	Administrator of the Sacele reservoir, the main water source of the metropolitan area
	CJBv County Council of Brasov	Responsible for the development and implementation of investments at the regional level, elaborates and implements plans and strategies at the regional level. It ensures the administration of public funds at the regional level.
	Brasov city hall	Responsible for the development and implementation of investments at the local level, develops and implements plans and strategies at the local level. It ensures the administration of public funds at the local level. Forest owner in the Tarlung hydrographic basin upstream of the Sacele reservoir.
	Brasov Metropolitan Agency	Public agency that promotes and supports cooperation between public, private actors and NGOs, for the sustainable, economic, social and cultural development of the Brasov Metropolitan Area (supporting social progress, promoting effective environmental protection measures, encouraging the rational use of natural resources, supporting economic growth).
	APM Brasov Environmental Protection Agency	Ensures regional monitoring of environmental factors; authorization of activities with an impact on the environment; implementation of environmental legislation and policies at the local level; reports to the National Agency for Environmental Protection, in the following areas: air quality, climate change, protected areas, soil contamination, water.
	Sacele City Hall	Responsible for the development and implementation of investments at the local level, develops and implements plans and strategies at the local level. It ensures the administration of public funds at the local level. Forest owner in the Tarlung hydrographic basin upstream of the Sacele reservoir.
	GNM NATIONAL ENVIRONMENTAL GUARD Brasov	GNM has attributions regarding the application of the Government's policy in the matter of preventing, ascertaining and sanctioning the violation of the legal provisions on environmental protection, including non-compliance with the regulations regarding the control of industrial pollution, dangerous substances and preparations, biodiversity and protected natural areas, the environmental fund, etc.
	Water company	The main supplier of drinking water in the metropolitan area
	WWF	Important actor in the environmental arena, participant in numerous research projects related to CC, with a wide audience at national and European level
Low Influence - High Interest	KRONSTADT RA Forest Administrator	Administrator of the forests in the metropolitan area and in the hydrographic basin of the Tarlung river that feeds the Sacele reservoir
	ANIF National Agency for Land Improvements Brasov	Administrator of the water wells that supply the metropolitan area, expertise in land improvement works
	RPLP Sacele Local Public Forest Management	Administrator of the forests in the metropolitan area and in the hydrographic basin of the Tarlung river that feeds the Sacele reservoir
	Brasovul civic	Civic group established on an online platform where opinions, opinions, ideas regarding development plans in the municipality of Brasov are expressed, civic actions are proposed
	National Forestry Research-Development Institute - Station Brasov	Administrator of the forests in the metropolitan area and in the hydrographic basin of the Tarlung river that feeds the Sacele reservoir
	Brasov Agency for Sustainable Development (ADDJB)	Regional association that includes 54 local communities (mayors from Brasov County) with the aim of supporting the economic and social development; protecting, promoting and developing the historical and cultural heritage; protecting and capitalizing on the natural environment; promotion and development of tourism; developing the institutional capacity of local public administrations in the county; implementation, monitoring, evaluation and adaptation to socio-economic changes of the Sustainable Development Strategy.
	Elderly populations People with disabilities	Easy access to the water source for the elderly and people with disabilities is decisive for their well-being
	Children from low income families	For families with low income, access to affordable potable water source may be a problem in a future characterized by water scarcity

Figure 18. Brasov selection and justification of LL participants

2.4.8 Birmingham

Birmingham SH Engagement Mapping

For Birmingham CSA, water management, buildings, water, education and health were the main sectors and government, NGOs, research and academia were the main representatives of these sectors (Table 20). The complete long list of list of stakeholders identified in Birmingham can be found in Appendix 9.

Table 20. Snapshot of Birmingham CSA long list of SHs mapping

Stakeholders Long List					
Sector (relevant Industry, e.g. public health, tourism, water management)	Category [Business/Industry, Government/Policy Makers, Research/Academia, Local Citizen, NGO/Association]	Name of Stakeholder or Organisation [e.g. National Ministry of Water Resources]	Scale [Local, National, Regional/International]	Existing Contact [Yes/ No]	Comment
Water Management	Business/Industry	Severn Trent Water	Regional	No	https://www.stwater.co.uk/
GI and Built environm	Business/Industry	Calthorpe Estate	Local	Yes	
GI and Built environm	Business/Industry	Landscape Institute Midlands Region	Regional	Yes	kate@wearedefine.com
GI and Built environm	Business/Industry	Lendlease (Smithfields new development in the city centre)	Regional	Yes	https://www.lendlease.com/
Community	Business/Industry	Business in the Community	Local	No	https://www.bitc.org.uk/
GI and Built environm	Business/Industry	Institute of Civil Engineers West Midlands	Local	No	https://www.ice.org.uk/about
Sustainability	Business/Industry	ARUP	Regional	Yes	
GI and Built environm	Business/Industry	Kier	Regional	Yes	
GI and Built environm	Business/Industry	Mott MacDonald	Regional	No	https://www.mottmac.com/
Community	Business/Industry	Midlands Cooperative	Regional	No	https://www.midcounties.co.uk
Community	Business/Industry	Greater Birmingham Chamber of Commerce	Local	No	https://www.greaterbirmingham.co.uk
Community	Business/Industry	Birmingham City Council; Business Improvement District (BID)	MunicipalOrganizations	No	https://www.birmingham.gov.uk
Water Management	Business/Industry	South Staffs Water	Regional	No	https://www.south-staffs-water.co.uk
GI and Built environm	Business/Industry	Institute of Chartered Foresters Midlands branch	Regional	Yes	https://www.charteredforesters.co.uk
GI and Built environm	Business/Industry	Arboricultural Association	Regional	Yes	
Health	Business/Industry	Queen Elizabeth Hospital	Local	No	
Health	Business/Industry	Birmingham City Hospital	Local	No	
GI and Built environm	Government/Policy	Birmingham Council; Parks	MunicipalAuthorities	Yes	
GI and Built environm	Government/Policy	Birmingham City Council; highways	MunicipalAuthorities	Yes	

The vulnerable communities identified by CSA Birmingham are the Red Wards, the areas that are mapped as having higher levels of social deprivation (Figure 21).

Table 21. Birmingham vulnerable communities of SHs

Stakeholders Long List - Vulnerable communities						
	to which hazard [flood / fire / heat / water access / food insecurity....]	temporality [short / mid/ long term]	Name of Stakeholder or Organisation [e.g. National Ministry of Water Resources]	Scale [Local, National, Regional/International]	Existing Contact [Yes/ No]	Comment
ch social gpe / A Red Ward in Birmingham is one that has higher levels of social deprivation, the Red wards are mapped https://naturallybirmingham.org/environmental-justice/						
Community Org that works in the Red Wards	flood / heat	long term	National Trust; Urban F	Regional	YES	
Community Org that works in the Red Wards	flood / heat	long term	Friends of the Earth, Bi	Regional	YES	
Community Org that works in the Red Wards	flood / heat	long term	Community Environment	Local	YES	
Community Org that works in the Red Wards	flood / heat	long term	Birmingham Settlement	Local	YES	
Community Org that works in the Red Wards	flood / heat	long term	Nechells Pod	Local	YES	
Community Org that works in the Red Wards	flood / heat	long term	Age Concern	Local	No	
Public Org that works to improve access to gre	flood / heat	long term	Natural England Green	National	Yes	
Community Org that works in the Red Wards	flood / heat	long term	Citizens UK	Regional	Yes	
Community Org that works in the Red Wards	flood / heat	long term	Active Wellbeing Trust	Regional	YES	https://theaws.co.uk/
Community Org that works in the Red Wards	flood / heat	long term	Birmingham Community	Regional	Yes	https://www.birminghamcommunitymatters.org.uk/
Community Org that works in the Red Wards	flood / heat	long term	Birmingham Voluntary S	Regional	Yes	https://www.bvsc.org/
Community Org that works in the Red Wards	flood / heat	long term	Locality	Local	No	https://locality.org.uk/
Community Org that works in the Red Wards	flood / heat	long term	Healthwatch Birmingham	Local	No	https://healthwatchbirmingham.co.uk/
Community Org that works in the Red Wards	flood / heat	long term	Citizen (Housing)	Local	No	https://www.bitc.org.uk/
Community Org that works in the Red Wards	flood / heat	long term	City Parks for Birmingham	Local	Yes	

CSA Birmingham short list of SHs mapping

Birmingham has a good representation of SHs in all squares. Government and policy makers are the categories most represented while NGOs are found mostly in the high interest low impact quadrant. Many SHs come from groups of forest and nature protection and are to be found in both quadrants as the Municipality also has such departments (Figure 19).

