RESILIAGE
Revolutionising community resilience

D2.1

CORE Survey: Gap Analysis and Inventory of RESILIAGE Lessons Learned

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1.0	15/09/2024		Final Report

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Table of Abbreviations and Acronyms

Abbreviation	Meaning
ACS	Analyses of Crisis Scenarios (Norway)
AFAD	Disaster and Emergency Management Presidency (Türkiye)
ANEPC	National Authority for Emergency and Civil Protection (Portugal)
AYDES	Disaster Management and Decision Support System (Türkiye)
CORTEX	Risk Coordination and Expertise Transfer Centre for Wallonia (Belgium)
CORE lab	Community Resilience laboratories
CUTA	Coordination Unit of Threat Analysis (Belgium)
D	Deliverable
DMC	Disaster Management Cycle
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DSB	Directorate for Civil Protection (Norway)
DSS	Decision Support System
FG	Focus Group
FLP	rontline Practitioner
FLR	Frontline Responder
FORF	National Association of Volunteers (Norway)
FR	First Responder
GIS	Geographic Information System
ICNF	Institute of Conservation of Nature and Forests (Portugal)
IPMA	Portuguese Institute for Meteorology
iRAP	Provincial Risk Mitigation Plan (Türkiye)
JD	Ministry of Justice and Emergency Preparedness (Norway)
LA	Local Authorities
LL	Lesson Learned
MET	Norwegian Meteorological Institute
NIS	Norwegian Intelligence Service
NVE	Water Resources and Energy Directorate (Norway)
OASP	Organisation for earthquake Planning and Protection (Greece)
PGRI	Resilience Flood Risk Management Plan (Belgium)
PNEPC	National Civil Protection Emergency Plan (Portugal)
RAISE	Resilient Assessment Interactive Self-Enabler
SIOPS	Integrated Protection and Relief Operations System (Portugal)

SR	Second Responder
SyRI	Systemic Resilience Innovation framework
T	Task
TAMP	Provincial Disaster Response Plan (Türkiye)
WP	Work Package

1. Executive Summary

The deliverable D2.1, CORE Survey: Gap Analysis and Inventory of RESILIAGE Lessons Learned, is the result of a twelve-month long task (T2.2, Investigation in the 5 COREs including past crises), the results of which constitute one of the cornerstones of WP2, Modelling behaviours: Building the assessment and monitoring framework. WP2 is dedicated to expanding the knowledge through the collection of new data in a multi-method and cross-disciplinary design to expand the existing knowledge documented in WP1 (baseline of current international policies and standards (T1.1) as well as of the present state of research within scientific literature (T1.2), pertaining to crisis preparedness planning, disaster risk management, climate change, and heritage). The data collected in WP2 is aimed at contextualising the knowledge on local level through the investigation of the five CORE labs, which the RESILIAGE project is centered around, through different disciplinary and methodological approaches analysed in a variety of associated tasks (T2.2, T2.3, T2.4, T2.6, T4.1).

This report documents the data collection on the five RESILIAGE CORE labs conducted between March and June 2024 through extensive in person, empirical field studies.

D2.1 forms the sum of T2.2's variegated results. The task as a whole focused in on the in-depth analysis of the CORE labs social, cultural, geographical make-up including key dimensions of the RESILIAGE project. First, the relevant local crisis policies and standards have been identified and analysed against the international formal crisis provisions issued by various international organisations (UN, EU, ICRC, etc.) collected in WP1. Second, local actors (citizens, frontline responders, and representatives of local governments) have been engaged in a series of focus groups and interactive workshops in order to gather their perspective on the interrelated topics of disaster management, community resilience, and the identification of local heritage drivers. Third, the social media communication during crises of a selection of these actors has been analysed. This was in pursuit of extending the knowledge baseline on these topics with the specifics of the local conditions for the remainder of the RESILIAGE project. Another aim of T2.2 has been to elicit the gaps, good practices, and lessons learned with regard to the formal provisions, as well as organisational practices in response to crises.

The key aspect of T2.2 was to expand on the formal descriptions of each CORE lab (presented in T1.1) through the inclusion of various data sources and the perspectives of the local stakeholders, including its geographical and historical context, the history and procedure of its chief and secondary crises, as well as the existing sets of tools and instruments available to fend off crises at the CORE sites.

It is hoped that these newly formed data sources and repositories – especially when read and treated in comparison and juxtaposition with the knowledge produced in WP1 – will constitute a useful and useable baseline of knowledge for the remainder of the RESILIAGE project as well as a continual point of reference for the work of future WPs.

2. Introduction

2.1. Aim and Structure of the report

Assuming a systemic and holistic research approach, the RESILIAGE project seeks to establish and advance knowledge surrounding citizens' behaviours in moments before, during, and after crisis. By attaining such knowledge, it hopes to be able help co-create communities with high levels of resilience and improved disaster risk management (DRM) plans, and to ensure more equitable and attainable future sustainable development (SD).

In pursuit of these aims, RESILIAGE aspires to create novel critical thinking around community resilience based on collected data – based in large part on knowledge gathered on-site – and to create and contribute to innovative digital tools, awareness campaigns, and policy trajectories. It is hoped that these contributions can all help activate cultural heritage (CH) as a powerful driver of community resilience.

The report is divided into the following chapters:

- Section 1 – Executive Summary: describes the main objectives of this deliverable.
- Section 2 – Introduction: introduces the purposes of the task, the structure of the report, including a contextualisation in the project-specific relevances including the gender dimension
- Section 3 – Methodology: provides an overview of each individual investigative approaches towards the CORE labs, ranging from policy analysis, qualitative methodologies (focus goups & interactive workshops), and social media analysis.
- Section 4 – CORE reports: presents the outcome of each of the in-depth investigations structured by the data set used, key dimensions of the RESILIAGE project and the CORE labs.
- Section 5 – Comparative Assessment: presents a short contrasting conclusion of the key findings in each CORE site
- Section 6 – References: documents the formal provisions included for the policy analysis.
- Section 7 – Appendix: includes the annexes of the deliverable, including ethical documents for empirical investigation, methodological guidelines, and a summary table.

2.2. Gender perspective

Following the RESILIAGE approach to consider human behaviours' variations in society, the developed analysis also included a gender perspective among vulnerabilities as well as opportunities of cultural practices. Moreover, a specific perspective for focusing on gender and impowering women in DRR has particularly been inserted into the project implementation through T2.1 and the WP8 which are transversal components of the RESILIAGE project. While T2.1 has generated a holistic systemic knowledge approach

to build the multiscalar, multidimensional, and conceptual framework for the project, WP8 oversees the overall coordination.

By focusing on the conceptualisation of community resilience and a critical perspective, the T2.1 (lead by POLITO) has provided multiple stakeholders brainstoring within the consortium for focusing on cross-cutting aspects and shaping new strategic inputs within WP2 and the overall RESILIAGE objectives.

In the scope of T2.1, several participatory online workshops have been organized. One of the main issues addressed in these workshops focused on the analysis of how gender perspective can be a crucial component of DRR from their own points of view. The workshop engaged a wide range of stakeholders from RESILIAGE consortium including CORE labs that represent FRs, knowledge organizations, policymakers, citizens, and civil societies. Such representativity for DRM allowed discussing and understanding how different target groups perceive and deal with the gender or how they adopt measures regarding gender in DRR.

Additionally, an in-presence workshop was organized by the COO within the project consortium during the in-presence 3rd RESILIAGE General Assembly in Crete in 22-23 May, 2024 focusing on integrating gender considerations into stakeholder engagement processes This workshop emphasized the importance of gender-sensitive approaches in DRR, highlighting how different gender groups experience and respond to disasters due to distinct social roles, responsibilities, and power dynamics. The workshop's outcomes underscored the need for gender-inclusive engagement strategies, contributing to the development of more equitable and effective disaster resilience frameworks.

Moreover, the RESILIAGE Summer School, titled "SHeroes Resilience Summer School: Empowering Women in Disaster Risk Reduction through Heritage," was successfully completed between 22-29 June 2024. This Summer School was specifically designed to empower women by providing them with the tools and knowledge necessary to actively participate in DRR, with a particular focus on leveraging cultural heritage as a resource for resilience.

RESILIAGE project made significant strides in embedding gender considerations into its DRR efforts, aligning with international best practices and enhancing the overall effectiveness of its resilience-building strategies with heritage drivers. Through these initiatives, the T2.2 also benefitted of this perspective for the analysis that will be more systematically included in further analysis within the WP2 and the overall development of the project.

By considering also the most contemporary developments such as the UNDRR’s emphasis on the need for a gender perspective and the subsequential launch of the Gender action plan to support the implementation of Sendai Framework 2015-2030, RESILIAGE project has structurally adopted the gender perspective to be explored in heritage drivers and community resilience.

2.3. Positioning within the project

The report D2.1 is the first of three deliverables documenting the new investigation, data collection and analysis focused on the local conditions of the CORE labs through a

multiplicity of disciplinary approaches ranging from document collection and analysis as well as qualitative and quantitative research methods in focus groups, workshops, interviews, experiments, and surveys.

It is set against the background of WP1 documenting the state of the art of international DRM policies, previous DRS projects, a cross-disciplinary literature review, and the data lake. Where WP1 documented available knowledge on European level, WP2 takes the specific local situation of the CORE labs in focus, to allow for a detailed problem analysis on ground level. It is at this level, that all further developments in WP3, WP4, and WP6 are geared towards. The various knowledge sources inform the subsequent WPs in various ways:

1. The identification of gaps, challenges, lessons learned, and good practices will guide the development of the digital tools in WP3, the soft solutions in WP4, and the preparedness plans in WP6.
2. The creation of new data sets directly feature into the development of the various digital solutions in WP3
3. Furthermore, the analysis of the local factors – challenges and opportunities – will be fed back directly to the CORE lab stakeholders through WP5, to empower heritage driven community resilience.

3. Methodology & Limitations

3.1. Policy analysis methodology

More than half of the global population currently resides in urban areas, making the task of enhancing city safety a long-term challenge that is attainable. Cities serve as engines of national growth and exhibit dynamic governance systems and capabilities. Historically, urban life has been disrupted by various disaster events. Increasingly, extreme and shifting climate conditions, earthquakes, and emergencies caused by human activities are placing additional strain on communities and jeopardizing the prosperity of cities.

There are a number of studies, guidelines (UNDP, IFRC, European Union, etc.) that the managers can use to make cities more resilient to disasters. Within RESILIAGE project there are five CORE Labs with different socio-demographic, economic, geographical and governance characteristics. It is not very easy to look for specific answers to be able to touch every subject needed to be prepared for disasters.

The project team looked into different documents like national disaster management governance models, strategies and plans as well as local plans. In most cases the risk and vulnerability assessments are at national scale while some have local assessments (Trondheim, Izmir, Crete). There are cases where the risks are analysed under climate adaptation works. Especially in Naturtejo and Trondheim CORELabs in which they cover an area of multiple local governments, there was a need to check if all the local governments had preparedness and/or adaptation plans. In other cases, like Crete there is a need to look into regulations for building codes, etc to be able to see if, necessary plans are in place.

Disaster management can be covered in different ways in different countries depending on the regulations, the most seen disaster types, socio-economic situation and so. There

is no one solution fits all and there is no preparedness plan that covers every aspect of disaster management.

As a methodology, the existing strategic planning structures and systems of each Core IAB region were thoroughly examined. This review aimed to understand each region's approach to disasters and its established priorities. Following the review of strategic plans, preparedness plans for each CORE Lab were collected. These documents are crucial for demonstrating the level of preparedness of each region and the measures implemented.

Based on the collected data, a comprehensive analytical framework was developed to assess organizational structure, risk management approaches, regulations, existing training activities and their scope, as well as efforts towards strengthening and improvement. This framework is structured around 10 main categories and 31 subcategories to thoroughly examine critical issues related to disaster preparedness. The aim of this analysis is to gain an in-depth understanding of the governance mechanisms associated with these areas and to determine whether they are sufficient to ensure adequate preparedness for disasters.[1]

Figure 1. Analysis framework categories and subcategories

The development of this analytical framework was informed by guidelines from international organizations such as UNDRR (United Nations Office for Disaster Risk Reduction), DG ECHO (Guidance Notes for Disaster Preparedness) and IFRC (International Federation of Red Cross and Red Crescent Societies). These guidelines provide strategies designed to enhance urban resilience to disasters. The framework integrates the strategies outlined in these guidelines with preparedness planning processes, ensuring that preparedness plans align with minimum requirements. This alignment guarantees that preparedness plans not only meet basic requirements but also incorporate best practices in risk reduction and resilience-building.

[1] The detailed policy gap analysis matrix can be found in the Annex.

This methodology provides a comprehensive approach to evaluating the effectiveness of strategic planning and preparedness plans, enabling concrete steps to enhance disaster preparedness and resilience.

In accordance with the developed Analysis Framework, the preparedness plans for each CORE lab were examined in detail. This review aimed to assess the scope, coverage of necessary areas, and alignment of the plans with the Task 2.1.

Under each heading of the evaluation framework, the preparedness plans were assessed according to the defined "research questions", and deficiencies were identified. Each CORE lab plans had their own challenges in terms of language, or having to look to other plans and make additional search to gather relevant information. Still there is a need to confirm some of the findings with CORE labs and their stakeholders. More detailed analysis and search will be done under Task 6.1 with additional workshops and meetings.

3.2. Focus group methodology

The FG sessions took place on-site of each CORE lab between April and June 2024 and were organised by RESILIAGE partners VIC and DBL, with logistical help from CORE lab representatives and SINTEF. FG sessions were facilitated by local-language partners, who were guided by a CORE-specific Facilitator's Guide, produced by VIC and DBL. Each Facilitator's Guide was tailored to the respective CORE lab's context and to the CORE-specific crisis scenario, and was also translated into the respective language (an English-language Facilitator's Guide is reproduced in the Annex of D4.1).

FG participants, which were invited to partake by the local CORE lab representatives, were asked to sign a consent form (reproduced in the annex), and were assigned to join parallel-running FG sessions, each running 90 minutes. In total, two parallel sessions, each lasting 90 minutes, took place over two days – meaning that each FG participant took part in 180 minutes of FG discussions. In each CORE case, there were individual exceptions, in which one individual could only partake in one or one fragmentary session. In Trondheim, due to a low number of participants on day one, the first day saw only one FG session occur, with no parallel session running simultaneously.

CORE lab site, Famenne-Ardenne
Date: 3-4 April, 2024
Location: Domaine De Lomme, Rochefort, Belgium
Total number of FG participants: 41
Number of parallel FGs: 2
Total number of sessions: 4

CORE lab site, Naturtejo
Date: 22-23 April, 2024
Location: Living Science Centre of the Forest, Proença-a-Nova, Portugal

Total number of FG participants: 25
Number of parallel FGs: 2
Total number of sessions: 4

CORE lab site, Karsiyaka
Date: 7-8 May, 2024
Location:Kal Kadoş Synagogue, Karsiyaka, Türkiye
Total number of FG participants: 40
Number of parallel FGs: 2
Total number of sessions: 4

CORE lab site, Crete
Date: 23-24 May, 2024
Location: Natural History Museum of Crete, Heraklion, Greece
Total number of FG participants: 28
Number of parallel FGs: 2
Total number of sessions: 4

CORE lab site, Trondheim
Date: 12-13 June, 2024
Location: Trondheim Red Cross Headquarters, Trondheim, Norway
Total number of FG participants: 18
Number of parallel FGs: 1 (on day 1), 2 (on day 2)
Total number of sessions: 3

The collection of input from FGs was necessarily limited, as it provided only the contribution of a selected sample of stakeholders. Furthermore, due to language and translation processes, some results will represent a synoptic and selective summary rather than an elaborate account of the discussions in the group. Nonetheless, the data, made available in the transcripts, allow for the identification of some generic and general problematics.

The focus group methodology has been already detailed in the deliverable D4.1 “Needs analysis and training requirements definition”, including the guide for facilitators, which is not repeated in this deliverable. The methdology has been co-created with the task leaders of T4.1 and implemented together.

3.3. Interactive workshop methodology

RESILIAGE views heritage as a powerful driver for enhancing the preparedness and adaptation of local communities. Within the framework of the project, heritage-driven resilience is a cross-cutting theme. Interactive workshops have been developed and held across CORE labs within the activities of T2.2 linked to other activities within T2.1, T2.6, T.4.2 (lead by POLITO) for the identification of local heritage drivers as a core element

throughout the RESILIAGE project. By this approach, these activities were designed to provide specific data and results, building upon the findings from other parts of the project addressing the matter, particularly the LL and scoping review from the analyses conducted in WP1, which, in turn, inform and enrich other aspects of the project. Particularly the LL considered for the scope of T2.2, highlighted the role of specific groups of people—such as the elderly, women, and heritage managers—as active contributors to fostering community resilience. It also recognized cultural narratives of disasters as valuable resources for recovery and emphasized the importance of long-term psychological healing from disaster trauma.

A particular focus on cultural, historical, and environmental factors has been integrated into onsite co-creation activities with local communities in the CORE lab networks to ensure their full participation in all stages of new knowledge co-building. Interactive workshops were designed to facilitate multi-stakeholder engagement, aiming to understand how local heritage and historical cultural backgrounds can influence human behaviors in disaster risk reduction (DRR).

The results of the activities conducted during the onsite campaigns are aimed at other aspects of the project particularly in relation to the CORE investigation.

Table 1. Interactive workshop activities and correspondence with RESILIAGE tasks/WPs

Interactive Workshop activity	Aim	Activity	RESILIAGE Tasks / WPs
CORE Local Heritage Identification and Characterization	Identification of human factors in DRM	Co-creation brainstorming and conceptual maps on historical, cultural and environmental factors characterizing CORE Local Knowledge	T2.2
CORE Local Heritage Identification and Characterization	Identification of historical cultural environmental factors that intervene in DRM	Activating protective behaviours in citizens with a specific attention to the vulnerable groups identified by CORE labs by being aware of historical and cultural layers	WP4, T4.2
Lessons Learned from Cultural Heritage and Community Resilience. Crisis Scenario Narratives	Lessons Learned identification	Extracting local narratives of disaster risk reduction in relation to the historical, cultural and environmental factors that intervene in crisis response	T2.2

Lessons Learned from Cultural Heritage and Community Resilience. Crisis Scenario Narratives	Understanding how local community interacts with the environment from a cultural and historical perspective	Multilayered communities-environments interactions in the five CORE labs	T2.6
Lessons Learned from Cultural Heritage and Community Resilience. Crisis Scenario Narratives	Understanding how local community interacts with the environment from a cultural and historical perspective	Extracting cascade effects related to the historical, cultural and environmental factors that intervene in crisis response	T2.6

The various activities were structured into progressive steps to enhance participant engagement. An initial activity focused on identifying local heritage was designed to understand how the community defines their territories in terms of key environmental, historical, and cultural characteristics. The process began with collective brainstorming sessions, progressed to activities involving discussion, debate, and shared decision-making, and culminated in simulation-based role-playing exercises.

Table 2. Interactive workshop activities description

Activity	Description
CORE Local Heritage Identification	It framed selecting a priority element from a previously identified list to define the valuable aspects of the territory and specify it according to various other elements.
CORE Local Heritage Characterization	This activity, conducted through the co-creation of a conceptual map, effectively led to a more articulated characterization of local heritage across multiple elements
Lessons Learned from Cultural Heritage and Community Resilience. Crisis Scenario Narratives	It involved presenting the groups with a newspaper article reporting on a disaster, particularly in relation to cultural heritage (such as the reconstruction of significant buildings, the transformation of landscape elements, and the activation of the community to create works of collective memory). The groups were then asked to comment on the article and summarise the negative and positive elements.
Lessons Learned from Cultural Heritage and	Based on a hypothetical scenario featuring characters in a difficult situation related to a hazard, participants were asked to take turns impersonating one of the characters and receive advice from the rest of the group on strategies and solutions to facilitate recovery.

Community Resilience. CORE Role Play	The aim of the activity was to extract LLs related to the historical, cultural, and environmental factors that intervene in crisis response, based on personal experiences not necessarily limited to the most recent disasters.

Following a co-creation approach, the activities were tailored to encourage engagement and active participation. All activities were conducted in person, with participants divided into small groups of approximately 6-8 members. Each collaborative activity in the CORE labs has involved several relevant actors of DRM (FR, Policy Makers, Heritage managers and experts, Civil Society representatives, NGO's representatives), Heritage working together two half days by a range between 15 to 60 people (from Trondheim to Karsiyaka).

A summary of the number of participants involved in the two half-day activities is provided in the table below.

Table 3. Stakeholders' participation at the CORE Interactive workshop activities

CORE Lab	n. engaged actors
Karsiyaka	60
Famenne-Ardenne	40
Crete	38
Naturtejo	17
Trondheim	12

The activities were conducted in person within each CORE lab, leveraging interactions with their networks. Since the activities were carried out in the local languages, the team could directly engage only in certain cases (French, Turkish), while in other workshops, the mediation of native-speaking facilitators was necessary. To foster participant interaction, facilitators acted as guiding figures, offering instructions and observing interactions among participants. A preliminary alignment session and a final reporting session were organized with the mediators, and a Facilitator Guide was developed to assist them (see annex: Workshop Session Facilitator Guide).

3.4. Social Media analysis methodology

In this report, we explored the potential of extracting and analyzing data from multiple social media platforms to assess disaster communication and its effectiveness. The platforms initially considered included Facebook and Instagram (from Meta), X (formerly Twitter), and YouTube (from Google). These platforms were selected because they are widely used and facilitate communication between influential actors and citizens, making them ideal for analyzing disaster-related communication.

However, during our investigation, we encountered significant limitations in accessing historical data from these platforms, which ultimately impacted the scope of our analysis. The X platform, for instance, imposed a subscription fee for access to historical data, which was outside the budget allocated for this analysis within the RESILIAGE project. Other platforms provide research accounts for entities like universities and non-profit organizations to access historical data. However, because the analysis was not conducted by an eligible group, these restrictions further limited the ability to perform a comprehensive analysis.

As a result, our analysis was confined to public Facebook pages where no login was required and it is publicly accessible. This constraint limited the type and volume of data available, as we could only collect public posts up to a certain date in the past. The data collected also included the number of reactions, comments, and shares per post, while ensuring that no individual private data was ever collected.

(i) Selection of Social Media Public Pages

The selection process for social media pages was critical to ensuring that our analysis focused on the most influential pages within each CORE Lab's region. CORE Labs were asked to identify social media pages that they believed would be most influential among citizens in their area. These pages included those belonging to municipalities, firefighter departments, public figures, and other relevant organizations.

(ii) Collection of Posts Data

Data collection presented its own set of challenges, particularly with pages that belonged to newspapers. These pages often had a high volume of content, making it more difficult to isolate relevant posts for analysis. Despite these challenges, we ensured that no personal data or information that could identify any individual was collected during this process. Our focus remained on the content of the posts and the associated engagement metrics.

(iii) Auto Translation of Posts Descriptions to English

Given that the CORE Labs operate in regions with different primary languages, an auto-translation process was necessary to standardize the data for analysis. Post descriptions were translated from the local languages of the CORE Labs into English. This translation was facilitated using Large Language Model technology (specifically, OpenAI's GPT-4o-mini), ensuring that the content was accurately conveyed and could be uniformly analyzed across different regions.

(iv) Clean and Transform Data

Before the data could be analyzed, it underwent a cleaning and transformation process to ensure it was usable. This step involved removing any irrelevant or duplicate information, standardizing data formats, and ensuring consistency across the dataset. This process was essential to prepare the data for the subsequent stages of analysis.

(v) Process and Analyze Data

Once the data was cleaned and transformed, we began the analysis by focusing on posts related to identified disasters within a specific time window. Posts were selected and

analyzed both before and after the disaster occurred to assess the level of disaster awareness and communication. Given the large volume of data, Large Language Models were used to help identify posts related to disaster awareness. However, human inspection was also performed to ensure accuracy.

Conclusions were drawn based on the analysis of posts related to disaster awareness. In some cases, numerical analysis was also conducted on the engagement metrics (reactions, comments, and shares) to gain further insights into the effectiveness of the communication strategies used.

The limitations encountered during this analysis—such as restricted access to historical data, the limited scope of data collection, and challenges associated with high-volume pages—affected the comprehensiveness of our findings. These constraints underscore the importance of accessible and open communication channels for effective disaster awareness and preparedness. Further investigation may be necessary to provide a more complete understanding and to inform the development of more effective disaster communication strategies.

4. CORE Reports

4.1. Overview of key local crisis management policies

4.1.1. Crisis Management and Preparedness Plan

Disasters have been one of the greatest threats humanity has faced throughout history. Natural hazards such as earthquakes, floods, hurricanes, and wildfires not only result in loss of life and property, but also deeply impact societal order, economic stability, and social life. Moreover, factors such as climate change, increasing population density, rapid urbanization, and environmental degradation are exacerbating the frequency and impact of disasters. This situation has made preparedness for disasters and managing disaster risks more crucial than ever before.

Effectively preparing for disasters requires comprehensive planning not only during the disaster but also before and after it. This is where disaster preparedness plans come into play. Disaster preparedness plans are strategic documents designed to ensure that communities and local governments can respond quickly, organized, and effectively in the event of a disaster. These plans detail the steps to be taken before, during, and after a disaster and coordinate these processes.

The primary purpose of disaster preparedness plans is to ensure that a community or local government can effectively respond to potential disasters they may face. The fundamental goal behind these plans is to protect the overall well-being of the community, minimize loss of life and property damage, and ensure a swift and effective recovery process after the disaster. In this regard, it can be said that disaster preparedness plans are shaped around four main objectives: (DG ECHO, 2021)

Ensuring Safety: Protecting human lives during and after disasters is the most important goal. Disaster preparedness plans evaluate potential risks and determine the most

suitable intervention strategies against these risks. This ensures that necessary measures are taken to prevent loss of life during and after a disaster. In this context, the evacuation of people to safe areas and the readiness of emergency medical intervention teams are critical components of the plans.

Minimizing Material Damage: Disasters threaten not only human lives but also material assets. Structures, infrastructures, and other economic assets can be seriously affected by disasters. The aim of disaster preparedness plans is to minimize such damage. Measures to achieve this goal include making buildings and infrastructure disaster-resistant, strengthening insurance systems, and protecting economic activities.

Rapid and Effective Response: Time is of the essence during a disaster. Therefore, disaster preparedness plans are designed to ensure a rapid and effective response. Plans specify the roles of various institutions and individuals during a disaster, how resources will be used, and which strategies will be implemented. This helps to prevent chaos during a disaster and minimizes its impact through coordinated response.

Accelerating the Recovery Process: After a disaster, it is crucial for the community to return to normal life as quickly as possible. Disaster preparedness plans include strategies to accelerate the recovery process. These strategies include damage assessment, rebuilding efforts, psychological support services, and economic recovery. This part of the plan aims to reduce the long-term negative impacts such as economic decline, population displacement, social inequities, and environmental degradation on the community.

The development and implementation of disaster preparedness plans is a comprehensive process encompassing a wide range of activities, from assessing how prepared a community or local government is for disasters to continuously updating and improving these preparations. Disaster preparedness plans can be considered a component of interconnected with elements such as response, prevention, and recovery, and can play a crucial role in enhancing the effectiveness of the DRM process.

Response encompasses the emergency services and interventions that take place after a disaster occurs, while recovery involves the efforts made to restore the community to normal processes post-disaster. Prevention (similarly to mitigation) includes strategies aimed at reducing the likelihood or impact of disasters. Preparedness, on the other hand, encompasses all planning and educational activities that enable society, institutions, practices, and strategies to become operational before any disaster occurs (IFRC, 2024).

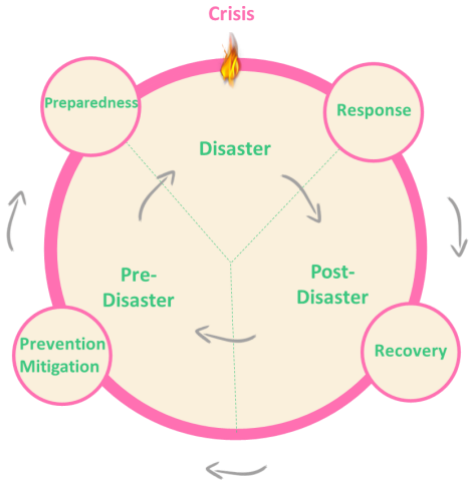

Figure 2. Disaster Risk Management Cycle

In accordance with the preparedness plan, a GAP Analysis has been conducted by reviewing the preparedness plans of the 5 CORE labs (which are Karsiyaka, Crete, Famenne-Ardenne, Naturtejo and Trondheim) involved in RESILIAGE, taking all relevant information into account.

4.1.2. Analysis Results

4.1.2.1. Famenne Ardenne Geopark

The National Crisis Centre, Ministry of Home Affairs, is responsible for the coordination of the emergency planning and crisis management policy of Belgium. Emergency planning and management is implemented at 3 different levels: municipal, provincial, or federal level. At each level generic and risk specific emergency plans are drawn up. The level at which a crisis is managed is based on a multitude of criteria, such as geographical extent, number of victims, environmental impact, etc.

Emergencies are coordinated at national/federal level if, e.g., 2 or more provinces are involved or the means available to the provincial governor within their competence of coordination are insufficient. In the federal phase of emergency planning, the Minister of Home Affairs initiates national coordination and promulgation.

In the region of Wallonia, the Risk Coordination and Expertise Transfer Centre (CORTEX), formerly known as the "Wallonia Regional Crisis Centre", aims of coordinating the Region's efforts in risk and crisis management. CORTEX provides methodological and material support and expertise to the entities of the Wallonia Public Service, the competent authorities and the disciplines. It also develops initiatives at the regional level to promote risk culture and experience sharing.

Furthermore, the Province of Namur actively participates in numerous working groups on the subject of flooding and, in particular, in the cross-sectional flood group (GTI) set up by the Wallonia public service which monitors the production of flood hazard maps due to overflowing watercourses and runoff. These maps can be consulted directly online via the "Floods" application of the Wallonia geoportal.

The National Crisis Centre, the Governors of the Namur and Luxembourg Provinces, the Municipality of Namur, and the Wallonia Region websites, along with various plans and reports, were utilized to do the gap analysis methodology. There will be consultation meetings with local stakeholders where the project team will have the chance to verify the gaps.

- **Institutional Structure and Coordination**

The emergency management system in Belgium is well-defined at the municipal, provincial, and federal levels. Starting at the federal phase, 3 bodies are activated within the National Crisis centre: an evaluation and assessment, a coordination, and an information cell.

At operational level, each emergency is handled by intervention services. Their tasks are divided into 5 so-called disciplines (sectors) within a command post. Relief operations, medical, sanitary and psychological services, police, logistical support, information to citizens (discipline 5).

There is a lack of clear integration and harmonization between the levels, particularly when transitioning from provincial to federal phases. The roles and responsibilities across different levels may overlap, leading to potential delays in decision-making during a crisis. Furthermore, the lack of a centralized and unified command structure could hinder the effective coordination of emergency responses, especially in complex, multi-jurisdictional emergencies. Authorities and emergency services carry out multidisciplinary exercises within different periodic recurrences which makes it difficult for some FLR or others who have responsibilities to keep up to date with checklists, procedures etc. There is also no open access feedback mechanism to improve the system.

- **Communication**

Despite having a comprehensive communication system (Incident and Crisis Management System (ICMS), radio communication (ASTRID), and telecommunication network (REGETEL)), there is a significant challenge in ensuring that all partners have the most up-to-date information during a complex emergency. The reliance on multiple communication networks increases the risk of information silos and miscommunication. To assist emergency services and authorities with crisis management, a support team, the Crisis Support Team (CST), is set up. The Crisis Support Team is a team of volunteers who can support crisis management in a crisis cell and/or the CP-Ops. Members of the CST are trained to optimally support the flow of information and form a common operational picture.

In the event of an emergency, discipline 5 is responsible for informing the public. This discipline uses the Crisis Communication Work Process, a model to structure the tasks of discipline 5 and shape the communication.

The nation-wide early warning system (BE-Alert system), although functional, has limited public awareness and participation, which reduces its effectiveness in reaching non-registered individuals during emergencies.

The private sector and citizens are not involved in the planning stages or exercises and in return their awareness about risk management is quite low although they have experience having floods every few years in the region.

- **Risk Assessment**

The national risk assessment framework is robust. The risks are categorised as natural, technological, health and security risks. Within the analysed hazards under natural risks there are heavy storms, floods, cold snap, heat wave, drought, water shortage, earthquake, wildfire, invasive species. The Wallonia region's Flood Risk Management Plan is the only hazard-specific plan[1], indicating a gap in comprehensive risk assessments for other potential threats at the region. Namur and Luxemburg provinces were also involved in the plan. Additionally, there is a lack of statistical and GIS-based information to support risk assessments, particularly in sub-basins.

- **Vulnerabilities**

The vulnerabilities identified in the Flood Risk Management Plan for Wallonia lack detailed statistical or GIS-based data, which limits the precision of risk mitigation strategies. Additionally, there is no integrated approach to address vulnerabilities across other regions or for hazards beyond flood, leaving gaps in the overall risk management framework. The province of Namur has a climate adaptation plan in which the local government included the sensibilities, exposure and adaptive capacity for vulnerable zones with statistical data and risk maps.

- **Critical Infrastructure and Environmental Protection**

Belgium has defined critical infrastructure and operators of essential services. All critical infrastructure must have a security plan with general measures that always apply, take additional measures depending on the level of threat. The threat level analysis is done by the Coordination Unit of Threat Analysis (CUTA); have a contact point (24/7) for the government. This enables the operator of the critical infrastructure and the government to exchange information quickly when necessary; organise exercises and inspections. This way, the procedures remain known or can be improved.

There are no references to additional energy or water resources planning during emergencies. Environmental protection is also not part of the risk management plans. The city of Namur has an adaptation plan covering the environmental issues.

- **Early Warning System**

The BE-Alert system, despite its wide implementation, faces challenges in public awareness and participation. Many citizens, particularly those unfamiliar with the system, may not receive timely alerts, reducing the system's overall effectiveness. Additionally, there is a need for continuous improvement in the technology and channels used to disseminate alerts to ensure broader coverage and more reliable communication.

The Risk Coordination and Expertise Transfer Centre (CORTEX) organises the Wallonia Region's action in the areas of risk prevention, crisis management falling under regional competences and post-crisis recovery. It is the preferred point of contact for the competent authorities and disciplines. It ensures effective collaboration between them

and all Wallonia stakeholders with a view to strengthening resilience in the Wallonia Region.

- **Building Regulations and Land Use Planning**

Wallonia has taken steps to integrate sustainable development into post-disaster rebuilding, zoning plans taking into consideration the disaster risks for Wallonia have been prepared. There is no reference to nationwide building regulations.

- **Cultural Heritage Protection**

There is a notable absence of comprehensive plans to protect tangible cultural heritage in disaster risk management. While CORTEX has an online tool for recording flood impacts, the preservation of cultural heritage, both tangible and intangible, requires more focused attention and integration into broader risk management strategies.

- **Training, Education, and Public Awareness**

While Belgium has established training and education programs for emergency management, there is a need for more cross-sectoral and multi-hazard training exercises. Additionally, public awareness campaigns, although present, are not sufficiently widespread or impactful, particularly in raising awareness about hazards and the importance of individual preparedness. The materials within national platforms are informative for citizens and can be found in different languages but awareness of this information can be questioned.

- **Recovery and Rebuilding**

The recovery and rebuilding processes, while structured, lack a dedicated budget for risk management, which can delay the implementation of necessary measures post-disaster. Moreover, the learning process following crises needs to be more systematically integrated into the planning and updating of emergency management strategies to ensure continuous improvement. The online tool for floods within CORTEX can be a good example for other disaster as well.

- **Finance Sources**

The absence of a specific budget allocation for risk management across different levels of government and relevant actors poses a significant challenge. This financial gap could hinder the effective implementation of risk management obligations, particularly in underfunded municipalities or regions.

4.1.2.2. Naturtejo Geopark

The National Authority for Emergency and Civil Protection (ANEPC) is a central service of the State's direct administration, under the Ministry of Home Affairs, with administrative and financial autonomy and with its own assets.

The ANEPC includes the Civil Protection Special Force, a task force specialising in protection and relief in situations of emergency, serious accident, or disaster. The ANEPC's headquarters is in Carnaxide, out of which operate the National Command, 5 Regional Commands, and 24 Sub-Regional Commands. In 2023, staff numbers are at 1530 and a budget of 145 million euros.

The ANEPC, Naturtejo Geopark, the municipalities in which Naturtejo is located regulations, guidelines, plans are utilized to do the gap analysis methodology. In the upcoming months various meetings and workshops will be planned to confirm the information in this report and may be revised in other deliverables based on feedback from local stakeholders.

- **Existing Institutional Structure**

The National Authority for Emergency and Civil Protection operates in mainland Portugal with the mission to plan, coordinate and implement the emergency and civil protection policies, articulate and coordinate the civil protection agents' operations and the bodies that intervene in this area, ensure the planning and coordination of the national requirements for emergency civil planning, and enforce the Portuguese State's international cooperation policy.

There is a District Commission for Civil Protection in each district and in each municipality, there is a Municipal Commission for Civil Protection. These may also determine the existence of Local Civil Protection Units at the parish level.

The following civil protection agents are available in Portugal:

- Firefighters
- Security Forces
- Armed Forces
- National Maritime Authority Bodies
- National Civil Aviation Authority
- INEM (Integrated Medical Emergency System) and other healthcare providers
- Forest firefighters
- Portuguese Red Cross (cooperates with the civil protection agents under the terms of its bylaws).

The following are bodies with a special duty to cooperate:

- Private legal entities who hold firefighter corps
- Security services
- Service charged with providing medical examination and forensics
- Social security services
- Private charities and others with the purpose of providing relief and solidarity
- Private security and assistance services for public and private enterprises, ports, and airports
- Institutions that are indispensable in protection and relief, emergency and assistance operations, namely from the forestry, nature conservation, industry and energy, transports, communications, water resources and the environment, sea and atmosphere sectors
- Civil protection volunteering organizations

- Public or private technical and scientific research institutions and services, with competence in fields of interest to the pursuit of civil protection's fundamental goals.

The National Civil Protection Emergency Plan (PNEPC) is directly linked to the **Regional and District Civil Protection Emergency Plans** and indirectly to the **Municipal Civil Protection Emergency Plans**, which describe the actions of civil protection structures at the respective territorial levels and reference the responsibilities, the organisation method and the operational concept, as well as the form of mobilisation and coordination of the means and resources essential for emergency management. The PNEPC is also linked to the National Operational Directives of the National Emergency and Civil Protection Authority.

- **Existing Institutional Structure**

Although the structure and distribution of authority of ANEPC's (National Authority for Emergency and Civil Protection) regional and sub-regional commands are well-defined, there is a lack of detailed information regarding the effectiveness and capacity of local civil protection units, particularly at the parish level.

The National Civil Protection Emergency Plan (PNEPC) is directly linked to the Regional and District Civil Protection Emergency Plans and indirectly to the Municipal Civil Protection Emergency Plans, which describe the actions of civil protection structures at the respective territorial levels and reference the responsibilities, the organisation method and the operational concept, as well as the form of mobilisation and coordination of the means and resources essential for emergency management. The PNEPC is also linked to the National Operational Directives of the National Emergency and Civil Protection Authority.

Under the Municipality there is a Municipal Civil Protection Commission. Identification of the actions of each agent or support organization are within the emergency plan. The hazards taken into account are; forest fire, adverse weather conditions, earthquake, landslide, floods, serious road accident, serious railway accident, transport of hazardous materials, urban fires.

All municipalities, that Naturtejo geopark covers, have emergency plan as well as a forest fire management plan. There is a District Commission for Civil Protection in each district and in each municipality, there is a Municipal Commission for Civil Protection. These may also determine the existence of Local Civil Protection Units at the parish level.

The roles and coordination of civil protection agents are generally described, but there is insufficient information on their training and capacity-building needs.

- **Coordination**

The structure of SIOPS (Integrated Protection and Relief Operations System) is well-defined, but there is a lack of information on how effective this coordination is at the local level during crises.

The operation of coordination centres is explained, yet evaluations of the adequacy of their resources and their operational flexibility are missing.

While the National Civil Emergency Planning System is well-structured, there are gaps in understanding how well municipalities and local governments integrate into this

system and how quickly they can make decisions during crises. There are no signs of scheduled training or drilling programs, especially that is involving the citizens. The municipalities in the area have separate emergency plans as it is mandatory to prepare one according to the guidelines developed by the national government. The roles and coordination mechanisms are well defined., but it is not clear how different institutions coordinate. Local governments also have a “Municipal Forest Défense Plan Against Fires”. The plan focuses on the reasons, occurrences and alert system about the forest fires.

The roles of the CNPCE (National Civil Emergency Planning Council) and emergency planning commissions are outlined, but the availability of necessary resources for these commissions to function effectively at the local level is unclear.

- **Communication**

The System integrates the National Council for Civil Emergency Planning (CNPCE) and 9 emergency planning commissions. A separate website is planned for CNPCE in the near future. Although communication channels are comprehensive, there is a lack of information on local communication capacities and the effectiveness of these channels during emergencies.

Regarding the effective dissemination of emergency messages to the public, there is a need for more analysis on the capabilities of local governments and the potential technical challenges they may face.

- **Risk Assessment**

National Risk Assessment Plan has been prepared within 2022. There is a dedicated open platform to monitor the risks in different regions. A GIS based system where anyone can select the area (**INFORISCOS).**

The emergency plans of cities also include risk assessments with GIS based studies and maps. Naturtejo Geopark encompasses seven municipalities: Castelo Branco, Idanha-a-Nova, Nisa, Oleiros, Penamacor, Proença-a-Nova, and Vila Velha de Ródã. They have prepared their risk assessments using different methodologies. There is a lack of consistency and standardization in the risk assessment methodologies used by different municipalities.

There are also different monitoring systems for different hazards. Most of them can be fallowed from the INFORISCOS system.

There seems to be a big gap about prevention actions for disasters and especially for forest fires. Even the local fire management plans do not include preventive activities except for the “Safe Village, Safe People” program.

Municipality of Castello Branco has protection zones identified on maps in its website showing possible areas to be impacted by hazards (Emergency Plan Castello Branco). Some of the other local governments also have maps, data on vulnerabilities in their emergency plans.

- **Infrastructure**

While it is noted that the majority of critical infrastructures are owned and operated by the private sector, there is insufficient information on the effectiveness of public-private collaboration in ensuring the resilience and continuity of these infrastructures. There is a manual named “Good Practices for Resilience in Critical Infrastructures - Private and State Business Sector”. This manual aims to stimulate the creation of a national culture of resilience, expanding the traditional perspective based on business continuity to a more comprehensive vision focused on maintaining the provision of vital services to society and reducing the impacts of disruption.

Despite the emphasis on a national culture of resilience and business continuity, the extent to which the private sector is actively involved in this effort is unclear.

- **Early Warning System**

Early warning systems are extensive; ANEPC institutional channels (website and social networks), Media outlets (dissemination at the request of ANEPC), MAI Mobile App, Georeferenced SMS for the population located in risk areas.

These channels are complemented by others of a local scope, such as:

- Sirens on the coastal strip, activated by Municipalities (tsunami risk), or in the self-rescue zone, activated by dam owners (risk of dam rupture);
- Megaphones or bells rung in small communities (multi-risk, but especially rural fires);
- Electronic information panels (tsunami risk);
- Door-to-door (multi-risk).

But additional measures to enhance the effectiveness of these systems at the local level (e.g., training, awareness-raising) are not well-documented.

The SMS-based warning system is highlighted as an effective solution, but there are no details on the regular testing and maintenance of this system.

- **Building Regulations and Land Use Planning**

Land use planning policies are aimed at ensuring public safety, but there is a lack of information on the effectiveness of these policies and the challenges encountered in their implementation. There is no control over the implementation of regulations.

- **Cultural Heritage**

The absence of cultural heritage considerations in emergency planning is a significant gap.

- **Training, Education, Public Awareness**

While guidance documents and manuals are available, there is uncertainty about how widely these are used and how effectively they are implemented at the local level. There is a lack of information on programs and training aimed at increasing public awareness.

There are brochures, emergency materials in different languages especially for tourists.

- **Environmental Protection**

The omission of environmental protection within the scope of municipal emergency planning is a notable gap. There could be stronger integration of climate adaptation plans and other environmental protection legislation with emergency planning.

- **Recovery and Rebuilding**

There are guidelines for the establishment and management of Population Concentration and Support Zones, but more information is needed on how these operations are conducted and their effectiveness at the local level.

There are no references regarding relief efforts for the needs of effected citizens.

- **Finance Sources**

There is a lack of clear information on allocated budgets for preparedness plans. This creates uncertainty about whether municipalities are facing difficulties in financing their emergency plans.

4.1.2.3. Karsiyaka

In Izmir Province, there is the “Provincial Disaster Response Plan (TAMP)” prepared under the Presidency of the Provincial Governor, under the Coordination of AFAD Provincial Directorate and with the contributions of institutions/organizations. The TAMP is prepared within the framework of the Disaster and Emergency Response Services Regulation. The plan includes the basic principles of pre-disaster, during and post-disaster response planning at the provincial level and has "Local Level Working Group Operation Plans" in its annex, in order to define the duties and responsibilities of the working groups and coordination units that will take part in response studies regarding disasters and emergencies (TAMP, 2024).

Another important part of the preparedness structure for the city is the “Provincial Risk Mitigation Plan – (IRAP)”. The current situation of the city (natural structure, socio-demographics, economics, critical infrastructure), risk assessments, scenarios, SWOT analysis for each hazard, scenarios, mitigation actions and responsibles are included in this plan.

The coordination and governance structure and operating principles between the national and local levels, which were prepared by considering the impact level of the disaster and emergency that may occur includes many different institutions and departments from the local governments (fire), the provincial representatives of the government as well as private sector (electricity distributor). The teams appear to be predominantly from the central government.

- **Existing Institutional Structure**

Although the institutional structure is defined, especially regarding the Provincial Disaster Response Plan (TAMP) and the Provincial Risk Mitigation Plan (IRAP), there is a lack of clarity on the coordination and governance between national and local levels during disasters. The roles of numerous stakeholders under working groups are not explicitly detailed.

- **Coordination**

At local level Intervention efforts for Level 1 and Level 2 (more local emergencies) are carried out by the Governor. Deputy Governors serve as Service Coordinators in the established services. At Level 3 and Level 4 (national and international organisations), intervention efforts are carried out by the Governor. Support for Level 3 and 4 includes disaster groups in provincial groups, AFAD field support staff, field support teams of national level disaster groups, AFAD volunteers, local support teams, local ranger support teams, personnel provided by the Turkish Employment Agency and NGOs. They plan and in line with disaster preparedness protocols, immediately take their place in the disaster area to support the work.

The coordination mechanisms at various levels (local, national, international) are outlined, but there is insufficient information on how these coordination efforts perform in practice, especially at Levels 1 and 2 (local emergencies).

NGOs that want to take part in the disaster area are coordinated at the national level by the main solution partner of the national disaster group, and by the service coordinator of the disaster group at the local level. The integration and effectiveness of NGOs and volunteer teams in disaster response are not well-documented.

- **Communication**

The communication coordinator is Provincial Disaster and Emergency Directorate Disaster and Emergency Management Center Branch Manager. They are always in coordination with the AFAD Center in times of emergency, performing correspondence, filing and archiving work, providing necessary reports regularly and in continuously communicating with AFAD Centre. They are also responsible for the correct flow of information.

There is also the Disaster Management and Decision Support System (AYDES) through which the different departments can communicate . Each department reports in AYDES what they have done during the disasters, their needs, the locations they need help with, etc.

Communication systems and roles are established, yet the effectiveness of communication during actual emergencies, particularly the use of the AYDES system by all relevant departments, is inconsistent. The integration of institutions into AYDES remains incomplete, leading to potential gaps in real-time information sharing.

- **During Crisis**

The explanations about the communication, reporting frequencies are detailed in the preparedness plan. The crisis communication strategy, including media relations, is also

covered, but the plan lacks detailed procedures on managing misinformation and ensuring consistent communication across all media channels.

- **Risk Assessment**

The prioritised hazards for the city of Izmir (and specifically Karsiyaka) are; earthquake/tsunami, mass movements (landslide, rockfall, avalanche), flood/Inundation, industrial accidents, fire (forest/urban), meteorological and climate change, medica geological disasters, infectious diseases/epidemic. As clearly seen heatwaves are not within the context of the national disaster management scheme.

Although local studies and actions on heatwaves exist, they are not integrated into the broader disaster management plan (Karsiyaka, 2023).

- **Vulnerabilities**

There is information on people with disabilities or medical needs at home, but the plans do not address other vulnerable groups such as children, the elderly, or immigrants. The identification and consideration of these groups in disaster planning are inadequate (İRAP, 2022).

- **Infrastructure**

Critical infrastructure risk mitigation actions primarily focus on earthquakes, floods, and fires. However, other hazards, like heatwaves, are not considered under these actions, leaving certain risks unaddressed (İRAP, 2022).

- **Early Warning System**

While there are early warning systems for earthquakes and meteorological events, the effectiveness of these systems across all relevant hazards is not fully evaluated. Additionally, the integration and regular testing of these systems are not sufficiently documented.

- **Building Regulations and Land Use Planning**

The city's efforts to rehabilitate disaster-prone areas are noted, but there is a lack of information on the effectiveness of these initiatives and their integration with broader disaster risk reduction strategies.

- **Cultural Heritage**

The protection of cultural heritage is included, but the plan lacks a comprehensive approach to safeguarding both tangible and intangible cultural assets from a wider range of hazards. The integration of nature-based solutions is mentioned but not fully developed (İRAP, 2022).

- **Training, Education, Public Awareness**

There is a focus on training relevant personnel and conducting drills, yet public awareness campaigns and training for volunteers are not sufficiently comprehensive. Moreover, the lack of information on heatwave risks in public awareness efforts is a significant gap.

- **Environmental Protection**

Environmental protection is not referenced within TAMP or IRAP, although İzmir has other relevant plans like the Climate Adaptation Plan. The integration of these environmental considerations into disaster preparedness and response is missing.

- **Recovery and Rebuilding**

The recovery and rebuilding processes are addressed, particularly through the use of assembly areas and urban transformation projects. However, the alignment of these efforts with energy efficiency goals and modern building codes is not consistently achieved.

- **Finance Sources**

There is no specific budget allocated for disaster management, and the financial planning for disaster response relies heavily on estimations and departmental budgets. The lack of a dedicated disaster fund creates uncertainty in the availability of resources during emergencies.

4.1.2.4. Crete

The disaster management framework in Crete falls under the broader national policies and structures established by the Greek government. The primary responsibilities for disaster prevention and mitigation in Crete are vested in the General Secretariat for Civil Protection, under the Ministry of Climate Crisis and Civil Protection. This centralized approach ensures consistency in disaster risk reduction (DDR) across regions, including Crete.

The Ministry of Climate Crisis and Civil Protection was established in September 2021 based on Presidential Decree 70/2021. In June 2023, based on Presidential Decree 77/2023, a General Secretariat for Natural Disaster Recovery and State Aid was established in the Ministry of Climate Crisis and Civil Protection.

- **Existing Institutional Structure**

The National Disaster Management Mechanism, established under Law 4662/2020, is a comprehensive framework that covers all aspects of disaster management, from planning and preparation to immediate response and rehabilitation. The document outlines the roles of various stakeholders, including central and local authorities, and provides guidelines for coordination, communication, and logistics during disasters. The

contents of the document cover all disaster management cycle except for mitigation with clear definition roles and responsibilities.

The General Secretary of Civil Protection has issued the General Civil Protection Plan concerning earthquakes in order to give general as well as specific guidelines to all the authorities (from Central Administration to Local government and municipalities) and NGOs on how to plan their earthquake preparedness and response plan.

There is also the Earthquake Planning & Protection Organization which is part of Ministry of Climate Crisis and Civil Protection. The strong earthquakes that hit Thessaloniki in 1978, Volos in 1980 and Athens in 1981 highlighted the need to establish a body responsible for planning the country's anti-earthquake policy. The Organization for Earthquake Planning and Protection (OASP) was founded in 1983 (https://oasp.gr/about/oasp). The organisation has several scientific committees about seismic activities and earthquakes.

There is a civil protection department under the “Autonomous Directories of Civil Protection of Regions” for Crete which seem to have practical information for citizens. Another organization is the Decentralized Administration is a level of the Greek Public Administration which has a Directorate of Civil Protection. The Directorate constitutes two departments; one for planning and prevention and the other for coping and rehabilitation.

- **Coordination**

The General Secretariat for Civil Protection is responsible for multi-sectoral coordination and collaboration in disaster risk reduction. This involves working with various ministries and local authorities to ensure the implementation of civil protection plans.

The coordination between central and regional authorities, particularly in Crete, could be strengthened. The current system relies heavily on centralized planning, which may not always account for the rapid response needed at the regional level in the event of a disaster. Enhancing regional autonomy in decision-making and resource allocation could improve the effectiveness of disaster response in Crete.

The Civil Protection Volunteerism System includes Non-Profit Voluntary Organizations (NPVO) belonging to the human resources of CP. They need to be registered to be able to serve during times of crisis.

- **Communication**

The documentation lacks detailed information on how communication is organized within the disaster management framework. The absence of detailed communication protocols, particularly in the context of regional and local authorities in Crete, represents a significant gap. Developing clear communication strategies that include regular updates, public alerts, and coordination among various agencies could enhance the overall effectiveness of disaster management.

- **Risk Assessment**

Daily fire hazard prediction plans are available on the National Civil Protection website, highlighting a proactive approach to risk assessment.

- **Vulnerabilities**

Certain vulnerabilities like socio demography of the population, buildings and infrastructures to be affected, cultural heritage is identified within the risk and vulnerability assessment and adaptation plan. The sectors considered are agricultural, forest-reforested areas, biodiversity-ecosystems, fisheries-aquaculture. There are no references to other vulnerable groups like elderly, disabled, etc. within the national or regional analysis.

- **Infrastructure**

The Greek Anti-Seismic Regulation and other building codes aim to protect infrastructure from earthquakes. However, the documentation does not mention how these regulations are enforced or updated in Crete.

- **Early Warning System**

Greece is enhancing its National Civil Protection infrastructure through the "National Early Warning System using Artificial Intelligence." This project, funded by the European Investment Bank, is part of the "AEGIS" National Program for Civil Protection. The project has not been finalised yet (https://elblog.pl/2024/06/07/greece-advances-civil-protection-with-ai-early-warning-system/).

While the national early warning system is a significant advancement, it is unclear how this system is being implemented or adapted specifically for Crete. Ensuring that the early warning system is fully operational in Crete, with localized alerts and tailored responses, is essential.

- **Building Regulations and Land Use Planning**

The “Revised Regional Spatial Framework” approved in October 2017 sets the framework in which the spatial planning of Crete needs to be formed. It contains obligations of the authorities that are included in spatial planning, expansion of residential plans and cities/villages, as well as restrictions. It does not include any reference to seismic vulnerability, but through the restrictions set by it, it does not permit building in seismic vulnerable areas as well as flooding prone areas.

Greek Aniseismic Regulation: This Code concerns the design of structures against earthquake. It does not cover structures for which partial or full earthquake isolation is applied. Additional provisions concerning specific materials are included in the relevant Codes.

The seismic design procedure proposed in this Code forms a set of rules of maximum acceptable simplification, which, when applied, is considered to satisfy the fundamental requirements for structural integrity. Beside what is referred to in this Code, application of more accurate methods for the analysis and design of structures may be accepted,

following the consent and approval of the responsible Public Authority, if satisfaction of these fundamental requirements is directly shown. The above alternative methods of analysis must be based on well founded and recognized scientific principles and, simultaneously, they must achieve the same level of safety as the one aimed for by the present Code.

Despite these restrictions, there is no explicit mention of ongoing monitoring or enforcement of land use regulations in Crete. Strengthening land use planning and ensuring strict adherence to these regulations could reduce the vulnerability of communities in high-risk areas.

- **Cultural Heritage**

The protection of cultural heritage is overseen by the Ministry of Culture and Sports, with a focus on safeguarding monuments and sites from disasters. A key role in policy-making for cultural heritage protection and in the approval of major interventions at monuments, sites and state museums is played by three collective bodies of the Ministry of Culture and Sports.

- Central Archaeological Council,
- Central Council of Recent Monuments and
- Council of Museums.

Less significant matters are dealt with by the Local Council of Monuments in each Region. The documentation does not specify how disaster management plans address the protection of cultural heritage in Crete. Given the island's rich historical and cultural assets, there is a need for dedicated disaster preparedness and response strategies that prioritize the protection of these sites.

- **Training, Education, Public Awareness**

The Academy of Civil Protection (A.PO.P.) is a new educational structure that provides training and education on civil protection and crisis management according to the needs of every group of the population. It is an educational structure, open to society, which invites citizens, civil protection volunteers, officials of the public sector and local government, the armed forces and the Security Forces, to "meet", to cooperate, to acquire a common communication code, so that society becomes more efficient and better able to face the challenges of today's times.

This whole framework will serve the Triptych "Prevention, Preparation-Readiness, Resilience", which is also the pillar of the actions of the Ministry of Climate Crisis and Civil Protection. In addition, special emphasis is placed on prevention, which is an effective long-term tool for reducing the risk of natural disasters and protecting society against them.

The General Secretary of Civil Protection issued the document as a general guideline for all the authorities involved in civil protection for the organization, planning and implementation of civil protection drills (https://www.civilprotection.gr/sites/default/gscp_uploads/gscp_20200125.pdf).

The Civil Protection Secretariat, the Earthquake Planning and Protection Organisation, the Region of Crete and all involved in the Disaster management mechanism took place

at a drill to face a real earthquake disaster on April 2024. Already a desktop drill for the organisation of the exercise was organised in February with all engaged parts (https://oasp.gr/dt/deltio-typoy-epiheirisiaki-askisi-seismoy-stin-kriti-minoas).

There are guidelines for each disaster for civic society to build their own resilience in 10 different languages. The disasters covered are; earthquakes, landslides, forest fires, snowfall – frost, heat, volcanoes, industrial accidents, chemical, biological, radiological & nuclear incidents (CBRN), stormy winds, storms, floods.

An earthquake simulator was established in the Natural History Museum in 2008 and offers information on seismic risk, mitigation measures and provides experience of real simulations. Due to its location, it is easy to reach by locals as well as tourists.

There are also guides and brochures for disabled about how to cope with disasters.

- **Environmental Protection**

Special Adaptation Plan to Climate Change adapts and fine tunes the provisions of the National Climate Adaptation law in regional level. It presents and analyse long term meteorological and geological, identify the hazards and risks in regional level, assesses the expected climate changes and the vulnerability of the Region, as well as their impact in various economic sectors. Finally, it proposes measures and actions for the adaptation to these changes (https://www.crete.gov.gr/perifereiako-schedio-prosarmogis-stin-klimatiki-allagi-stin-kriti/).

- **Recovery and Rebuilding**

A dedicated web page for State Aid provides information on recovery and rebuilding for those affected by natural disasters. This platform offers resources for households, businesses, and agriculture. (https://arogi.gov.gr/). Donations can also be made through this web site.

- **Finance Sources**

The documentation does not provide detailed information on the financial resources available for disaster management in Crete. A clear funding strategy, including both national and regional sources, would support the implementation of disaster management plans and the recovery and rebuilding process.

4.1.2.5. Trondheim

Municipalities play a key role in the implementation of disaster risk reduction, as they are responsible for societal planning, including land-use planning and planning for critical infrastructure. The municipalities also have a coordinating role to enhance disaster prevention in planning across sectors, and they are responsible for local preparedness planning.

The basis for civil protection at municipal level is awareness and knowledge of risk and vulnerability through a holistic risk and vulnerability assessment. This will form the basis

for the municipality's targeted work on reducing risk and vulnerability through prevention, strengthened preparedness, and better emergency response capabilities.

The County Governors have delegated authority from Norwegian Directorate for Civil Protection (DSB) to carry out audits of the municipalities' implementation of the Civil Protection Act and provide guidance and supervision. The County Governors also have a coordinating role for civil protection in their own region.

- **Existing Institutional Structure**

The Norwegian Directorate for Civil Protection (DSB) reports to the Ministry of Justice and Emergency Preparedness. DSB's overall task is maintaining a complete overview of various risks and vulnerability in general. Their responsibilities cover local, regional and national preparedness and emergency planning, fire safety, electrical safety, handling and transport of hazardous substances, as well as product and consumer safety.Furthermore, the Norwegian Civil Defence, the DSB College, the Norwegian Fire Academy (Norges brannskole) and the Civil Defence Academy belong to DSB's portfolio. As do the Norwegian Support Team (NST), an internationally focused emergency capacity. DSB's website is quite a good source to find information regarding the structure of disaster management in Norway (www.dsb.no).

The municipalities have a general responsibility for safeguarding their inhabitants and local emergency preparedness, which also includes conducting risk and vulnerability analyses. The municipalities also have responsibility for land-use planning and are required to ensure that any new buildings are in accordance with the safety requirements for floods, landslides and avalanches stipulated in Acts and Regulations. Developers are responsible on their side for studying hazards prior to any new development. Guide to regulations on municipal preparedness obligations not only target the municipal authorities but also external actors who are responsible for social security within their own professional areas. The municipality must create arenas for cooperation so that social security work takes place in a holistic perspective. Security and Emergency Preparedness recommends municipal emergency councils to be established, hence many municipalities already have an emergency response council. In addition to the municipality's various emergency plans, there will also be emergency plans by other relevant actors such as security and defense, health care, etc, which must be coordinated with the overall emergency plan. Responsible bodies and capabilities of organisations are clearly identified within the preparedness plan of Trondheim.

The Norwegian Ministry of Petroleum and Energy has the public administrative responsibility for floods, landslides and avalanches, with the Norwegian Water Resources and Energy Directorate (NVE) as the operative authority. The NVE assists municipalities and society in general with managing the challenges related to floods, landslides and avalanches through hazard mapping, follow-up of land-use plans, implementation of protection measures, monitoring and warning, as well as assistance during incidents (Analysis of Crisis Scenario, 2019).

State administrators are the supervisory authority and have an important guiding role vis-à-vis the municipalities in their work with municipal preparedness obligations. At regional level, the state administrator has an equivalent coordination role. At central level, the coordination role has been assigned to the Ministry of Justice and Emergency

Preparedness (JD). The Directorate for Social Security and Preparedness (DSB) supports JD's coordination role.

- **Communication**

National

DSB is the Ministry of Justice and Emergency Management's competence body for emergency communications and telecommunications and shall contribute to uniform, secure and robust national solutions for emergency communications.

Nødnett is the Norwegian Emergency Public Safety Network, a separate radio network, built specifically for rescue and emergency users and is owned and managed by DSB. DSB must arrange for Nødnett to be used effectively on a daily basis and during crises. An important part of this work is that the directorate practices regularly with the users and participates in exercises. DSB must be the driving force for both the use of Nødnett and the absence of Nødnett to be part of Nødnett users' emergency plans.

The directorate has an independent responsibility for elucidating issues and providing input on emergency communication, and through sound professional analysis must contribute to ensuring that the Ministry of Justice and Emergency Preparedness has the best possible decision-making basis for policy development in the field (Nodnett, 2024).

Local

The crisis management system (CIM) is used as a management tool in Trondheim to ensure effective interaction for emergency events. An analysis centre is formed to deal with the questions from media and assistance to units within the municipality. Health guard, IT services, Municipal Director, environmental unit, psychological crisis team, infection control supervisor, Trondheim city operation units are part of this analysis center (Trondheim Emergency Plan, 2017). Function cards are role-based checklists designed for crisis management team members and serve to clarify the emergency roles.

The municipality has the ability to quickly establish systems for notifying, structuring and carrying out communication and information in a crisis situation. Responsibility, roles and routines for this appear in the company's information preparedness plan/ crisis communication plan as part of the municipality's preparedness documentation.

There is a national guide on Crisis Communication (dated 2016) and within Trondheim there is a unit for communication, administration and citizen contact.

- **During Crisis**

Trondheim municipality has a unit for communication, administration and citizen contact (“EKAI”), consisting of 6 employees. The group assists at the request of the communications manager or municipal director. In case of particularly demanding events 10 communications advisers are brought in from the service areas /other units.

DSB has prepared a guide on the liaison function which is defined as a link between two organisations, where one of the main purposes is to improve the flow of information between the organisations (Communicaiton Guidelines, 2016).

To ensure effective strategic collaboration with other organisation's handling, the municipal director has established a liaison preparedness for the following venues;

- County governor's preparedness council
- The Chief of Police's operational staff
- Collective rescue management that includes a strategic liaison role of the municipality

- **Risk Assessment**

In February 2019, the Norwegian Directorate for Civil Protection (DSB) published a new edition of Analyses of Crisis Scenarios (ACS) (previously called the National Risk Assessment) containing a compilation of 25 different risk analyses of serious adverse events that could strike Norway. This document describes the method and process behind the work on ACS 2019. It is hoped to facilitate the transparency and verifiability of the assessments and results, as well as describe a method for risk analyses that, after the necessary adaptations, can also be used in other contexts.

The DSB's Analyses of Crisis Scenarios (ACS) is one of four threat and risk assessments published every year. The others are published by the Norwegian Police Security Service (PST), the Norwegian Intelligence Service (NIS) and the Norwegian National Security Authority (NSM).

The risk analyses in ACS take a social science approach and are based on qualitative data, expert assessments and broad participation in the analysis processes. In some analyses, especially of natural events, technical and natural science methods and quantitative data are also used, especially in calculations of likelihood.

The municipality must carry out a comprehensive risk and vulnerability analysis, including mapping, systematizing and assessing the probability of unwanted events that may occur in the municipality and how these may affect the municipality.

- **Vulnerabilities**

The municipalities have a general responsibility for safeguarding their inhabitants and local emergency preparedness, which also includes conducting risk and vulnerability analyses. For this activity, a guidance for municipalities is available. (DSB, 2018).

The Norwegian Ministry of Petroleum and Energy has the public administrative responsibility for floods, landslides and avalanches, with the Norwegian Water Resources and Energy Directorate (NVE) as the operative authority. The NVE assists municipalities and society in general with managing the challenges related to floods, landslides and avalanches through hazard mapping, follow-up of land-use plans, implementation of protection measures, monitoring and warning, as well as assistance during incidents. Within the climate adaptation plan it is foreseen to make vulnerability analysis every five years.

- **Infrastructure**

The NVE, being responsible for the national flood, landslide and avalanche warning service, issues warnings at the regional level, while it is up to local actors to monitor the relevant valley mountainsides and debris avalanche channels. In emergency situations linked to flooding, landslides and avalanches, several emergency response authorities

are involved, including municipal authorities, the police, the Joint Rescue Coordination Centre, the Civil Defence, the Norwegian Public Roads Administration, the Norwegian National Rail Administration and the County Governor.

- **Early Warning System**

The Norwegian Meteorological Institute (MET) issues an extreme weather warning when it is likely that the weather will cause extensive damage or a risk to life and property in an area, such as a region, county or a large part of a county.

- **Building Regulations and Land Use Planning**

According to the Planning and Building Act, safety is a general provision in all planning. In connection with land-use planning, risk and vulnerability assessments is mandatory. The Planning and Building Act enables the definition of zones that require special attention due to risk. The technical regulations for building and construction (TEK17) provide safety standards for floods and landslides. In addition, DSB has published guidelines for how to deal with sea level rise and storm surges in local planning (DSB web site).

New knowledge about potential danger areas and the effects of climate change can lead to areas -previously considered sufficiently safe for buildings- no longer meeting the requirements for safety in the Planning and Building Act and in building technical regulations.

DSB participates, together with the Norwegian Directorate of Water Resources and Energy (NVE), in the working group led by the Directorate for Construction Quality (DIBK). Norway's Planning and Building Act (with associated regulations) and the Civil Protection Act24 (with the specifications in the regulations relating to the emergency preparedness duties of municipalities) are crucial to ensuring necessary climate adaptations. For example, the Planning and Building Act specifies requirements for assessing natural damage in all construction activity in Norway (Risk Analysis 2019).

The municipalities also have responsibility for land-use planning and are required to ensure that any new buildings are located in accordance with the safety requirements for floods, landslides and avalanches stipulated in Acts and Regulations. Developers are responsible on their side for studying hazards prior to any new development. The climate change adaptation plan of Trondheim has actions to take climate change risks in consideration by Building Affairs Office and prepare sustainable frameworks for constructions to follow.

- **Cultural Heritage**

Protection under the Cultural Heritage Act is the strongest form of protection. Trondheim has a Cultural Heritage Plan 2013-2025. Protected cultural monuments are shown on Trondheim municipality's cultural heritage map to increase awareness and knowledge of the cultural heritage of the area.

National Antiquities is a directorate under the Ministry of Climate and the Environment, and the ministry's advisor in all matters relating to cultural heritage and the cultural

environment. The National Antiquities Authority is the overall cultural heritage authority and is responsible for implementing the national cultural heritage policy. They have a professional responsibility towards the municipalities, the county councils, the Sami Parliament, the Governor of Svalbard and the administrative museums in the cultural heritage field.

The climate change adaptation plan of Trondheim has also taken actions to prepare an inventory of the cultural values of the city, make risk assessments and take action for their maintenance.

There are no references to cultural heritage in the Municipal emergency plan. It will be discussed with stakeholders during the course of the project.

- **Training, Education, Public Awareness**

The regulations require that the municipality has a system for training. The background for this is that employees who are assigned a role in the municipality's crisis management must receive sufficient training to be able to fulfil the role. Proactive staff methodology is used for the teams to be prepared in times of emergencies to manage the crisis rather than being governed by it through proactive decision-making processes based on the potentialin the event (Trondheim, 2017). The methodology used is like an early intervention strategy with pre-identified focused meetings (first meeting, focus, actions/measures, plot and status meetings). There are criteria defined for the crisis management to have competencies in several areas such as in-depth knowledge of municipality’s organisation, roles, authority, responsibility between stakeholders, risk picture of the area, The ability to guide or lead the preparation of risk, security or threat assessment. Training plans are not provided in the emergency plan leaving it for the next one.

There are no references in Trondheim's emergency plan for public awareness.

- **Environmental Protection**

Within the emergency plan of Trondheim there is a reference for only pollutants and air pollution.