Power / Interest Matrix CARMINE - Birmingham

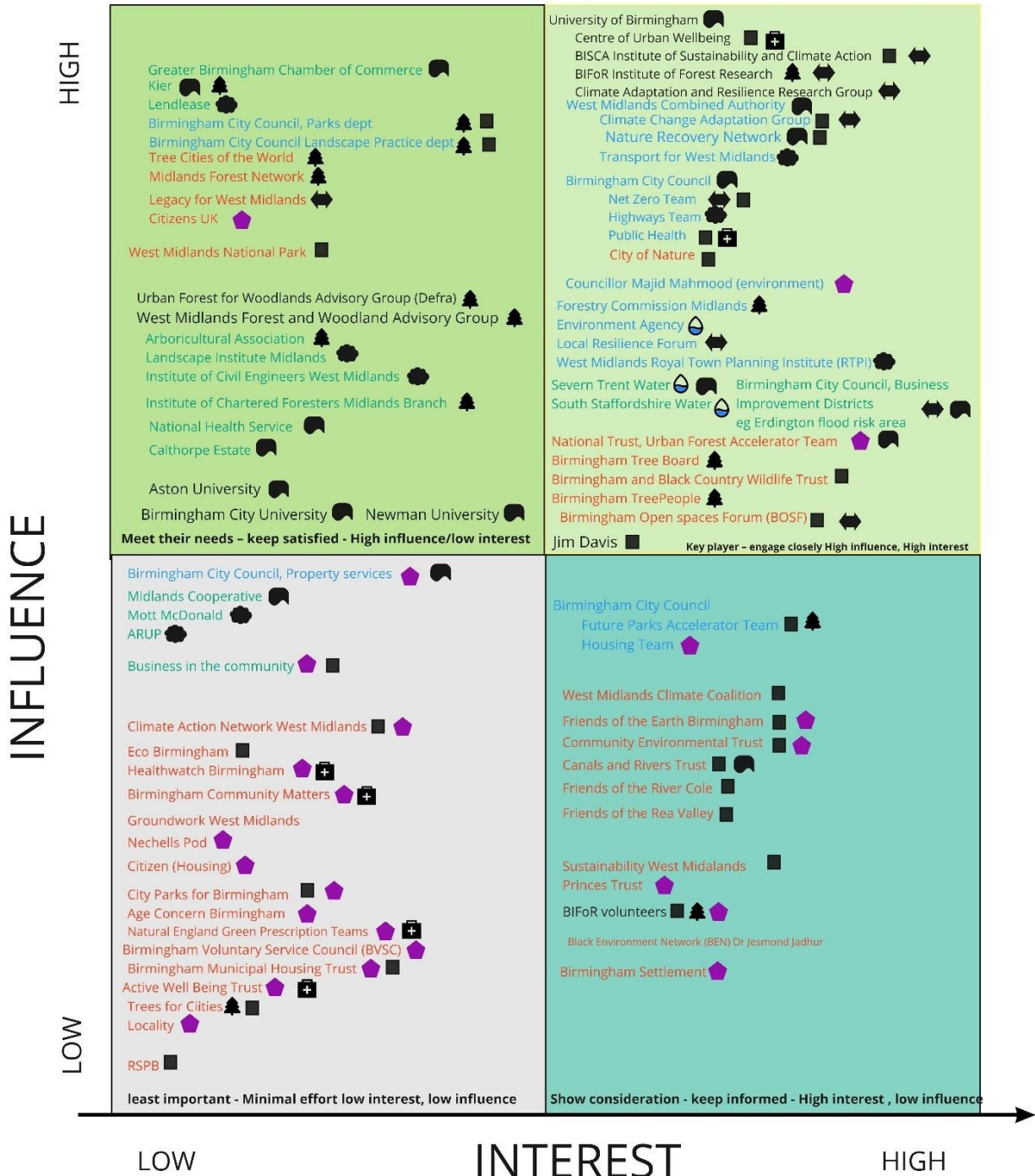


Figure 19. Birmingham short list of SHs mapping using the influence/interest matrix (below)

High Influence - High Interest	Organisation to be involved	Justification: why is it selected?
	University of Birmingham representatives from Centre of Urban Well Being, BISCA, BIFoR and Climate Adaptation and Resilience Group	Within the University there are many Institutes / Research Groups with experts, of which some experts will be a part of more than one of these Institutes - so it could be one person represents more than one Institute and feeds back.
	Forestry Commission, Midlands	The Forestry Commission is the UK Government department responsible for protecting, expanding and promoting the sustainable management of woodland. They link to Forestry England who manage the UK's public forests eg Wyre Forest near Birmingham
	West Midlands Combined Authority (WMCA)	The WMCA represent 7 local authorities and 10 non-constituent members. Specifically we would invite members from the WMCA Climate Adaptation team and Transport for West Midlands (TWM). TWM delivers better connected, more prosperous, fairer greener and healthier West Midlands
	Birmingham City Council Net Zero, Highways teams and Councillor Mahmood	Birmingham City Council has a number of teams that will be interested to join the Living Labs, including the Net Zero team, Highways teams. Councillor Mahmood is cabinet member for the Environment.
	City of Nature	A team that looks to increase the number of green blue spaces in Birmingham (by 400)
	Councillor Majid Mahmood	Councillor Mahmood is cabinet member the environment and has a track record in championing initiatives such as equitable access to nature based solutions
	Environment Agency	The Environment Agency works to create better places for people and wildlife, and support sustainable development.
	Local Resilience Forum	Local Resilience Forums are multi-agency partnerships made up of representatives from local public services, including the emergency services, local authorities, the NHS, the Environment Agency and others. Inviting these will mean we reach some of the stakeholder
	Royal Town Planning Institute West Midlands (RTPI)	The RTPI delivers services and support for planners in the West Midlands and acts as a local champion for planning.
	Severn Trent Water	Supplies over 8 million homes and business with fresh water (including those in the West Midlands conurbation, Works with developers to get water infrastructure in place for new developments. Also own a lot of land in the region.
	South Staffordshire Water	Supplies over a million homes and business with fresh water (including those in the West Midlands conurbation,
	Business Improvement District (BID)	BIDS are managed by a BID body (a private company) which will aim to take money paid into the BID by local business to make improvements to all businesses in the area eg additional street cleaning and physical improvements.
	National Trust Urban Forest Accelerator Team	The National Trust manages a lot of land, sites of historic interest including large estate (houses and large land areas). The Urban Forest Accelerator project has been working with councils (including Birmingham) to increase access to green spaces for all but especially for people living in areas of social deprivation.
	Birmingham Tree Board	The Birmingham TreeBoard holds a lot of the responsibility to deliver the Birmingham Urban Forest Master Plan.
	Birmingham TreePeople	Local NGO which promotes, plants and protects the cities trees, has a large network of urban forest volunteers
	Birmingham Open Spaces Forum (BOSF)	An NGO which brings together lots of other smaller NGO under one umbrella. For example a "friends of a park" group would join BOSF, provides communication route to many involved in green spaces in Birmingham.

Figure 20. Birmingham selection and justification of LL participants (1)

Low Influence - High Interest	Business in the Community	Business in the Community (BITC) is the UK's largest and most influential responsible business network dedicated to building a fairer and greener world together, supported by His Majesty The King for over 40 years.
	BCC, Future Parks and Housing Teams	The Future Parks programme seeks to embed the value of green spaces across all areas of the Council and ensure that Birmingham's substantial green infrastructure is well utilised, sustainable, and valued The Housing team look after the 59,000 council homes, land and residents within Birmingham and those without homes
	Community Environmental Trust	Create cleaner, greener and safer places for communities to live in, based many in Castle Vale a deprived area of Birmingham
	West Midlands Climate Coalition / West Midlands Greener Together	The Forum came from the West Midlands Climate Coalition group which asked West Midlands Combined Authority to create an open and inclusive space for discussion around the climate and ecological crisis. The Forum convenes four times a year to discuss important environmental topics and how as a group they can progress the ideas/projects raised in the meetings.
	Friends of the Earth Birmingham	Friends of the Earth is a national organisation and the Birmingham network is one of the largest active networks in their organisation
	Canals and Rivers Trust	Nationally a large land owner and there are many miles of canals and rivers that run through Birmingham.
	Friends of the River Cole and Rea Groups	These 'Friends' groups are run by volunteers. They run conservation days, fundraise for planting along river, do lots of public engagement and awareness raising about benefits of nature for wildlife and people.
	City Parks for Birmingham	This is a newly established groups which is seeking to influence the largest new development site in Birmingham City Centre (17 hectares of land right in the centre of the city) they are campaigning for a large city park
	Sustainability West Midlands (SWM)	SWM is the sustainability champion for the West Midlands, they are an independent, not-for-profit organisation that works with 175 members in the private, public and third sectors across the UK.
	Princes Trust	support people aged 11 to 30 years who are not in full time education or employment to live, learn and earn.
	Volunteers from the Birmingham Institute of Forest Research (BIFoR)	Volunteers are mainly undergraduate students from University of Birmingham but can also include local residents.