Within the Trondheim adaptation plan there is a specific section related with identifying and mapping the vulnerabilities regarding climate change and plan restoration actions.

- **Recovery and Rebuilding**

There are contingency plans and guides to prepare contingency plans for schools especially kindergartens, health and welfare, food and water supply within the preparedness plan of Trondheim.

- **Finance Sources**

The municipality has to document the adapted social security and preparedness measures that are considered in the annual budget. Activities are financed by DSB as well as by relevant institutions.

4.1.3. Overview of preliminary findings

The preliminary findings after using the methodology explained at the beginning of the section and going through several policies of CORELabs that are relevant with preparedness plans are summarized below;

Table 4. Summary table of findings

Core Lab: EVALUATION QUESTIONS	KARSİYAKA	CRETE	FAMENNE ARDENNE	NATURTEJO	TRONDHEIM
1: Institutional and Administrative Framework	Planned but coordination mechanisms not clear	Strong at national level, need to strengthen local	Complicated structure with municipal, provincial and federal level	Well planned but coordination with local ins. Not clear	Well-planned
2: Financing and Resources	Not dedicated budget but aid mechanisms exist	Not dedicated budget	No dedicated budget	Not dedicated budget	Within the institutions' budgets
3: Multi-hazard Risk Assessment	Analysis made with scenarios but certain climate risks and especially heatwaves missing	Limited information on vulnerabilities. Detailed analysis in local adaptation plan	Regional risk assessments exist, need to be strenghtened with GIS systems	At local level Municipalities have different risk assessments	National Level assessment, no referenceto local
4: Infrastructure and Vital Facilities Protection and Resilience	Not all hazards covered by plans	There is regulation for infrastucture but not very informative	Handled at national level	No reference to environmental protection	Coordination among different organisations
5: Building Regulations and Land Use Planning	Planned, unclear areas	How the policies monitored and impelemented not clear	No reference at national level.	Yes but not clear	Well planned
6: Protection of Cultural Heritage	Protection strategies not clear but planned	National level protection in general (not emergencies)	No reference in rsik management strategies	Not mentioned	Cultural Heritage Plan and Adaptation Plan
7: Training, Education and Public Awareness	Not clearly defined	Training pprograms, public awareness initiatives in place	Trainina and awareness efforts are not widespread	Insufficiently planned	Trainings planned but no specific timeline, no reference to awareness raising
8: Environmental Protection and Strengthening of Ecosystems	Some measures in IRAP but mostly adaptation plan	Local adaptation plans		No alignment with emergency planning	No allignment with emergency planning
9: Effective Preparedness, Early Warning and Response	Well planned but only works between governmental organisations, not citizens	How the system works is not clear	Early warning system has limited coverage	Yes but with insufficiencies	Yes but not clear
10: Recovery and Rebuilding Communities	Noted but insufficiently planned	Dedicated mechanism exists	Structured but no dedicated budget	No reference for relief efforts	Well planned

4.2. Coordination & Management of the crises

This chapter closely investigates how FG participants characterised existing coordination and management mechanisms of the respective CORE lab-specific crisis scenarios. The analysis of such coordination and management mechanisms is here broken down into

12 thematic subchapters, contrasting the five CORE labs within them, all highly pertinent to the wider workings of RESILIAGE.

4.2.1. Specific crisis characteristics informing crisis response

The different types of crises analysed here show different characteristics in terms of time scale, type of damage, reaction and response options. Moreover, the local conditions of the sites under investigation must be considered to determine the characteristics of specific crises. This is done in the present section, for each CORE.

In all cases it must be considered that crises have a dual nature – they involve an observable natural process or event (an earthquake, a flood, etc.) but at the same time they need to be experienced, perceived and collectively defined and understood as a specific state of the world requiring specific (re-)actions and responses. This dual nature must be taken into account, particularly when it comes to crisis response. While within an administrative-bureaucratic context a crisis may be defined by a specific metric (Richter scales for earthquakes, Celcius scale for temperature, water levels at designated measure points), the perceptive side is more difficult to capture. When do citizens perceive a situation as a crisis, and do different individuals have different perceptions at different times – and hence show different responsiveness to public crisis policies? The difference between crisis and non-crisis can be constructed as a categorial distinction in administrative practice, using thresholds on metric scales, but for the lay citizens we must assume a continuum between a clear state of normalcy and a full-blown crisis with different shades of *crisisness* in between, triggering different activities. Much of the academic and policy debate about crisis response focusses on the adequate and comprehensive information and engagement of citizens, affected by a crisis. Public authorities apply a wide variety of communication channels and media to inform the general public about the “official start” of the crisis which then requires citizens to take a set of preventive or protective actions.

A similar constellation can be found when an officially declared crisis is terminated. In a flooding area, water levels may be down below the crisis threshold, suggesting an end to the actual crisis, but homeowners who lost their houses still may see themselves in state of crisis long after the end has been declared by the administration. The heuristic model of the DMC can be helpful to overcome such clear-cut administrative distinctions. Nonetheless, any activity by a public agency needs such clear-cut definitions to govern response strategies in a legal-bureaucratic regime. The challenge for any successful and efficient approach to crisis response is to align the perceived and the measured concepts of crisis.

Questions revolving around these above considerations characterise many CORE sites. In the below, we run through the specific characteristics and challenges that FG participants have identified as informing local crisis response.

4.2.1.1. Famenne Ardenne Geopark

In the various crises scenarios studied in the RESILIAGE project, the nature of the onset of the crisis, the preceding observable phenomena, as well as their location, impact, direction, varies. In the case of Famenne Ardenne Geopark, high water occurs every year, and floods, of varying height, do every few years. They are preceded by heavy rainfall, which, within days to a week, leads to the rise in water levels of rivers. There is

an observable early warning sign of continued rain of a certain strength. Due to the fact, that also the specific locations of the river are known, where the water would come out first, and which areas would be affected first, it is possible for first responders and the local population to take notice of the potentially onsetting crisis in advance. While varying in strength and impact, the crisis unfolds in a predictable sequence of observable changes in the environment. In that, it is different from earthquakes, landslides, and wildfires.

While the procedural course of events in a flooding is usually predictable and comparatively unhurried – seemingly, however, if flooding from heavy rainfall is combined with flooding rivers, then the pace of disaster accelerates and the course of events – the further cascades - becomes more difficult to foresee:

> *Flooding is not an abrupt event, it's not a forest fire. There's nothing sudden about it, no one presses an emergency button. Rivers react more quickly; you have rivers like the Meuse that only react after a week. Here, it was a little quicker, but it still took hours. (F/A-G1-S2)*

4.2.1.2. Naturtejo Geopark

The specific crisis characteristics prevailing in Naturtejo consist of an interplay of intensifying fires and a human population that is increasingly incapable of handling crisis situations.

In this rural and sparsely populated region, an informal culture of notification prevails, in which coordination decisions are primarily decided upon face-to-face, clashing with modern requirements for quick coordination and decision-making. This slow communication is further hampered by the impact of wildfires and heat on communication infrastructures. The population, predominantly elderly and remote, relies on the national landline telephone network, which is often rendered useless during wildfires, hindering effective communication.

Typically, fires have been detected through sensory impressions like wind, smell, and sight, and descriptions of these sensory impressions have constituted the first steps towards fire coordination. To some degree, this system prevails to this day, as the local citizenry generally is unable or unwilling to use modern tools of detection. In conjunction with the elderly demographic pattern of the region, there is a noticeable lack of support for firefighters – in terms of volunteers or actionable aid – from local communities.

Historical policies of centralization and urbanization have led to the aforesaid population decline and demographic bias towards an elderly population. This has contributed to a decline in agricultural output and to a local economic decline. All such factors contribute to the severity of risk. Not only is Naturtejo characterised by an elderly and economically vulnerable population, but the decline in agriculture – and the attendant disappearance of traditional practices of forest maintenance – have led to drying soils, making forests still more vulnerable to fires.

Nonetheless, agriculture, and especially viticulture, holds significant local and historical importance, which influences the prioritization of fire brigades' response efforts – amongst their first priorities is to save the crops. Doing so may have adverse effects, as firefighters cannot primarily focus on the direction or development of the fire as such.

Due in large part to the regions' economic decline, many fires are man-made and are ignited because of local profit motives. That is, there is a potential economic gain to be

made from razing land of its woods, or from selling burnt timber. Policies to systematically protect local forests have failed in part due to the land being predominantly privately owned.

A final specific characteristic of Naturtejo's crisis has to do with climate change, which is causing shifts in established wind patterns. Such shifts further complicate coordination and response efforts.

4.2.1.3. Karsiyaka

As heatwaves are not classified as disasters in Türkiye, no prior warnings are issued to the public when temperatures are forecast to rise. During a disaster, the governmental body specialising in disasters, the Disaster and Emergency Management Presidency (AFAD), takes charge in administering crisis response. However, as heatwaves are today not considered a disaster category event, actors' crisis response is much more haphazard and non-centralised. For instance, during especially hot periods, some local authorities or companies may grant administrative leave to vulnerable members of staff, but such practice is not necessarily formalised in policy.

Because heatwaves are not categorised as a disaster by the authorities, and because there is a sense amongst many members of the Turkish public that the country has always been hot, public awareness of the potential dangers of heatwaves is largely missing. Nonetheless, certain local characteristics can already help inform citizens themselves when addressing and avoiding the dangers of heatwaves. Such characteristics include a widespread culture of neighbourliness (meaning, people traditionally ensure their neighbours are doing fine), a tradition of living in close quarters thus being in continuous contact with fellow citizens, as well as a historical convention of avoiding too much activity or exposure to the outdoors during the hottest hours of the day (ca. 12:00-15:00).

4.2.1.4. Crete

Earthquakes are a perennial risk in Crete and oftentimes minor earthquakes cause little harm or disruption. Major earthquakes, however, are extremely dangerous and can cause widespread destruction. Frequently, such earthquakes will happen without unequivocal prior warning, meaning that individuals, groups, and society as a whole will not have had time to prepare for the specific event in question. Moreover, the earthquake's impact is felt immediately, leading to immediate and sudden immobilisation of persons and actors. Once an earthquake hits, in other words, persons are mandated to seek shelter and will stay in place until they can sense that the earthquake is over. A recurring risk following a major earthquake is aftershocks, which can cause further damage and harm. In 2021, after the initial event, aftershocks continued for months.

This suddenness informs crisis response in different ways. First, it means that – unlike with gradually-intensifying hazards, e.g. fires or floods – FLRs do not have any time to prepare and brace themselves beforehand, or to study predictions or forecasts of potential damage. Second, the sudden immobilisation and sheltering that an earthquake triggers also affects FLRs, volunteers, and officials, meaning that a response can practically only occur once the disaster has unfolded, not during the major earthquake as such. Third, the risk of aftershocks will inform crisis response insofar as the actions of FLRs and volunteers is perilous and curtailed, even after the disaster itself.

Because major earthquakes can lead to massive injuries and death, as well as massive infrastructural and economic damage, in some sense the disaster occurs only after the earthquake itself. FG respondents complained that the poor crisis response following the 2021 earthquake, as well as the apparent indifference and incompetence of local officials (as well as officials in Heraklion and Athens), has created an impoverished, incapacitated, and traumatised local citizenry.

4.2.1.5. Trondheim

It is known that a major quick clay slide event in the centre of Trondheim would likely lead to human losses, widespread infrastructural damage, and environmental destruction. Moreover, the cascading effects of such an event – including dangerously high waves, flooding, and urban fires – would cause further local devastation. Because of this awareness, both public and private actors are mandated to take necessary precautions when operating in and altering the local environment. For instance, construction projects and roadworks are done with the risk of triggering quick clay slides in mind, and official topographical maps displaying high-risk areas are frequently updated and circulated.

However, in part thanks to such precautionary measures, a major quick clay slide event has not occurred in Trondheim. As such, a specific local characteristic informing all coordination considerations is that plans remain in the subjunctive realm. That is, all coordination mechanisms, and related emergency plans, are conceptual in nature and remain untested, in the sense of not having seen real-world application. (Regular courses, exercises, and drills do take place, so the plans are not untested in the extended sense of the term.)

As such, while the potential risks of a quick clay slide are well-known, existing coordination plans have not seen improvement or empirical retrofitting based on past events. One possible result, affecting response and coordination mechanisms, of this lack of past cases is that the potential extent of the hazards presented by quick clay slides have not been entirely internalised by the local citizenry, nor by some crisis practitioners. One local FLR, for instance, disclosed during the FG discussion that the extent of the destruction that a major quick clay slide would have, along with its possible cascading effects, was unknown to him before the FG scenario was presented.

4.2.2. Organisation of actors involved

We suggest to distinguish different types of actors involved along the DMC, with the main distinction to be drawn between actors facing the citizens and frontline responders managing vital infrastructures such as transport, energy, communication, water, sewage, public administration, health services and the variety of first responders (fire fighters, Red Cross, etc.). Right in the middle between these two categories we may locate those actors who bear a political responsibility (local administration) for governing the crisis (mayors, presidents of regional councils, etc.). Typically, these different actors are hierarchically organized from local to national or even international levels.

With regard to crisis management, (critical) infrastructures should be understood as complex, interconnected and vulnerable techno-social systems. Increasing the resilience of these infrastructures requires a coordinated approach, since failures in one sector often create cascading secondary effects in others. (Just think of water supplies for the cooling of nuclear power plants from rivers in a period of extended drought).

The organization of actors endowed with maintaining critical infrastructures in a crisis involved should mirror this complexity and should be based on a shared understanding of multiple dependencies and the ensuing need for coordinated action along horizontal and vertical lines.

Actors addressing citizens are a heterogeneous group, including staff from public authorities, civil society volunteers, community leaders, teachers and others. Their task in the preparatory phase of the DMC is to raise awareness among the general population and, where needed, design and implement targeted initiatives for specific vulnerable groups (such as children, elderly citizens, ethnic minorities or homeless individuals). With regard to cultural heritage, it may be a promising strategy to investigate existing social networks at local levels to assess available social capital that can increase community resilience. However, it should be noted, that the idea of social capital can be meaningfully only applied when looking at stable, local communities. Since we are dealing with areas where tourists during the holiday season constitute a significant part of the individuals in the area, a different approach needs to be taken (providing relevant visitor information in a suitable form).

4.2.2.1. Famenne Ardenne Geopark

Table 5. Actors mentioned in the Famenne-Ardenne FG

	Local administration	Frontline responder	Citizens
International level		Red Cross, 112	
National level	Royal Meteorological Institute, National Crisis Center	Civil Protection, Army	
Regional level	Governor		
Local/municipal level	Mayor, Safety units, Aldermen	Police, Fire fighters, Social Action Centres	Red Cross (volunteers), Boy Scouts, Vulnerable groups (elderly, disabled), Tourism/Geopark representatives

In the event of a flood, there is an established ideal-type procedural chain of coordination for the effective crisis response of on-the-ground actors.

This begins with emergency services on the ground, who – after usually having been alerted of a potential crisis by citizens – are to assess the situation and, assuming a high level of severity, will contact the mayor's office. Through the mayor, all relevant crisis coordination actors are informed of the situation. If the crisis situation is contained within

a single municipality, then the mayor will keep to a municipal emergency plan. If several municipalities are affected, however, then the authorities and governors will be informed and the governor may activate a provincial emergency plan. A provincial emergency plan is based on the plans of various relevant so-called disciplines (encompassing fire brigades, medical aid, police, civil and military protection, and communication), and the governor and associated departments will coordinate with these disciplines to determine the appropriate response. During this phase, all heads of discipline must gather around the governor to coordinate actions on the field. The top level of response is in case of several provinces being affected, in which a federal response plan may be activated. This federal plan was presided over by the Minister of the Interior.

This top-level saw activation in the 2021 floods. At this time, numerous communes across several provinces were affected within 24 hours, and municipalities were quickly overwhelmed. As this case shows, the ideal-type crisis response, as sketched above, assumes a clear course of events, a measured and knowledgeable response from all actors, and a transparent coordinative chain.

However, as the focus groups have revealed, given the complexity of the crisis and the abundance of actors and regions involved in potential crises, there is potential for confusion:

First, while the emergency plan assumes a levelling-up to correspond with the severity of the crisis and the objective conditions on the ground, in actual fact, triggering a levelling-up is a decision that actors do not take lightly. Namely, while doing so will entail the freeing-up of financial and infrastructural aid, it also adds a heavier bureaucratic burden and the involvement of a new set of actors, additions which will stifle and slow down ongoing coordination efforts.

Second, while it is very rare for floods to start at provincial or federal level, if this were the case, then the established coordinative procedure would be upended. In other words, the extant emergency plan rigidly depends on an expected chain of events, in which chronological events correspond to response levels (from communal up to the federal).

Third, the ideal chain of events heavily relies on the assumption that citizens and first responders correctly observe an ensuing crisis, and that they in turn contact the mayors' office. This first triggering action relies on convention, however – should the alert come from other actors, the coordinative chain would look different.

Fourth, provincial emergency plans are largely modal, meaning that each province has developed its own separate emergency plan and was expected to manage its own crises. Since 2021, inter-provincial collaboration has been fostered to some degree, with the provinces of Namur and Luxembourg cooperating – but whether such cooperation will work in a real crisis situation remains to be seen. In 2021, for instance, the municipalities of Rochefort and Rouillé set up a common crisis centre, but wound up not working together during the crisis as such.

Fifth, from comments by several Focus Group members, it seems the military's role in the response phase remains somewhat opaque.

Sixth, several potentially consequential actors are not wholly or consistently integrated into existing plans. These include Red Cross members, local volunteers or charities, and international organisations.

4.2.2.2. Naturtejo Geopark

Table 6. . Actors mentioned in the Naturtejo FG

	Local administration	Frontline responder	Citizens
International level			
National level	Portuguese Institute of Meteorology Institute of Conservation of Nature and Forests		
Regional level		Rural Fires Integrated Management Agency	
Local/municipal level			**Church** bells are/were traditionally used to signal emergencies and mobilise citizens (Nat-G2-S2)

The management of wildfire risk in Portugal involves a coordinated approach among various governmental institutions and agencies, each playing a distinct role in forecasting, monitoring, and communicating wildfire risks. Key entities include:

1. The **Portuguese Institute of Meteorology** (IPMA): The IPMA is responsible for defining meteorological conditions that may affect fire behavior and risk.
2. The **Institute of Conservation of Nature and Forests** (ICNF): The ICNF publishes fire danger levels based on environmental conditions and risk assessments.
3. **ANEPS** and **GNR**: These entities, along with IPMA and ICNF, are integral in managing fire risk and response. They facilitate internal communications that inform readiness and alert protocols.

From an actors-perspective, crisis coordination processes involve a combination of institutional platforms for internal communication among emergency services, such as firefighters and local authorities, and public communication strategies. For the general population, fire risk information and alerts are disseminated through official websites and media broadcasts. These primarily focus on alerting the public about potential dangers and preparedness measures rather than operational tactics. This structured communication ensures that both emergency responders and the public are informed and prepared for potential wildfire incidents. Older means of communication exist, too, and here other actors come into play: in the event of a fire, some village churches still ring the church tower bells to signal imminent danger to the local citizenry.

4.2.2.3. Karsiyaka

Table 7. Actors mentioned in the Karsiyaka FG

	Local administration	Frontline responder	Citizens
International level		Red Crescent	
National level		AFAD, military	NGOs, volunteers
Regional level			NGOs, volunteers
Local/municipal level	Government agencies, neighbourhood leaders, building managers	112 (Fire brigades, medics, police), neighbourhood doctors	NGOs, volunteers

There are two main classifications of crisis events in Türkiye: emergencies and disasters. When emergencies occur, local FLRs are usually able to operate without the interference of higher-up or national-level actors. On the other hand, when disaster-classified events occur, the chief agency in charge is the Disaster and Emergency Management Presidency (AFAD), which is a national governmental body operating within the Ministry of Interior. AFAD issues coordination orders and will establish local emergency coordination centres. The latter are intended to provide a unified and effective disaster response.

Generally, an emergency and a disaster both commence by way of citizens informing 112 of a prevailing situation. Experts within this emergency call system may then determine whether the situation is to be classified as an emergency – entailing the mobilisation of local or regional resources – or as a disaster – entailing the mobilisation of national-level actors.

During a disaster, AFAD mobilises and coordinates the local response, including through commanding the actions of local NGOs. Important local actors during heatwaves will include hospital staff, neighbourhood representatives, building managers, and family doctors, all of whom are potentially aware of the specific make-up and vulnerabilities of the local citizenry better than large administrative units like AFAD.

The Turkish military used to be the principal disaster-response actor, until about 15 years ago, when AFAD was established. During disasters today, conflicts and miscommunication between military actors, AFAD officials, and lower-tier regional and local actors frequently arise, complicating and sabotaging effective response efforts.

4.2.2.4. Crete

Table 8. . Actors mentioned in the Crete FG

	Local administration	Frontline responder	Citizens
International level		Red Cross	
National level	Ministry of Civil Protection, General Secretariat of Civil Protection; National Technology Center; The Organization for Earthquake Planning and Protection	FLRs; Emergency Managing and Coordination Centers	
Regional level	Heraklion Development Commission	FLRs and volunteers	
Local/municipal level	Municipal councils, mayors	FLRs and volunteers	Churches; volunteer groups; as training facilities: athletic and cultural clubs, educational institutions, private firms

Coordination strategies are upheld and reinforced by a multitude of actors across varying levels, operating internationally, nationally, regionally, and locally. The Hellenic Red Cross draws information on how to coordinate and operate during an earthquake disaster from guidelines produced by the International Red Cross and other international bodies. Following a major earthquake, the national government of Greece – if the relevant ministries and expert groups determine it is necessary – will ask the Red Cross to help coordinate rescue and relief actions. The Red Cross is not tasked with proactively intervening, but must instead receive a governmental invitation. On a regional level, the Heraklion Development Commission is in charge of relief coordination, although empirically, private initiatives have proven quicker and more effective than public bodies. Finally, FG respondents reported that the step of coordinating local immediate-stage relief operations occurs somewhat ad hoc, across informal channels (WhatsApp, SMS, telephone calls, etc.) – volunteers often realise that their help is needed by reading the newspaper, not through official notification or mobilisation.

Churches and volunteer organisations play an important role in coordinating relief efforts after the disaster, including through collecting and distributing charitable funds. Sports

clubs, cultural groups, educational institutions (kindergartens, schools), and private companies – in their offering earthquake training and conducting drills – play an important role in fostering societal preparedness and, in the long run, in smoothing coordination efforts.

4.2.2.5. Trondheim

Table 9. . Actors mentioned in the Trondheim FG

	Local administration	Frontline responder	Citizens
International level			
National level	Norwegian Directorate for Civil Protection; National emergency services (112, 113); National Association of Volunteers (FORF)	Civil Defence	Norwegian Women's Public Health Association
Regional level	County Governor	Inter-municipal fire services	
Local/municipal level	Trondheim Municipal crisis management team; Municipal emergency council; Red Cross (shelter care unit); EPS (Evacuation and Relatives Center); institutional security and emergency preparedness services (e.g. museums)	FLRs; Municipal Auxiliary Corps; Red Cross (relief corps unit)	Volunteers (Norwegian People's Help, Scouts, etc.)

Should a quick clay slide arise in Trondheim, most likely the communicative trigger will be local citizens calling 112 or the local municipality. The local municipality will be amongst the first bodies to act. The Municipal crisis management team will gather, and steer upcoming coordination maneuvers, including by setting up telephone contact with

the local police force and the Police Chief of Staff, local fire brigades, and medical services. (Communication can happen both ways – should the police hear of a quick clay slide, without already having been contacted by the municipality, then the police will set up contact with the Municipal crisis management team.)

An emergency council will be set up, which will include all important crisis agents in Trondheim Municipality and County. Depending on the severity and tempo of the crisis, this council will be established and coordinated by telephone, video conference, SMS, email, or by face-to-face contact. Similarly, information on current crisis coordination protocols will be circulated to citizens via SMS, voice messages, or telephone calls.

The primary intention of the crisis council, which is a consultative body, will be for needs to be clearly laid out, and for existing resources to find each other. For instance, local transport companies may be recruited to help coordination activities, universities and hotels may be asked to provide shelter, or higher-up actors (national agencies, the military) may be contacted.

The primary focus will now be on saving and protecting lives, so a centre for evacuees will be established by the municipality and police, as will a centre for relatives (EPS). The Municipal Auxiliary Corps and the Relief Corps unit of the Norwegian Red Cross will play an important role in aiding these FLR actions.

Other public bodies, cultural institutions, and private organisations have their own emergency protocols, which fall outside of the expected parameters of public emergency coordination. However, if the quick clay slide falls in the immediate vicinity of the location of one such institution or company, these will nevertheless be centrally involved in the public crisis response. Public institutions with highly trained professionals, such as is the case with the local penitentiary system, may be contacted if the crisis is severe enough. In a similar fashion, while protocols do not formally involve coordinating with the press or mass media, it is clear that contact will be set up in a real-world scenario, entailing especially the sharing of news and information.

In a second step, the municipality may expect volunteers, Scouts, charitable organisations, and the Red Cross shelter care unit to handle aid measures in the time immediately following the crisis event. Sanitation organisations will be recruited to do the necessary clean-up.

4.2.3. Coordination mechanisms

With regard to coordination mechanisms, it frequently makes sense to distinguish between the formal, written provisions – as laid out in the administrative crisis response plans at different levels of government – and the “lived” experience- and tradition-based practices at local community levels. An analysis of coordination mechanisms should look at the resilience, robustness and vulnerability of the mechanisms in place, assessing time and resource criticality. It should investigate the chains of command and information/communication and the role of different media (written material, social media, phone, designated intercom channels). Also, we might distinguish between the coordination in terms of exchanging and sharing information and the coordination of resources (equipment, manpower, water, shelter, etc.). A final analytically-relevant feature in the investigation of different coordination mechanisms could be the underlying network structure:

- Is coordination using a top-down chain-of-command strategy,
- Does it involve one-way or two-way information flows,
- Can poly-centric networks be identified, build around key informants, what is the role of weak ties?

Formal crisis response plans seem to be in place, but no coordinated pre-crisis training program. Different actors have been active, e.g., informing hikers about flood situation, preparing a map of camp sites and access/escape routes but obviously no overall training/preparedness training for the whole region and overall population.

Coordination relies on different communication channels, linking first responders and authorities to coordinate their actions during a crisis.

In the sections below, we investigate existing coordination mechanisms at each CORE site. The textual analysis is broken down according to the DMC stages, where possible.

4.2.3.1. Famenne Ardenne Geopark

Preparedness

Preparedness for crisis management involves several administrative authorities, including the Minister of the Interior, provincial governors, and mayors, who are responsible for preparing plans, organising exercises, and coordinating emergency situations. Security units are organised at the provincial level by governors, but the frequency and quality of their meetings vary significantly. Some communes hold monthly meetings, while others meet annually, and the knowledge and outcomes of these meetings are not systematically disseminated.

Response

The activation process of the response phase begins with FLRs alerted by citizens via the emergency number 112. The ensuing response phase is highly top-down, with key figures like mayors, governors, or ministers of the interior playing central roles. The mayor, in particular, initiates communication with various departments and convenes the security unit, which includes representatives from each emergency discipline. Discipline Five, responsible for public alerts and acting as a spokesperson, is crucial. Despite the procedural predictability of events like flooding, the response to the 2021 crisis saw several coordination problems due to unclear role transfers and the absence of explicit policies, such as checklists. This was compounded by structural issues and inadequate training. FLRs, such as firefighters and police, often need to request higher authorities to activate emergency phases, a process hindered by the lack of a standardised response timeline.

Recovery

The recovery phase begins with immediate infrastructure assessments to ensure that buildings are safe for residents to return. The recovery phase should also heavily involve the distribution of post-disaster aid. In 2021, however, the distribution of aid – particularly drinking water – was poorly managed, highlighting the need for improved coordination protocols. A notable citizen movement emerged to address gaps in official aid distribution, emphasising the importance of incorporating such grassroots efforts into future recovery plans. Effective recovery requires a dedicated management unit to handle these aspects and regulate aid distribution.

“End of crisis”

The crisis management phase concludes with a decree issued by the governor, signaling the end of coordinated emergency efforts. Once the decree is issued, formal crisis management activities cease, and normal governance resumes. With the “end of crisis” usually the end to the immediate response work is referred to. If the whole Disaster Management Cycle is concerned, and as the contrast of the different crisis scenarios studied shows, failings in adequately addressing other stages of the DMC (e.g. the Recovery phase) can result in the prolongation of the crisis and transformation of a crisis-like situation.

4.2.3.2. Naturtejo Geopark

Prevention

The analysis of wildfire management and prevention strategies in Portugal reveals both the intentions behind national programs like the "Safe Village Program" and the challenges encountered in their execution. These programs, designed to enhance village safety and coordination during wildfires, provide insights into systemic issues in managing fire risks.

The “Safe Village, Safe People” Program is structured to foster coordination and communication at the village level, aiming to ensure that every resident knows where to gather in the event of a fire. The program includes assigning specific responsibilities to identified local individuals who have direct contacts with all village residents, thereby personalizing the approach to emergency management.

Despite its comprehensive design, the program's implementation is inconsistent. Some residents have received emergency kits, while others have not, indicating a lack of uniformity in resource distribution and training. The establishment of designated safe spots within villages for gathering during emergencies is a critical component of the program. However, the effectiveness of such measures is contingent on widespread community awareness and training, which appears to be sporadic.

Planning, prevention, combat, and recovery form the core of civil protection's strategy. However, the first two pillars—planning and prevention—are noted as particularly weak, suggesting that much of the preparatory work that could mitigate fire risks is often overlooked or inadequately addressed. The neglect in implementing preventive measures and maintaining forests contributes directly to the intensity and spread of wildfires. Poorly managed forests, lacking proper clearing and maintenance, become prime fuel for fires, exacerbating their severity and the difficulty of controlling them.

While some villages have begun to implement safety and evacuation programs, the consistency and recurrence of these efforts vary significantly. Initial training sessions may take place, but follow-up sessions or sustained campaigns are rare. The training provided sometimes includes practical simulations, such as using whistles or other signaling devices to coordinate actions during emergencies. However, the sporadic nature of these training sessions reduces their potential impact on community preparedness.

The intention behind the national and local programs in Portugal is clear: to build a robust framework for wildfire risk management that integrates community involvement and prepared coordination. However, the implementation of these programs faces significant challenges. These include inconsistency in execution, a lack of sustained training and education for residents, and inadequate preventive measures within the broader framework of civil protection. To improve the efficacy of these programs, a more

consistent application of training, resource distribution, and forest management practices is essential, alongside a reinforcement of planning and prevention strategies at all levels of civil protection.

Response

Initial responses to fires typically involve local coordination between community leaders and residents. This immediate local engagement is a standard initial procedure.

In some traditional settings, village church bells continue to be used as an alert system to mobilize emergency responses or gather the community, although this practice is not universally applied across all villages.

However, coordination mechanisms for managing these emergencies remain predominantly centralized, with key decision-makers often located in distant urban centers such as Lisbon. This centralized control may result in a disconnect between management strategies and the actual conditions and needs on the ground.

On the front lines, communication among emergency responders and between the command center and personnel on the ground is facilitated through radio systems, which remain the primary method of operational communication during firefighting efforts.

Recovery

Post-fire assessments typically involve distributing questionnaires to gather data on what was and was not burned. However, these surveys are often perceived as ineffectual because the outcomes of these inquiries do not lead to substantive follow-up or meaningful communication with the affected individuals.

In the aftermath of fires, the responsibilities for clean-up and reconstruction are divided among various stakeholders. Fire brigades and public-sector agencies are tasked with clearing debris and facilitating recovery efforts. Concurrently, private-sector entities, such as loggers, engage in activities aimed at generating profit from the situation, often by salvaging and selling burned timber. This highlights a divergence in post-fire roles, where public-sector efforts focus on restoration and safety, whereas private-sector interests may prioritize economic gain.

4.2.3.3. Karsiyaka

Coordination mechanisms against disasters occurs through a top-down system in Türkiye, with the Ministry of Interior and AFAD on top, issuing orders down to regional governments, municipalities, and local NGOs. However, because heatwaves are not nationally classified as disasters, in Karsiyaka **response** mechanisms are generally precipitated through meteorological data and the emergency number 112.

On a local level, FLRs do not have to wait for any higher or other institution to invite them to intervene. Instead, citizens usually call FLRs to ask for help. FLRs may respond to these calls immediately, without prior event classification. Subsequently, local coordination occurs through inter-institutional contact – between fire departments, the region of Izmir, medical professionals, the Red Crescent, etc.

In Karsiyaka, crisis **response** is generally divvied up into “hot” and “cold” areas. Actors operating in “hot” areas include those that deal with immediate rescue operations, while actors who operate in “cold” areas are in charge of support mechanisms and back-up operations.

Mitigation strategies are still in initial forms, but there are plans to better coordinate the work of urban planners and to recruit public health experts in improving conditions in public space and the built-up environment.

On several occasions, FG participants suggested that the roles of local actors (neighbourhood representatives, landlords, NGO workers, etc.) should be codified in legislation, thus clarifying their responsibilities in **all DMC stages**.

4.2.3.4. Crete

Due to the unpredictable nature of earthquakes, a large part of effective coordination efforts should entail **prevention**, including the fostering of an earthquake-aware local citizenry. While earthquake education is offered in kindergartens and primary schools, and twice a year in high schools, unfortunately a more widespread risk culture does not prevail in Crete, not even basic first-aid courses in preparation for acquiring drivers' licences.

Moreover, while large private companies are required to have an emergency protocol in the case of an earthquake – and are mandated to have a specially-dedicated emergencies officer, tasked to organise drills and update the emergency protocol – these requirements are hardly ever enforced or taken seriously. Worse, FG participants reported that actors who are immediately related to disasters – e.g. public officials, police officers, and volunteers – are frequently poorly trained and accordingly poorly prepared to effectively manage a disaster.

In order to ensure effective coordination measures, municipalities should inform citizens with basic **preparation**-related information, pertaining to emergency evacuation sites, post-disaster relief plans, etc. – but in reality, such information campaigns are lacking, and the citizenry remains unaware of plans.

When a disaster has occurred, local **response** is coordinated in an improvised, non-protocol-based manner – through SMS, WhatsApp, Google searches, and news consumption. Volunteers and FLRs will frequently begin to mobilise before receiving the official order to do so. The Red Cross must wait for notification from the national government before their mobilisation can officially commence. After municipal agencies and police have been activated during emergencies, a local coordination centre is established.

In the aftermath of an earthquake, **recovery** efforts are supposed to be coordinated by local municipalities and the Heraklion Development Commission – these actors will also organise the post-disaster inspection of public and private infrastructure, determining which structures require repair, renovation, reconstruction, or demolition. De facto, due to ineffective governmental response, much recovery and relief occurs through private initiatives by local citizens or companies, or by extra-regional charity organisations.