Figure 21. Birmingham selection and justification of LL participants (2)

3 Convening of Living Labs

Once the short list of stakeholders is identified for each CSA, invitations will be sent to these stakeholders to attend Workshop 1 (M9-M12). This workshop will produce a comprehensive Climate Change Challenge Systems Map, which will highlight key challenges, interdependencies, and synergies within the CSA's climate context. Workshop 2 (M15-M18) will focus on developing Sector-based Climate Change Goals, also referred to as Visions, tailored to the specific needs and priorities of key sectors within the CSA. These sector-specific visions will set ambitious yet attainable climate goals, serving as guiding principles for sectoral actions and interventions. Finally, Workshop 3 (M21-M24) will outline Adaptation and Mitigation (A&M) Pathways, providing a strategic framework for enhancing climate resilience and sustainability within the CSA. These pathways will detail actionable steps and interventions aimed at both adapting to and mitigating the impacts of climate change. Through collaborative exercises and group discussions, participants will validate and refine the vision established in Workshop 2, identify key milestones for achieving the vision, explore Nature-Based Solutions (NBS) as part of the back casting process, and assess the digital tools necessary to support decision-making and implementation efforts (For a complete description of all three workshops, please refer to D1.1).

4 Conclusion and Next Steps

In summary, D1.7 describes the Living Labs (LL) process in the CARMINE project and explains how LLs address climate resilience and sustainability within the project itself. Through a detailed step-by-step process which is described in this D1.7, it shows how it gathers CSA stakeholders' perspectives and knowledge from Case Study Areas (CSAs). The LLs structured approach involves as a first step a detailed survey aimed at CSA leaders. This survey results in an accurate description of the diverse needs and challenges of each CSA which are thoroughly understood and addressed through the collection of data capturing detailed information on climate hazards, stakeholder engagement, existing climate actions, and relevant data and indicators. These surveys identify therefore significant climate challenges and ongoing metropolitan climate actions. As a second step, a critical component of the project is the stakeholder mapping process, which begins with creating a long list of potential stakeholders to ensure inclusivity and representation from various sectors, age groups including vulnerable communities. The long list is then refined into a short list using an influence/interest matrix, which plots stakeholders based on their capacity to effect change and their interest in the project. This refined list ensures that the most influential and interested stakeholders are engaged in the Living Labs, fostering a collaborative environment for developing climate-resilient solutions. These diverse and meticulously identified SHs are then engaged in the three workshops which play a significant role in validating and refining the project's strategic frameworks. These workshops—starting with the creation of a Climate Change Challenge Systems Map, followed by the development of sector-specific Climate Change Goals, and culminating in the formulation of Adaptation and Mitigation (A&M) Pathways—serve to fine-tune the collaborative efforts and ensure that the developed solutions are practical and impactful. The workshops facilitate the validation and refinement of strategic visions, exploration of Nature-Based Solutions (NBS), and assessment of digital tools essential for informed decision-making.

Based on the CSA analysis (T1.1) and engagement with stakeholders (TG1-TG5) in each LL (T1.2 and T1.3), T1.2 will establish a joint assessment of the CC challenges, their interdependencies and synergies at CSA scale by integrating the local perspectives with scientific available data sources (open science) / Within the LLs, a “hands-on” complex activity including series of workshops, focus groups, interviews, and questionnaires are used with each TG and collectively, to evaluate knowledge gaps, stakeholder and user needs and requirements, but also sectoral climate-related goals, threats and barriers in the local adaptation planning, enabling enables discussion and exploration of CC and their effects and links with natural and anthropogenic driving factors. At the end of the participatory (bottom-up) exercise, each LL has a multi-criterion mapping system for the main CC risks (multi-actor, multi-sectoral), represented by a network of factors (i.e., main issues, challenges and drivers related to CC risks) and their causal relations. The mapping system provides the knowledge baseline for the preliminary identification of transformative adaptation measures in CSAs

T1.4 develops and applies a participatory and iterative process of geo-designing A&M pathways towards resilient metropolitan communities in each CSA, considering both conventional and NBS approaches. The A&M pathways consist of scenario narratives and alternative futures, understood here as the spatial representation of potential future states. In each CSA, T1.4 organises at least three geo-design workshops (online or physical), for exploratory consultations,

co-development feedback, and jointly geo-design alternative futures. T1.4 builds upon the specific challenges and transformative adaptation measures identified in T1.2, harnesses the communication through the SC-HUB in T1.3, considers and informs the modelling and scenario-building efforts in WP2 and WP3 in an iterative process.

T6.2 concludes on A&M and resilience priorities in the CSAs by developing R&I roadmaps to help communities and individuals become more climate resilient. T6.2 updates the CSA roadmaps to reflect new climate data, emerging risks, and changing priorities and opportunities. Once risks are assessed, strategies are developed to address them, involving creating new policies and regulations, building new infrastructure, or adapting existing infrastructure to be more resilient.

T6.3 integrates the outcomes of socio-economic impacts modelling, stakeholders' engagement and co-designed strategies, and the tested interaction with IDSS to mainstream local and science-based knowledge in decision-making and climate policy. These outcomes will be overlaid on the results of previous WP6 activities and results from codesigned case-specific implementation pathways for local and regional climate adaptation (T1.4; WP4), to create a clear understanding of policy improvement needs and road mapping for adaptation action planning.

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Appendix 1: Stakeholder mapping guidelines

This document provides guidelines to help case study (CS) leaders set up a long list of stakeholders to be delivered to WP1 on Month 4 (15 May 2024). This long list will permit the WP1 to establish a short list through a stakeholder mapping methodology which is due on Month 6 (31 July 2024). The short list will be the basis for inviting stakeholders to be part of Living labs for the first workshop to take place in December 2024 (M11).

An introduction to the system innovation approach (SIA), the creation of the Living Labs and the step of the stakeholder identification will be presented by the WP1 team to case study leaders on 25/4 or 29/4.

The process of stakeholder mapping is led by the case study leaders, in collaboration with the case study team and supported by the WP1 team.

Case study elaboration: the context setting is already mostly done as case study leaders have presented the main challenges; they want to tackle in their case study (CASA Questionnaire).

Stakeholder mapping for WP4 activity

a) Identify long-list of stakeholders

The starting point is the identification of sectors (e.g. local economic sectors, infrastructure, sensitive ecosystems and biodiversity, and social indicators related to health vulnerability and low response capacity).

The second step will be to identify the relevant categories of stakeholders representing those sectors.

The third step will be to identify key stakeholders representing those categories.

This initial list of stakeholders maps all potential stakeholders related to climate risk, mitigation and resilience in the case study.

METHODS: Desk study, literature review, CS leader knowledge of local context, exchange with already known stakeholders.

All these will compose what is called the long-list of stakeholders: identifying key stakeholders within each sector, under different categories (Quintuple Helix: Business/Industry, Government/Policy Makers, Research/Academia, Citizens, NGOs). This long-list may be further extended based on input from stakeholders during the LL WSs (see Example 1).

Example 1 (from ARSINOE): For instance, for all tiers of the metropolitan climate change risks and challenges sector in the context of an objective of ecological transition, the following categories of stakeholders could be of relevance: regarding the climate change mitigation and adaptation strategies:

1. Policy makers at local level/municipalities for public health, tourism, water management, health, food and agriculture, water resources, and energy, heat
 - The ones that work on these issues (local/regional/councillors)
 - Civil servants/policy makers in municipalities, regional administrations, governments that work/design/ participate in discussions on public health, heat, energy-water, agriculture-water, environment-water issues.
 - Strategic managers
2. Local decision makers (e.g. municipalities) Policy makers at national level
 - regional administrations, governments that work/design/ participate in discussions on metropolitan climate change risks.
3. Irrigation districts or all organizations of water allocation
 - Managers of existing initiatives to which the project can connect
 - Strategic managers
 - Actors that deal with water-heat-fire issues
4. Climate change and Civil Protection Authorities
 - Strategic managers
 - Actors that deal with climate change issues
5. Management Authorities
 - Strategic managers
 - that work/design/ participate in discussions on climate change risks
6. Business/private enterprises and industries on climate change adaptation and mitigation
7. Local, regional or national private enterprises
8. Environmental NGOs
9. Tourism activities
10. Others

b) Identify short-list of stakeholders

The second step is the stakeholder mapping. The aim of the stakeholder mapping is to determine a certain level of interactions between stakeholders of the **long list of stakeholders**.

This is done by establishing, with the collaboration of case study leaders, an ‘**influence/interest matrix**’. This is done by plotting the identified stakeholders on a graph which plots Influence vs. Interest. By influence is meant the answer to the question **“how much power and capacity the stakeholder has to effect change”**. By interest is meant the answer to the question: **“how likely the stakeholder is to engage in activities or initiatives relevant to the case study focus; this may be due to resultant benefit or adverse impact”** (Figure A.1).

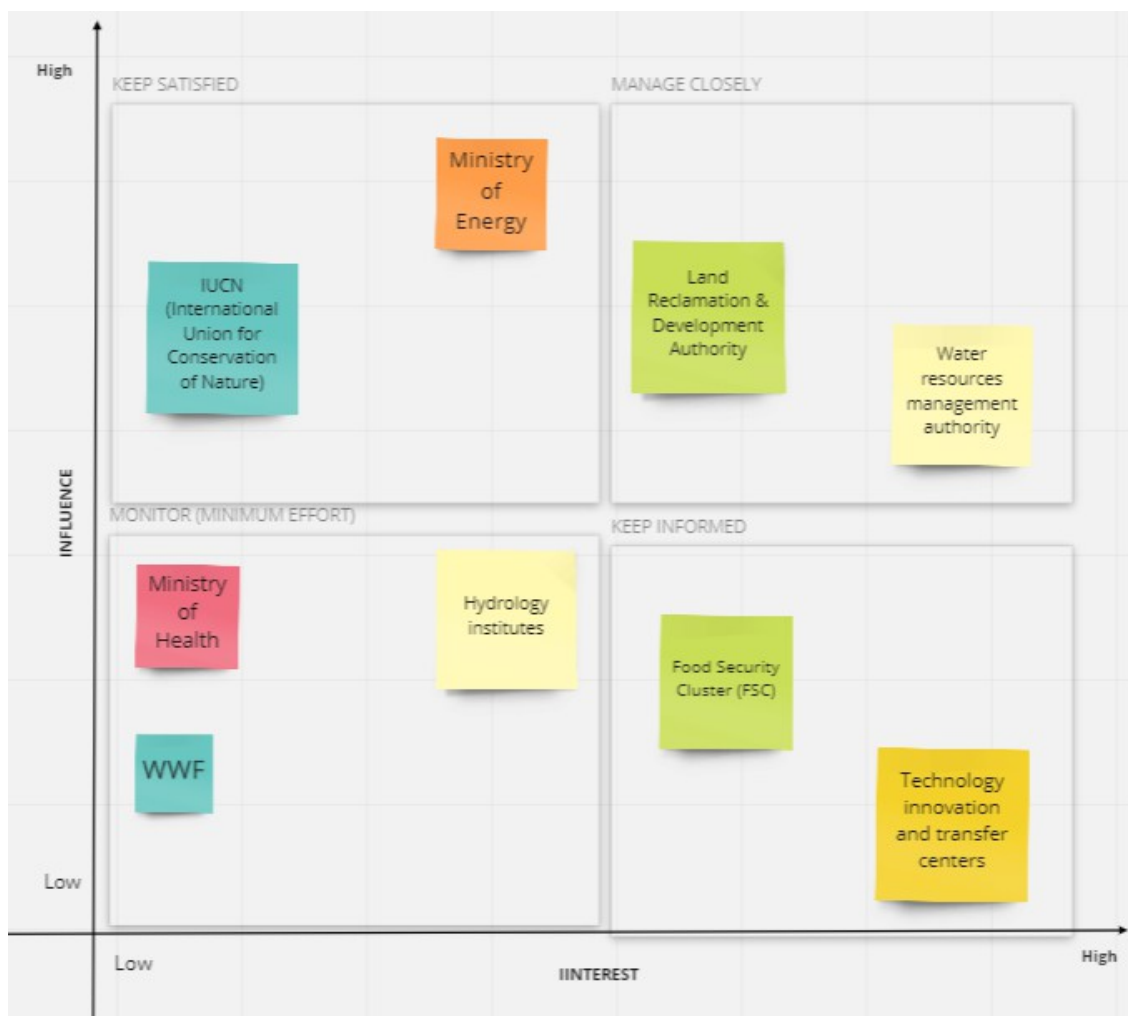


Figure A.1: Example of Influence/Interest mapping in progress

- There is a validation process for this influence/interest matrix. For this, the initial plotting based on input from project scientists and local partners, is further revised by identified experts (e.g. advisory board members).

On the strength of these results, the **short-list of stakeholders** can be determined: The stakeholders within the **upper right quadrant (high influence/high interest)** constitute the **core group of stakeholders within the context of the case study and will serve as the basis for recruiting LL participants**. In addition to these core stakeholders, consideration is also given to the inclusion of stakeholders at the upper limits of the top left and the bottom right quadrants.

The WP2 team will support the CS leaders in this exercise.

Convening of Living Labs

With the short list of stakeholders, the recruitment of LL participants can start, invitations are sent out to selected stakeholders from the short-list (12- 15 participants).

Then, a Series of facilitated LL WSs including Mapping, Envisioning, and Innovation Pathway Co-creation are planned.

Several interaction methods will be used: Participatory WSs, Facilitated critical dialogue, Joint concept mapping, Participatory envisioning, Back casting, Reporting.

Materials provided for SH Mapping:

1. Stakeholder Guidelines (present document)
2. Stakeholder identification template (in excel format) (Table A.1)

To help case study leaders to establish the initial long list of stakeholders, the following synthesis of the method and a template is proposed:

1. First, synthesize the main challenges and objectives of the case study in a few sentences.
2. Then provide an exhaustive list of sectors concerned by these challenges and objectives.
3. For each sector, provide a stakeholder identification list (SH Mapping Template). This is the “long list of stakeholders” corresponding to WP1 on Month 4 (15 May 2024). It is an extensive pre-selective list of stakeholders which maps all potential stakeholders implicated in the issues the case study wants to tackle within CARMINE.

Table A.1: Stakeholder Identification Template (provided in Excel form)

Case Study	[Number and Title of the Case study]
Background: <i>[Paragraph providing an overview of the case study describing the context, location, focus and main issues/challenges]</i>	
<i>[Map of case study area]</i> <i>[Illustrative/representative image of the case study]</i>	
Objectives: <i>[List main objectives of the case study]</i>	
Current activities: <i>[Existing or ongoing projects/activities related to the case study focus that CARMINE can build on]</i>	
Stakeholders	

Sector	Category	Name of Stakeholder or Organisation	Scale	Existing Contact
<i>[Relevant Industry]</i>	<i>[Business/Industry, Government/Policy Makers, Research/Academia, Local Citizen, NGO/Association]</i>	<i>[e.g. National Ministry of Water Resources]</i>	<i>[Local, National, Regional/International]</i>	<i>[Yes/ No]</i>

Appendix 2: Prague CSA Long List of SHs Mapping

Table A.2: Prague CSA long list of SHs mapping

Sector (relevant Industry, e.g. public health, tourism, water management)	Category [Business/Industry, Government/Policy Makers, Research/Academia, Local Citizen, NGO/Association]	Name of Stakeholder or Organization [e.g. National Ministry of Water Resources]
Climate change adaptation	Government/Policy Makers	City of Prague, Department of Environment Protection
Climate change/public health/air quality	Government/Policy Makers	Central Bohemian Region
Climate change adaptation	Government/Policy Makers	Ministry of Environment
Crisis management	Government/Policy Makers	City of Prague, Department of Security
Public health	Government/Policy Makers	City of Prague, Department of Health
Transport (air quality)	Government/Policy Makers	City of Prague, Department of Transport
Public health	Government/Policy Makers	National Public Health Institute
Public health	Government/Policy Makers	Prague Emergency Department
Urban planning	Government/Policy Makers	The Prague Institute of Planning and Development - IPR
Prague data management company	Government/Policy Makers	Operator ICT
Air quality	Business/Industry	Prague Public Transport Organization
Biometeorological monitoring	Government/Policy Makers	Czech Hydrometeorological Institute, Department of Biometeorological Forecast
Climate services	Research/Academia	Department of Atmospheric Physics, Charles University
Public health	Research/Academia	Palacky University of Olomouc
Public health	Research/Academia	Recetox, Masaryk University Brno

Urban planning	Research/Academia	Czech Technical University
Air quality monitoring	Research/Academia	Czech Hydrometeorological Institute, Department of Air Quality
Gerontology/population ageing	NGO/Association	Gerontology centre - Prague 8
Climate services NGO	NGO/Association	Fakta o Klimatu
Think-tank	NGO/Association	Institut pro evropskou politiku EUROPEUM
Climate-related NGO	NGO/Association	Klimatická koalice
Climate-related NGO	NGO/Association	
Climate-related NGO	NGO/Association	
Climate-related NGO	NGO/Association	Ekologický institut Veronica
Climate-related NGO	NGO/Association	
Climate-related NGO	NGO/Association	Arnika
Climate adaptation strategies etc.	Business/Industry	CI2.CO.CZ
Urban planning	Government/Policy Makers	Ústav úzmeního rozvoje (MMR)
Energy/air quality	Business/Industry	PRE (Pražská energetika) (electricity provider)
Energy/air quality	Business/Industry	Pražská teplárenská a.s. (heat provider)
Energy/air quality/waste management	Business/Industry	Pražské služby a.s. (waste management, waste burning)
Urban greenery	Research/Academia	EKNI, o.p.s.
	Government/Policy Makers	local municipalities (22 Prague districts, near-Prague municipalities)