4.2.3.5. Trondheim

Because quick clay slides are mainly triggered through vibrations and irritations in the earth, and are therefore often man-made, **prevention** is a very high priority. The Norwegian Water Resources and Energy Directorate (NVE) has published quick clay maps of Norway, which accurately display high-risk areas. Such maps are published online, and have been circulated locally. Construction and infrastructure projects in Trondheim Municipality must take into account such quick clay areas when planning and executing. Effective cooperation and participation in coordination actions is expected

also from the local citizenry, hence why much current citizen-directed information material revolves around **preparedness**. Such information, found e.g. in popular books such as *In Case of Doomsday* (published by the Norwegian Directorate for Civil Protection), instructs citizens on basic principles of crisis preparedness. Nationally, in an emergency event, citizens are obligated to self-manage for up to seven days, including by storing week-long emergency supplies in their household.

Response is handled by a variety of actors in a variety of ways, with Trondheim Municipality and its emergency council forming a central coordinate node. This council will take on the principal responsibilities of coordinating actions of FLRs, handling the incident, alerting the citizenry, **mitigating** further harm and damage, and caring for affected residents. During a crisis, coordination decisions are shared via face-to-face discussions, video conferences, telephone, SMS, and email, with no given centralised agency dictating or directing messaging. **Response** actions are expected to occur stepwise, with police, fire services, and medical services handling first-level rescue operations and evacuation efforts. The police will principally be in charge of coordinating these evacuation efforts, though if these reach a scale that municipal forces cannot manage, national authorities will be recruited. Organisations such as the Auxiliary Corps and the Red Cross staff the supportive second steps, especially entailing shelter and emergency care; these are recruited through liaison officers, which have already been part of the emergency council from the first moment. Coordination efforts will also entail digital trip alerts, informing citizens not to travel into or through the affected areas.

Charitable organisations, volunteers, and Scouts aid in post-disaster **recovery**, entailing emergency aid and territorial clean-up; this is coordinated in part through FORF, the national Norwegian Forum for Volunteer Organisations, which includes major organisations like the Red Cross, Norwegian Rescue Dogs, Radio Relay League, and other voluntary organisations.

4.2.4. Formal crisis provisions

Formal crisis provisions – i.e. guides and rules on how actors should coordinate and behave during a crisis – primarily exist in writing, as handbooks for crisis response and management. In the below, characterisations of these formal crisis provisions, as put forth by FG participants, are detailed.

4.2.4.1. Famenne-Ardenne Geopark

In terms of formal crisis provisions, actors across Famenne-Ardenne Geopark – including municipalities, departments, and private agents – have pre-established and separate emergency plans. These are applied on a case-by-case basis across local, provincial, and national level. The grand-level crisis provision of the province is the Governor's Emergency Plan, which stipulates three orders of priority, from high to low: rescue of people, rescue of property, rural and historical characters.

Several issues pertaining to formal crisis provisions were identified by FG participants:

Unmanageability and inaccessibility of Governor's Emergency Plan

This plan was described by a Focus Group participant as "well done but not well known" – it spans several hundreds of pages and therefore seems incomprehensible and unmanageable to on-the-ground actors. To mitigate this, the Province of Luxembourg

has added a two-page appendix to summarise the Flood Risk Preparedness Plan, but this is not an addition that is consistently seen across provinces.

Limits of generic formal provisions in a large-scale crisis event

Because municipalities, departments, and institutions have their own separate pre-established plans, coordination beyond these nodes has proven difficult in the past. Actors have found themselves unable to help each other because they have been bound to their distinct provisions.

Absence of responsibilities checklist and protocol for transferal of power

There is an absence of a formal checklist of responsibilities, explaining exactly which responsibilities fall under which actors. Moreover, there are no formal instructions for when powers should be transferred. Instead, such transferal happens on a case-by-case basis, with Focus Group participants explaining that actors are simply expected to "observe facts", "feel it", and based on such observations and intuition should determine that higher actors should take charge.

Absence of guiding protocol for recovery phase:

There is no formal set of rules governing when the recovery phase has set in. Instead, different actors and different levels of government separately determined that the recovery phase should begin. This coordinative dissonance ended up stifling recovery efforts.

4.2.4.2. Naturtejo Geopark

Need for formal regulation

Historically, forest maintenance was a collective effort by the local community, which naturally minimized the necessity for formal fire-prevention regulations. Community members actively engaged in cleaning and managing forests, effectively reducing fire risks. However, current trends in abandonment and other factors have led to increased fire hazards. Consequently, there is now a pressing need for the implementation of legal frameworks to aid in fire prevention and ensure the continued maintenance of forested areas.

Gap between formal policies and ground realities

There is a perception that many existing regulations are formulated without a thorough understanding of the actual conditions and challenges faced by those on the ground. This disconnection suggests that laws are often crafted in isolation from the practical realities and complexities encountered by those directly affected.

Gap in policy implementation

There exists a framework of plans and legislation aimed at managing and mitigating fires. However, the efficacy of these regulations and plans appears limited when it comes to practical implementation. Despite the detailed strategies laid out on paper, their execution on the ground remains insufficient. It is acknowledged that even with full implementation, fires would still occur as they are a natural component of forest ecosystems.

Gap between formal policies and compliance/enforcement

Regulatory measures are established to manage and control specific issues, but there is a notable gap in both compliance by local populations and enforcement by government actors. The directives specify requirements such as safe distances and clear lanes around structures, yet when assessments are made in various villages, these stipulations are frequently not met. This discrepancy raises questions about the practical application of policies and what steps should be taken when regulations are not adhered to or enforced.

Good practices & resources limited to only high-risk areas

Government-initiated projects designed to assist rural populations in managing fires and natural hazards are operational, yet they target only those villages identified by official cartographers as facing the highest risk. These initiatives, such as the "Safe Villages, Safe People" project, are implemented within areas designated as APPS zones—zones of prevention, protection, and security as defined by legislation. Specifically, these zones fall into categories 4 and 5, which represent the highest levels of risk in rural fire cartography. Consequently, these targeted villages receive interventions including awareness campaigns and citizen training programs. These efforts aim to cultivate local leaders capable of enhancing the village's resilience in the face of such hazards.

4.2.4.3. Karsiyaka

Because heatwaves are not classified as a disaster-level event by Turkish national authorities, local governments and private-sector actors have issued their own policies to deal with the issue. However, this patchwork of different policies has the risk of decreasing the effectiveness of local crisis response, because the roles of all actors and agencies are not clear and may often overlap. For Karsiyaka, FG respondents highlighted several issues with regards to improving formal crisis provisions:

Warning systems must be developed

As of yet, there is no uniform way of informing the public, and other relevant actors, of the imminence of a heatwave. As such, coordination strategies are implemented differently by different actors, and at different times.

Roles should be assigned

Local actors' roles – from the neighbourhood level up through to the municipality and regional government – should be predetermined, with representatives made aware of their exact roles and responsibilities before, during, and after a heatwave.

Academics and experts should be involved in planning

Emergency planners, urban planners, and public health experts from local universities should be recruited to improve and synchronise extant plan.

4.2.4.4. Crete

Policies are in place to cultivate widespread societal preparedness against an earthquake. These include the mandate for public institutions and private companies to have their own emergency protocols and training regimens. Too, kindergarten and schools train their pupils on how to act during an earthquake. With the exception of schoolchildren, however, *de facto* societal preparedness levels are very low. This is because policies and laws are poorly implemented and enforced, and because citizens mistrust government actors, leading to low rates of compliance. Moreover, while private

enterprises have their own emergency plans, these will vary in quality – and their existence are not always communicated to employees.

The following critical points were raised by FG participants with regards to current formal crisis provisions:

Official coordination strategies, if they exist, are poorly conveyed to the local citizenry, stunting effective preparation and response

Public signage used to direct citizens to evacuation sites, easing post-disaster coordination; now they're online-only, and sites are not immediately clear to people.

Emergency and safety protocols are poorly followed

Many institutions – including police departments, volunteer organisations, and private companies – lack any sort of systematised and rigorous regimens of training, exercises, and drills.

Governmental checks ensuring effective preparation are irregular and poorly done

There is not enough regular official checking of the stability of public buildings and infrastructures.

The state is viewed as incompetent and ill-prepared, stunting citizens' willingness to cooperate

There is not enough trust in the state capacities for citizens to trust or pay attention to emergency plans or protocols.

Actors' roles and responsibilities remain unclear

All institutions and organisations have their own protocols and charters, but no central directive exists from the state on who should cooperate with whom, and how.

Distribution of aid is conducted in an ad-hoc and ineffective manner

State actors and agencies in particular have proven ineffective at managing the variety of challenges that a post-earthquake event brings forth.

4.2.4.5. Trondheim

Numerous provisions and schemes are in place to prevent a quick clay slide from occurring, including the production and circulation of detailed and continually updated maps of local risk areas, as well as related informational leaflets. FG participants noted that a feature of Norwegian civil culture includes a great trust in authority and a great willingness in citizens to help out public security efforts. As such, acceptance of and cooperation with crisis provisions is largely ensured. However, the question of whether existing formal crisis provisions go far enough was continually brought up. Suggestions for complementing formal crisis provisions included the following topics:

Nationally: campaigns should inform citizenry of quick clay slides

National awareness of the risk of quick clay slides remains low. To ensure wider-scale prevention efforts amongst Norway's citizenry, a national campaign – for instance, through postal leaflets – should be instated, which would inform citizens of what measures can be taken by individuals and groups to ensure mitigating, preventing, and protecting against quick clay slides.

Locally: signage and awareness should be improved

Quick clay evacuation points were contrasted with fire signs and escape plans – while the latter are well known, quick clay slide plans are not in the public's consciousness. Similarly, while local awareness of fire safety and protocols have been improved through awareness campaigns (e.g. through children-oriented programs), no such effort exists with regards to quick clay slides.

Individually: local residents should be contacted door-to-door

Residents of high-risk areas should be individually contacted by authorities with information on how to actively prevent a quick clay slide, how to improve the security of residential infrastructure, and how to act in case of a quick clay slide incident.

Legally: property sellers, landlords, or realtors should disclose potential risks to buyers or renters

It should be a regulatory requirement of property sellers, landlords, or real estate agents to inform buyers or renters that a given property, house, or apartment is located on quick clay land, with clear guidance on the potential risks and consequences of residing on or manipulating such land.

4.2.5. Involvement of civil society and vulnerable groups

Civil society comprises individual citizens, voluntary organisations and the business community. Many crisis responders (such as Red Cross or firefighters) rely heavily on the involvement and contribution of volunteers. The higher the density of volunteer organisations, the stronger the involvement of citizens in crisis activities. The challenge with the involvement of vulnerable groups is their frequent invisibility. Homeless, illegal immigrants or immobile elderly citizens often have no voice and typically are involved by proxy, or simply as the intended object of care and protection.

For the investigation of the needs of citizens and vulnerable groups we suggest a similar analytical difference like in the discussion of crisis characteristics above. Needs can be ascribed from the outside or reconstructed from actors' perspectives. Ascribed needs are more instrumental (e.g., access to shelter, water, etc.), whereas from a reconstructive perspective there might be more expressive needs.

4.2.5.1. Famenne-Ardenne Geopark

In Famenne-Ardenne, involvement of civil society occurs chiefly within the DMC stages of response and recovery. During the response phase, teams of volunteers will canvas citizens door-to-door to explain the situation, issue evacuation orders, and distribute sandbags. Volunteers will also operate telephone hotlines to issue warnings to citizens. In the recovery phase, volunteers help clear areas of debris and clean people's homes. In 2021, because telephone lines had collapsed, volunteers were also used for direct on-the-ground communication with residents.

One desideratum expressed by Focus Group participants is to also involve volunteers in the stage of preparation. This would entail recruiting volunteers to educate citizens on basic crisis response and to increase the sense of preparedness and overall resilience of vulnerable groups.

Chief vulnerable groups across Famenne-Ardenne include the elderly, the young, the disabled, and tourists or foreigners. **The elderly** frequently wish to remain at home for as long as possible because they assume that care homes for the elderly are

overcrowded and unaccommodating. **The youth** express a general lack of trust in authority and as such are less likely than others to follow evacuation orders. **The disabled** suffer from immobility and as such (along with elderly) strain the financial and temporal resources of FLPs. As such, these should be evacuated early on in the crisis. **Tourists, visitors, and foreigners** are variously unable or unwilling to cooperate due to linguistic unfamiliarity, unawareness of local context, or reluctance to give up their large financial investments in the vacation.

A general desideratum when it comes to vulnerable groups is, in the stage of preparation, to foster a consistent risk culture across F/A and across vulnerable groups. This would strengthen society-wide resilience across all ensuing DMC stages.

4.2.5.2. Naturtejo Geopark

The entire region of Naturtejo is characterised by a great overlap between civil society actors and members of vulnerable groups. The primary vulnerable populations identified include **the elderly** and individuals who are **socio-geographically isolated** (including tourists and non-registered residents).

The pervasive presence of elderly individuals requiring ongoing assistance and coordination can impede immediate firefighting efforts. In emergency scenarios, the priority often involves **FLRs** protecting people and property, relegating the direct combat of fires to a secondary concern. This prioritization can result in fires spreading extensively before being able to be addressed full-on. As a result, by the time firefighting efforts are resumed, the fire may have already covered a substantial distance.

An emerging vulnerable group comprises **non-Lusophone residents and tourists**, particularly those who engage in off-the-grid camping and living. Increasingly, these individuals, often from English-speaking countries, deliberately choose to isolate themselves in remote natural settings such as bushes or forests, using caravans, tents, or wooden cabins. Their isolation, combined with potential language barriers, poses significant challenges for a coordinated emergency response and safety management.

A critical issue impeding the effective **mobilization of civil society** in the region is its sparse population. No level of financial investment can compensate for the deficiency in human resources required for effective action. The adage "goods do not earn men", voiced by one FG participant, aptly summarizes this situation – highlighting that material resources alone are insufficient without the necessary personnel to utilise them.

Efforts to improve civil society involvement in crisis preparedness and response exist. There are now brief meetings between government representatives, FLRs, and citizens that occur with increased frequency.

4.2.5.3. Karsiyaka

Chief vulnerable groups in Karsiyaka encompass two potentially overlapping categories. First, there are persons whose age and health conditions make them particularly at risk to the dangers of heat. Second, there are persons whose current socioeconomic status increases their vulnerability. In the former categories, we find elderly persons (encompassing about 30% of Karsiyaka's population), very young persons, chronically ill persons, and physically or mentally disabled persons. In the second category, we find homeless persons, persons living in substandard housing, or persons who suffer from so-called energy poverty (i.e. persons who cannot afford to use air conditioning or water bills).

To date, few methods exist to mitigate the risk factors and address the needs of vulnerable groups. An important immediate-term step would be to involve existing civil society actors, such as neighbourhood leaders (muhtars), building managers, or local doctors, as these actors have close knowledge of the local population. Longer-term steps would include improving spatial conditions within neighbourhoods – constructing cooling stations, planting roof gardens, etc. – and creating a comprehensive list of vulnerable individuals, including their particular health conditions.

4.2.5.4. Crete

Numerous groups are especially vulnerable in the event of a major earthquake. These include elderly persons, disabled persons, chronically ill persons, Roma, refugees, and special needs children. Because pupils at school and kindergarten are regularly subject to earthquake trainings, they are nominally amongst the most prepared citizens. However, during a disaster, parental instincts naturally set in, and panicked, untrained adults subject themselves to great risk to seek out or protect their children.

It is known that 18.6% of the population of Crete, or nearly 1 in 5 persons, is disabled. However, due to privacy concerns and personal data regulations, many vulnerable persons remain unknown to FLRs and volunteer groups. Moreover, because private organisations are in charge of their own emergency protocols, there is a risk that vulnerable people are not accounted for in these plans.

Some vulnerable persons are organised in societies and clubs – e.g. mutual support groups, lobby organisations, associations for cancer patients, etc. Because they keep track of their members, there is untapped potential within these groupings in the case of a disaster.

Finally, there is an association, called Elpida, which lobbies for the rights of earthquake victims. This association could potentially prove very important in future relief efforts and post-disaster coordination, but it has faced severe pushback from the municipality and government actors, who do not see it as a productive partner.

4.2.5.5. Trondheim

In Trondheim, several groups are identified as potentially vulnerable in an emergency due to factors such as ill health, limited access to information, poor digital connectivity, and lack of social support networks. Among these groups are the elderly, refugees and immigrants, students, children, and tourists.

The elderly, particularly those who are not digitally connected or those who live alone, face challenges in receiving vital information and support. While some can rely on family, others depend on home care services or volunteer centres.

Refugees, immigrants, and people with limited Norwegian or English skills often struggle to access official information. Effective communication requires targeted campaigns that utilise trusted figures within these communities, such as religious leaders or family members.

Students in Trondheim, many of whom live in temporary housing and lack adequate insurance and housing-registry forms, represent another vulnerable group. Their often transient and disconnected lifestyle leaves them unprepared for emergencies. Municipal campaigns should aim to raise awareness and improve self-preparedness among students through collaboration with educational institutions and health organisations.

Efforts to reach these vulnerable populations must focus on micro-targeting and leveraging non-traditional communication channels, such as religious congregations, sports teams, and unorganised community groups. During crises, institutions like NTNU and SINTEF, as well as refugee services, play crucial roles in extending support and ensuring inclusivity.

Moreover, Norwegian civil culture places a great emphasis on citizen-governmental cooperation, a volunteer spirit, and friendly neighbourliness – such a culture should effectively be harnessed for effective citizen-administrative cooperation during disaster coordination.

4.2.6. Challenges and gaps identified

4.2.6.1. Famenne-Ardenne Geopark

Lack of risk/crisis culture

There is a general absence of risk culture or crisis culture in Famenne-Ardenne and Belgium. This is due to a lack of educational efforts to alert people to potential hazards surrounding them. A chief effect of this lack of crisis culture is a lack of awareness of risk; cascading effects of this include an absence of citizen-level preparedness, for instance through no consistent insurance coverage.

Lack of preparedness & awareness

There is a general lack of citizen-level preparedness and awareness of potential hazards.

Weak local resilience ordinances

Resilience ordinances (such as legislation on what construction material to use when building on private property), designed to make regions fare better in times of crisis, are rarely followed by citizens. In turn, this is due to local authorities rarely checking or enforcing such resilience orders.

Lack of cooperation

In the 2021 floods, even when crisis centres were established to facilitate cooperation across municipalities, these wound up not operating in unison.

Lack of trust in (remote) experts (Conflicting experts' vs. locals' accounts)

Amongst citizens and local actors, there is an expressed absence of trust in remote experts' assessments. Such experts may include high government officials, academics, meteorologists, or journalists who are not privy to prevailing facts on the ground.

Lack of trust in emergency services & measures

Coordination efforts have been stunted by citizens' lack of trust in emergency services, amounting to citizens being unwilling to cooperate with formal coordination and evacuation efforts, and an unwillingness to accept formal predictions of the course of the crisis. The adverse effects of this lack of trust and cooperation is a late-stage evacuation, which is much costlier than an evacuation done early on.

Limits of basing (future) expectations, on (past) events

The course of a flooding event often occurs in predictable stages; however, on rare occasions these set stages do not match events on the ground, stunting effective coordination efforts.

Language problems with specific groups (tourists, visitors)

Tourists, visitors, and foreigners frequently do not speak French and as such cannot follow official instructions or evacuation orders.

Lack of citizens' involvement in crisis planning and preparedness

The public is not involved in the development of emergency plans, or in the practical preparation of executing these plans (e.g., education, crisis exercises, etc.).

Lack of focus on recovery

The stage of recovery is unclear to numerous actors – when it sets in, who should be involved, etc.; as the potentially costliest stage, more formal provisions should guide its execution.

Interregional and institutional solidarity not formalised

There is no system of solidarity or cooperation between regions and institutions; in 2021, numerous acts of solidarity were on display, but such acts were ad hoc and spontaneous.

Responsibility overburdening of FLRs

FLRs are expected to be coordinating matters on-the-ground, constantly helping citizens, while also consistently aligning and communicating with government actors and efforts. This can lead to an overreach of FLR personnel.

Multiplicity of actors' roles

Local officials are expected to play central roles in the practical part in response and recovery, while also coordinating the crisis response on a high level. All the while, they are also citizens who are affected by the crisis and who may be subject to evacuation orders.

Dealing with uncertainty & lack of expertise for assessments

The varying speed and complexity of a flooding crisis may lead to a divergence of predictions and different assessments from a range of different actors; determining which assessment to follow is a difficult and consequential decision.

Challenges of authorisation, priorisation, and triage

FLRs and other actors may have a wide set of expected responsibilities but in a crisis situation may have to ex tempore choose one chief set of actions to focus on, while sidelining other potential responsibilities.

Lack of clarity regarding the role of private-sector and tourism-sector actors during crisis

On one hand, private-sector and tourism-sector actors have much information pertaining to the current state and number of tourists, visitors, foreigners, and temporary workers in affected regions, as well as their identities and contact details. Moreover, these actors have great potential to accommodate displaced persons. However, these actors are hardly considered in governmental crisis plans at all, with Focus Group participants

lamenting that tourist managers and private sector actors are practically treated as second-class stakeholders.

4.2.6.2. Naturtejo Geopark

Demographic and socio-economic problems

The local demographic is notably vulnerable, consisting predominantly of elderly, economically disadvantaged individuals, some of whom exhibit uncooperative behavior, such as frequent alcohol intoxication. This older segment of the population struggles significantly with engaging with contemporary media forms and interpreting the disseminated information.

Lack of trust and cooperation of citizens

The effectiveness of preventive measures is hindered by a lack of cooperation from the citizenry. There is a cultural tendency, in which preventative plans are often inadequately adhered to or outright neglected. This pattern of non-compliance significantly reduces the potential impact of preventative initiatives.

Loss of local practices and knowledge

Traditional knowledge and local practices related to the effective management of fire, soil, agriculture, and forestry are diminishing.

Lack of infrastructure

The GSM network coverage in the region, and across Portugal more broadly, is inconsistent, resulting in significant gaps. These deficiencies negatively impact both intra- and inter-regional coordination.

Limits of digital communication and solutions

The local culture, which is predominantly face-to-face and analog in nature, poses issues for the projected effectiveness of digital solutions. Local residents are more likely to take coordination directives seriously when they are delivered by familiar, respected figures such as priests or village leaders, rather than through digital or impersonal channels.

Challenges in integrating volunteers and citizens

Volunteers and volunteer firefighters are inadequately integrated into formal emergency operations, resulting in the provision of essential supplies such as food and water being largely dependent on private individuals and spontaneous, ad hoc efforts.

Managing tourists during the crisis

Managing tourists during crises presents a significant logistical challenge, particularly in terms of accurately determining their numbers, identities, and exact locations. Tourists and non-locals often lack the necessary intention and risk-awareness to respond appropriately during crises.

Lack of recovery measures

There is a no structured system for providing financial aid, compensation, or benefits to those affected by fires and disasters. Individuals who suffer losses, such as income or property loss due to fire damage, often receive no assistance.

4.2.6.3. Karsiyaka

AFAD, the emergency body of the central government, lacks manpower and financing

The staff and wherewithal required to centrally coordinate disasters is immense, and AFAD's capacities are lacking.

AFAD does not recruit volunteers

In order for citizens to volunteer during an emergency, it is necessary for them to register with a local NGO; AFAD might profit from direct recruitment.

Local volunteer organisations cannot act without AFAD's prior coordination

No official or voluntary organisation can act without informing AFAD, a fact which prevents local actors (e.g. municipalities, local volunteer disaster teams) from proactively intervening. Some FG participants suggested that the pre-AFAD system, which included more local autonomy, was a superior system.

The roles of healthcare units and workers during heatwaves are poorly defined

There is no existing central response protocol for healthcare workers, although their manpower and expertise would help mitigate problems in heatwave situations.

The number of deaths or afflictions from past heatwaves is unknown

Because no study has been launched to study past heatwaves, the municipality of Karsiyaka does not know the number of deaths or afflictions from past heatwaves. Also unknown are the socioeconomic profiles, residential data, and health histories of the victims. Consequently, without proper and rigorous risk analysis, mitigation strategies based on past crises are bound to be limited in effectiveness.

Heatwaves go hand-in-hand with power outages

During heatwaves, the use of air conditioning greatly increases, which frequently overburdens the local power network. These power outages can exacerbate crisis situations and may even escalate into larger disasters. Worse, these power outages are not predictable or notified in advance, increasing their risk potential.

Heatwaves are not seen as dangerous by some officials, nor by local citizens

Public awareness of the potential risks posed by heatwaves is generally lacking amongst the Turkish citizenry. Such an absence of risk culture is reflected in a negative, fatalistic attitude towards the potential of effective preparedness and governmental support. Conversely, some municipalities do not accept that heatwaves are a serious issue, and as such contribute little to coordination meetings and plans.

4.2.6.4. Crete

Citizens lack disaster training and education

With the exception of children, who receive training in school, local citizens do not know what to do and how to act in the event of an earthquake.

During a disaster, telephone lines are overburdened

Immediately following an earthquake, a consistent trend consists in citizens telephoning relatives, friends, and neighbours, to check in on their status. This over-burdens telephone lines, and complicates coordination efforts.

Post-disaster recovery efforts are mismanaged

Due to lack of official training and poor knowledge of crisis management, governmental recovery efforts are consistently badly handled.

There is a local culture of help and charity, but this culture is poorly harnessed and badly managed by officials

Following a major earthquake, sites are flooded with volunteers and charitable donations, but officials do not know how to handle this influx of people and donations. In 2021, this took expression in clothes being handed out to persons who did not need clothes, while persons who were in need of clothes did not receive any; food donations, meanwhile, were left to perish in the sun, with no consumption or distribution.

Post-disaster recovery was self-organised, with the state offering no directives or support

Where state-led recovery efforts proved ineffective and incompetent, private initiatives had to take over. For instance, a tent village was erected, using private funds.

Many institutions – including police departments and volunteer organisations – lack systematised and rigorous regimens of training, exercises, and drills

Even actors who play central roles in any major disaster in Crete report that they have not received appropriate basic training pertaining to how to coordinate an evacuation effort, or what to do in terms of emergency management immediately following an earthquake. Public bodies and large private companies are obliged to hire safety technicians. These are responsible for maintaining safety codes, producing institutional safety handbooks, and training. However, these technicians are often poorly trained themselves, and are not expected by higher-ups to actually carry out trainings.

Volunteers and some FLRs in Greece are poorly trained and prepared, meaning that much time during response efforts is taken up to train the volunteers

FG participants reported that much municipal and FLR effort would be relieved if volunteers would come to the field prepared with basic knowledge of disaster response.

Local civil and political culture is not characterised by risk vigilance, nor by respect for ordinances

Safety, according to numerous FG participants, should be instilled *as an attitude* into local culture. For earthquake coordination purposes, this might entail encouraging citizens to prepare survival kits for their household. Currently, citizens do not much respect laws or officials recommendations; public officials, meanwhile, do not always enforce or respect laws, knowing they can act as they please, without fear of job or status loss.

Municipalities lack the finances needed for improvement

To implement systematic preparation measures, especially involving infrastructural improvements or course development, funding is lacking.

Locals complain of trauma and marginalisation, but politicians seem not to care

For many victims, the earthquake was just the first in a series of personal disasters and travesties (e.g. physical injury, job loss, homelessness), all exacerbated by governmental and bureaucratic incompetence, inattentiveness, inaction.

4.2.6.5. Trondheim

Lack of clarity surrounding which actor bears the brunt of responsibility for inter-agency coordination and reporting

Currently, numerous emergency actors report a multiplicity and ambiguity of roles during a potential crisis, meaning there may be no clear leader in crisis-response efforts.

For crisis-proof coordination, more communication channels must be in use

Current crisis protocols heavily rely on electronic, digital, and online communication. Should this fail, then landlines and radio channels may be used, but coordination protocols should also account for the necessity of face-to-face backup options.

Too much information is digital-only

Up to one-in-ten Norwegians have poor digital skills, complicating effective administrative-citizenry cooperation and coordination during a crisis. Moreover, should there be a power outage or internet failure, much digital-only information will be inaccessible to FLRs.

The digital coordination tool hasn't been battle-tested

RAVEN is the current Norwegian digital crisis coordination tool. It was fairly recently adopted, replacing CIM. FR participants worry that it is not as comprehensive as the previous system, and it has not yet been tested in a major real-life emergency.

Norway's civil defense education should be continuity-proofed

The national crisis management relies on courses and collegiality, with workers from different agencies regularly meeting up for education and training. This leads to the establishment of a select group of highly knowledgeable and familiar experts, but the system risks being upended once such experts resign or retire. Coordination strategies should be codified to ensure greater and more continuous applicability of principles.

4.2.7. Local good practice and Lessons Learned

4.2.7.1. Famenne-Ardenne Geopark

Locally specific knowledge of citizens

FLRs confirm that while there exist a formal mechanism and associations dedicated to monitor waterways, the first alert is triggered by concerned citizens. As they are the one impacted by the crisis, or have been in the past, and know the local conditions, they will usually contact the fire department first, as to how to act best, short-circuiting the formally assigned organisations.

Local expert knowledge

The caves in Famenne-Ardenne are worked on by speleologists and heologists who have in-depth knowledge about the way high water occurs and manifests. Integrating

their knowledge, which allows to alert to the risk of floodings not within days, but within weeks, into the early warning communication. In addition, they are more aware of the changing nature of natural crises, while the local populations' knowledge is predominately informed by previous presentations of the flooding.

Identification of tourists and (local) scouts as particular at-risk group in the Geopark

The governor is initiating evacuation protocols and seeks to catalogue the scout camps within the region. Additionally, inquiries have arisen concerning the conditions upstream of the scouts near the Lesse River. These inquiries include whether a water management plan exists, and if the roadways are accessible to heavy vehicles such as trucks and ambulances. In the region of Luxembourg, a geographical map outlining the locations of the scout camps is available.

Identifying and integrating local resources into the crisis response

A civil society representative expressed uncertainty about her contribution because the cultural center does not typically manage crises, making it challenging to address pre-crisis scenarios. The center's primary focus is on lifelong learning, and prior to this event, there had not been a crisis communication strategy in place. However, the potential of the center to serve as a refuge center, a role that requires prior planning. This includes identifying potential refuge points, maintaining a list of contact numbers, having knowledge of keyholders, and knowing the facility's capacity, including the number of toilets. Anne emphasized that this is what preparation entails. During the floods, it appeared that the center was unprepared due to the unexpected assignment of this role. However, moving forward, the center can be better equipped to function as a crisis center. This involves documenting procedures and establishing a clear understanding of these roles and responsibilities.

Improvement of early information and warning

Based on the feedback received, it is imperative that local and provincial emergency plans include provisions for disseminating information prior to the onset of a crisis. This should occur before water levels peak, utilizing channels such as social networks and the B-Alert system to issue warnings and precautionary advice. These procedures have been implemented following the recent floods, including the issuance of early warning messages from meteorological services to the governor's office and other authorities. We have also observed an increased trend in government entities leveraging social media to communicate critical information, which was not as prevalent in 2021.

Initiatives to improve risk culture are being undertaken

A collaboration with the Walloon Region has been established to enhance risk awareness and culture. Over the coming years, there is a plan to develop various tools in partnership with relevant stakeholders, commencing with educational initiatives in schools to ensure comprehensive stakeholder involvement. Especially for actors who have their expertise predominantly in areas other than crisis management, it is necessary to put a significant focus on enhancing prevention strategies.

Face-to-face contact with vulnerable groups

Many actors identified the challenge to engage with citizens who lack internet connectivity, as they also tend to be more resistant to receiving communications from the government. Implementing a multi-channel communication strategy will not only

expand the avenues for disseminating information but will also increase the number of individuals capable of relaying the message. For instance, in the Geopark region, the objective is to maximize outreach. In the event of an evacuation, this includes utilizing firefighters and police officers to personally visit households.

Regional investigations are useful for recovery measures

An audit was conducted on July 24-25 2021, during which data was collected through questionnaires distributed via letterboxes and in face-to-face interactions with the public. The questions focused on the extent of flooding experienced and the specific damages incurred. The information gathered has been judged as extremely valuable.

Mobilisation of an emergency administrative unit, to help organise response efforts and to aid affected persons

During the crisis, a volunteer team consisting of individuals who were not affected by the flooding and have experience in administrative tasks. This team was responsible for managing incoming phone calls. A comprehensive list was compiled, detailing the equipment that people could provide, individuals who volunteered, and similar information. Additionally, the importance to include data on the relocation sites of displaced persons was realised, allowing them to provide the locations to family members who might inquire about them the following days.

Utilisation of existing instruments, including regional risk maps:

To derive lessons from past experiences and improve future preparedness, the Walloon Region has historically invested in the development of flood risk and constraint risk maps. Despite some perceptions of their ineffectiveness, these maps have revealed the construction of houses in flood-prone areas within the Geopark, opposite the mills, which raises questions about the rationale behind such decisions. Predictably, these are the houses that suffer the most during flooding events. It is essential for the Geopark and speleologists to conduct a comprehensive assessment of the damage and establish geological research programs aimed at understanding flood recurrence and related phenomena.

Regional campaigns to increase awareness and foster geographical and cultural resilience

The initiatives known as Environment Week and Tree Week were centered on the theme of hedgerows. The project aimed to plant 4,000 kilometers of hedges, successfully achieving this objective. As one participant noted, "We are collaborating with local authorities to develop a map that identifies hedges in runoff areas to retain water." The university's "Yes We Plant" program was utilized to acquire the trees, and funding was obtained through the Resilience Flood Risk Management Plan (PGRI) grant for their implementation. Some local authorities have also allocated funds for the purchase of a tractor to maintain and plant the hedges. According to the PGRI, municipalities are required to define actions that enhance their resilience.

4.2.7.2. Naturtejo Geopark

Remaining local knowledge

The remaining population in the region retains the essential knowledge and skills necessary for maintaining forest health and cleanliness, which contributes to making these areas more resistant to fires.

Local projects involving citizens aiming to diversify the forest

Local initiatives aimed at engaging the population in forest management, promoting forest diversification, and converting certain forested areas into agricultural land have proven successful. Projects have involved clearing forest areas, cultivating the land, and planting selected tree species. These collaborative efforts between the community and local authorities have contributed to a partial local transformation and sustainable management of the landscape.

Lack of prevention and mitigation training

Local fire brigades demonstrate high competence in firefighting once fires have ignited, and there is a growing recognition that firefighters should also receive training in prevention and mitigation strategies, including in forest management.

Lack of impact of information campaigns

Information campaigns targeting local populations have been implemented, although their effectiveness appears to be limited.

Lack of foresight/focus only on wildfire period

A resilient, prevention-focused mindset must be maintained throughout the entire year, rather than being limited to the traditional fire season. Continuous preparation and proactive thinking about fire prevention should extend beyond the typical three to four months, emphasizing the importance of year-round vigilance and readiness.

Increased professionalisation of fire fighters

In recent years, firefighting professionals have undergone significant advancements in training, organizational structure, and operational posture. Specialized teams now engage in comprehensive data analysis, leveraging available resources such as satellite imagery and fine fuel moisture measurements. This information facilitates more informed decision-making and strategic planning in firefighting operations.

4.2.7.3. Karsiyaka

Profit from the knowledge and skills of neighbourhood leaders

During the Covid pandemic, neighbourhood leaders (mahalle yönticileri) were tasked to call households and ask about their situation and particular needs. Leaders would then relay the needs of patients to any relevant departments. Initiating a similar system during heatwave periods would provide relief to citizens and greatly ease the governmental response to the situation – including real-time information on afflicted persons and on local power outages.