Appendix 3: Leipzig CSA long list of SHs mapping

Table A.3: Leipzig CSA long list of SHs mapping

Sector (relevant Industry, e.g. public health, tourism, water management)	Category [Business/Industry, Government/Policy Makers, Research/Academia, Local Citizen, NGO/Association]	Name of Stakeholder or Organisation [e.g. National Ministry of Water Resources]
Administration	Government/Policy Maker	Digital City Unit (City of Leipzig)
Administration	Government/Policy Maker	Office for Geoinformation and Soil Planning (City of Leipzig)
Utility	Business	Wasserwerke Leipzig (water supply)
Research	Research/Academia	Scads.ai Leipzig (Center for Scalable Data Analytics and Artificial Intelligence)
Real Estate	Business/Industry	Leipziger Wohnungs- und Baugesellschaft
Real Estate	Research/Academia	DIA – Deutsche Immobilien Akademie Freiburg
Financial	Business/Industry	Deka Investment GmbH
Financial	Business/Industry	HanseMerkur Holding GmbH
Real Estate	NGO/Association	Bundesverband für die Immobilienwirtschaft BVFI
Real Estate	NGO/Association	ZIA – Zentraler Immobilien Ausschuss
Civil Protection	Government/Policy Maker	Federal Agency for Technical Relief - THW

<i>Administration</i>	<i>Government/Policy Maker/Policy Maker</i>	<i>Ministry of Economic Affairs</i>
<i>Civil Protection</i>	<i>NGO/Association</i>	<i>Deutscher Feuerwehrverband</i>
<i>Agriculture</i>	<i>NGO/Association</i>	<i>Deutscher Bauernverband eV</i>
<i>Tourism</i>	<i>NGO/Association</i>	<i>Landestourismusverbandes Sachsen e.V.</i>
<i>Research</i>	<i>Research/Academia</i>	<i>Climate Service Center Germany (GERICS)</i>
<i>Forestry</i>	<i>Business/Industry</i>	<i>Staatsbetrieb Sachsenforst</i>
<i>Forestry</i>	<i>NGO/Association</i>	<i>Sächsischer Forstverein</i>
<i>Forestry</i>	<i>Business/Industry</i>	<i>Constantia Forst</i>
<i>Administration</i>	<i>Government/Policy Maker</i>	<i>European Central Bank</i>
<i>Administration</i>	<i>Government/Policy Maker</i>	<i>Deutsche Bundesbank</i>
<i>Housing</i>	<i>NGO/Association</i>	<i>Deutscher Mieterbund</i>
<i>Housing</i>	<i>NGO/Association</i>	<i>Deutscher Mieterbund - Mieterverein Leipzig e.V.</i>
<i>Real Estate</i>	<i>NGO/Association</i>	<i>Haus und Grund</i>
<i>Energy</i>	<i>NGO/Association</i>	<i>Fachverband Wärmedämm-Verbundsysteme</i>
<i>Environment</i>	<i>NGO/Association</i>	<i>NABU Leipzig</i>
<i>Tourism</i>	<i>NGO/Association</i>	<i>Tourismusverband LEIPZIG REGION e.V</i>
<i>Employers association</i>	<i>NGO/Association</i>	<i>Allgemeiner Arbeitgeberverband Sachsen e. V.</i>

<i>Forestry</i>	<i>NGO/Association</i>	<i>Arbeitgeberverband für die Land- und Forstwirtschaft in Sachsen e. V.</i>
<i>Building Construction</i>	<i>NGO/Association</i>	<i>Bauindustrieverband Ost e. V.</i>
<i>Automobile</i>	<i>NGO/Association</i>	<i>ADAC</i>
<i>Water</i>	<i>Business/Industry</i>	<i>Sachsen Wasser GmbH</i>
<i>Health</i>	<i>Business/Industry</i>	<i>Helios Park-Klinikum Leipzig</i>
<i>Health</i>	<i>NGO/Association</i>	<i>St. Elisabeth Krankenhaus</i>
<i>Real Estate</i>	<i>Business/Industry</i>	<i>CG Gruppe</i>
<i>Real Estate</i>	<i>Business/Industry</i>	<i>IBIS GmbH</i>
<i>Real Estate</i>	<i>Business/Industry</i>	<i>3R Projektentwicklung GmbH</i>
<i>Energy</i>	<i>Business/Industry</i>	<i>Lausitz Energie Kraftwerke AG</i>
<i>Education</i>	<i>Research/Academia</i>	<i>University of Leipzig</i>
<i>Energy</i>	<i>NGO/Association</i>	<i>Arrhenius-Institut</i>
<i>Financial</i>	<i>Business/Industry</i>	<i>Kreditanstalt für Wiederaufbau (KfW)</i>
<i>(Re-)Insurance</i>	<i>Business/Industry</i>	<i>Münchener Rück</i>
<i>Utility</i>	<i>Business</i>	<i>Badenova</i>
<i>Cities</i>	<i>NGO/Association</i>	<i>Deutsche Städte- und Gemeindebund (DStGB)</i>
<i>Cities</i>	<i>NGO/Association</i>	<i>Bundesverband Smart Cities</i>
<i>Cities</i>	<i>NGO/Association</i>	<i>Council of European Municipalities and Regions</i>
<i>Energy</i>	<i>Business</i>	<i>Vaillant</i>
<i>Administration</i>	<i>Government/Policy Maker</i>	<i>Landkreis Leipzig</i>

<i>Administration</i>	<i>Government/Policy Maker</i>	<i>Amt für Digitalisierung Leipzig</i>
<i>Administration</i>	<i>Government/Policy Maker</i>	<i>Umweltbundesamt KI Lab Leipzig</i>
<i>Cities</i>	<i>Business</i>	<i>Daten-Kompetenzzentrum Städte und Regionen DKSR</i>
<i>Cities</i>	<i>NGO/Association</i>	<i>Civitas Connect</i>
<i>Energy</i>	<i>Business</i>	<i>Cenero</i>
<i>Research</i>	<i>Research/Academia</i>	<i>Helmholtz-Zentrum für Umweltforschung GmbH - UFZ</i>
<i>Cities</i>	<i>Business</i>	<i>adesso Lakes GmbH</i>
<i>Administration</i>	<i>Government/Policy Maker</i>	<i>Amt für Umweltschutz Leipzig</i>
<i>Research</i>	<i>Research/Academia</i>	<i>Leibniz-Institut für ökologische Raumentwicklung (IÖR)</i>
<i>Administration</i>	<i>Government/Policy Maker</i>	<i>Gelsenkirchener Kommunale Datenzentrale</i>

Appendix 4: Funen-Odense CSA long list SHs mapping

Table A.4: Funen-Odense CSA long list of SHs mapping

Sector (relevant Industry, e.g. public health, tourism, water management)	Category [Business/Industry, Government/Policy Makers, Research/Academia, Local Citizen, NGO/Association]	Name of Stakeholder or Organisation [e.g. National Ministry of Water Resources]
Urban planning	Government/Policy Makers	Municipality of Odense
Urban planning	Government/Policy Makers	Municipality of Svendborg
Geodata collaboration	Government/Policy Makers	Geo Fyn
Water management	Government/Policy Makers	VandCenterSyd
Tourism	NGO/Association	Destination Fyn
n/a	NGO/Association	KL
Industry/Tourism	Business/Industry	Odense Port
Industry/Tourism	Business/Industry	Svendborg Port
Urban planning	Government/Policy Makers	Municipality of Middelfart
Urban planning	Government/Policy Makers	Municipality of Kerteminde
Urban planning	Government/Policy Makers	Municipality of Nyborg
Industry	Business/Industry	Erhvervshus Fyn
Urban planning	Government/Policy Makers	Municipality of Assens
Urban planning	Government/Policy Makers	Municipality of Nordfyns
Urban planning	Government/Policy Makers	Municipality of Faaborg-Midtfyn
Industry/Tourism	Business/Industry	Assens Port
Industry/Tourism	Business/Industry	Middelfart Port
Industry/Tourism	Business/Industry	Kerteminde Port
Industry/Tourism	Business/Industry	Nyborg Port
Industry/Tourism	Business/Industry	Bogense Port
Industry/Tourism	Business/Industry	Faaborg Port
Urban planning	Government/Policy Makers	Municipality of Langeland
Industry/Tourism	Business/Industry	Dageløkke Port
Coastal protection	NGO/Association	Landsforeningen for Digelag i Danmark (LDD)
Angling/Fishing	NGO/Association	Odense Sportsfisker Klub
Angling/Fishing	NGO/Association	Odense Å sammenslutningen
Nature	NGO/Association	The Danish Society for Nature Conservation
Coastal protection	NGO/Association	Hou Digelag

Nature/Ocean	NGO/Association	Ocean Institute/Tænketanken Hav
Tourism	NGO/Association	Visit Odense
Climate adaptation	Research/Academia	University of Southern Denmark
Environmental management	Government/Policy Makers	The Danish Environment Agency
Coastal protection	NGO/Association	Citizens living in Seden Strandby
Nature/Ocean	NGO/Association	The Odense Fjord Collaboration
Climate adaptation	Government/Policy Makers	Region of Southern Denmark
Building design	Research/Academia	UCL University College
Climate adaptation	Government/Policy Makers	Danske Regioner
Coastal protection	NGO/Association	Spodsbjerg Digelag
Coastal protection	NGO/Association	Nab Strand Digelag
Coastal protection	NGO/Association	Digelaget for Dalbybugten
Coastal protection	NGO/Association	The North Funen Coastal Protection, Dike and Pump Layer
Industry	Business/Industry	Danish Industry
Industry	Business/Industry	Danish Agriculture and Food Council