Establish an emergency telephone hotline for heatwave matters

During the Covid pandemic, a telephone connection was set up for citizens to proactively report on their specific needs, easing government relief efforts. During heatwaves, having a similar system (allowing citizens to announce their need for water, food, medical care) would prove useful in crisis response.

Construct public cooling centres for citizens to use

During cold weather days, it is established local practice to offer homeless persons access to warm shelters. Conversely, during extremely hot days, cooling centres should be erected, where individuals can temporarily cool down and be given water. Concentrating people in one dense space not only conforms to local traditions of socialising in “tea gardens”, but also eases surveillance of persons’ health conditions, and eases the burden on the power network (i.e. ensuring persons do not all operate separate air-conditioning units).

Establish a back-up internet system, or strategies for operating offline

During a major flood in 2023, the municipal internet and communication network collapsed, hindering effective coordination – to prevent this, a back-up system should be established. FLRs already have back-up satellite telephones; other public institutions should also adopt this practice.

Mitigation and response strategies must also encompass environmental care, saving local flora and fauna

FG participants recognised the imperative of developing strategies that focus not merely on human well-being and comfort but also entailing the survival of natural habitats and natural heritage. Deaths of bees, birds, insects, and crops due to heatwaves can lead to diseases and grave cascading effects. Moreover, overuse of water during heatwaves can contribute to drought conditions, necessarily leading to long-term adverse effects including crop death and contaminated drinking water.

4.2.7.4. Crete

Large residential units should have a building manager

To improve evacuation efforts and post-disaster assessments, a building manager should be employed on-site at multi-story apartment buildings.

Foster a culture of precaution

Since the 2021 earthquake, individuals report having increasingly begun following basic safety precautions, such as not leaving large objects at locations where they could block exits, not placing heavy objects in high places, etc.

During disasters, Cretan and Greek culture calls for collective help

A major factor in past relief efforts has been the willingness of Cretan citizens to help their neighbours and communities in whatever way possible

Enforce existing mandates, which stipulate that public bodies (and large private companies) must have an effective safety and security memorandum

Each institution must have a memorandum of actions to be followed, and this memorandum should be made known to employees, and should be checked for faults once yearly.

Buildings and infrastructure should be made earthquake-proof; officials should crack down on illegal constructions

We know from past disasters and from other countries that an earthquake’s damage is greatly reduced if public and private infrastructure adheres to rigorous building codes.

Priests, pivotal in disaster coordination, should learn first aid

An obligation pronounced by the metropolitan since the 2021 earthquake has ordered Cretan priests to learn first aid.

4.2.7.5. Trondheim

Tap the knowledge and capabilities of clubs, sports teams, faith communities, etc.

It is recognised that specific groupings – e.g. sports teams, local clubs, or religious groups – have much knowledge of their specific membership. This knowledge should be deployed to aid in the sharing of crisis-specific information, as well as to ensure cooperation and coordination during a crisis amongst people who may otherwise not see effective targeting.

Formalise coordination plans, to prevent *ad-hoc* crisis response

Through study and discussions, the municipality has learned that not all relevant emergency actors know their itemised place, role, and responsibility during a major emergency. It is recognised that this is something that must be mitigated and corrected before a crisis occurs, including the setting-up of firm meeting points, publicly-known evacuation locations, common lines of communication, etc.

Promote citizens' self-coordination

Particularly since the Covid pandemic, the Municipality of Trondheim recognises that a major crisis will require much citizen action and self-help to be successfully broached; self-coordination initiatives, in which affected households manage their own emergency affairs, should be promoted.

Use findings from past crisis reports to aid coordination plans

Empirical evidence showing what worked and what did not work in past crises – whether these crises be directly related to quick clay slides or not – should be integrated into municipal planning and coordination mechanisms.

Micro-target specific vulnerable groups

During the Covid pandemic, numerous gaps in existing coordination plans were discovered, including how to deal with highly specific demographic and vocational groups (e.g. non-resident international truck drivers). To improve coordination efforts on this front, particular strategies should target these highly specific groups.

Make use of the local culture of neighbourliness and cooperation

The local principle of "dugnad" – of collectively helping others in need, and offering assistance to help improve society – should be harnessed by the municipality. However, some FG participants warned that emphasising *dugnad* should not veer into cliché, as this traditional concept may alienate young people.

4.2.8. Potential pathways for improved coordination

4.2.8.1. Famenne-Ardenne Geopark

FG participants identified several potential pathways for improving crisis coordination in Famenne-Ardenne:

Create a register for vulnerable/special-needs groups

Develop a registry for individuals with special needs. Determine a clear registration process for these individuals.

Organise awareness-raising events with politicians

Hold sessions organised by politicians to involve citizens in the emergency plan. Educate authorities about the role of the Emergency Plan. Ensure emergency plan personnel receive proper training, considering their roles are often part-time.

Develop trust in official institutions

Foster trust between citizens and official institutions involved in emergency management.

Promote intergenerational activities

Encourage activities that span multiple generations to enhance community resilience and knowledge sharing.

Cultivate a culture of risk and preparedness

Prepare for the recurrence of emergencies by fostering a risk culture. Instil a culture of preparedness within communities through continuous education and awareness. Develop an early insurance culture to ensure coverage before risks arise.

Implement a digital solution for real-time data

Develop a tool that provides real-time, quantitative data on water levels, weather conditions, etc. Use this tool to accurately predict impacted areas and inform evacuation decisions.

Erect memorials to past floods

Install signs and markers indicating past flood levels to enhance the community's memory and awareness of flood risks.

Involve engineers and experts in emergency plans

Include engineers in emergency planning, especially during the recovery phase. Engineers can help stabilise roads, assess building safety, and manage waste removal.

Formalise inter-agency and inter-actor coordination

Integrate various stakeholders (e.g., tourism, farmers) in emergency planning and response. Establish a common source of information for all involved parties.

Utilise existing geological maps for planning and response

Numerous flood risk and constraint risk maps already exist, but these are yet to be fully integrated into local DRM.

Establish a help desk for administrative matters like insurance and subsidies

Sorting out administrative emergencies has proven to be most difficult in a post-disaster context, although doing so should rank high amongst affected persons' priorities. A help desk to help coordinate administrative matters would greatly aid and ease such difficulties.

Provide training in post-crisis management

Existing DRM plans have focussed overwhelmingly on preparation and response; past events show, however, that what happens after the immediate crisis is of utmost security importance.

Review urban planning to make buildings less permeable

Existing urban planning ordinances are loosely interpreted and sometimes ignored; developing a more stringent set of policies would fortify societal resilience and preparedness.

Update the flood zone map

Existing flood zone maps should be reviewed and updated; property sales and construction projects must consider them.

Implement and communicate the Flood Risk Management Plan (PGRI)

The PGRI are amongst several existing policies and plans that would be more effective and impactful if these were made more known to the public.

Clearly communicate the end of the crisis to all stakeholders

A chief concern in past crises has been that different stakeholders recognise the end of a crisis at different times and in different ways.

4.2.8.2. Naturtejo Geopark

FG participants in Naturtejo identified at least one potential pathway towards improved coordination efforts in times of crisis, namely by **improving criminal investigations through surveillance**. The existing CCTV and on-the-ground surveillance system could be further expanded to enhance its effectiveness. This expansion would significantly strengthen legal investigations into the causes of fires and support potential criminal prosecutions for arson. By increasing surveillance capabilities, authorities would be better equipped to monitor key areas and gather crucial evidence for judicial inquiries.

4.2.8.3. Karsiyaka

Create a list of vulnerable individuals

To improve local preparedness and response, it is imperative to be aware of the most vulnerable individuals, and to know their whereabouts and particular conditions.

Create an inventory of energy-poor households and of buildings' thermal insulation

Energy poverty (i.e. the inability of persons to afford air conditioning) is a chief contributing factor to individuals' vulnerability during heatwaves. Creating an inventory of energy-poor households and of buildings that are improperly insulated would greatly aid in the identification of potentially vulnerable persons.

Identify problems with the built environment

It is crucial to identify the problems and potentials of the physical and built environment. Public spaces should be transformed into natural cooling areas during heatwaves. New strategies should be developed to increase cooling areas. New construction projects should be designed to include planted roofs, light colours, and cooling wind corridors.

Create a protocol of information-sharing & pre-determine actors' specific roles

As of now, it is unclear how information about upcoming or present heatwaves should affect the responsibilities of FLRs and care workers. A protocol should be set up, determining precisely who checks in on elderly and vulnerable citizens, and in what chronological order.

Integrate cascading effects into coordination protocols

Heatwaves increase the risk of urban fires and wildfires, drought or irregular rainfall, power outages, disease (e.g. through vermin infestations), and wide-scale migration. Coordination protocols should consider such multiplicities when planning for all stages of the DRC.

Synchronise FLRs' radio frequencies

Currently, FLRs (including fire departments, ambulances, and police) operate on different frequencies. For improved coordination, during crises, these FLRs should switch to the same frequency.

4.2.8.4. Crete

A recurring and immediate complaint amongst FG participants was that citizens lack basic knowledge in safety and security protocols. One suggestion to improve this problem entailed **mobilising the vast number of groups and associations** – sports clubs, cultural clubs, religious organisations, etc. – to enforce rigorous training and education regimens to their members.

4.2.8.5. Trondheim

Target preparation messaging to specific vulnerable groups

There is an abundance of local vulnerable groups, from migrant or itinerant workers to students and tourists, who at present remain unaware of (their role in) evacuation strategies and other coordination procedures.

An interpreting service would help coordination practical manoeuvres

Due to the large number of non-native local residents, whose command of the local language is lacking, coordination procedures would be smoothed if the municipality integrated an unit of interpreters to be included in the work of FLRs and SLRs.

Coordination plans should have pre-set geographical coordinates for meetings and evacuation efforts

To prevent coordination mishaps, not least in case of a digital blackout, municipal coordination should integrate a firm set of geographical agreements. To this end, the current Red Cross plan already stipulates that if communication is down, there is an agreed-upon physical meeting point.

Create table-top exercises for the home, to help citizens self-coordinate

Table-top exercises have empirically proven highly effective for experts and FLRs to better understand their role and responsibilities in a crisis scenario. Concurrently, the Municipality of Trondheim seeks to promote and improve citizens' self-coordination capabilities. To this end, developing table-top for home-use can increase the awareness and skills of individual households.

Integrate a situational plot, or layered map service, into existing emergency tools

A situational plot is a layered and interactive digital map that shows, in real-time, how the crisis currently stands in terms of accessibility and geography: which roads and buildings have been damaged, which streets and intersections are unusable, which ones are reserved for FLRs, and so on. Such a service greatly helps FLRs, SLRs, and citizens know up-to-date relevant information, without the recourse to reading reports or news articles.

4.2.9. Role of technology in crisis management

4.2.9.1. Famenne-Ardenne Geopark

While there is a proliferation of technological and digital tools designed to aid coordination (e.g., Astrid, beALERT), there is little public and general knowledge of these tools, with Focus Group participants complaining of information overflow. One participant received over 80 alerts within one month, leading to her ignoring most such messages – “too much information kills information”.

Focus Group participants identified two imperatives pertaining to technological tools. First, crisis-pertinent physical infrastructures such as hydrometric sites – that is, the locations where water levels are measured – must be synched up to digital applications, thus ensuring that actors have access to real-time updates and information on water levels. Second, emergency response plans must first and foremost be technologically flexible, meaning that if a digital-app-based crisis response fails due to the collapse of telephone lines, a second-order fallback technological response must be in place. A final fallback option must include relying on analogue technologies, e.g., on analogue radio systems.

4.2.9.2. Naturtejo Geopark

FG participants expressed skepticism about the impact of technology in practical terms, citing material challenges and the region's aging population. Many residents do not use cell phones but rely on landlines with large keypads. Too, a portion of the population is unable to read or write, greatly limiting their ability to use text-based communication methods or digital technologies.

The community's characteristics necessitate specific considerations for on-site coordination and emergency response strategies, tailored to address the limited technological engagement and literacy skills of its elderly population.

One technological tool mentioned as being used by FLRs is SAD, which is a technological network designed to track and describe the location and movement of fires. However, the information SAD can provide is quite restricted, offering only basic descriptions such as a fire’s intensity and direction without further detailed data or context. Its limited informational scope restricts its employment in comprehensive fire management.

Use of fire projection tools

The Emergency and Civil Protection Authority has developed and issued a digital tool designed to enhance crisis management. This platform allows for real-time projections of fire spread and the movement of firefighting personnel. It provides access to a wealth of information, including the precise location of individuals operating near the fire front,

thereby improving situational awareness and decision-making during emergency responses.

Use of surveillance technologies

The implementation of camera and photographic surveillance in forested areas has proven effective in identifying the causes of fires over time. By capturing and analyzing visual data over a five-year period, the predominant causes of these fires have been determined, highlighting the utility of this approach as a potential solution for fire prevention and investigation efforts.

4.2.9.3. Karsiyaka

Vulnerable groups in Karsiyaka are more likely to be unable to use, or weary of using, digital technology than average citizens. Therefore, FG responders agreed that technological solutions should stick to basic and bare-bones solutions, for instance through landline connections, 112 calls, and check-ins via SMS. Information and coordination activities should largely stay on such established methods, and are less likely to be effective when only spread on social media channels or when integrated into digital applications.

Karşıyaka Municipality already operates a WhatsApp line, which allows citizens to directly communicate with the municipality. This channel has proven a crucial method of citizen-to-government communication during crisis and disaster situations. Moreover, İzmir Metropolitan Municipality has developed a digital application entitled “I’m under the rubble”. This is designed to help citizens trapped in debris after earthquakes. The same application, or a similar one, could also be used for communication and intervention in emergency situations during heatwaves and other disasters. Having citizens self-report on their situations during heatwaves could prove an important complementary instrument when issuing coordination orders.

FLRs use an AFAD-issued G.I.S. tool, the Disaster Management and Decision Support System, or AYDES. This is important for coordination manoeuvres because when there is a shortage of equipment, human resources, or anything else, this shortage is put into the AYDES system. Others from neighbouring cities or other FLRs may then see this need and can supplement the afflicted department or municipality. The entire country is integrated into this system.

FG participants suggested that digital simulations (e.g. through VR) could be integrated into Karsiyaka’s heatwave planning and training strategies. Moreover, the municipality and local universities could cooperate in periodically monitoring the urban heat island effect with digital tools. Also, digitally processing cultural heritage and heritage sites could prove important.

4.2.9.4. Crete

To help residents prepare for and respond to such emergencies, the municipality of Heraklion operates an official website titled “Citizens of Heraklion.” This platform can offer guidance on what steps to take during an earthquake, serving as a reliable resource for the community. However, the digital landscape in Greece and Crete is cluttered with various websites – all developed by various programs and funding mechanisms – that also claim to provide similar information. One such example is the “Talos Crete” website, which attempts to offer earthquake-related advice but has in the past proven outdated and often inaccurate.

FG participants pointed out that when dealing with a matter as serious as earthquake preparedness, there should be one clear, official source that citizens can trust to provide accurate, up-to-date guidance – and that such guidance should have analogue appendages, in the form of speeches, brochures, and public signage.

4.2.9.5. Trondheim

Technology plays a central role in Trondheim's current crisis management system, fundamentally shaping how local actors respond to emergencies. The city is transitioning from the older CIM system, a digital crisis management platform that enabled effective communication and situational awareness, to a new system called RAVEN. While RAVEN offers some similar functionalities as CIM – such as real-time mapping and incident sharing – it is still in its early stages, making it less robust and far less familiar than its predecessor.

Several FG participants related that a key challenge in Trondheim's crisis management is the lack of inter-agency cooperation. Different organisations often practically operate in separate silos, with their own proprietary systems, limiting effective coordination and cooperation. For instance, power providers rely on systems like SCADA, which are highly specialised and not easily integrated with other agencies' tools. This creates gaps in real-time situational awareness, especially during complex emergencies like landslides or severe weather events, where a unified situational plot could significantly improve response coordination.

Because of the growing use of digital tools, a specific newfound vulnerability lies in the heavy reliance on such digital means. Should telephone and data networks fail, the municipality's emergency response would be severely compromised. While Trondheim's agencies do have backup radio systems, the dependency on electricity and electronic communications remains a critical weakness.

Efforts to address these challenges include ideas like developing a common app to improve collaboration and implementing situational plotting tools that provide real-time visual representations of incidents. These tools could enhance decision-making and resource allocation during crises, ensuring a more coordinated and effective response across all agencies involved.

4.2.10. Specific aspects of the SyRI framework

4.2.10.1. Famenne-Ardenne: Socio-economic resilience

FG participants frequently emphasised, hinted at, or assumed the importance of the UNESCO site for local and regional prosperity. When asked what meaning the Geopark holds to them, several respondents used terms resounding with financial socio-economic resilience and financial prosperity, e.g. "evolution", "future", "green future", "potential", and "wealth".

Socio-economic factors are of foremost concerns to some local actors upon the onset of a crisis. F-A UGGp wondered whether the caves and other sites would keep open to tourists or not; tourists worried that their costly vacations would be squandered; citizens worried whether they had the appropriate insurance to restore houses and properties.

The massive scale of destruction left behind by large flooding events means that recovery requires immense socioeconomic resources.

In terms of coordination, a lack of awareness and general lack of risk culture proves massively costly and thus adversely affects Famenne-Ardenne's socio-economic resilience. Persons, unaware of or unfazed by the dangers facing them, are unwilling to evacuate at early stages of the crisis, and their ensuing late-stage evacuation is far more costly than it would have been. A lack of risk culture means that citizens are not prepared for a crisis – they do not have the right tools to secure the home, they do not have the correct digital tools to help coordination, and they do not have insurance to help personal recovery after the crisis.

Tourists having invested money into holidays may cause them to be *less* prone to listen to evacuation orders, because they are unwilling to accept their personal loss. More generally, local rise in importance of the tourist sector has brought economic prosperity but raises multiple challenges for DRM, including a greater complexity of demographic constellations, plenty of unregistered persons, and linguistic and cultural differences and barriers. Nonetheless, in 2021 the private sector was very quick to return to business after the crisis, and thus was an important factor in boosting local socio-economic recovery and resilience.

4.2.10.2. Naturtejo: Social interaction and inclusiveness

The primary challenges pertaining to the local SyRI framework in Naturtejo involve the effective interaction with and inclusion of vulnerable groups in coordination strategies. The local demographic patterns, characterized by a dispersed population with a significant proportion of elderly individuals, require FLRs to dedicate much labour on protection and care to the elderly, who are often unable to manage on their own in moments of crisis.

Macro-economic policies and trends, including the effects of globalization and European Union regulations, were identified by FG participants as having negatively impacted the social and demographic structure of the region. These policies have disrupted local economies, particularly in forestry and agriculture, by imposing requirements that undermine traditional practices and economic stability in these territories. Such changes and disruptions to local tradition have further diminished possibilities of positive social interaction in the region.

4.2.10.3. Karsiyaka: Adaptive governance

FG responders agree on the many potential pathways towards improved coordination that exist, signalling the potentiality of adaptive governance strategies in Karsiyaka. However, one limiting factor that was mentioned in several sessions was the prevailing centralisation of coordination strategies during disasters. During disaster events AFAD will centrally coordinate any and all response efforts, and local – and potentially more knowledgeable – actors have the scope of their actions greatly reduced. To improve on this, it was suggested that a decentralisation of efforts would be desirable.

Notwithstanding this desire for decentralisation, another recurring theme was that of the definition of roles and responsibilities. For governance and adaptive strategies to best work, FG respondents agreed, clear roles amongst local actors must be pinned down and directly communicated, for each DMC stage.

4.2.10.4. Crete: Active memory

FG participants all agreed that the 2021 earthquakes had proven pivotal in changing many citizens' attitudes towards earthquakes – the disaster led to a massive mobilisation of volunteers, huge church-led relief operations, and to a shift in many citizens' mindsets towards personal safety and security.

The earthquake as such will prove a watershed moment in locals' collective memory, and citizens' experiences – including their many disappointments vis-a-vis the governmental and official crisis response – can be transferred by way of local festivals and other events.

4.2.10.5. Trondheim: Health and wellbeing

In Trondheim's crisis response, matters of health and wellbeing are prioritised to ensure both the mental and physical support of those involved and affected. Several measures are in place to provide care during emergencies, including the mobilisation of trained personnel and psychosocial teams. Emergency Response Guards (ERG) and the Norwegian Women's Public Health Association (NKS) are equipped to handle crises, providing essential support by addressing psychosocial issues and engaging in conversations with individuals in distress. Additionally, municipalities activate their psychosocial teams quickly, ensuring immediate mental health care for those in need.

Central to Trondheim's response is the integration of emergency healthcare services, including mental health support. Organizations like the Regional Resource Centre for Violence, Traumatic Stress, and Suicide Prevention (RVTS) play a critical role, as they did during the July 22 attacks. However, given the potential scale of crises, these organisations alone cannot manage the needs of all affected. This is where community effort, or "dugnad", becomes vital – encouraging everyone to look after one another. In a national crisis, resources may also be drawn from other regions, including specialised health services and emergency accommodation in hotels, to ensure comprehensive support for those impacted.

4.3. Local Heritage Drivers for DRR

In this chapter of D2.1, we present the results of the analyses conducted on the historical, cultural, and environmental factors of the communities (POLITO). When interconnected with the psychosocial factors discussed in this document, these analyses help to clarify the human behaviour of communities in reaction to hazards and climate change.

4.3.1. CORE Interactive Workshop: Analysis

The analyses were conducted by examining the data from each CORE lab, aiming to understand the specific historical, cultural, and environmental backgrounds of each community. This aspect is particularly significant, as heritage includes both tangible and intangible elements that reflect important societal values on a global scale while also embracing regional characteristics that are especially meaningful at the local level.

The preliminary activity on CORE Local Heritage Identification and Characterization has been designed to identify and analyze the cultural, historical, and environmental factors that could impact DRM according to diverse CORE scenarios. These factors have been co-extracted and categorized through participatory activities. The terms were initially gathered through a brainstorming session conducted by each group, followed by a

prioritization based on collective discussions within the groups. In a subsequent phase, the groups created conceptual maps of the terms selected as priorities, categorizing them accordingly. The following analysis presents a summary of the work carried out by the different groups for each CORE Lab.

The extraction of Lessons Learned (LL) has been designed with consideration of the SyRI framework, analysing all 5 SyRI components within each CORE lab. Each purpose will especially consider different target groups and relevant stakeholders to be involved:

1. exploring adaptive governance in a municipality of a huge city;
2. exploring health issues and pursuing a mental wellbeing in condition of quick clay;
3. investigating the level of social interaction in a mountain area;
4. considering education and museum cultural role in the elaboration of collective disaster memory;
5. understanding cascade effects on production and tourism in a rural region.

4.3.2. CORE Interactive Workshop: Results

4.3.2.1. Local Heritage Drivers in Famenne-Ardenne CORE Lab

The CORE Local Heritage Identification and Characterization activity reported 54 terms listed which define the Famenne-Ardenne territory according with a multistakeholder perspective.

The result of the brainstorming activity in Famenne-Ardenne reveals a strong emphasis on **tourism**, **natural heritage**, and **local products**, especially those tied to **gastronomy** and **beverages (beer)**. These elements are closely intertwined with the region's identity, suggesting a focus on promoting its rural heritage, cultural traditions, and natural attractions. The frequency and repetition of certain terms indicate their centrality in the local heritage, with tourism serving as a key sector for economic development.

In the conceptual mapping exercise for Famenne-Ardenne, in total **70 terms** were identified, with four primary themes emerging by the 4 groups: **Stones, Nature, Geological Characteristics**, and **Well-being**.

Table 10. Categorization of Local Heritage Elements in Famenne-Ardenne CORE lab

Categories	Terms
Stones and **Geological Characteristics** 14 terms	Sandstone, Conglomerate, Limestone, Quarries, Hotton Quarries, Fond des Vaux Quarry, Lhoist, Wéris Megaliths, Extractive Industry, Underground Network, Geological Characteristics, Caves, Limestone Grasslands, Speleology

Nature 24 terms	Forests, Biodiversity, River, Living Rivers, Pines, Mediterranean Plants, Nature Walks, Famenne-Ardenne Geopark, Fond des Urulx Valley, Lesse Valley, Bymarka (Park and Nature Reserve), Green Classes, Agriculture, Farms, Livestock Farming, Vegetables and Fruits, Cured Meats (Charcuterie), Gourmet Walks, Goat, Cow, , Short Supply Chain, Farm Sales, Wood Industry, Wind Energy, Geothermal Energy	
Well-being 32 terms	Cultural and Social Well-being	Tourism, Leisure, Spots, Carnivals, Folklore, Local Festivities, Buildings, Castles, Beautiful Villages, Religious Heritage, Museums, Tourist Attractions, Festivals, Walking, Adventure Sports, Kayak, Fishing, Hunting, Logging with Draft Horses, Scouts, Carnival, Grand Fire, Kermesses (late January to March).
	Gastronomy	Cheeses, Beers, Microbrewery, Local Products, Trout au Bleu, Delhaye (Bakery), Kisses (Pastries), Wood Mushrooms, Sheep Cheese
	Lifestyle and community	Camping Accommodation, Accommodations, Mediterranean Mentality, Sweetness of Life, Terraces, Summer Markets, Local Markets.

These themes collectively show that the region's identity is deeply connected to its natural environment, geological features, and a strong emphasis on well-being through cultural and outdoor activities.

4.3.2.2. Lesson Learned from Famenne-Ardenne CORE lab

The subsequent activities related to the crisis scenario and Role Play (Lessons Learned from Cultural Heritage and Community Resilience. Crisis Scenario Narratives and Lessons Learned from Cultural Heritage and Community Resilience. CORE Role Play) allowed us to extract some Lessons Learned related to human behavior, which can be analysed in terms of their relevance to the SyRI framework as well as to specific target groups (elderly, young people, FRs, ...)

Table 11. Lessons Learned from the Famenne-Ardenne CORE lab

Lesson Learned from Famenne-Ardenne CORE lab	
Active Memory	**Highlight Victims' Testimonies On-Site**: Provide a platform for victims to share their experiences at the location, personalizing and deepening the understanding of the events.
	Collect and Share Testimonies: Gather and simplify testimonies to make history accessible, ensuring stories are widely known.
	Preserve Oral History: Treat oral traditions with the same importance as written records to ensure memories and lessons are passed down accurately.

	Host Exhibits and Memorial Ceremonies: Organize exhibitions and create commemorative plaques to honor the memory of those affected, fostering community remembrance.
	Develop a Memory Preservation Strategy: Create a strategy to preserve the memory of catastrophes through images, written records, and informational panels at affected sites.
	Preserve Memories through Imagery: Encourage participants to share photographs and visual memories to safeguard the history of events.
	Create a Dedicated Time and Place for Remembrance: Establish a specific time and location, such as during the Walloon Water Days, to focus on collective memory and reflection.
Social Inclusiveness	**Leaders as Community Anchors**: Spiritual and social leaders should serve as connectors, listeners, and advocates for the community.
	Incorporate Testimonies in Schools: Integrate survivors' stories into school curricula to educate younger generations about past events and their implications.
	Engage in Playful Learning: Use games and activities to transmit knowledge and ensure important lessons are passed down in an engaging and memorable way.
	Work with Children on Societal Changes: Involve children in understanding and adapting to societal changes, ensuring they are informed and prepared for the future.
	Educate and Inform Children: Provide children with information and guidance to understand the importance of heritage, risk awareness, and societal changes.
	Share Testimonies in the Media: Use media platforms to broadcast survivors' stories, ensuring that the broader public is informed and remembers.
Socio-Economic Development	**Learn to Enhance Cultural Sites**: Teach and encourage the preservation of cultural sites as a key aspect of economic development
	Museums' Role in Preserving Heritage: Museums should actively recognize and preserve local heritage, ensuring its protection and public education.
	Churches' Responsibility in Heritage Preservation: Churches, under the guidance of the diocese, should acknowledge and take responsibility for preserving their heritage as part of the broader community memory.
	Promote Short Supply Chains with Local Actors: Collaborate with local businesses and producers to strengthen short supply chains, fostering economic resilience and diversification.
Health and Wellbeing	**Support in Grieving**: Provide support and guidance to help individuals and the community navigate and cope with grief.
	Promote a Culture of Risk Awareness: Foster a culture that is conscious of risks and prepared to handle them through education and awareness.
	Educate on Crisis Response: Promote education that addresses crises and encourages a shift in mindset to better handle future challenges.
	Cultivate Risk Awareness: Encourage a culture of risk awareness as part of sustainable community development.

Adaptive Governance	**Provide Support to Local Businesses**: Ensure that support is given to local merchants to help affected communities receive essential services on-site during and after a disaster. **Engage Experts in Policy Making**: Recognize that policymakers may lack specialized expertise in areas critical to managing specific disaster risks, such as flooding. Engage experts to inform and guide policies effectively. **Foster Collaboration with Geopark**: Collaborate with Geopark to leverage their resources and knowledge for better disaster risk management and community support. **Coordinate Resource Management**: Implement effective coordination of resource management and preservation by regional authorities to ensure that resources are utilized efficiently and equitably during disaster response and recovery. **Regional Support for Land and Material Resources**: Seek regional support to facilitate the provision of land and materials necessary for disaster response and recovery efforts.

4.3.2.3. Local Heritage Drivers in Trondheim CORE lab

The initial brainstorming activity, conducted with two groups of participants, resulted in the identification of 28 terms that define the territory from a multistakeholder perspective. Among these, "Historic buildings" and "Historical hub/junction point" emerged as prioritized terms, highlighting the main values associated with the Trondheim area. In the subsequent conceptual mapping exercise, **65 terms** were identified, reflecting the key themes prioritized by the two groups, as summarized in the following analysis.

Table 12. Categorization of Local Heritage Elements in Trondheim CORE lab

Categories		Terms
Cultural and Historic Factors 36 terms	Historic Buildings and Architecture	Wooden buildings, Jugendstil buildings, The Wharves/The docks area, Bakklandet (historic area), Stiftsgården (residence of the King), Lystgårdene (manors?), City fire, Cicignon (military engineer), Britannia (historic hotel), Møllenberg House, Old Town Bridge (historical wooden bridge), Kristiansten fortress, Gråkallen Line (suburban tram line), Sverresborg Folk Museum (outdoor museum recreating traditional village and traditions).
	Historic People and Events	Olav Trygvason, The King, Pilgrim, Historic people, Royal coronation ceremony, Saint Olav (Pilgrim's Route, statue in the square, Olav Festival), Earls of Lade (norse dynasty).
	Cultural Institutions and Activities	Museums, Festivals, Theater, Cultural attractions, Archaeological sites, Nidaros Cathedral, Ringve old music museum, Nidaros cathedral voice choir, Rockheim museum, Trondheim's soloists, DORA Archive,

		Samfumet (student society), Trondheim Rose (local craft product).
	Traditions	Olsok/St. Olav Festival, Royal Regalia (Crown's jewels), Archbishop's Palace, Trondheim Rose, Tronder bunad (traditional costume), Mustache tradition (barbershops), Moccasins (typical shoes), Song, Dialect.
Environmental and Natural Factors 29 terms	Nature and Environment	Nature, Bymarka (park and nature reserve), Trondheim Fjord/maritime, The Marine (play area beside Nidelva), Ladestien (hiking trail), The Nidelva River, Munkholmen (island fortress, ex-convent), Transport, Bathing place, Archaeological sites, Trading town.
	Food and Agriculture	Food, Agriculture/farming, Sodd (Traditional Stew), Michelin (restaurants), Beer, Trading town, Brewed (local beer brands), Coffee (Kjeldsberg), Nidar (national food store), Food culture.
	Sports and Recreation	Sports, Granåsen (Ski Jumping arena), Lerkendal (Trondheim football club), Trondheim Spektrum (Sport Arena), Moser (Nobel prize winner on Alzheimer research).

If we look at the results, 56% of the terms (36 out of 65) are associated with cultural and historic factors, indicating a strong focus on the cultural and historical heritage in shaping the values and behaviors of Trondheim's residents. The prominence of historic buildings, architecture, and cultural institutions like the Nidaros Cathedral, Ringve Museum, and the Archbishop's Palace underscores the importance placed on the region's heritage. This focus on cultural landmarks suggests that historical identity is a significant priority for the people of Trondheim, which influences their sense of belonging and community engagement. The repeated mention of traditions, such as the Tronder bunad, Olsok/St. Olav Festival, and the Royal coronation ceremony, highlights a commitment to maintaining cultural continuity. These traditions contribute to intergenerational connections, as they are passed down and celebrated across different age groups, reinforcing community cohesion. The emphasis on institutions like NTNU and NTH, along with cultural schools and archives, reflects Trondheim's focus on education in shaping human behavior. This environment likely encourages a population that values knowledge, historical awareness, and cultural literacy. The inclusion of natural landmarks like Trondheim Fjord, Bymarka, and The Nidelva River suggests that the natural environment is an integral part of the identity and lifestyle of the city's residents. This connection to nature influences behavior by promoting outdoor activities, environmental stewardship, and a lifestyle in harmony with the surrounding landscape. The focus on local food culture, agriculture, and short supply chains reflects a community behavior oriented towards sustainability and self-sufficiency, as seen in the emphasis on local products like Trondersodd, Michelin restaurants, and local beer brands.

4.3.2.4. Lesson Learned from Trondheim CORE lab

The subsequent activities related to the crisis scenario and Role Play (Lessons Learned from Cultural Heritage and Community Resilience. Crisis Scenario Narratives and Lessons Learned from Cultural Heritage and Community Resilience. CORE Role Play) allowed us to extract some Lessons Learned related to human behavior, which can be analysed in terms of their relevance to the SyRI framework as well as to specific target groups (elderly, young people, FRs, ...)

Table 13. Lessons Learned from Trondheim CORE lab

Lesson Learned from Trondheim CORE lab	
Active Memory	**Involve Heritage Professionals:** Keep heritage professionals informed and involved in crisis response plans to preserve cultural heritage.
	Promote Neighborhood Watch Programs: Encourage neighborhood watch programs to build community resilience, especially in preserving the historical character of neighborhoods.
	Preserve Cultural and Historical Sites: Enforce regulations and awareness to ensure that heritage sites are protected from the impact of land use and other activities.
	Verify Information Sources: Always ensure that information sources, particularly those related to heritage and cultural sites, are verified before public dissemination to maintain credibility and accuracy.
	Involve Heritage Professionals: Keep heritage professionals informed and involved in crisis response plans to preserve cultural heritage.
Social Inclusiveness	**Foster Community Dialogue:** Encourage open dialogue between the municipality and various community groups to strengthen community ties.
	Include Diverse Perspectives: Involve diverse perspectives, including environmental activists and community representatives, in decision-making processes.
	Facilitate Health Discussions: Foster open discussions on health and other relevant issues within the community to promote well-being.
	Encourage Community Self-Assessment: Promote self-assessment among community members to identify potential resources and support roles during crises.
Socio-Economic Development	**Promote Local Business Support:** Continue promoting the use of local businesses to sustain the local economy during and after crises.
	Develop Evacuation Centers: Maintain and regularly update designated evacuation centers (EPS) to provide proper facilities and support during crises.
	Enforce Land Use Regulations: Ensure landowners are aware of regulations, particularly in vulnerable areas, to verify ground conditions before activities begin.
Health and Well-being	**Strengthen Collaboration with the Red Cross:** Enhance collaboration with the Red Cross to provide comprehensive emergency services.
	Mobilize Crisis Response Organizations: Ensure rapid mobilization of organizations like NKS in crisis response efforts.
	Provide Comprehensive Mental Health Support: Provide comprehensive resources and mental health support through established organizations.
	Enhance Direct Care Initiatives: Implement structured psychosocial support programs with volunteer involvement to meet immediate needs during crises.

	Address First Responder Mobilization Issues: Investigate and address issues related to the mobilization of first responders and associated traumas.
Adaptive Governance	**Evacuation Centers Development**: Develop and maintain designated evacuation centers (EPS) to ensure proper facilities and support for evacuees during crises. This demonstrates proactive governance in crisis preparedness.
	Geological Monitoring: Enhance the monitoring of geological conditions, such as quick clay, to provide timely updates and prevent unforeseen risks.
	Early Warning Systems: Regularly update and maintain early warning systems for hazard evaluations to ensure prompt and effective risk communication.
	Land Use Regulations Enforcement: Enforce land use regulations by ensuring that landowners, especially in vulnerable areas, are aware of and comply with ground condition checks before any activities.
	Rapid Mobilization of Crisis Response Organizations: Ensure the rapid mobilization of organizations like NKS in crisis response efforts.

4.3.2.5. Local Heritage Drivers in Naturtejo CORE lab

The brainstorming activity focused on Naturtejo local knowledge extraction facilitated a progressive categorisation of valuable elements within participants' territories, allowing them to identify components that could be considered part of the cultural natural heritage. For instance, in the CORE lab in, the initial brainstorming session led to an equal distribution of tangible elements (such as tourist trails and forests) and intangible elements (including religious festivals and gastronomic traditions), totaling 16 terms equally divided.

The subsequent conceptual mapping activity further characterised these elements, revealing a notable predominance of cultural elements related to gastronomic traditions (18 terms) and musical and folkloric traditions (14 terms) over other categories. Specifically, elements related to gastronomy and traditions were more prominent compared to socioeconomic (3 terms) and sports activities (7 terms).

This detailed categorisation highlights the rich tapestry of cultural and natural heritage elements identified by the participants, emphasizing the crucial role of gastronomy and traditions in fostering the identity and resilience of local communities.

Table 14. Categorization of Local Heritage Elements in Naturtejo CORE lab

Category	Terms
Gastronomy 18 terms	Mel, Lemon, Beer, Bagaceira Aguardente, Callum Wine, Negra Peire, Tigelada, Sweets, Honey bread, Borrachões de Castela Branca, Filhós, Fine cake, Carolo porridge, Azevias, Roasted goat, Maranho, Plangaio
Traditions 14 terms	Music: Mamia Faia “Lady of Death, Orders of souls, Canteicas, Parties and Carnivals, Tigelada Festival, Boom Festival, Lynx Festival, Mill and Clown Festival, Feijãoprado Festival, Academic Environment, Folkloric Group, Bells, Concertinas/adults, Orange/lemon Festival
Socioeconomics 3 terms	Local artisans, Restaurants, Rural tourism
Sports Activities	Geocaching, Trails, Fishing, Yoga Retreat, Paragliding, MTB, Climbing

7 terms	

4.3.2.6. Lesson Learned from Naturtejo CORE lab

The subsequent activities related to the crisis scenario and Role Play (Lessons Learned from Cultural Heritage and Community Resilience. Crisis Scenario Narratives and Lessons Learned from Cultural Heritage and Community Resilience. CORE Role Play) allowed us to extract some Lessons Learned related to human behavior, which can be analysed in terms of their relevance to the SyRI framework as well as to specific target groups (elderly, young people, FRs, ...)

Table 15. Lessons Learned in Naturtejo CORE lab

Lesson Learned from Naturtejo CORE lab	
Active Memory	**Addressing Unfulfilled Promises**: Follow through on commitments made to affected individuals and communities. *(important for maintaining trust and collective memory)*
Social Inclusiveness	**Valuation of Risk Professions**: Recognize and value the contributions of firefighters and other risk professionals year-round. *(inclusion of key professionals in the community)*
	Equitable Support Distribution: Ensure that support reaches those who need it most, regardless of connections or status. *(promotes fairness and equity)*
	Working Group with Mutual Support: Establish support groups, mainly for psychological support among professionals and affected individuals. *(fosters social cohesion and mutual aid)*
Socio-Economic Development	**Incentives and Support**: Develop incentives for population return, childbirth, and local economic growth, and support tourism and local businesses. *(drives economic recovery and development)*
	Renewable Energy Use: Increase the use of renewable energy sources and reduce reliance on fossil fuels. *(sustainable economic development)*
	Emergency Fund Utilization: Create and manage emergency funds to support affected businesses and local reconstruction efforts. *(economic resilience and support)*
	Defense of Local Companies: Advocate for the protection of large local companies due to their social and economic importance. *(supports local economic stability)*
Health and Wellbeing	**Safety and Health Support**: Address gaps in safety and health support, ensuring comprehensive coverage for all involved. *(ensures overall wellbeing during crises)*
	Psychosocial Support: Enhance psychosocial support for professionals and victims, including emotional and psychological support. *(directly related to mental health and recovery)*
	Bureaucracy Management: Simplify bureaucratic processes to reduce delays and prevent fraud, making support more accessible. *(improves access to resources and reduces stress)*

Adaptive Governance	**Bureaucracy Reform**: Tackle bureaucratic inefficiencies that can lead to delays or fraud, ensuring that governance processes are transparent and effective.
	Community Engagement in Governance: Work closely with local communities to develop resilient strategies, ensuring that governance is inclusive and responsive to local needs.
	Responsibility Distribution: Ensure that the responsibility for civil protection does not rest solely on firefighters, but is shared across relevant agencies and government bodies for a more balanced and effective response.
	Realistic Policy Planning: Ensure that cabinet planning and policy development are grounded in the realities of the affected areas, aligning governance with the actual needs of the population.

4.3.2.7. Local Heritage Drivers in Karsiyaka CORE lab

The activities in Karsiyaka were characterised by a larger number of participants, which resulted in the collection of more data. The initial brainstorming activity, conducted with four groups of participants, resulted in the identification of **86 terms** defining the values of Karsiyaka according with a multistakeholder perspective. Among these, emerged some prioritized terms and topics.

Table 16. Categorization of Local Heritage Elements in Karsiyaka CORE lab

Category	Terms
Culture and Traditions 29 terms	Atatürk's legacy Levantine lifestyle Historical vacation spot Being from Karsiyaka (sense of place) 35.5 (A local expression used to describe a person from Karsiyaka) Karsiyaka Sports Club (KSK) Sailing Club Tuna Patisserie Girne Avenue Mavişehir Residential Zone - in relation with swamp Crowd (in particular commercial zone of city centre) Horse-drawn carriages Strong sense of cultural belonging Migrant culture The trio of Rakı, Fish, and Mussels Flower festival Population Exchange Days (refers Independence War of Turkey in 1919) Liberty and comfort Respect for Ata to Mothers Race (Ata'dan Ana'ya Saygı Koşusu) Liberty and free lifestyle Neighborhood culture - neighborliness Gender equality (Women-friendly) Tolerance and progressiveness (Disability-friendly, animal rights) Laicism

	Local Festivities Festivals Carnival, Grand Fire, Kermesses Family Tradition, Passed Down Logging with Draft Horses The duo of Rakı - Fish (traditional gastronomic habit)
Urban and Recreational Spaces and Activities 23 terms	Karşıyaka bazaar Bostanlı - grassy area Constitution Square BOSPA (Bostanlı Bazaar) Sunset terraces Kucukavci Coffee Shop Yasemin Coffee Shop IZBAN (tram line of Izmir) Karşıyaka Commercial City Center Best balcony (kind of competition among the local community) Hergele Square Karşıyaka Commercial City Center Vegetable garden (Bostan) Sport activities, in particular athleticism Fishing Fancy Women Group Bicycle Tour Kayak Scouts Bostanlı Bazaar (BOSPA) Summer Markets Local Markets
Historical and Tangible Heritage 14 terms	Durmus Yasar Mansion (historical building) Karşıyaka Stadium (historical value and landmark) Latife Hanım Mansion (historical building) Zübeyde Hanım Mansion (historical building) Ankara Primary School (historical building) Greek houses Levantine (in particular historical Italian houses) Zübeyde Hanım (Atatürk's mother) Latife Hanım (Atatürk's wife) Human Rights Monument Women Rights Monument Karşıyaka Monument Symbol Monument - Dolphins Statue (Uçan Yunuslar Anıtı) Plates and ceramic remains (Neolithic Age 5000 B.C)
Nature and Landscape 16 terms	Sea Karşıyaka Pier Adjacent houses along the seaside promenade Swamp Flamingo Fisher shelter Karagöl Nature Park Ornekkoy National Park Yamanlar Mountain Little Yamanlar Hill Gediz Delta

	Dolphins Pelican Living Rivers Bostanlı Coast - Therapy - Observation terrace
Economic and Urban Values 4 terms	Mavişehir Residencial Zone Short Supply Chain Livestock Farming Wood Industry

In the conceptual mapping exercise, several topics were identified as priorities by the four groups, reflecting the unique cultural and social landscape of Karşıyaka:

- **Liberty and Free Lifestyle**: Karşıyaka is characterized by a strong sense of freedom and liberal values, particularly in terms of gender equality and personal expression. This is evident in the emphasis on a free lifestyle and the comfort women feel in the area.
- **Karşıyaka Commercial City Center**: The commercial heart of Karşıyaka plays a significant role in the community, serving as a hub for social interaction, economic activity, and cultural exchange.
- **Coast-Sea and Walking Culture**: The coastal area is central to life in Karşıyaka, not only as a natural feature but also as a space for recreation, socialization, and cultural activities. The tradition of walking along the coast highlights the residents' connection to the sea and the importance of public spaces.
- **35.5 Identity**: The term "35.5," derived from the car license plate of İzmir (35), is used by Karşıyaka residents to differentiate themselves from the broader İzmir community. It reflects a sense of elitism and local pride, underscoring the strong identity and distinctiveness of the Karşıyaka community.

Given the richer dataset available for Karşıyaka compared to other CORE locations, it is possible to identify several recurrent topics or aspects that receive greater emphasis:

Recurring and Significant Topics

- **Atatürk's Legacy**: The frequent references to Atatürk, his family, and related monuments underscore Karşıyaka's deep cultural and historical connection to the founder of modern Turkey. This connection highlights the district's pride in its national identity and its role in preserving the memory of Atatürk.
- **Levantine and Migrant Influence**: The presence of Levantine lifestyle elements, historical Italian houses, and references to migrant culture point to Karşıyaka's rich multicultural past. These influences have shaped the district's identity, contributing to its unique architectural heritage and diverse community life.
- **Nature and Coastal Connection**: The importance of natural heritage is evident in the numerous mentions of the sea, coastal areas, and parks. These natural features are not just part of the landscape but are integral to the lifestyle and identity of Karşıyaka's residents, reflecting a deep connection to the environment.
- **Community and Social Life**: Karşıyaka is marked by a strong sense of community, as seen in the emphasis on neighborhood culture, local markets, festivals, and the overall sense of belonging. Social bonds and communal activities are highly valued, reinforcing the district's reputation as a close-knit and vibrant community.

4.3.2.8. Lesson Learned from Karsiyaka CORE lab

The subsequent activities related to the crisis scenario and Role Play (Lessons Learned from Cultural Heritage and Community Resilience. Crisis Scenario Narratives and Lessons Learned from Cultural Heritage and Community Resilience. CORE Role Play) allowed us to extract some Lessons Learned related to human behavior, which can be analysed in terms of their relevance to the SyRI framework as well as to specific target groups (elderly, young people, FRs, ...)

Table 17. Lessons Learned from Karsiyaka CORE lab

Lesson Learned from Karsiyaka CORE lab	
Active Memory	**Cultural Heritage Enhancement**: Forming teams and collaborating with NGOs to transfer cultural heritage, knowledge, and experiences to future generations and other neighborhood residents. Creating digital archives and platforms to store heritage values and memories.
	Revitalizing Traditional Practices: The traditional Turkish practice of *imece* (communal cooperation and mutual aid) can be revitalized and integrated into community efforts, especially in revitalizing spaces and assigning new functions to agricultural lands.
	Historical Building Preservation: Applications for provincial governor's support and collaboration with development agencies can help preserve historical buildings, ensuring that cultural memory remains intact.
	Engagement with Elders and Storytelling: Encouraging elderly individuals to share their stories and experiences can help maintain cultural memory. Psychological support and motivational activities can help rejuvenate the spirits of those who feel disconnected.
Social Inclusiveness	**Community Collaboration and Volunteering**: Collaborating with NGOs, establishing teams like the Lokman Hekim Assistance Team, and creating fields of application for volunteers. Mobilizing volunteers for projects like restoration campaigns.
	Social Support Networks: Providing psychological support, ensuring community motivation, and creating temporary spaces for social interaction. Sharing information and experiences with municipalities and local governments to strengthen networks.
	Inclusivity in Disaster Management: Establishing neighborhood security units, organizing district heads (muhtars), and incorporating NGOs into local government organizations.
	Revitalizing Communal Spaces: Using communal efforts like *imece* to revitalize spaces, along with municipal permits. Organizing community days and planning to assign new functions to communal spaces (e.g., beekeeping, camping tourism).
Socio-Economic Development	**Merit-Based Employment and Organizational Efficiency**: Employing staff based on merit, collaborating with the private sector, and focusing on organizational change. Handling permits and legal obligations efficiently.
	Agricultural and Environmental Adaptation: Researching drought-resistant production models and learning nature-based solutions for rainwater harvesting. Collaboration with agricultural development support institutions and applying for support through agritourism models.
	Funding and Support for Local Businesses: Finding funding, reopening workshops with digitalization and government support, and ensuring the widespread adoption of products produced through cooperatives.

	Infrastructure and Technological Development: Developing technological infrastructure, creating mobile facilities for operations, and establishing digital platforms.
	Sustainable Collaboration with NGOs and Government: Creating sustainable collaborations between local governments, NGOs, and the private sector. Budget planning and requesting consultation and collaboration with social services.
Health and Wellbeing	**Psychological and Motivational Support**: Providing psychological support, establishing centers for mental health, and offering motivational support through various activities.
	Public Health and Safety Coordination: Improving coordination in healthcare, organizing volunteers, and ensuring access to medical support during crises are crucial for health and wellbeing. Sharing experiences and knowledge with other municipalities and governments can enhance this process.
	Ensuring Safe and Inclusive Spaces: Establishing temporary spaces for social interaction, ensuring safety for women, and maintaining living environments through risk analysis and security measures contribute to both physical and mental wellbeing.
	Community Involvement in Health: Engaging the community in health-related activities, such as firefighting training and creating needs lists, ensures that everyone is involved in maintaining a healthy and resilient community.
Adaptive Governance	**Identifying and Addressing Gaps**: Regularly assess and revise the lack of precautions, information, materials, and organization for first response to improve disaster preparedness.
	International Knowledge Exchange: Increase knowledge by contacting competent professionals from other countries who have successfully managed similar problems.
	Risk Analysis and Budget Allocation: Conduct comprehensive risk analyses and increase the municipality's disaster budget to ensure adequate resources for crisis management.
	Organizational System Overhaul: Implement necessary organizational changes, including workflow planning and preparing an inventory of essential hardware and equipment.
	Merit-Based Staffing: Employ staff, consultants, and technical specialists based on merit to ensure effective disaster response and recovery efforts.
	Utilize Scientific Infrastructure: Effectively use scientific infrastructure and discuss best practices to continuously improve learning and crisis response.
	Community Engagement and Motivation: Ensure community motivation by revitalizing the traditional Turkish practice of imece (communal cooperation), organizing community days, and getting support from the local community and NGOs.
	Neighborhood Security and Local Leadership: Establish and train neighborhood security units, and raise awareness among local leaders (muhtars) to enhance community-based disaster resilience.
	Environmental Monitoring: Incorporate air temperature measurements, such as recording the highest temperature in 85 years, into future projections and risk assessments to better prepare for climate-related challenges.
	Identifying and Addressing Gaps: Regularly assess and revise the lack of precautions, information, materials, and organization for first response to improve disaster preparedness.

4.3.2.9. Local Heritage Drivers in Crete CORE lab

The initial brainstorming activity, conducted with two groups of participants, identified 21 terms that define the territory from a multistakeholder perspective. Among these, "Value System" and "Traditions and Environment" emerged as prioritised terms. In the subsequent conceptual mapping exercise, a total of 66 terms were identified, encompassing various aspects of Crete's local heritage. The following analysis reflects the key themes prioritised by the two groups.

Table 18. Categorization of Local Heritage Elements in Crete CORE lab

Category	Terms	
Natural Environment 17 terms	**Biodiversity and Landscape**	Temperature increase Desertification Variety of products Unique fauna and flora Environmental makeup Distinct climate Lifted species Change in biodiversity Water shortage Geographic location
	Agriculture	Olive cultivation Animal husbandry (related Productions, as cheese) Mediterranean diet Variety Olive oil Grasses/edible flora Pharmaceutical
Culture and Traditions 31 terms	**Traditions and Folkore**	Cooking Method Oral Traditions/Stories Lyra instrument Local dances traditional rituals Myths Unique language Distinct dialect Expression methods Traditional Crafts/Techniques Water Mills Workers Pottery Old Professional Mantinades (Traditional Cretan Folk Poetry) (3) Cultural Events Musical Lyre Common/Poetry Types Of Dance Festivities

	Minoan culture & history	Identity Monuments
	Gastronomy	Greens And Herbs Traditional Medicine Healing Practices Health Benefits (1960s Research Studies) Different From Mediterrenean Diet Dietary Changes Variety Of Products Olive Cultivation The pica products (could refer to 'mezedes' or 'meze' dishes, which are small, flavorful appetizers or snacks, similar to bite-sized foods in Greek cuisine)
Tourism 6 terms	**Tourism**	Economy Tourism Effects on everyday life Bearing capacity Ecology Development Social economic factors related to Tourism
Society 12 terms	**Customs and morals**	Stigma/Stigmatization Racism Peculiar Justice System Bta (could stand for 'blood-tie association,' relating to groups where membership and relationships are based on familial connections) Illegal Use of Firearms Pointless Shootings
	Isolation	Lack Of Arable Land Pesticides Loss Of Local Varities Imported Food Supply Loss/Overproduction Of Products Food Sufficiency

Many aspects of Crete's cultural and historical dimension, such as its traditional arts, performance practices, and gastronomic heritage, underscore a deep connection with the island's unique identity and environment, revealing a rich tapestry of local customs, dialects, and historical narratives that shape its distinct character

4.3.2.10. Lesson Learned from Crete CORE lab

The subsequent activities, including the crisis scenario and the CORE Role Play (Lessons Learned from Cultural Heritage and Community Resilience), resulted in valuable lessons learned regarding human behavior. These lessons are detailed in the following table and are analysed in terms of their relevance to the SyRI framework and specific target groups such as the elderly, young people, and others.

Table 19. Lessons Learned from the Crete CORE lab

Lesson Learned from Crete CORE lab	
Active Memory	Document and preserve digital files and records related to cultural and historical assets, such as wood carving works, to recover valuable information lost during disasters.
	Build relationships with elders and use multimedia, such as video or audio recordings, to capture and preserve their stories and memories.
	Ensure ongoing maintenance and repair of historic monuments and churches to preserve cultural heritage and historical memory.
Social Inclusiveness	Create communal spaces, like takeaway stations, where people can meet and foster social interactions, especially for those living in temporary housing.
	Encourage children to engage in outdoor activities and participate in community events to maintain a sense of normalcy and social inclusion.
	Use existing social networks, such as churches, to support and connect with vulnerable populations, helping them integrate and recover.
Socio-Economic Development	Foster collaboration between municipalities, insurance companies, and other stakeholders to secure compensations and support economic recovery.
	Address the needs of communities affected by natural disasters through targeted restoration projects and applications for funding.
	Ensure transparency and clear communication about the safety and status of buildings to avoid uncertainty and rebuild trust.
Health and Wellbeing	Recognize the importance of a supportive social environment in helping individuals return to normalcy after a crisis.
	Prioritize empathy, counseling, and material support to address both immediate and long-term recovery needs.
	Facilitate open discussions about problems and seek advice from knowledgeable sources to support mental health and trauma recovery.
Adaptive Governance	Implement and upgrade preventive measures and the role of coordinating bodies to improve crisis management and resilience.
	Promote humility and responsibility in leadership to regain community trust and improve crisis response.
	Develop policies that enhance organizational response and create networks to address social and community issues as collective challenges.

4.4. Social Media Analysis of selected crisis actors

4.4.1. Introduction

This report presents an analysis of social media communication during disaster events, drawing on data from past cases to assess the effectiveness of communication and their impact on disaster response and preparedness. By examining how information was disseminated during specific disasters, this report aims to identify gaps in communication, evaluate the level of implementation of disaster risk awareness, and contribute to a deeper understanding of the human factors influencing these outcomes.

The findings of this analysis are integral to several key work packages within the RESILIAGE project. Specifically, the insights gained will inform the development of communication materials produced in Work Package 4 (WP4). Additionally, this report includes a gap analysis for five CORE Labs, which assesses the current state of implementation and highlights areas requiring improvement. The results of this analysis will also serve as a foundation for policy development initiatives conducted in Work Package 6 (WP6) and will identify critical needs to be addressed through capacity-building efforts designed in WP4. Through this comprehensive approach, the report aims to support the enhancement of disaster preparedness and response strategies across multiple facets of the project.

4.4.2. CORE Lab Reports

This section presents the findings from Social Media Analyses conducted across different CORE Labs, with each subsection dedicated to a specific CORE Lab. The results focus on Awareness Disaster Risk Analysis, examining how effectively each region's social media presence communicates disaster risk awareness before and after identified disasters. This analysis aims to provide insights into the strengths and gaps in current communication, contributing to better-informed disaster preparedness and response initiatives.

4.4.2.1. Famenne Ardenne Geopark

This report presents the findings from an analysis of social media public pages identified as influential actors within the region of the specific CORE Lab. The goal is to understand the role these pages play in shaping public awareness.

Study Case

The study case for this analysis is the **Famenne-Ardenne** CORE Labs. Next, is presented specific information related to this study case.

Identified Facebook Public Pages *(by July 2024)*:

- *VilledeMarcheenFamenne:* municipality - 15000 *followers*
- *villederochefort:* municipality - 4600 *followers*
- *VilledeDurbuy:* municipality - 2800 *followers*
- *AC.Nassogne:* municipality - 2900 *followers*
- *HottonOfficiel:* municipality - 2800 *followers*

Registered disaster(s):

- July 14, 2021: Flood

Data

Due to limitations in the social media data collection process, the following is a summary of the date range for which posts were successfully gathered.

- *VilledeMarcheenFamenne*: 2022-10-06 17:42:00 - 2024-07-08 08:08:00
- *villederochefort*: 2022-10-06 17:42:00 - 2024-07-08 08:08:00
- *VilledeDurbuy*: 2021-05-31 19:47:00 - 2024-07-08 12:11:00
- *AC.Nassogne*: 2022-05-15 16:30:00 - 2024-07-09 16:30:00
- *AC.HottonOfficiel*: 2021-07-16 13:12:00 - 2024-07-09 08:44:00

These limitations affected the analyses presented in this report, restricting the examination to content within the specified date ranges.

After data collection, data was cleaned and preprocessed in order to make it possible to analyze the posts. For the analysis related to the Awareness, only the ***VilledeDurbuy*** page and the ***AC.HottonOfficiel*** page produced useful material that could be analyzed as disaster risk awareness. Other pages were lacking data or produced results that were not useful for those analyses.

Awareness Analysis

In this section, we analyze the content of social media posts to assess the level of awareness related to the target disaster type. The analysis focuses on posts made during the 60 days leading up to the disaster as well as the 60 days following it, examining whether they discuss topics relevant to the event. Additionally, we evaluate the engagement metrics of these posts, including the number of Reactions, Comments, and Shares they received.

Information on Social Media Pages

The analysis of the social media posts from both ***villedeDurbuy*** and ***hottonOfficiel*** surrounding the flood on July 14, 2021, reveals similar communication patterns and highlights critical gaps in disaster preparedness awareness. Both pages demonstrate a reactive approach to disaster communication, with a strong emphasis on post-disaster recovery and support but a notable lack of pre-disaster awareness efforts.

(vi) Pre-Disaster Communication

- **Absence of Awareness Posts:**
    - **villedeDurbuy:** No disaster awareness posts were identified before the flood. This absence suggests a significant gap in proactive communication about flood risks, early warning signs, and preventive measures. Without such posts, the community may not have been adequately informed or prepared for the flood.

- **hottonOfficiel:** Similarly, this page also showed no pre-disaster awareness posts. This indicates a critical shortfall in engaging the community on flood preparedness, potentially leaving them underprepared for the event.

(vii) Post-Disaster Communication

- **Focus on Recovery and Support:**
  - **villedeDurbuy:** After the flood, posts focused on practical advice for managing flood damage, avoiding flood-affected areas, and safety during cleanup. The communication emphasized immediate recovery needs, including directing individuals to resources, providing mail redirection services, and offering safety advice.
  - **hottonOfficiel:** The page concentrated on providing essential items like furniture and appliances for flood victims, directing them to dedicated assistance pages, and discussing financial compensation. The focus was on meeting the immediate needs of those affected by the flood, ensuring they had access to critical resources and support.

(viii) Insights on Communication Changes

- **Shift from Prevention to Recovery:**
  - Both pages demonstrated a significant shift in focus after the disaster, moving from an apparent absence of communication on prevention to an intense focus on recovery. This reactive approach suggests that while the response was strong, there was little emphasis on preparing the community for the disaster before it occurred.
- **Lack of Pre-Disaster Engagement:**
  - The absence of pre-disaster posts on both pages highlights a crucial gap in disaster risk awareness. This lack of engagement could have contributed to lower community resilience and preparedness, making the impact of the flood more severe.

(ix) Gaps in Disaster Risk Awareness

- **Need for Proactive Awareness Campaigns:**
  - Both *villedeDurbuy* and *hottonOfficiel* would benefit from implementing proactive awareness campaigns. These campaigns should focus on educating the community about flood risks, early warning signs, and preventive measures. Such efforts are essential for enhancing community preparedness and resilience against future disasters.
- **Balanced Communication Strategy:**
  - It seems that there is a need for a more balanced communication that includes both pre-disaster preparedness and post-disaster recovery. While the post-disaster communication was comprehensive, incorporating regular posts about disaster preparedness and risk mitigation would ensure that the community is better equipped to handle future events.

Final Conclusion

The social media activities of both *villedeDurbuy* and *hottonOfficiel* following the July 14, 2021, flood reveal a strong commitment to supporting the community during the recovery phase. However, the lack of pre-disaster awareness and preparedness communication represents a significant area for improvement. Moving forward, both pages could adopt a more proactive approach to disaster risk communication, ensuring that their communities are well-informed and prepared before a disaster strikes. This balanced approach will not only improve community resilience but also mitigate the impact of future disasters.

4.4.2.2. Naturtejo Geopark

This report presents the findings from an analysis of social media public pages identified as influential actors within the region of the specific CORE Lab. The goal is to understand the role these pages play in shaping public awareness.

Study Case

The study case for this analysis is the **Naturtejo** CORE Labs. Next, is presented specific information related to this study case.

Identified Facebook Public Pages *(by July 2024)*:

- Bombeiros-Voluntários-de-Nisa*:* Firefighters - 6800 *followers*
- bombeiroscastelobranco*:* Firefighters - 4600 *followers*
- municipiocastelobranco*:* Municipality - 36000 *followers*
- municipiodepenamacor*:* Municipality - 29000 *followers*
- MunicipioIdanhaNova*:* Municipality - 109000 *followers*

Identified Facebook Public pages but not used for analysis:

- Bombeiros-Voluntários-de-Idanha-a-Nova: Firefighters - 7700 Followers
- Bombeiros-Voluntários-de-Oleiros-0506: Firefighters - 6400 Followers
- Bombeiros Voluntários de Proença-a-Nova: Firefighters - 1400 Followers
- Bombeiros-Voluntários-de-Vila-Velha-de-Ródão: Firefighters - 3600 Followers
- Municipionisa: Municipality - 17000 Followers
- Municipiooleiros: Municipality - 14000 Followers
- Municipio.deproencaanova: Municipality - 27000 Followers
- Município-de-Vila-Velha-de-Ródão: Municipality - 105 Followers

Registered disaster(s):

- August 1, 2023: Fire
- July 1, 2022: Fire
- October 1, 2017: Fire
- June 1, 2017: Fire

Data

Due to limitations in the social media data collection process, the following is a summary of the selected social media pages and its date range for which posts were successfully gathered.

- Bombeiros-Voluntários-de-Nisa: 2019-12-01 20:09:00 - 2024-07-11 23:07:00
- bombeiroscastelobranco: 2020-03-14 08:51:00 - 2024-07-18 11:17:00
- municipiocastelobranco: 2023-04-03 18:15:00 - 2024-07-17 21:32:00
- municipiodepenamacor: 2021-10-19 11:00:00 - 2024-07-21 13:30:00
- MunicipioIdanhaNova: 2022-11-22 16:27:00 - 2024-07-18 12:16:00

These limitations affected the analyses presented in this report, restricting the examination to content within the specified date ranges.

After data collection, data was cleaned and preprocessed in order to make it possible to analyze the posts. For the analysis related to the Awareness, only the ***Bombeiros-Voluntários-de-Nisa***, ***bombeiroscastelobranco*** and the ***municipiodepenamacor*** pages produced useful material that could be analyzed as disaster risk awareness. Other pages were lacking data or produced results that were not useful for those analyses.

Awareness Analysis

In this section, we analyze the content of social media posts to assess the level of awareness related to the target disaster type. The analysis focuses on posts made during the 60 days leading up to the disaster as well as the 90 days following it, examining whether they discuss topics relevant to the event. Additionally, we evaluate the engagement metrics of these posts, including the number of Reactions, Comments, and Shares they received.

Information on Social Media Pages

The analysis of social media posts related to the fires on August 1, 2023, and July 1, 2022, across three different pages—**Bombeiros-Voluntários-de-Nisa**, **bombeiroscastelobranco**, and **municipiodepenamacor**—provides a comprehensive overview of the disaster communication strategies employed and highlights several critical insights.

(i) 1. Pre-Disaster Communication:

- **Inconsistent Proactive Awareness:**
  - **Bombeiros-Voluntários-de-Nisa** and **municipiodepenamacor** both demonstrated a lack of pre-disaster communication in 2022, with no posts focused on raising awareness about fire risks. This gap indicates a missed opportunity to prepare the community before the fire incidents.
  - In contrast, **bombeiroscastelobranco** exhibited a proactive approach in 2022, providing several posts aimed at educating the public about fire risks and preventive measures. However, by 2023, this page also failed to maintain proactive communication, as no pre-disaster awareness posts were identified.

(ii) 2. Post-Disaster Communication:

- **Varied Approaches and Effectiveness:**

- **Bombeiros-Voluntários-de-Nisa** and **bombeiroscastelobranco** both showed a commitment to post-disaster communication. After the 2023 fire, **Bombeiros-Voluntários-de-Nisa** focused on promoting ongoing training and preparedness, indicating a forward-looking approach to fire safety. Meanwhile, **bombeiroscastelobranco** emphasized preventive tips and collective responsibility following both the 2022 and 2023 fires, although its 2023 communication was more reactive.
- **Municipiodepenamacor** displayed significant gaps, with no post-disaster communication following the 2022 fire and only a single post related to future preparedness after the 2023 fire. This inconsistency suggests a lack of focus on immediate community needs and recovery after disasters.

(iii) 3. Insights on Communication Changes:

- **Improvement and Decline in Proactivity:**
  - **Bombeiros-Voluntários-de-Nisa** showed an improvement in proactive disaster communication from 2022 to 2023, shifting towards more sustained and comprehensive messaging that included training and preparedness activities.
  - Conversely, **bombeiroscastelobranco** exhibited a decline in proactive engagement, as its pre-disaster communication became less prominent by 2023. This shift towards a more reactive approach could reduce community preparedness.
  - **Municipiodepenamacor** displayed no significant change or improvement between 2022 and 2023, consistently lacking both pre- and post-disaster communication.

(iv) 4. Gaps in Disaster Risk Awareness:

- **Persistent Awareness Gaps:**
  - Across all three pages, there were notable gaps in disaster risk awareness, particularly in the absence of pre-disaster communication. **Municipiodepenamacor** was the most consistent in its lack of engagement, missing critical opportunities to inform and prepare the community both before and after the fires.
  - The inconsistency in proactive communication across the pages highlights a need for a more uniform and sustained approach to disaster risk awareness.
- **Specific Concerns:**
  - It is concerning that **bombeiroscastelobranco**, representing the capital of the municipality, does not provide any consistent information about disaster risk management, despite the importance of this region in the broader context of municipal safety.
  - Although the social media pages of these municipalities have a substantial number of followers, which indicates a high potential for reaching the community, they are not fully capitalizing on this

opportunity to run effective awareness campaigns. This presents a critical opportunity for improvement.

- **Potential Gaps in Social Media Communication:**
  - The presence of various types of social media accounts, including public pages, people pages (representing organizations like "Bombeiros-Voluntários-de-Idanha-a-Nova"), groups, and even "Local Business" pages, raises questions about whether these are the most effective ways for disseminating public safety information. This suggests there may be a knowledge gap in understanding the best approaches to social media communication within these organizations.

Final Conclusion:

The overall analysis reveals both strengths and weaknesses in the disaster communication strategies employed across the three social media pages. While there have been some improvements in proactive engagement, particularly on **Bombeiros-Voluntários-de-Nisa** in 2023, significant gaps remain, especially in pre-disaster communication. The absence of consistent awareness campaigns and the reactive nature of many posts suggest that the communities may not be adequately prepared to face fire risks.

To enhance disaster risk awareness and community resilience, it is crucial for all pages to adopt a more proactive, consistent, and comprehensive communication strategy. This should include regular updates before disaster seasons, continuous community engagement on preventive measures, and robust support during and after disasters to ensure that the community is well-informed, prepared, and supported at all stages of a disaster.

Given the substantial following of these social media pages, there is significant untapped potential to improve disaster awareness and preparedness campaigns. Moreover, a reassessment of the types of social media accounts used to disseminate public information could help in overcoming the knowledge gaps and optimizing communication strategies for better community engagement.

4.4.2.3. Karsiyaka

This report presents the findings from an analysis of social media public pages identified as influential actors within the region of the specific CORE Lab. The goal is to understand the role these pages play in shaping public awareness.

Study Case

The study case for this analysis is the **Karsiyaka** CORE Labs. Next, is presented specific information related to this study case.

Identified Facebook Public Pages *(by July 2024)*:

- KARŞIYAKA-HABER-GAZETESİ*:* News - 11000 *followers*
- karsiyakabelediyesi*:* Municipality - 75000 *followers*

- izmiritfaiyesi*:* Fire Department - 4100 *followers*

Registered disaster(s):

- February 11, 2021: Flood
- May 30, 2019: Forest Fire
- October 22, 2018: Flood

Data

Due to limitations in the social media data collection process, the following is a summary of the selected social media pages and its date range for which posts were successfully gathered.