Appendix 5: Athens CSA Long List of SHs mapping

Table A.5: Athens CSA long list of SHs mapping

Sector (relevant Industry, e.g. public health, tourism, water management)	Category [Business/Industry, Government/Policy Makers, Research/Academia, Local Citizen, NGO/Association]	Name of Stakeholder or Organization [e.g. National Ministry of Water Resources]
Environment, Urban projects	Foundation	Onassis Foundation
Environment, Urban projects	Foundation	Foundation Stavros Niarchos
Environment, Urban, Innovation	Foundation	Bodossaki Foundation
Urban development	Real Estate Company	Lambda Development
Environment, urban	Government	Ministry of Environment & Energy, GenSecr Spatial Design and Urban Environment
Climate Change, urban	Network of Municipalities	Climattica
Climate Change	Hub	CCHUB
Environment, Urban, Innovation	Project	CoolHub EATA
Environment, Urban, Innovation	Local authority company	EATA
Environment, Urban, Innovation	Local authority company	DAEM
Green projects	Research/Academia	Agricultural University of Athens
Climate Change, urban	Forum	Athens Climatic Forum
Climate Change, urban	Forum	Youth Athens Climatic Forum
Digital Twin, IT	Research/Academia	AUTH, DestinE Community of Practice
Health Sector	Government/Policy Makers	https://eody.gov.gr/
Social Involvement	Hub NGO	https://higgs3.org/
Ageing	NGO	https://www.50plus.gr/en/
Health Sector	Hospital	Laiko Hospital Geriatrics
Health Sector	Research/Academia	Obstetrician Union Greece

Environment, Urban, Innovation	Research/Academia	Dianeosis
Green projects	Business/Industry	ASTARTE
	Government	Ministry of Social Cohesion and Family
Environment/Climate sector	Government	Ministry of Environment and Climate Change
IT	Government	Ministry of Digital Gov
Heat, Resilience	Consultant	
Environment, Tourism, NbS	Local authority company	New Metropolitan athens
Environment/Climate sector	Government	National Environment and Climate Change Agency (NECCA - partner in Arsinoe)
Energy sector	Government	Greek Ministry of the Environment, Energy and Climate Change (MEGR)
Environment/Climate sector – Spatial Planning	Government/Policy Makers,	Region of Attica
Resilience, Innovation and Documentation	Local Authority	City of Athens
Tourism sector	Local Citizen	Athens Conventions and Visitors Bureau
Tourism sector	Local Citizen	Global Sustainable Tourism Council in Athens
Environment, Climate Change	Think Tank	Dianeosis
Climate sector	Local Citizen	The Green Tank
Environmental sector	NGO/Association,	Greenpeace
	Local Citizen	
Environmental	NGO/Association, local citizen	WWF
Societal sector	Citizen groups for citizen science projects	synAthina
Communication	Citizen groups, communication	This is Athens
Resilience, Climate Change	Cities network	C40
Resilience, Climate Change	Cities network	Resilient Cities Network
Resilience, Climate Change	Cities network	iCLEI

Environment, Climate Change, Urban projects	NGO	OrganizationEarth.org
		Red Cross
Journalism sector	Business, Local citizens	Media
Social sector	Business/Industry	Wind of Renewal https://anemosananeosis.gr/
Recreation/ Travel	Business/Industry	Athens by bike https://athensbybike.com/
Micro mobility	Business/Industry	Kineo https://kineo.gr/
Civic Engagement	Business/Industry	www.novoville.com
Civic Engagement	NGO/Association	https://atenistas.wordpress.com/
Environmental Finance	Government/Policy Makers	https://prasinotameio.gr/
Demography	Research/Academia	Harokopio Uni of Athens
Health	Research/Academia	NKUA Epidemiologists
Tourism, Aesthetic, Recreation	Business/Industry	https://creativelighting.gr/work/adrianne-aqueduct/
Health	Government/Policy Makers	Ministry of Health https://www.moh.gov.gr/
Health, well-being, pandemic	Government/Policy Makers	NPHO (National Public Health Organization) https://eody.gov.gr/en/npho/
Climate Crisis	Government/Policy Makers	Special Scientific Committee on Climate Change
Sustainability	NGO/Association	SUSTAINABLE CITY https://www.sustainable-city.gr/eng.html
Environment, Climate Crisis	Research/Academia	Greek Geo Office
Climate Change, Adaptation	Project	AdaptInGR - LIFE project
Ecosystem Services, Biodiversity	NGO/Association	hESP (HELLENIC ECOSYSTEM SERVICE PARTNERSHIP) https://www.es-partnership.org/community/regional-chapters/south-east-europe/greece-hesp/
Tourism	NGO/Association	SETE
environment	Policy makers & authorities	Ministry of Environment & Energy

civil protection	Policy makers & authorities	Ministry of Civil Protection and Climate Crisis
digital gov	Policy makers & authorities	Ministry of Digital Governance
Knowledge & Research	Knowledge & Research	NTUA
Knowledge & Research	Knowledge & Research	National Centre for Social Research
Knowledge & Research	Knowledge & Research	Greek Statistical Agency
Knowledge & Research	Knowledge & Research	Social Atlas
Knowledge & Research	Knowledge & Research	Climate Lab
Civil society	Civil society	NGO Organization Earth
Business	Business	Impact Hub
Business	Business	Common Space
Policy makers & authorities	Policy makers & authorities	Central Association for Local Government
Policy makers & authorities	Policy makers & authorities	Green Fund (Hellenic)
Health Sector	Government/Policy Makers	Ministry of Health - Directorate of Public Health and Environmental Hygiene
Environment/Health Sector	Research/Academia	National Centre for Scientific Research "Demokritos"
Community Development and Urban Planning	NGO/Association	Astylab
Climate / Youth Climate Corps	NGO/Association	Ecogenia
Public Governance	Government/Policy Makers	Municipality of Athens
Public Governance	Government/Policy Makers	Municipality of Agia Varvara
Public Governance	Government/Policy Makers	Municipality of Agia Paraskevi
Public Governance	Government/Policy Makers	Municipality of Agios Dimitrios
Public Governance	Government/Policy Makers	Municipality of Agioi Anargyroi-Kamatero
Public Governance	Government/Policy Makers	Municipality of Aigaleo
Public Governance	Government/Policy Makers	Municipality of Alimos
Public Governance	Government/Policy Makers	Municipality of Marousi
Public Governance	Government/Policy Makers	Municipality of Aspropyrgos

Public Governance	Government/Policy Makers	Municipality of Acharne
Public Governance	Government/Policy Makers	Municipality of Vari-Voula- Vouliagmeni
Public Governance	Government/Policy Makers	Municipality of Vrilissia
Public Governance	Government/Policy Makers	Municipality of Vyronas
Public Governance	Government/Policy Makers	Municipality of Galatsi
Public Governance	Government/Policy Makers	Municipality of Glyfada
Public Governance	Government/Policy Makers	Municipality of Dafne-Ymitos
Public Governance	Government/Policy Makers	Municipality of Dionysos
Public Governance	Government/Policy Makers	Municipality of Elefsina
Public Governance	Government/Policy Makers	Municipality of Hellinikon - Argyroupoli
Public Governance	Government/Policy Makers	Municipality of Zografou
Public Governance	Government/Policy Makers	Municipality of Ilioypoli
Public Governance	Government/Policy Makers	Municipality of Herakleion
Public Governance	Government/Policy Makers	Municipality of Ilion
Public Governance	Government/Policy Makers	Municipality of Kaisariani
Public Governance	Government/Policy Makers	Municipality of Kallithea
Public Governance	Government/Policy Makers	Municipality of Keratsini-Drapetsona
Public Governance	Government/Policy Makers	Municipality of Kifisia
Public Governance	Government/Policy Makers	Municipality of Korydallos
Public Governance	Government/Policy Makers	Municipality of Koropi
Public Governance	Government/Policy Makers	Municipality of Lavreotiki
Public Governance	Government/Policy Makers	Municipality of Lykovrysi-Pefki
Public Governance	Government/Policy Makers	Municipality of Mandra - Ydylia
Public Governance	Government/Policy Makers	Municipality of Marathonas
Public Governance	Government/Policy Makers	Municipality of Markopoylo Mesogaia
Public Governance	Government/Policy Makers	Municipality of Megara
Public Governance	Government/Policy Makers	Municipality of Metamorfosi
Public Governance	Government/Policy Makers	Municipality of Moschato-Tavros
Public Governance	Government/Policy Makers	Municipality of Nea Ionia
Public Governance	Government/Policy Makers	Municipality of Nea Smyrni
Public Governance	Government/Policy Makers	Municipality of Nea Philadelphia-Nea Chalkidona
Public Governance	Government/Policy Makers	Municipality of Nikaia-Agios Ioannis Rentis
Public Governance	Government/Policy Makers	Municipality of Paiania
Public Governance	Government/Policy Makers	Municipality of Palaio Faliro

Public Governance	Government/Policy Makers	Municipality of Pallini
Public Governance	Government/Policy Makers	Municipality of Papagou - Cholargos
Public Governance	Government/Policy Makers	Municipality of Peiraeus
Public Governance	Government/Policy Makers	Municipality of Penteli
Public Governance	Government/Policy Makers	Municipality of Perama
Public Governance	Government/Policy Makers	Municipality of Peristeri
Public Governance	Government/Policy Makers	Municipality of Petroupoli
Public Governance	Government/Policy Makers	Municipality of Rafina Pikermi
Public Governance	Government/Policy Makers	Municipality of Saronikos
Public Governance	Government/Policy Makers	Municipality of Spata-Artemida
Public Governance	Government/Policy Makers	Municipality of Trizinia-Methana
Public Governance	Government/Policy Makers	Municipality of Philothei-Psychiko
Public Governance	Government/Policy Makers	Municipality of Filis
Public Governance	Government/Policy Makers	Municipality of Chaidari
Public Governance	Government/Policy Makers	Municipality of Chalandri
Public Governance	Government/Policy Makers	Municipality of Oropos
Public Governance	Government/Policy Makers	Region of Attica General Directorate of Sustainable Development & Climate Change
Public Governance	Government/Policy Makers	Region of Attica General Directorate of Sustainable Development & Climate Change Secretary
Public Governance	Government/Policy Makers	Region of Attica Directorate of Environment & Climate Change
Public Governance	Government/Policy Makers	Deputy Head of Region Environment and Quality of Life
Public water supplier	Business/Industry	EYDAP President
Organization	Government/Policy Makers	Global Chief Heat Officer at UN-Habitat and ARRFRC
Public Governance	Government/Policy Makers	Ministry of Environment and Energy Directorate of Climate Change and Atmospheric Quality
Environmental and Cultural Society	Local Citizen	Society "Epimenoume Pedion tou Areos"
Non-Profit Company	Local Citizen	UrbanDig Project
Public Governance	Government/Policy Makers	Ministry of Environment and Energy General Directorate of Spatial Planning

Public Governance	Government/Policy Makers	Ministry of Environment and Energy General Directorate of Urban Planning
Public Governance	Government/Policy Makers	Ministry of Environment and Energy Directorate of Metropolitan, Urban and Semi-Urban Planning
Public Governance	Government/Policy Makers	Ministry of Environment and Energy Directorate of Planning Implementation and Structured Environment Control
Community development, Social Infrastructure	NGO/Association	Melissa Network
Seniors' centers and services	NGO/Association	KAPI - ΚΑΠΗ
Worker Safety and Health	Government/Policy Makers	Ministry of Labor and Social Affairs
Civil Protection / Emergency Management	Government/Policy Makers	Civil Protection Regional Authority
Social / Equity		Athens Coordination Centre for Migrant and Refugee Issues (ACCMR)
Culture	Government/Policy Makers	Ministry of Culture
Culture	NGO/Association	Private museums or galleries that have used or could use their facilities as cooling centers?
Other official emergency responders - ambulance services, fire service, etc.		
Civil Protection / Emergency Management	Government/Policy Makers	National Centre for Social Solidarity
Civil Protection / Emergency Management	Government/Policy Makers	Reception and Solidarity Centre of the Municipality of Athens
Social / Equity	NGO/Association	PRAKSIS
Civil Protection / Emergency Management	Government/Policy Makers	Public Benefit Municipal Management of Piraeus
Social / Equity	NGO/Association	Group for Unesco Piraeus & Islands

Bank/Finance but doing research	Research/Academia	Bank of Greece - their Climate Change Impacts Study Committee that is doing research and applying climate projections
Public health	Government/Policy Makers	Ministry of Interior

Appendix 6: Barcelona CSA long list of SHs mapping

Table A.6: Barcelona CSA long List of SHs mapping

Sector (relevant Industry, e.g. public health, tourism, water management)	Category [Business/Industry, Government/Policy Makers, Research/Academia, Local Citizen, NGO/Association]	Name of Stakeholder or Organisation [e.g. National Ministry of Water Resources]
Civil Protection	Government/Policy Makers	Barcelona Fire Service
Civil Protection	Government/Policy Makers	Catalan Fire Service
Civil Protection	Government/Policy Makers	Catalan Civil Protection
Natural resources management	Government/Policy Makers	Collserola Natural Park
Public management	Government/Policy Makers	Barcelona Metropolitan Area
Public management	Government/Policy Makers	Barcelona provincial council
Forest management	Government/Policy Makers	Catalan Forest Service
Wildfire prevention	Government/Policy Makers	Wildfire prevention service
Forest management	Government/Policy Makers	Forest property centre
Nature conservation	Government/Policy Makers	Catalan Rangers
Climate	Government/Policy Makers	Catalan Office of Climate Change
Weather	Government/Policy Makers	Catalan Meteorological Service
Water management	Government/Policy Makers	Water Agency
Agroforestry	Research/Academia	IRTA
Local authority	Government/Policy Makers	Barcelona local council
Local authority	Government/Policy Makers	Sant Cugat local council
Local authority	Government/Policy Makers	Cerdanyola local council
Local authority	Government/Policy Makers	<u>Esplugues local council</u>
Local authority	Government/Policy Makers	<u>Molins de rei local council</u>
Local authority	Government/Policy Makers	Montcada local council
Local authority	Government/Policy Makers	El Papiol local council
Local authority	Government/Policy Makers	Sant Feliu local council

Local authority	Government/Policy Makers	Sant Just local council
Wildfire modelling	Research/Academia	Lleida University
Wildfire Modelling	Research/Academia	CREAF
Biodiversity	Research/Academia	CREAF
Forest and wildfire management	Research/Academia	CTFC
Wildfire risk	NGO/Association	Collserola Paisatge Viu
Landscape architecture	Research/Academia	MB Landarch
Rural development	NGO/Association	Arran de Terra
Social sciences	Research/Academia	Open University of Catalonia
Earth Sciences	Research/Academia	Barcelona Supercomputing Centre
Health	Business/Industry	Medical Studies Institute
Tourism	Business/Industry	Barcelona Tourism Consortium
Forest property	NGO/Association	BOSCAT
Tourism	Business/Industry	Catalan Tourism
Mobility	Business/Industry	Ferrocarrils Generalitat
Landscape	Government/Policy Makers	Observatori Paisatge Catalunya
Water	Business/Industry	Water supplier (AGBAR)
WUI fires	Research/Academia	Tecnical University of Catalonia

Appendix 7: Bologna CSA long list of SHs mapping

Table A.7: Bologna CSA long list of SHs mapping

Sector (relevant Industry, e.g. public health, tourism, water management)	Category [Business/Industry, Government/Policy Makers, Research/Academia, Local Citizen, NGO/Association]	Name of Stakeholder or Organisation [e.g. National Ministry of Water Resources]
Services, in alternative Climate resilience	NGO/Association	ANCI - National Association of Italian Municipalities
Services, in alternative Climate resilience	NGO/Association	Fondazione Sempre Insieme Onlus
Transport/mobility	Business/Industry	- electric mobility consultant
Services, in alternative Climate resilience	NGO/Association	Consumerismo
Public health	Government/Policy Makers	AUSL Bologna - Local Health Authority
Services, in alternative Climate resilience	Business/Industry	ANIA
Transport/mobility	Business/Industry	COTABO
Services, in alternative Climate resilience	Business/Industry	Lega COOP
Transport/mobility	Business/Industry	Interporto
Transport/mobility	Business/Industry	WeCity
Transport/mobility	Business/Industry	Cenntro
Real estate	Business/Industry	Studio Frigerio Design Group
Services, in alternative Climate resilience	NGO/Association	AMPRO
Climate resilience	Government/Policy Makers	Comune di Bologna
Finance	Government/Policy Makers	Chamber of Commerce of Bologna
Climate resilience	Government/Policy Makers	Regione Emilia-Romagna