- izmiritfaiyesi: 2020-02-27 15:16:00 - 2024-08-10 08:21:00
- karsiyakabelediyesi: 2023-04-08 17:18:00 - 2024-08-14 19:28:00
- KARŞIYAKA-HABER-GAZETESİ: 2022-01-10 12:25:00 - 2024-08-14 12:23:00

These limitations affected the analyses presented in this report, restricting the examination to content within the specified date ranges.

After data collection, data was cleaned and preprocessed in order to make it possible to analyze the posts. For the analysis related to the Awareness, only the **izmiritfaiyesi** page produced material that could be analyzed for the disaster risk awareness. Other pages were lacking data or produced results that were not useful for those analyses.

Awareness Analysis

In this section, we analyze the content of social media posts to assess the level of awareness related to the target disaster type. The analysis focuses on posts made during the 60 days leading up to the disaster as well as the 90 days following it, examining whether they discuss topics relevant to the event. Additionally, we evaluate the engagement metrics of these posts, including the number of Reactions, Comments, and Shares they received.

Information on Social Media Pages

Given the limited number of pages available for this analysis, the results of this study are not fully conclusive, and further investigation may be necessary to provide a more comprehensive understanding. The challenges encountered during this analysis, including the high posting frequency on news-oriented pages and limitations on collecting posts from earlier disasters, further constrained the scope of the evaluation.

The high volume of posts on news-oriented pages made it difficult to isolate relevant content related to the disasters, complicating the assessment of their disaster communication. Additionally, the inability to access posts from earlier disasters hindered the ability to draw comparisons and evaluate changes in communication strategies over

time. These factors underscore the need for a more extensive and detailed examination to accurately assess the effectiveness of social media in disaster risk communication.

Considering the izmiritfaiyesi page, the analysis of social media posts related to the February 11, 2021, flood disaster provides some insights into the disaster risk communication efforts by the Izmir Fire Department. Before the disaster, the posts focused on showcasing the department's readiness and preparedness, highlighting their equipped organization and trained personnel. This proactive communication emphasized the department's ability to respond effectively to flood emergencies and underscored their commitment to emergency rescue interventions and continuous training.

After the disaster, the communication appeared to shift towards educational content, with posts focusing on training programs for firefighters, community awareness through disaster training sessions, and specific initiatives aimed at preparing village heads for future disasters, including floods. These post-disaster posts indicate a sustained effort to enhance community preparedness and resilience, reinforcing the importance of training and education in disaster response.

Although the posts before and after the flood disaster demonstrate a consistent focus on preparedness and training, the analysis cannot compare these efforts to previous disasters due to the lack of available data for earlier events. This limitation prevents a thorough evaluation of whether the communication evolved in response to lessons learned from past disasters. Nonetheless, the Izmir Fire Department's approach, as observed in this analysis, suggests a strong commitment to maintaining and improving disaster readiness through both proactive and reactive communication.

4.4.2.4. Crete

This report presents the findings from an analysis of social media public pages identified as influential actors within the region of the specific CORE Lab. The goal is to understand the role these pages play in shaping public awareness.

Study Case

The study case for this analysis is the **UoC** CORE Labs. Next, is presented specific information related to this study case.

Identified Facebook Public Pages *(by July 2024)*:

- *Protothemagr: News - 568000 Followers*

Identified Facebook Public pages but not used for analysis:

- *ΜΕΤΕΩΚΡΗΤΕΣ* - 61200 Followers
- *LIVE TALKS με τον Κώστα Μπογδανίδη* - 5900 Followers
- *Makeleionew - 35000 Followers*

Registered disaster(s):

- June 1, 2024: Heatwaves
- June 1, 2021: Earthquake

Data

Due to limitations in the social media data collection process, the following is a summary of the selected social media pages and its date range for which posts were successfully gathered.

- protothemagr: 2023-04-04 22:56:00 - 2024-08-13 20:36:00

These limitations affected the analyses presented in this report, restricting the examination to content within the specified date ranges. Due to limitations in obtaining data from the time range when the earthquake disaster occurred, it was not possible to include this event in the analysis.

After data collection, data was cleaned and preprocessed in order to make it possible to analyze the posts. For the analysis related to the Awareness, only the ***Protothemagr*** page produced material that could be analyzed for the disaster risk awareness. Other pages were lacking data or produced results that were not useful for those analyses.

Awareness Analysis

In this section, we analyze the content of social media posts to assess the level of awareness related to the target disaster type. The analysis focuses on posts made during the 60 days leading up to the disaster as well as the 60 days following it, examining whether they discuss topics relevant to the event.

Information on Social Media Pages

Given the limited number of pages available for this analysis, the results of this study are not fully conclusive, and further investigation may be necessary to provide a more comprehensive understanding. The challenges encountered during this analysis, including the presence of private pages, high posting frequency on news-oriented pages, and inaccessible content lacking detailed descriptions, underscore the difficulties in assessing social media communication effectively.

Private pages prevented data extraction, limiting the scope of the analysis. Similarly, the high volume of posts on news-oriented pages made it difficult to isolate relevant content related to the disasters, complicating the evaluation of their disaster communication. Additionally, posts on the "makeleionew" page lacked descriptions, offering only links to external news sites, which fell outside the methodology's scope. These limitations highlight the need for public, detailed, and easily accessible social media content to facilitate effective disaster communication and analysis.

Considering the Protothemagr page, the analysis of social media posts related to the heatwave disaster on June 1, 2024, reveals gaps in disaster risk communication. Both pre-disaster and post-disaster awareness posts were absent in the Protothemagr page, indicating a lack of both proactive and reactive communication. This shortfall suggests

that the community may have been left uninformed and unprepared to handle the risks associated with the heatwave, reflecting a broader issue in disaster preparedness and awareness.

The absence of any posts related to heatwave awareness before or after the June 1, 2024, disaster might point to a deficiency in disaster communication. This lack of engagement may have left the community inadequately informed about the risks and necessary precautions for heatwaves. To enhance disaster preparedness and response, it is crucial to adopt a more proactive and comprehensive communication. This should include regular pre-disaster awareness campaigns, accessible post-disaster guidance, and ensuring that all relevant pages are public and focused on disaster risk awareness. By doing so, communities will be better equipped to prepare for and respond to future disasters.

Considering the Protothemagr page, the analysis of social media posts related to the heatwave disaster on June 1, 2024, reveals gaps in disaster risk communication. Both pre-disaster and post-disaster awareness posts were absent, indicating a lack of proactive and reactive communication. This deficiency suggests that the community may have been left uninformed and unprepared to handle the risks associated with the heatwave, highlighting a broader issue in disaster preparedness and awareness. To address this, adopting a more proactive and comprehensive communication might be relevant, including regular pre-disaster awareness campaigns, accessible post-disaster guidance, and ensuring that all relevant pages are public and focused on disaster risk awareness. This approach will better equip communities to prepare for and respond to future disasters.

4.4.2.5. Trondheim

This report presents the findings from an analysis of social media public pages identified as influential actors within the region of the specific CORE Lab. The goal is to understand the role these pages play in shaping public awareness.

Study Case

The study case for this analysis is the **Trondheim Red Cross** CORE Labs. Next, is presented specific information related to this study case.

Identified Facebook Public Pages *(by July 2024)*:

- *Trondheimkommune:* The municipality - *30000 followers*
- *Brannogredningstjenesten:* Local fire department - *22000 followers*
- *Trondheimspolitiet:* Local police - *34000 followers*
- *adressa.no:* Local newspaper - *95000 followers*

Registered disaster(s):

- August 15, 2023: Fire
- September 2, 2022: Landslide
- August 27, 2022: Fire
- September 28, 2021: Landslide
- April 22, 2021: Landslide
- January 1, 2012: Landslide

Data

Due to limitations in the social media data collection process, the following is a summary of the date range for which posts were successfully gathered.

- Trondheimkommune: 2021-07-08 13:03:00 - 2024-07-04 13:14:00
- Brannogredningstjenesten: 2018-10-26 14:13:00 - 2024-07-05 10:33:00
- Trondheimspolitiet: 2021-10-18 19:25:00 - 2024-07-03 17:15:00
- adressa.no: 2023-05-27 21:01:00 - 2024-07-06 13:28:00

These limitations affected the analyses presented in this report, restricting the examination to content within the specified date ranges.

After data collection, data was cleaned and preprocessed in order to make it possible to analyze the posts. For the analysis related to the Awareness, only the **Trondheimkommune** page and the **Brannogredningstjenesten** page produced useful material that could be analyzed as disaster risk awareness. Other pages were lacking data or produced results that were not useful for those analyses.

Awareness Analysis

In this section, we analyze the content of social media posts to assess the level of awareness related to the target disaster type. The analysis focuses on posts made during the 60 days leading up to the disaster as well as the 60 days following it, examining whether they discuss topics relevant to the event. Additionally, we evaluate the engagement metrics of these posts, including the number of Reactions, Comments, and Shares they received.

Information on Social Media Pages

The comparative analysis of social media posts from **Brannogredningstjenesten** and **Trondheimkommune** reveals distinct yet complementary approaches to disaster awareness and communication.

(a) Brannogredningstjenesten page

- **Pre-Disaster Focus:** The posts consistently emphasize fire safety, with a strong focus on preventive measures such as the use of smoke alarms, fire drills, and responsible behavior in vulnerable areas. This reflects a longstanding commitment to educating the public about fire risks and promoting preparedness.
- **Post-Disaster Shift:** Following recent disasters, particularly the August 2023 fire, there is a noticeable shift towards more community-oriented and targeted outreach. The communication evolved to include organizing events like Fire Prevention Forums and educational visits, specifically targeting vulnerable populations such as children and the elderly. This shift underscores an increasing emphasis on community engagement and tailored messaging.

(b) Trondheimkommune page

- **Pre-Disaster Focus:** Before the August 2023 fire, the posts were similarly focused on raising awareness about fire risks, particularly those associated with extreme weather conditions. The use of historical incidents to stress the importance of fire safety highlights a proactive approach to linking past lessons with current preparedness.
- **Post-Disaster Broadening:** After the disaster, the communication broadened to address the impacts of climate change, including the risks of landslides triggered by increased rainfall. This shift from a fire-specific focus to a broader discussion of climate-related hazards indicates a comprehensive approach to disaster preparedness, involving both community and municipal levels.

(c) Key Insights and Comparative Analysis

- **Evolution of Communication:** Both pages exhibit a clear evolution in their communication of disaster awareness. While **Brannogredningstjenesten** has shifted towards more interactive, community-based efforts post-disaster, **Trondheimkommune** has expanded its focus to include broader environmental issues such as climate change, demonstrating a more holistic approach to disaster preparedness.
- **Targeted and Broadened Focus: Brannogredningstjenesten** has increasingly targeted vulnerable groups and emphasized the importance of tailored outreach. Meanwhile, **Trondheimkommune** has broadened its focus beyond fire safety to address interconnected hazards, reflecting a growing awareness of the multifaceted nature of disaster risks.

The combined analysis of Brannogredningstjenesten and Trondheimkommune pages might reveal a complementary approach to disaster communication. Brannogredningstjenesten focuses on deepening community engagement and targeting vulnerable populations, while Trondheimkommune broadens the conversation to include climate change and multi-hazard preparedness. However, the analysis also suggests that information regarding landslide disaster awareness is not frequently emphasized in the posts, indicating a potential gap in communication that could leave the public less informed about this specific risk.

Numerical Analysis

This section presents a quantitative analysis of social media engagement across the targeted social media pages before and after the registered disasters. The focus is on understanding the volume of posts, user interactions (comments, reactions, shares), and engagement trends for each page and disaster event.

Timely visual representations of the number of reactions (blue), comments (red) and shares (green) was created. The disaster dates are also represented (Fires in orange and Landslides in purple). The following image shows the graph.

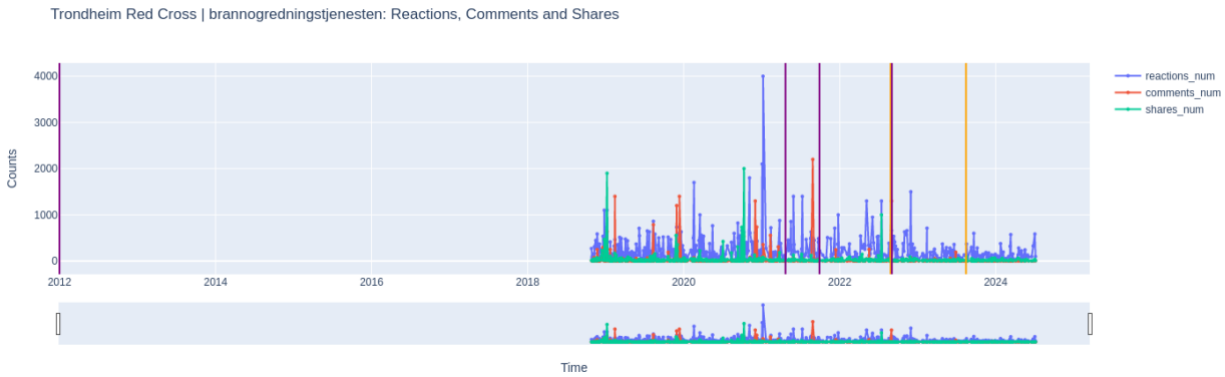

Figure 3. Brannogredningstjenesten interactions

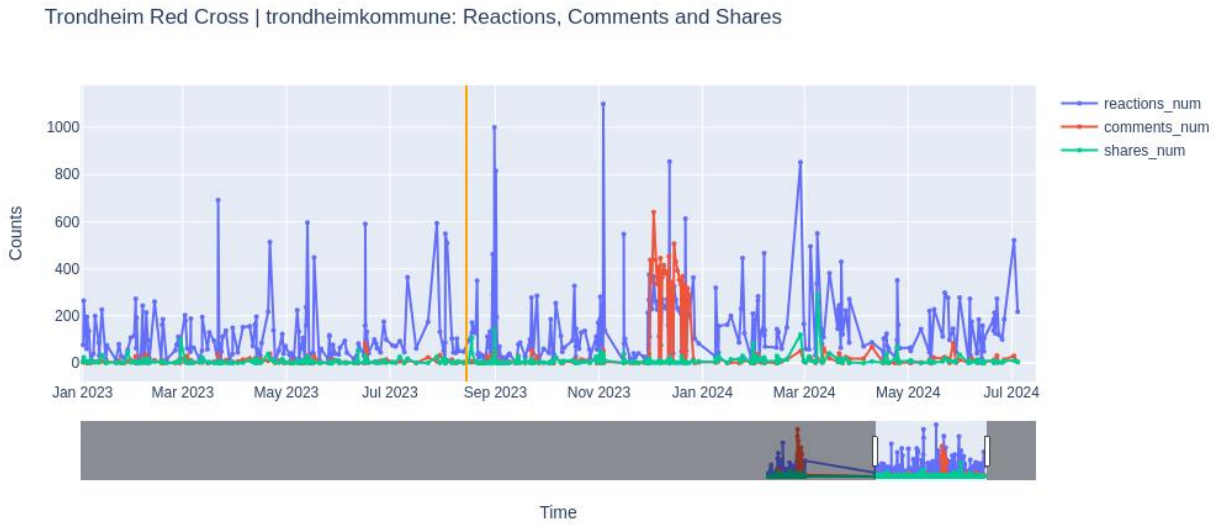

Figure 4. Trondheimkommune interactions

Notice here that the data, due to technical limitations, was not able to reach all disasters.

To facilitate the analysis and focus on the disaster awareness posts identified in the previous section, the following table summarizes the interactions each post received before and after each disaster, within a 60-day window, organized by page and disaster.

Table 20. Data Summary for Each Page and Disaster

		Total							**Averages/post**					
		Fire	Landslide	Fire	Landslide	Landslide	Landsli		Fire	Landslide	Fire	Landslide	Landslide	Landsli

							de							de
	Disaster Date	*D1*	*D2*	*D3*	*D4*	*D5*	*D6*		*D1*	*D2*	*D3*	*D4*	*D5*	*D6*
Brannogredningstjenesten	**Posts Before:**	3	4	2	3	5	-		-	-	-	-	-	-
	Posts After:	5	2	2	2	2	-		-	-	-	-	-	-
	Comments Before:	8	67	45	6	4	-		2.7	16.8	22.5	2.0	0.8	-
	Comments After:	0	11	11	6	10	-		0.0	5.5	5.5	3.0	5.0	-
	Reactions Before:	245	637	250	579	494	-		81.7	159.3	125.0	193.0	98.8	-
	Reactions After:	478	330	330	369	609	-		95.6	165.0	165.0	184.5	304.5	-
	Shares Before:	66	77	27	44	73	-		22.0	19.3	13.5	14.7	14.6	-
	Shares After:	35	13	13	19	31	-		7.0	6.5	6.5	9.5	15.5	-
Trondheimkommune	**Posts Before:**	2	0	0	0	-	-		-	-	-	-	-	-
	Posts After:	1	0	0	0	-	-		-	-	-	-	-	-
	Comments Before:	5	0	0	0	-	-		2.5	N/A	N/A	N/A	-	-
	Comments After:	1	0	0	0	-	-		1.0	N/A	N/A	N/A	-	-
	Reactions Before:	92	0	0	0	-	-		46.0	N/A	N/A	N/A	-	-
	Reactions After:	11	0	0	0	-	-		11.0	N/A	N/A	N/A	-	-
	Shares Before:	4	0	0	0	-	-		2.0	N/A	N/A	N/A	-	-
	Shares After:	1	0	0	0	-	-		1.0	N/A	N/A	N/A	-	-

D1 - August 15, 2023; D2 - September 2, 2022; D3 - August 27, 2022; D4 - September 28, 2021; D5 - April 22, 2021; D6 - January 1, 2012

From this numerical data, it is possible to observe that the **Trondheimkommune** page (Municipality page) seems to have started posting disaster awareness information

around the time of the last disaster. It might indicate a proactive communication that aims to prepare the audience for disaster awareness.

Although they have around 30000 followers, it seems that they don't have much interaction from the users regarding these disaster awareness posts. For the disaster that this analysis could reach, there were on average less Reactions, Comments and Shares per post after the disaster has occurred than the post after it. That might indicate less engagement about this topic from their public.

On the other hand, **Brannogredningstjenesten** page (Fire department page) seems to be more active on disaster awareness information over the years, what makes sense since they are a Fire Department. Although with fewer followers than the Trondheimkommune page (22000 followers), it seems they managed to have more engagement with the public. From the identified awareness posts, the average number of Reactions per post was most of the time higher after a disaster had occurred than before the disaster. It might indicate an increased level of public concern and engagement with disaster-related content in the aftermath, reflecting heightened awareness and a greater sense of urgency among the audience. On the other hand, the number of posts shared have decreased, which could suggest that while the content resonates on a personal level, users may feel less compelled to distribute the information further, possibly due to saturation of similar content or a belief that the immediate need for widespread dissemination has passed.

5. Comparative Assessment of Key Aspects of Crises and Response

In the face of divergent and region-specific crises, effective disaster management demands a deep understanding of the unique characteristics of each environment. The previous sections, covering coordination and management aspects of the CORE sites and respective crisis, have contributed to such deep local understandings. Nonetheless, a central tenet of RESILIAGE also maintains that each CORE site can learn from the knowledge, experiences, and doings of other CORE sites. Such learning may especially take place through exchange and comparison.

The below section aids such comparative endeavours, by assessing common and contrasting aspects across the five CORE sites. By identifying three comparative factors – the predictability and onset of crises, community response mechanisms, and local resource management – the comparative points below highlight both the strengths and vulnerabilities in the crisis management strategies of these regions.

These three comparative aspects were chosen because they each formed a continuous point of conversation amongst participants of the FG discussions, at each CORE site. It is clear from these three comparative aspects that, despite their many differences, all five CORE sites may provide valuable lessons for one another in how local settings and localised approaches can either mitigate or exacerbate the impact of disasters. Through the comparative lens opened and offered here, we can further explore the commonalities and contrasts in crisis response, shedding insights into broader crisis management practices.

1. Predictability and Onset of Crises

The predictability and progression of crises varies significantly across the five CORE sites, with some disasters arriving suddenly and without warning, while others unfold gradually, allowing time for preparation. These differences are not merely notional; they have profound implications for the effectiveness of crisis management, the coordination of response efforts, and the potential for mitigating damage. In each CORE, stakeholders and FG participants have underscored the importance of improving coordination through increased training, regular drills, and fostering a long-term perspective on preparedness. This suggests that, despite their different crisis profiles, all CORE sites could benefit from a more proactive approach to local DRM.

In **Famenne Ardenne**, floods are a recurring threat, but they generally follow a predictable pattern. Heavy rainfall over several days leads to rising river levels, giving the local population and first responders time to prepare. The ability to anticipate the crisis allows for a relatively organised response, with early warnings enabling preemptive actions such as evacuations and the reinforcement of flood defences. However, this predictability can be a double-edged sword. When multiple flooding sources converge, the complexity of the situation increases dramatically, potentially overwhelming the coordination efforts that are typically effective in more straightforward flood scenarios. This highlights the need for adaptive response strategies that can handle more dynamic and multifaceted crises.

By contrast, **Naturtejo** faces a far more unpredictable and volatile threat in the form of wildfires. Unlike the gradual onset of flooding in Famenne Ardenne, wildfires in Naturtejo can ignite suddenly, driven by erratic wind patterns and exacerbated by the region's declining population and economic activity. The shrinking number of residents, particularly younger people, has weakened the local community's ability to respond quickly and effectively. Communication in this rural area remains largely informal, relying on face-to-face interactions, which slows down the coordination of firefighting efforts. This contrasts sharply with Famenne Ardenne, where the established communication networks support faster and more coordinated responses.

Karsiyaka presents yet another distinct scenario, where the threat of heatwaves, though frequent, is not officially recognised as a disaster by local authorities. This has led to a lack of formalised early warning systems and a continued local reliance on traditional practices and informal networks for crisis management. In the absence of a centralised response framework, local customs such as checking on neighbors and limiting outdoor activity during peak heat hours become crucial survival strategies. However, these practices are not enough to fully mitigate the risks associated with prolonged periods of extreme heat, particularly as climate change intensifies the frequency and severity of heatwaves. Raising public awareness about the dangers of heatwaves and integrating these risks into formal disaster response plans could significantly improve the community's resilience and ability to protect its most vulnerable members.

Crete, on the other hand, faces the sudden and often catastrophic impact of earthquakes. Unlike the gradual onset of floods or even the unpredictability of wildfires, earthquakes strike without warning, leaving no opportunity for immediate preparation. The instantaneous nature of these events demands a reactive crisis response, as there is little that can be done in the moments leading up to the disaster. This has led to a focus on post-event recovery and rebuilding, but there is a growing recognition that long-

term preparedness is equally important. Such long-term preparedness might take shape through regular earthquake drills, public education campaigns, and the reinforcement of building codes – all of which could help reduce the impact of future earthquakes. The recurring risk of aftershocks further complicates the response efforts, as these secondary tremors can cause additional damage and prolong the recovery period. As such, the emphasis in Crete should be on strengthening long-term resilience rather than solely relying on reactive measures.

In **Trondheim**, the threat of a quick clay slide, though widely recognised, remains largely theoretical. That is, no major event has occurred to date, but the potential devastation of such a disaster has prompted significant preventive measures. Public and private actors alike are required to take precautions in construction and land use, ensuring that the risk of triggering a slide is minimised. Regular drills and training exercises help keep response plans and actors up-to-date and sharp, but without real-world experience, these plans remain largely conceptual and without empirical trouble-shooting. Furthermore, the lack of past incidents means that the full extent of the hazard has not been entirely internalised by the local population or even by some crisis responders, meaning that administrative-citizenry coordination efforts may prove haphazard in a real-world event. Such potential faults highlight the importance of continued vigilance and the need to translate theoretical plans into practical action should the worst occur.

2. Community Response

Across the five CORE sites, there is significant variation in community composition, ranging from sparsely populated rural regions that span large areas to highly-populated, high-density, and comparatively compact urban settings. These demographic and geographic differences play a crucial role in determining how communities can cooperate, communicate, and mobilise in times of crisis. The ability of a community to effectively coordinate response efforts during a crisis can be greatly impacted by its size, structure, and social dynamics. While larger communities may have access to more resources, smaller and rural areas often rely on tighter-knit relationships and informal networks. However, regardless of the size or composition of the community, FG participants across all CORE sites consistently reported that their communities tend to be close-knit, with members expressly willing to provide mutual aid and support whenever necessary. This widespread sense of solidarity and cooperation is encouraging, as it suggests that CORE sites can learn from each other's experiences and existing coordination mechanisms, and possibly adapt these to their unique circumstances.

In **Famenne Ardenne**, the local community is strengthened by the relative predictability of the local crisis patterns and by the existence of well-established and reliable communication channels between local authorities and residents. This allows for highly coordinated efforts when crises such as floods arise. The community benefits from a strong volunteer culture, with many citizens willing to contribute to response and recovery efforts. The organised nature of the community, along with a collective sense of mutual responsibility, ensures that even in times of crisis, there is a clear understanding of roles and procedures. The region's relatively stable population and long-standing traditions of cooperation have created a resilient community that can act quickly and effectively in the face of predictable disasters.

In contrast, **Naturtejo** faces significant challenges due to its aging and geographically dispersed population. The elderly and remote nature of the community means that outdated and potentially unreliable communication methods, such as landline telephones, are often the primary means of communication, which proves problematic during wildfires, as these may cause these systems to fail. Coordination efforts are further hindered by the slow, face-to-face methods of decision-making that persist in the region. This traditional approach conflicts with the urgent need for rapid coordination during crises, leaving the community vulnerable to delayed responses. Additionally, the demographic makeup of Naturtejo limits the number of available volunteers who can assist with crisis response. Many community members are physically unable to contribute to firefighting efforts or other forms of aid, – and, indeed, are members of vulnerable groups in need of assistance – further straining the region's ability to effectively manage wildfires. This highlights the critical local need for modernised communication systems and enhanced support networks, especially to better protect vulnerable populations.

Karsiyaka presents a different scenario, where community-based responses to heatwaves are deeply rooted in local traditions and informal practices. The widespread culture of neighbourly check-ins and the traditional avoidance of outdoor activities during the hottest hours of the day play a vital role in mitigating the risks associated with extreme heat. These informal systems of care and support help ensure that vulnerable individuals, such as the elderly or those with health issues, are not left to cope with the heat alone. However, the reliance on these informal mechanisms means that there is a lack of formal coordination structures in place, which could become problematic as heatwaves become more frequent and severe due to climate change. While the community's existing practices have proven effective in managing smaller-scale heat events, there is a growing need for more formalised systems to ensure that all members of the community are adequately protected in the face of increasingly extreme temperatures. Raising public awareness and integrating heatwave risks into official disaster response plans would significantly enhance the community's overall resilience.

In **Crete**, earthquakes frequently disrupt communities, causing members to become isolated and making communication and cooperation extremely difficult. The sudden nature of earthquakes often leaves little time for communities to organise, and the subsequent immobilisation of people during the event itself further complicates efforts to coordinate a response. After the initial shock, communication networks can be severely disrupted, leaving many without access to information or assistance. In such situations, official responses from local and national authorities are often slow and poorly coordinated, leading to frustration among affected communities. Despite the challenges posed by ineffective governance, communities in Crete have developed their own methods of coping with disaster recovery. In the absence of timely government support, community members often step in to provide charitable donations, financial aid, and emotional support to those in need. These grassroots efforts, while essential, also highlight the gaps in official crisis management and the need for more efficient and transparent communication from authorities during emergencies.

In **Trondheim**, although communication plans have been developed to address the risk of a quick clay slide, the lack of real-world experience with such an event means that many community members and FLRs may not fully grasp the severity of the potential crisis. The theoretical nature of the threat has left many unprepared for the cascading effects that a major quick clay slide could trigger, such as the collapse of telephone and

electricity lines. This lack of practical experience underscores the importance of ongoing education and training to ensure that both the community and crisis responders are ready to act decisively in the event of a disaster. Trondheim could also benefit from studying the experiences of other CORE sites, particularly those that have faced similar challenges and have developed effective informal community support networks. For example, learning from regions like Crete and Karsiyaka, where door-to-door checks and neighborly support have played crucial roles in crisis recovery, could help Trondheim strengthen its own community-based response efforts in the face of future threats.

3. Infrastructure and Resources

When comparing the crisis management infrastructure across the five CORE sites, it is clear that the preparedness and effectiveness of each region's response are heavily influenced by the nature of the crises they face. From the comparatively predictable floods in Famenne Ardenne to the untested quick clay slide prevention measures in Trondheim, each site showcases a unique relationship between its infrastructure, the types of crises encountered, and the challenges in mobilising resources to address them.

In **Famenne Ardenne**, the relatively predictable nature of floods allows for well-prepared infrastructure and early warning systems that are capable of handling most flood events. However, the region's capacity to respond could be strained by simultaneous crises, such as multiple flooding sources occurring at once, which would complicate response efforts and stretch available resources to their limits.

In contrast, **Naturtejo** faces more complex challenges due to its declining rural infrastructure, coupled with a shrinking population and weakened agricultural practices. These factors increase the region's vulnerability to wildfires, which are often unpredictable and exacerbated by changing climate patterns. Firefighting efforts in the region are further complicated by the need to balance saving crops with controlling the fires themselves, creating a difficult situation where resources must be divided between protecting livelihoods and containing the disaster.

Meanwhile, in **Karsiyaka**, the absence of formalised infrastructure for heatwave response forces the community to rely heavily on informal practices and traditional knowledge. Public awareness of the risks associated with heatwaves remains limited, and resource allocation is insufficient to adequately address the growing threat posed by rising temperatures. The community's reliance on informal practices highlights a gap in institutional support, which could be strengthened through the implementation of formal response strategies and increased public education.

In **Crete**, the sudden and unpredictable nature of earthquakes leaves little room for infrastructure to mitigate the immediate impact of these disasters. The abruptness of such events forces crisis management efforts to focus on recovery rather than prevention, with resources often stretched thin during the rebuilding phase. Additionally, there is widespread dissatisfaction with the official response from local and national authorities, further complicating the recovery process and highlighting the need for more effective governance and disaster preparedness.

Finally, in **Trondheim**, extensive precautionary measures have been taken to prevent the occurrence of quick clay slides. However, the theoretical nature of this crisis means that the region's infrastructure and resources have not been fully tested in a real-world scenario. The reliance on untested plans presents a potential vulnerability should a quick

clay slide occur, as the region's response mechanisms may not perform as expected under the pressure of an actual disaster. Nonetheless, the regular drills and preparations conducted in Trondheim reflect a proactive approach to crisis management that could benefit from the lessons learned in other CORE sites.

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Preserve Nature, Landscape, Biodiversity in Wallonia, retrieved from; https://territoire.wallonie.be/fr/page/preserver-la-nature-le-paysage-la-biodiversite

General information related to emergency measures for Namur, retrieved from; https://www.province.namur.be/

Crisis Management of Namur, retrieved from; https://www.gouverneurnamur.be/fr/securite/gestion-de-crise/

Crisis Management of Luxemburg, retrieved from; https://gouverneur-luxembourg.be/securite/gestion-de-crise/

Organization for Earthquake Planning and Protection website; https://oasp.gr

Greece State Aid website; https://arogi.gov.gr/

Ministry of Climate Crisis and Civil Protection website; https://civilprotection.gov.gr

Region of Crete website, civil protection page

Municipality of Heraklion website; https://www.heraklion.gr

7. Annex

7.1. Methodological Templates

7.1.1. Policy Analysis Matrix (DEM)

Core Lab:	Preparedness Plan			Feedback from Focus Group Sessions	Related DMC									
EVALUATION QUESTIONS	Yes / No	There are no info	Comment		Prevention	Preparation	Response	Recovery	Mitigation	Issuing Body	Target group	Source	Public	Rating
1: Institutional and Administrative Framework														
Existing Institutional Structure														
1. Is there a clearly defined and structured institutional framework for disaster management?														
2. Are roles and responsibilities for disaster management explicitly defined?														
3. Is the institutional structure aligned with national and international standards for disaster management?														
4. Is the hierarchical structure of disaster management institutions clear and effective?														
Operations														
1. Are the decisions related to disaster management tracked and reported?														
2. How effective is inter-institutional cooperation and information sharing?														
3. Are the procedures and protocols used in disaster management processes up-to-date and effective?														
4. Do they take into account all stakeholders? Are there specific target groups?														
2: Financing and Resources														
Budget Allocation														
1. Is there a specific budget allocated for disaster management?														
2. What percentage of the total municipal budget is allocated to disaster management activities?														
3. Are emergency funds readily available for immediate disaster response?														
External Financing and Support														
1. Are there partnerships with local, national and international organizations for financial support?														
Budget Management and Monitoring														
1. Are there systems for monitoring and tracking financial resources in disaster management?														
Resource Mobilization and Logistics														
1. Are there plans and systems for rapid mobilization of resources in case of disaster?														
3: Multi-hazard Risk Assessment														
Hazard Analysis														
1. Are there regularly updated risk analyses for different types of hazards?														
2. Do hazard analyses include historical disaster data and possible scenarios?														
Risk & Vulnerability Analysis														
1. Are up-to-date and detailed risk maps available?														
2. Do risk maps show different hazards and their potential impacts?														
3. Have the vulnerability levels of society and infrastructure been analyzed?														
4. Do vulnerability analyses include demographic data and socioeconomic factors?														
4: Infrastructure and Vital Facilities Protection and Resilience														
Infrastructure Protection and Strengthening														
1. Have risk assessments been conducted for critical infrastructures (roads, bridges, water and energy facilities)?														
2. Have alternative energy and water sources been planned for emergencies?														
3. Have alternative energy and water sources been planned for emergencies? Are alternative infrastructure systems regularly tested?														
Training and Drills														
1. Are there training programs organized to increase preparedness and response capacity for disasters?														
2. Is there training and drills organized to increase preparedness and response capacity for disasters?														
Protection of Vital Facilities: Education and Health														
1. Does the preparedness plan include emergency plans for educational and healthcare facilities?														
2. Have schools and hospitals been reinforced against disasters?														
3. Is there a plan to ensure adequate emergency supply stocks in schools and hospitals?														
4. Does the preparedness plan include strategies for the reconstruction and repair of infrastructure and critical facilities after a disaster?														
5: Building Regulations and Land Use Planning														
Renovation and Strengthening Projects														
1. Does the preparedness plan include renovation and strengthening projects to make existing structures resistant to disasters?														
Building Regulations														
1. Are there disaster-resistant building codes?														
2. Are there mechanisms to monitor the implementation of building regulations?														
Land Use Planning														
1. Do the city have regulations limiting land use in risky areas?														
2. Do the plans restrict construction in areas susceptible to natural disasters?														
6: Protection of Cultural Heritage														
Inventory and Documentation														
1. Does the preparation plan include detailed inventory and documentation of cultural heritage sites?														
2. Are tangible and intangible cultural heritage clearly defined?														
3. Is inventory information integrated into emergency response plans?														
4. Is cultural heritage taken into account (intangible) for preparedness?														
Risk Assesment														
1. Has a vulnerability analysis of cultural heritage sites against hazards been conducted?														
Protection Strategies														
1. Does the preparedness plan include strategies for protecting cultural heritage sites against disasters?														
2. Have the strategies been designed to include tangible and intangible heritage?														
7: Training, Education and Public Awareness														
Educational Programs														
1. Does the preparedness plan include training programs for disaster preparation and response?														
2. Do the training programs cover all processes for combating disasters (response, recovery, prevention, mitigation)?														
Trainer and Training Resources														
1. Does the preparation plan ensure that there are sufficient number of qualified trainers?														
2. Are training materials and resources up-to-date and comprehensive?														
3. Are they publicly available and to whom?														
Community Awareness Campaigns														
1. Does the preparedness plan include public awareness campaigns about disaster risks?														
2. Does the preparedness plan include disaster awareness and preparedness education programs in schools?														
3. Does the preparedness plan include raising disaster awareness through public service announcements and media campaigns?														
4. Does the preparedness plan include community-based disaster training and drills?														
5. Does the preparedness plan ensure the participation of the private sector and NGOs in disaster education and awareness activities?														
6. Does the preparedness plan include ongoing updating of training and awareness programs?														
7. Are all segments of the society (especially the vulnerable people) reached in public awareness activities? (gender equality)														
8. Is there a communication plan about disasters? How it can be communicated, through which channels, language to be used, etc ?														
8: Environmental Protection and Strengthening of Ecosystems														
Environmental Risk Assessment														
1. Does the preparedness plan include regularly updated risk assessments to identify environmental risks?														
2. Do the environmental risk assessments include the impacts of natural disasters on ecosystems?														
Environmental Protection Strategies														
1. Does the preparedness plan include environmental protection strategies and projects?														
2. Does the preparedness plan include projects for strengthening ecosystems?														
3. Does the preparedness plan include strategies for the conservation and rehabilitation of natural areas?														
4. Does the preparedness plan include strategies and projects for biodiversity conservation?														
5. Does the preparedness plan include strategies for the sustainable management of water resources?														
6. Does the preparedness plan include national and international cooperation strategies for environmental protection and ecosystem strengthening?														
9: Effective Preparedness, Early Warning and Response														
Preparedness Plans and Strategies														
1. Does the plan include preparedness strategies customized for different types of disasters (flood, earthquake, fire, etc.)?														
2. Are there mechanisms in place to oversee the implementation of preparedness plans?														
Early Warning Systems														
1. Does the preparedness plan include an effective early warning system?														
2. Are warning messages communicated quickly and effectively to different segments of the community?														
3. Does the preparedness plan include emergency response plans?														
4. Is the preparedness plan detailed according to various disaster scenarios?														
Communitation and Coordination														
1. Does the preparedness plan include effective communication and coordination strategies for disaster situations?														
2. Does the preparedness plan include the effective sharing of disaster risks with the community?														
3. Is there any plans for tourists or non Norwegian speakers?														
Performance Monitoring and Evaluation														
1. Does the preparedness plan include mechanisms for monitoring and evaluating disaster preparedness and response performance?														
2. Are the results of performance monitoring regularly reported?														
10: Recovery and Rebuilding Communities														
Recovery and Restructuring Strategies														
1. Does the preparedness plan include recovery and reconstruction strategies after a disaster?														
2. Are the recovery and reconstruction strategies detailed according to different disaster scenarios?														
Economic Recovery														
1. Does the preparedness plan specify the budget and resources allocated for post-disaster recovery and reconstruction?														
2. Does the preparedness plan include strategies for economic recovery and the restoration of livelihoods after a disaster?														
Recovery of physical structure														
1. Does the preparedness plan include strategies for post-disaster housing and infrastructure reconstruction?														
2. Does the preparedness plan include strategies for the reconstruction of educational and healthcare institutions after a disaster?														
Environmental Recovery														
1. Does the preparedness plan include strategies for environmental recovery and ecosystem restoration after a disaster?														
Social Recovery														
1. Does the preparedness plan include psychosocial support and healthcare services after a disaster?														
2. Does the preparedness plan ensure community participation in the recovery and reconstruction processes after a disaster?														