Food industry/Tourism	Business/Industry	Grand Tour Italia (prev. FICO)
Food industry/Tourism	Research/Academia	FICO Foundation
Industry	Business/Industry	Italmercati
Industry	Business/Industry	Rete di Imprese
Industry	Business/Industry	WUWM
Education, in alternative Climate resilience	Research/Academia	University of Bologna
Education, in alternative Climate resilience	Business/Industry	Bologna Business School
Energy	NGO/Association	AESS
Finance	Government/Policy Makers	Italian Trade Agency
Industry	Business/Industry	Nomisma
Food industry	Local Citizen	Direct market customers
Food industry	Local Citizen	Urban city customers (retail stores)
Agriculture	Business/Industry	Farmers/Producers
Industry	Business/Industry	Agribologna, Cenerini, Eurostar, Di Pisa, etc.
Transport/mobility	Business/Industry	Transporation and distribution vehicles (trucks)
Agriculture	Business/Industry	Supermarkets, Farmer's markets, etc.
Food industry/Industry	Business/Industry	Mercato delle Erbe
Agriculture	Government/Policy Makers	Minister of Agriculture
Climate resilience	Government/Policy Makers	Deputy Mayor of Bologna
Climate resilience	Government/Policy Makers	Bologna Missione Clima
Transport/mobility	Government/Policy Makers	TPER
Energy	Business/Industry	HERA
Energy	Research/Academia	Cluster Green-Tech
Industry	Local Citizen	Cluster Economia Urbana (ART-ER)
Services, in alternative Climate resilience	NGO/Association	AIAS - Associazione Italiana Assistenza Spastici- Bologna
Transport/mobility	Government/Policy Makers	Ministry of Infrastructure and Trasportation

Appendix 8: Brasov CSA long list of SHs mapping

Table A.8: Brasov CSA long list of SHs mapping

Sector (relevant Industry, e.g. public health, tourism, water management)	Research/Academia	Name of Stakeholder or Organisation [e.g. National Ministry of Water Resources]
Water management	Business/Industry	Water Company
public authority	Government/Policy Makers	Brasov Metropolitan Agency
Water management	Government/Policy Makers	Brasov Water Water Management System (SGA)
Forest administration	Business/Industry	ROMSILVA State Forest Administrator
Forest administration	Business/Industry	KRONSTADT RA Forest Administrator
Environmental management and monitoring	Government/Policy Makers	APM Brasov Environmental Protection Agency
public authority	Government/Policy Makers	Sacele City Hall
Water management, Land use	Business/Industry	ANIF National Agency for Land Improvements Brasov
public authority	Government/Policy Makers	CJBv County Council of Brasov
consultancy	NGO/Association	Brasov Agency for Sustainable Development (ADDJB)
Biodiversity conservation	NGO/Association	WWF
Education/research	Research/Academia	UNITBV University Transilvania of Brasov
Environment	Government/Policy Makers	ANANP National Agency for Natural Protected Areas BRASOV
Environment	NGO/Association	AAANP ASSOCIATION OF PROTECTED AREAS ADMINISTRATIONS
Tourism	NGO/Association	Association for the Promotion and Development of Tourism in Brasov County (APDT)
Hazard management	Government/Policy Makers	Inspectorate for Emergency Situations
Advocacy	NGO/Association	Association Smart City Braşov

Energy	NGO/Association	ABMEE Energy Management and Environmental Protection Agency
Transport	Business/Industry	RAT BV Public Transport Operator
public authority	Government/Policy Makers	DJS-BV BRASOV COUNTY STATISTICS DIRECTORATE
Environmental management and monitoring	Government/Policy Makers	GNM NATIONAL ENVIRONMENTAL GUARD Brasov
citizen association	Local Citizen	G.I.C.V.B. Vulcan civic initiative group
citizen associationn	Local Citizen	Brasovul Civic
public authority	Government/Policy Makers	Brasov City Hall
Environment	NGO/Association	PROPARK
Environment	NGO/Association	ARR RANGER ASSOCIATION FROM ROMANIA
Environment	NGO/Association	Conservation Carpathia
Waste management	Business/Industry	BRAICATA BRASOV
Waste management	Business/Industry	Comprest Brasov
Waste management, recycling	Business/Industry	REMAT BRASOV
Recycling	Business/Industry	SILNEF
Energy	NGO/Association	CLUSTER PRO-NZEB
Water	Government/Policy Makers	ANAR National Water Administration
Forest administration	Business/Industry	RPLP Sacele Local Public Forest Management
Public health	Government/Policy Makers	Directorate of Public Health Brasov (DSP BV)
Land use	Government/Policy Makers	Cadaster and Land Registration Office Brasov
Forest administration	Business/Industry	National Forestry Research-Development Institute - Station Brasov
Water management	Research/Academia	National Institute of Hydrology and Water Management

Appendix 9: Birmingham CSA Long list of SHs mapping

Table A.9: Birmingham CSA long list of SHs mapping

Sector (relevant Industry, e.g. public health, tourism, water management)	Category [Business/Industry, Government/Policy Makers, Research/Academia, Local Citizen, NGO/Association]	Name of Stakeholder or Organisation [e.g. National Ministry of Water Resources]
Water Management	Business/Industry	Severn Trent Water
Environmental Justice	Business/Industry	Calthorpe Estate
Membership Institute	Business/Industry	Landscape Institute Midlands Region
Building	Business/Industry	Lendlease (Smithfield's new development in the city centre)
Business	Business/Industry	Business in the Community
Membership Institute	Business/Industry	Institute of Civil Engineers West Midlands
Business	Business/Industry	ARUP
Treespaces	Business/Industry	Kier
Housing	Business/Industry	Mott MacDonald
Business	Business/Industry	Midlands Cooperative
Business	Business/Industry	Greater Birmingham Chamber of Commerce
Business	Business/Industry	Birmingham City Council; Business Improvement District (BID)
Water Management	Business/Industry	South Staffs Water
Membership Institute	Business/Industry	Institute of Chartered Foresters Midlands branch
Membership Institute	Business/Industry	Arboricultural Association
Health	Business/Industry	Queen Elizabeth Hospital
Health	Business/Industry	Birmingham City Hospital
Community	Government/Policy Makers	Birmingham Council; Parks
Infrastructure	Government/Policy Makers	Birmingham City Council; highways

Planning	Government/Policy Makers	Birmingham City Council; landscape practice
Housing	Government/Policy Makers	Birmingham City Council; Housing
Health	Government/Policy Makers	Birmingham City Council; Public Health
Community	Government/Policy Makers	Birmingham City Council; Future Parks Accelerator
Environment	Government/Policy Makers	Environment Agency
Environment	Government/Policy Makers	Councillor Majid Mahmood (Cabinet member Environment)
Local Authority	Government/Policy Makers	Birmingham City Council; Net Gain
Housing	Government/Policy Makers	Birmingham City Council; Property Services
Treescaping	Government/Policy Makers	Forestry England Midlands branch
Resilience	Government/Policy Makers	Local Resilience Forum
Local Authority	Government/Policy Makers	Transport for West Midlands
Local Authority	Government/Policy Makers	West Midlands Combined Authority
Planning	Government/Policy Makers	West Midlands RTPi
Health	NGO/Association	Natural England Green Prescriptions Team
Ecology	NGO/Association	Birmingham and Black Country Wildlife Trust
Treescaping	NGO/Association	Birmingham Tree Board
Treescaping	NGO/Association	Birmingham TreePeople
Community	NGO/Association	Birmingham Open Spaces Forum (BOSF)
Environmental Justice	NGO/Association	Birmingham Settlement
Environmental Justice	NGO/Association	Citizens UK
Environmental Justice	NGO/Association	City of Nature
Environmental Justice	NGO/Association	National Trust; Urban Forest Accelerator
Treescaping	NGO/Association	Midlands Forest Network
Ecology	NGO/Association	Birmingham City of Nature Alliance
Ecology	NGO/Association	Canals and Rivers Trust

Ecology	NGO/Association	RSPB
Ecology	NGO/Association	EcoBirmingham
Community	NGO/Association	Community Environmental Trust
Environmental Justice	NGO/Association	Legacy West Midlands
Treescaping	NGO/Association	Trees for Streets
Treescaping	NGO/Association	Tree Cities of the World
Treescaping	NGO/Association	Trees for Cities
Health	NGO/Association	Active Wellbeing Trust
Community	NGO/Association	Birmingham Community Matters
Community	NGO/Association	Birmingham Voluntary Service Council (BVSC)
Community	NGO/Association	Locality
Health	NGO/Association	Healthwatch Birmingham
Sustainability	NGO/Association	Sustainability West Midlands
Housing	NGO/Association	Citizen (Housing)
Community	NGO/Association	Friends of the River Cole
Community	NGO/Association	Groundwork West Midlands
Housing	NGO/Association	Birmingham Municipal Housing Trust
Treescaping	NGO/Association	Nechells Pod
Resilience	NGO/Association	Climate Change Adaptation Group
Treescaping	NGO/Association	Friends of the Rea Valley
Community	NGO/Association	Age concern Birmingham
Environmental Justice	NGO/Association	Friends fo the Earth Birmingham
Environmental Justice	NGO/Association	West Midlands Climate Coalition
Environmental Justice	NGO/Association	Climate Action Network West Midlands
Education	Research/Academia	University of Birmingham
Education	Research/Academia	Aston University
Education	Research/Academia	Birmingham City University

Education	Research/Academia	Newman University
Treescaping	Research/Academia	West Midlands Forest and Woodlands Advisory Group (Defra)
Treescaping	Research/Academia	Urban Forest and Woodlands Advisory Group (Defra)
Education	Research/Academia	Centre for Urban Wellbeing