INTERACTIVE WORKSHOP FACILITATORS' GUIDE

Scope & Objectives

The general aim of the CORE lab Workshop sessions is to provide qualitative data to RESILIAGE WP2, in specific to T2.2 and T2.6.

*"**T2.2** will investigate the 5 COREs to assess their level of implementation reviewing the available formal provisions (plans, protocols, guidelines) and organisational practices (incl. past cases). Using the SyRI framework, it will conduct 5 focus groups with key crisis managers and front-line responders in each CORE to identify LL, local best practices dealing with limited capabilities, communal strategies to serve the needs of vulnerable groups."*

*"**T2.6** By considering the emerging indicators from the previous Tasks, this Task will co-map with local stakeholders the multilayered communities-environments interactions in the five CORE labs by providing georeferenced information, full visualisation and 3D models for advancing the analysis (T2.2, T2.3). It will include crowdsourcing campaigns with RESILIAGE tool (T3.2) and shape the information for the Atlas tool with User experience design and front-end support provided by (T3.3).*

More specifically, the Workshop focuses on:

- understanding how the local community define their territories in terms of main environmental, historical, and cultural characterizations
- understanding how local community interacts with the environment from a cultural and historical perspective
- extracting local narratives of disaster risk reduction
- extracting cascade effects related to the historical, cultural and environmental factors that intervene in crisis response
- extracting lesson learned related to the historical, cultural and environmental factors that intervene in crisis response

Format & methodology

The role of facilitators

In addition to the above-mentioned focuses, the workshop aims to activate and encourage interaction among participants. For this reason, facilitator should create small groups of 4 to 6 persons from participants. These small groups should be composed of representatives of diverse target groups.

In order to encourage interaction among participants, facilitators will take the role of guiding figures for providing indications and observers of interactions among participants. As seen in the table below, the workshop is structured in steps. Facilitator should guide the groups through these sections paying particular focus on keeping the track and correct flow of activities.

Groups will work on pre-prepared printed large A1 and A0 sheets on which participants will be asked to integrate their input. In each step, they will be asked to provide more input. For documenting the outcomes of the study, facilitators should also document by photographs the different stages of the workshop.

As the session is moderated by a skilled facilitator, the role of this person is one key to the success. To achieve this goal, a psychologically safe atmosphere where ideas are welcome to be shared and discussed is a crucial pre-requisite for the facilitator to continuously monitor. An efficient facilitator ensures that all the participants are involved in the flow of ideas and everyone 's opinion is well represented, without being suggestive on potential answers.

Facilitators are expected to make sure these key topics are addressed, however, handle them flexibly to leave room for the free flow of thoughts: "**In this discussion we are interested in learning how you perceive your territory with its cultural, historical, and environmental aspects, how you define best practices in your field, and what are the lessons learnt from your previous experiences**" in the local language. It is important to prime participants with this at the introduction, to encourage them to make references to such specific circumstances and contextual factors.

Logistics

Small groups will work in 4 to 6 people around a table/board.

Each group will have a **A1** or **A0 sheet prepared**. The A0 sheet that will be used in the session 1 is a map, thus it is specific to each CORE Lab. They will need sticker notes (post-its), pens, board markers, A0 translucent sheets.

To ensure that no information is lost in the process, **the workshop will be documented with photographs in different stages. In these photographs, the writings of participants should be readable.**

Participants will sign consent sheets to confirm their participation and processing of personal data, including being photographed at the session's opening.

Participants for the focus group sessions should be selected in a way that diversity of CORE lab key actors are ensured, and **all the key actors relevant to managing the respective CORE specific crisis scenario are represented**

In case there are two focus groups running in parallel, a homogenous and balanced set of stakeholders should be ensured in both sessions, to dive into the actual needs of the target groups involved.

Physical space: the meeting room for the sessions should be equipped with a table that all participants can gather around and share the same vision of the task as well as can see each other's faces (alternative can be a blackboard where the interactive sheet is hung).

Duration of the session: 2 x 1,5 hours.

Context specificity

Each session focuses on understanding the context specificity of each lab. Focusing on a past crisis/disaster of the territory as well as their experiences and lessons learnt from that area, and extracting the knowledge of participants about their territory, the Workshop requires a preliminary study and investigation of each territory.

Time frame:

While RESILIAGE is taking the general approach of the DRM cycle, the Workshop will focus on the recovery phase. This is due to the main focuses of the workshop, understanding lessons learnt and experiences of target groups, extracting the role of environment and human interactions in the context of disasters.

Workshop structure

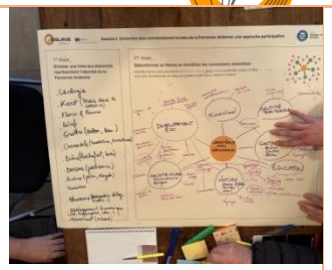
Session I.

Extracting Famenne-Ardenne Local Knowledge: a participatory approach.

The Workshop aims to co-identify Heritage characterization of CORE Labs territories by extracting and then geo-referencing cultural, historical and environmental factors emerged from the CORE direct experience. COREs' Heritage characterization will be identified through guided co-mapping activity.

Title	**What to do**	**Tools, equipment needed**	**Duration**	**Topics to be covered** **Example of potential questions to support the facilitator**
0_Preparation	Form small groups of 4-5 participants.			There should be small groups already created from the participants checking the registration form and signature list in the morning. It is important to include diverse user groups in each group.
1_Introduction to Workshop goals (ppt presentation)		PLENARY Projector, PC	5 mins	Presentation (ppt or similar) Project groups at the end of your presentation so everyone knows their group. After this, each group should move to a different space and start working around tables.
2_Warm-up: introduction of participants		IN GROUPS Split into 4 GROUPS	10 mins	Ask each one to introduce themselves (name and role) and ONE (1) term/object which represents Crete according to themselves.

(ask each one to introduce themselves, and say one item		of 4 to 6 people depending on the n. participant. Located in 2 rooms (2 facilitators + 2 assistants) A1 Board		*"Indicate a term that defines what Famenne-Ardenne means to you, and which remains valid across the past, present, and future"* *"For me Famenne-Ardenne region/area is: …"* They should write this thing on a post-it and stick to a white board.
3_Local knowledge extraction 	Co-identify CORE Heritage characteristics	IN GROUPS	15 mins	Activity "**Local Knowledge Extraction**": Confront in group and make a list of elements that represents the identity of the CORE region or a portion of CORE, historically, culturally but also from the socio-economic point of view (related for example to the productivity). Its value should have a lasting impact from the past to the present to the future (perhaps transforming over time). It can be a tangible or intangible element. Confront in group and select just one item that the group consider more relevant.
4_Local knowledge characterization	CORE Heritage characterization extraction (participatory)	GROUPS depending on the n. participants Printed canvas for	25 min	Once you have identified the single theme, place it at the centre of the table and create a conceptual map starting from it. This map should indicate in two steps which other aspects, cultural, historical, socio-economic, are connected to it: these can be traditions, foods, habits, buildings, monuments, ceremonies,

		Heritage characterization. (with schema of conceptual map)		holidays, myths, rituals, but also landscapes, stories, folk songs, recipes, products, …. *For example, if your chosen element is "beer," here are some categories you could use. You can create your own categories based on the element you choose and how it relates to the region of Crete or a portion of it.* *1_Choose a Central Theme:* ● *Start with your chosen element, such as "beer" in the example.* *2_Create Categories (green circles):* *Around the central theme, create categories or branches where related aspects will be placed. These categories can be the ones you listed earlier:* ● *Monastery* ● *Trappist beer route* ● *Landscape* ● *Drinking beer together in the square* ● *Seasonal beer festivals* ● *Stories* ● *Traditions* *Add Subcategories or Specific Examples (pink circles):Under each category, you can add subcategories or specific examples. For example:* ● *Monaster* ○ *Abbaye Notre-Dame de Saint-Rémy (Rochefort Brewery)* ○ *Brasserie de Bellevaux*

- *Historical role of monasteries in brewing*

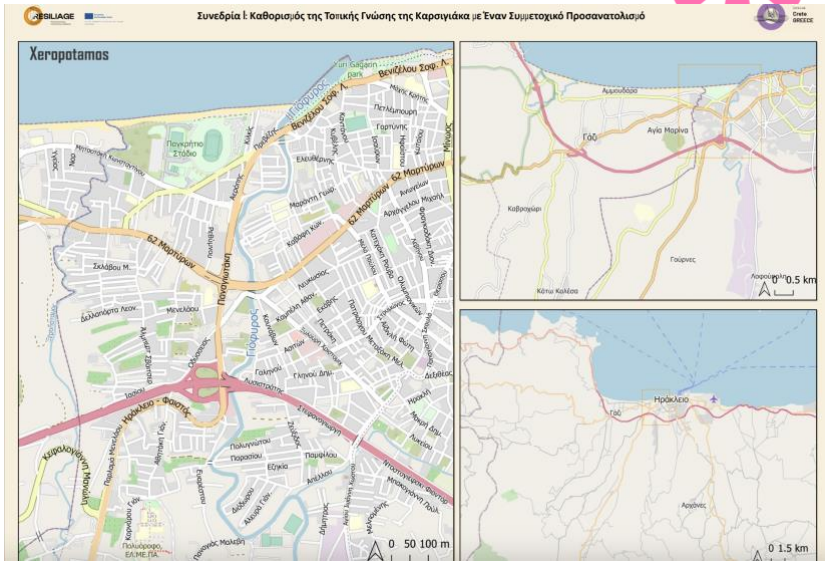
- *Trappist beer route*
  - *Orval Brewery*
  - *Chimay Brewery*
  - *Development of the beer route through history*
- *Landscape*
  - *Scenic views of rolling hills*
  - *Agricultural fields where hops are grown*
  - *Changes in the landscape due to brewing activities*
- *Drinking beer together in the square*
  - *Place de l'Europe in Marche-en-Famenne*
  - *Local pubs and bars*
  - *Historical gatherings and events in the square*
- *Seasonal beer festivals*
  - *Fête de la Bière in Marche-en-Famenne*
  - *Beer and Food Festival in Durbuy*
- *Stories*
  - *Legends of brewing monks*
  - *Historical accounts of brewing traditions*
  - *Anecdotes and tales related to beer culture*
- *Traditions*
  - *Beer brewing workshops*

				○ *Beer tasting events* ○ *Customs and rituals associated with beer consumption* Connect with Arrows or Lines: Use arrows or lines to connect the central theme (beer) to each category and subcategory or between subcategories. This shows the relationships between them and how they contribute to the overall narrative.
5_Crete Heritage co-mapping 	**Co-identify heritage drivers for community resilience in Crete trough co-mapping activity**	GROUPS big printed map with some elements already featured (green areas, main streets, main elements) Stickers post-it; markers; pens Colored skotch	20 min	Participants will be asked to identify and co-map on the a printed map (one for each group, they can choose which area) the Heritage items they identified in the previous activities. They will map on a multyscalar board, they will be able to choose between 4 different maps that compose the overall area of the geopark and affected area.
6_Crete Heritage Drivers co-mapping	**Co-identify heritage drivers for community resilience in Crete trough co-mapping**	GROUPS	20 min	Participants will then be asked remember a recent disaster on which they still have some memories.

	activity (whithin the Recovery framework identify coping strategies)	Stickers post-it; markers; pens		The effects of the earthquake of September 2021, Municipality of Minoa, Region of Crete, Participants will be asked to identify on the previous mapped heritage, which strategies has been adopted to reconstruct, replace, transform, … (Heritage drivers of resilience) which items. *How did you adapt to that loss?* *What's new has been generated from the loss?* Stick a post-it describing what happened in the recovery phase (not necesserly a positive thing)

For the co-mapping exercise, each group will be provided with a simplified map of the CORE Lab area with the simple representations of the natural elements (river, mountain), and significant landmarks. The map should be as simple as possible to allow participants draw over it. An example for the Crete case is provided below.


RESILIAGE
Session I. Extraction des connaissances locales de la Famenne-Ardenne: une approche participative
1re étape_
Dresser une liste des éléments représentant l'identité de la Famenne-Ardenne
2de étape_
Sélectionnez un thème et identifiez les connexions associées
Identifiez dans la liste précédente un thème central, placez-le au centre de la table et créez une carte conceptuelle, en indiquant d'autres sujets liés à l'élément central."


RESILIAGE
Συνεδρία I: Καθορισμός της Τοπικής Γνώσης της Καρσιγιάκα με Έναν Συμμετοχικό Προσανατολισμό
Xeropotamos
0 50 100 m
0 0.5 km
0 1.5 km

Session II

WS. Lessons Learned from Cultural Heritage and Community Resilience.

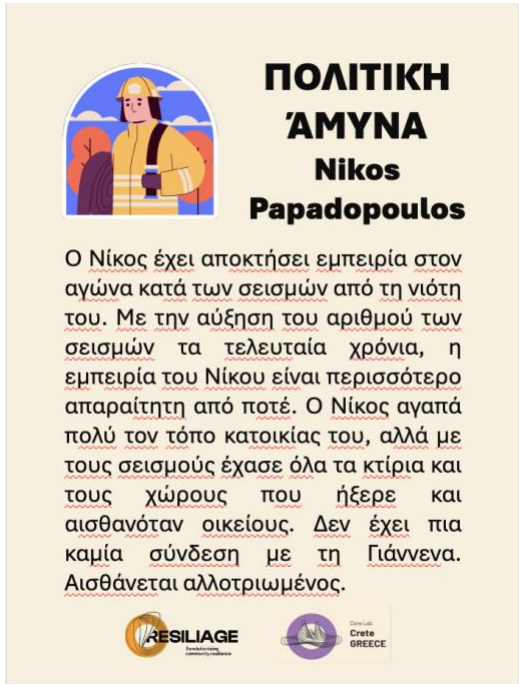
aims to co-identify LLs related to the historical, cultural and environmental factors that intervene in crisis response. LLs will be identified and discussed in relation to the SyRI framework.

Title	**Aim**	**Tools, equipment needed**	**Duration**	**Topics to be covered,** **Example of potential questions to support the facilitator**
Introduction to WS goals	In the second session, facilitators should briefly present the second part.	In GROUPS	5 mins	Introduction of the facilitators (and partners present) Introduction to the aim of the focus group activity Main ethical points addressed (data confidentiality, how data will be aggregated and used).
Crete Heritage Narrative (Storyboard)	Co-create Crete Heritage narrative	Groups	20 min (10 min + 5 each min for each sub-group)	Participants will then be asked to comment a newspaper narrative of the Crete disaster, or journalist photos and propose a format for a storytelling on the items they have co-mapped and the relative recovery strategies.
Introduction to the LLs ROLE PLAY	Introducing the methodology.	GROUPS	5 mins	Facilitators introduce the work to be done **Setup:** The setting and characters are introduced, establishing context and setting the stage for the challenges to come. **Conflict:** Characters face situations or problems that require decisions or actions (Hazard). These situations mirror real-world challenges that the learner might encounter.

				Decision Points: At key moments, the narrative may pause to allow the learners to make a choice on behalf of a character or suggest a solution to a problem. **Consequences:** Based on the decisions made, the story progresses in different directions, showcasing the outcomes of the choices. This branching structure illustrates the real-world implications of decisions and actions. **Resolution:** The scenario concludes, often summarizing the key learnings or reinforcing the course's main objectives. **Feedback and Reflection:** After the scenario plays out, learners are typically provided with feedback on their choices. This might involve insights into why certain decisions were better than others or how a situation could have been handled differently.
Role Play Activity	Co-identify LL in Crete and particularly refer them to the SyRI framework. Starting from the coping strategies they adopted from their own experience participants will extract LL.	GROUPS Scenario summary (short description and photos) Carachters Cards	5 min	SCENARIO ROLE-PLAY Introduction of the 4 SCENARIOs (1 for each group, 2 for each room)
Role Play Activity			20’	*4 diverse hazards scenario: 5 characters for each scenario. (see ex. Below)*

			Cards for each characters	**Elena**: The mayor, a determined and resourceful leader who is trying to keep spirits up despite the devastation. **Marcus**: The owner of the local bookstore, a beloved figure in the community who has lost his shop to the floodwaters. **Sofia**: A high school teacher. High, passionate about education and the well-being of her students. **Antonio**: A local musician whose instruments were all destroyed in the flood, leaving him without his means of livelihood and creative expression. **Jhon**: Juan, a young son of a family of rice producers, recently returned to promote the family tradition and to relaunch rice production.  *They chose one and the others have to suggest a solution according with their experience.*
Lesson Leard extraction		LL A1 board (1 for each group)	20’	**Resolution:** The scenario concludes, often summarizing the key learnings or reinforcing the course's main objectives. **Feedback and Reflection:**

				Participants are invited to summarize the LL that emerged from the and stick them on a printed boards.
Conclusion		PLENARY	20’	**Each group present in 5’ the LL’s board.**



Session I. Extracting Famenne-Ardenne Local Knowledge: A Participatory Approach

The Workshop aims to identify Heritage Drivers of Famenne-Ardenne by extracting and then geo-referring cultural, historical and environmental factors emerged from the CORE direct experience. Famenne Ardenne Heritage characterization will be identified through guided co-mapping activity.

Core Lab
Famenne - Ardenne
BELGIUM

1st step_

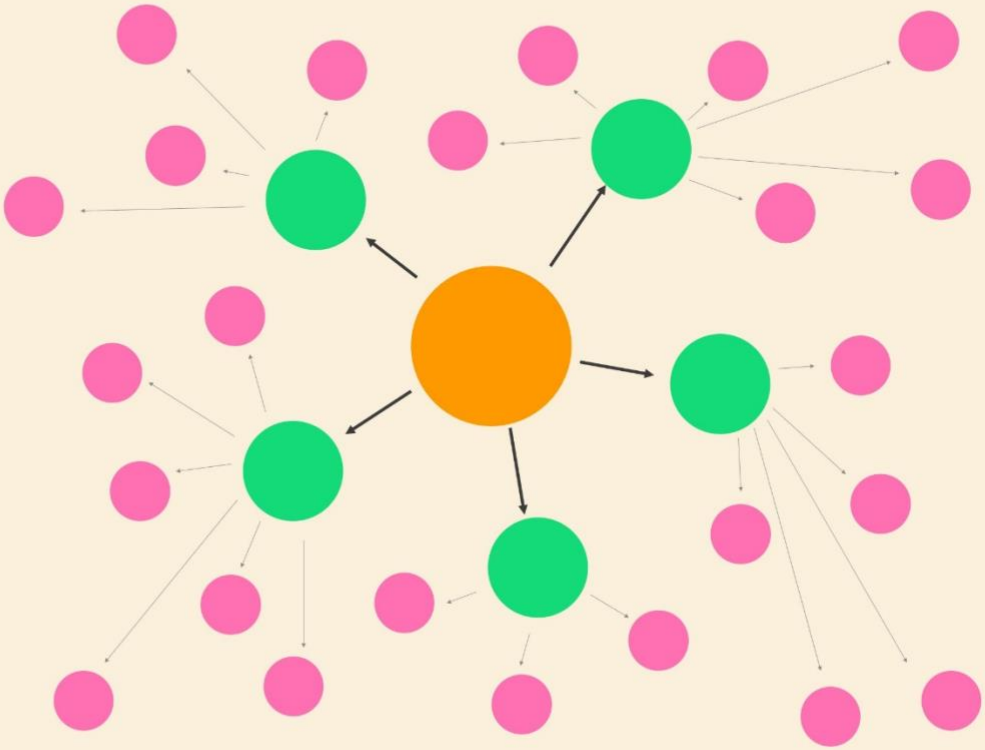
List of elements of particular value for Famenne Ardenne

Choose an element that historically and culturally represents the identity of the Famenne Ardenne region or a portion of Famenne Ardenne. Its value should have a lasting impact from the past to the present to the future (perhaps transforming over time). It can be a tangible or intangible element.

2nd step_

Select a theme and identify related categories

Identify from the previous list a **central theme**, place it at the centre of the table and create **categories** and **sub-categories** starting from it. Then, try to figure out if they are connected to different aspects and dimensions e.g. cultural, historical, and socio-economic perspectives.




RESILIAGE
Συνεδρία Ι: Καθορισμός της Τοπικής Γνώσης της Καρσιγιάκα με Έναν Συμμετοχικό Προσανατολισμό
Crete GREECE
Ηράκλειο_Ιστορικό κέντρο της πόλης
Venetian harbor
Βενιζέλου Σοφ. Λ.
Νεάρχου
Εφέσου
Χάνδακος
Κορωναίου
Σκορδύλων
Σαββαθιανών
Βαλέστρα
Δεληγιάννη
Γιαμαλάκη Στυλ. κ. Νικ.
25ης Αυγούστου
Δουκός Μποφόρ
Ικάρου
Ανθεμίου
Καλοκαιρινού
Μονής Καρδιωτίσσης
Τσιριγωτάνηδων
Δημοκρατίας
Σπιναλόγκας
Νικολάου Πλαστήρα
Δρακοντοπούλου
Πυρόνθου
Αυλώνος
Θενών
0 50 100 m
Ηράκλειο
Νέα Αλικαρνασσός
Αγία Μαρίνα
Καλλιθέα
Κνωσσός
Γούρνες
Λοφούπολη
0 0.5 km
Γάζι
Αρχάνες
0 1.5 km

Facilitators' Debriefing Space

The data recorded throughout the activity will be analysed through a "Cluster" thematic approach, where common themes will be clustered through post-its with the goal of highlighting what stood out during the discussion. Aside what is explicitly communicated during the activity, the analysis would benefit of the facilitator's observations throughout the whole WSs sessions. Facilitators are therefore asked to answer the following open-ended questions giving their own subjective perception on how the exercise went.

Facilitator's name:

Focus Group Session:

CORE:

MOMENTS THAT STOOD OUT
Where there specific moments that stood out during the activity? If yes, who was involved in the conversation, what happened and what was specifically discussed?
MEMORABLE QUOTES
Where there some quotes that stood out and that you think were memorable as well depicted a specific target group needs or feelings? Please insert the actor phrasing the quote followed by the quote as you remember it
OBSERVATIONS
Did you perceive any tension among stakeholders when asking specific questions or discussing specific topics? If yes, who was involved in the conversation, what was discussed, what do you think was the actual point of tension?
FEEDBACK ON THE ACTIVITY

Please provide your feedback on the overall activity. How did the activity go? What worked well and what worked poorly? Please provide here your suggestions on both Sessions so that we can fine tune and adjusts the next focus groups. We will get a chance to speak about this in more detail in a debriefing session so try to be concise and highlight the key aspects to be discussed further.

7.1.3. Focus Groups Facilitators' Guide (VIC)

Please find the detailed Facilitators' Guide of the focus groups documented in the annex of D4.1.

7.2. Ethical Templates

7.2.1. Informed Consent Procedures

Before the FG activities took place, each participant was asked to sign an informed consent form, ensuring that they knew how their personal data and opinions might be used. A copy of the informed consent form used for Famenne-Ardenne, the first CORE lab FG session, is reproduced below. All consent forms have been made available in the local languages.

Acronyme du projet RESILIAGE
Accord de subvention N° : 101121231

RESILIAGE Formulaire de consentement

Je, _____ [nom du participant] accepte de participer [à l'entretien / au focus group / à la formation / à l'atelier / à l'enquête/ à l'expérience/ au projet pilote].

L'objectif de [l'entretien / du focus group / de la formation / de l'atelier / de l'enquête / de l'expérience / du projet pilot] m'a été expliqué par écrit (dans la fiche d'information).

Je participe volontairement et je comprends que je peux me retirer de [l'entretien / du focus group / de la formation / de l'atelier / de l'enquête / de l'expérience / du projet pilot] sans aucune conséquence, à tout moment, en contactant le délégué des protections des données. Pour cela, je peux soit envoyer un courrier électronique à [l'adresse électronique du DPD], soit appeler [le numéro de téléphone du DPD].

J'ai été pleinement informé.e de la manière dont la protection de mes données sera assurée et je suis convaincu.e que les garanties d'une gouvernance responsable et stricte des données, apportées par le projet RESILIAGE, seront respectées.

Je comprends que l'anonymat, en supprimant toute information d'identification des protocoles et des transcriptions, sera assuré à chaque étape de la recherche dans le cadre du projet.

Une copie de la fiche d'information et du présent formulaire de consentement signé m'a été remise (au signataire).

- ○ Je consens à participer à cet [à l'entretien / au focus group / à la formation / à l'atelier / à l'enquête/ à l'expérience/ au projet pilote].
- ○ Je consens au traitement de mes données personnelles.
  - ○ Je consens à être enregistré.e
  - ○ Je consens à être pris.e en photo et que celle-ci soit publiée
  - ○ Je consens à être contacté.e par les partenaires du projet pour participer à d'autres activités

[Signature participant]

[Ville], [Date]

7.3 RESILIAGE Gaps, Best Practices, and Lessons Learned from the CORE lab Field Studies

RESILIAGE Gaps, Best Practices, and Lessons Learned from the CORE lab Field Studies			
Number	**CORE**	**Types (G, BP, LL, PP)**	**Description**
1	Famenne Ardenne	Gap	Innaccessibility of the Emergency Plan to the public; Lack of involvement of citizens in the creation of the Emergency Plan
2	Famenne Ardenne	Lesson Learned	Development of 2 page summary of the Emergency Plan for stakeholders
3	Famenne Ardenne	Gap	Limits of generic formal provisions in a large-scale crisis event
4	Famenne Ardenne	Gap	Absence of responsibilities checklist and protocol for transferal of power
5	Famenne Ardenne	Gap	Absence of guiding protocol for recovery phase
6	Famenne Ardenne	Gap	Tourists, visitors, and foreigners are variously unable or unwilling to cooperate due to linguistic unfamiliarity, unawareness of local context
7	Famenne Ardenne	Gap	Lack of risk/crisis culture
8	Famenne Ardenne	Gap	Lack of preparedness & awareness
9	Famenne Ardenne	Gap	Weak local resilience ordinances
10	Famenne Ardenne	Gap	Lack of cooperation

11	Famenne Ardenne	Gap	Lack of trust in (remote) experts
12	Famenne Ardenne	Gap	Lack of trust in emergency services & measures
13	Famenne Ardenne	Gap	Limits of basing (future) expectations, on (past) events
14	Famenne Ardenne	Gap	Language problems with specific groups (tourists, visitors)
15	Famenne Ardenne	Gap	Lack of citizens' involvement in crisis planning and preparedness
16	Famenne Ardenne	Gap	Lack of focus on recovery
17	Famenne Ardenne	Gap	Interregional and institutional solidarity not formalised
18	Famenne Ardenne	Gap	Responsibility overburdening of FLRs
19	Famenne Ardenne	Gap	Multiplicity of actors' roles
20	Famenne Ardenne	Gap	Dealing with uncertainty & lack of expertise for assessments
21	Famenne Ardenne	Gap	Challenges of authorisation, priorisation, and triage
22	Famenne Ardenne	Gap	Lack of clarity regarding the role of private-sector and tourism-sector actors during crisis
23	Famenne Ardenne	Best Practice	Local knowledge enables early warning
24	Famenne Ardenne	Best Practice	Identification of particular groups to protect
25	Famenne Ardenne	Best Practice	Identifying and integrating local resources into the crisis response
26	Famenne Ardenne	Lesson Learned	Initiatives to improve risk culture are being undertaken:
27	Famenne Ardenne	Best Practice	Regional investigations are useful for recovery measures:

28	Famenne Ardenne	Best Practice	Mobilisation of an emergency administrative unit, to help organise response efforts and to aid affected persons:
29	Famenne Ardenne	Best Practice	Utilisation of existing instruments, including regional risk maps:
30	Famenne Ardenne	Best Practice	Regional campaigns to increase awareness and foster geographical and cultural resilience:
31	Famenne Ardenne	Potential pathway	Create a register for vulnerable/special-needs groups
32	Famenne Ardenne	Potential pathway	Organise awareness-raising events with politicians
33	Famenne Ardenne	Potential pathway	Develop trust in official institutions
34	Famenne Ardenne	Potential pathway	Promote intergenerational activities
35	Famenne Ardenne	Potential pathway	Cultivate a culture of risk and preparedness
36	Famenne Ardenne	Potential pathway	Implement a digital solution for real-time data
37	Famenne Ardenne	Potential pathway	Erect memorials to past floods
38	Famenne Ardenne	Potential pathway	Involve engineers and experts in emergency plans
39	Famenne Ardenne	Potential pathway	Formalise inter-agency and inter-actor coordination
40	Famenne Ardenne	Potential pathway	Utilise existing geological maps for planning and response
41	Famenne Ardenne	Potential pathway	Establish a help desk for administrative matters like insurance and subsidies
42	Famenne Ardenne	Potential pathway	Provide training in post-crisis management
43	Famenne Ardenne	Potential pathway	Review urban planning to make buildings less permeable

44	Famenne Ardenne	Potential pathway	Update the flood zone map
45	Famenne Ardenne	Potential pathway	Implement and communicate the Flood Risk Management Plan (PGRI)
46	Famenne Ardenne	Potential pathway	Clearly communicate the end of the crisis to all stakeholders
47	Crete	Gap	Poor training of citizens & practitioners
48	Crete	Gap	Official coordination strategies, if they exist, are poorly conveyed to the local citizenry, stunting effective preparation and response
49	Crete	Gap	Emergency and safety protocols are poorly followed
50	Crete	Gap	Governmental checks ensuring effective preparation are irregular and poorly done
51	Crete	Gap	The state is viewed as incompetent and ill-prepared, stunting citizens' willingness to cooperate
52	Crete	Gap	Actors' roles and responsibilities remain unclear
53	Crete	Gap	Distribution of aid is conducted in an ad-hoc and ineffective manner
54	Crete	Gap	Lack of coordination of public and private organisations crisis repsonse plans
55	Crete	Gap	Lack of inclusion of vulnerable groups in crisis response plans
56	Crete	Gap	Citizens lack disaster training and education
57	Crete	Gap	During a disaster, telephone lines are overburdened
58	Crete	Gap	Post-disaster recovery efforts are mismanaged
59	Crete	Gap	There is a local culture of help and charity, but this culture is poorly harnessed and badly managed by officials
60	Crete	Gap	Post-disaster recovery was self-organised, with the state offering no directives or support

61	Crete	Gap	Many institutions – including police departments and volunteer organisations – lack systematised and rigorous regimens of training, exercises, and drills
62	Crete	Gap	Volunteers and some FLRs in Greece are poorly trained and prepared, meaning that much time during response efforts is taken up to train the volunteers
63	Crete	Gap	Local civil and political culture is not characterised by risk vigilance, nor by respect for ordinances
64	Crete	Gap	Municipalities lack the finances needed for improvement
65	Crete	Gap	Locals complain of trauma and marginalisation, but politicians seem not to care
66	Crete	Lesson Learned	Large residential units should have a building manager
67	Crete	Lesson Learned	Foster a culture of precaution
68	Crete	Lesson Learned	During disasters, Cretan and Greek culture calls for collective help
69	Crete	Lesson Learned	Enforce existing mandates, which stipulate that public bodies (and large private companies) must have an effective safety and security memorandum
70	Crete	Lesson Learned	Buildings and infrastructure should be made earthquake-proof; officials should crack down on illegal constructions
71	Crete	Lesson Learned	Priests, pivotal in disaster coordination, should learn first aid
72	Karsiyaka	Gap	Warning systems must be developed
73	Karsiyaka	Gap	Roles should be assigned
74	Karsiyaka	Gap	Academics and experts should be involved in planning
75	Karsiyaka	Gap	AFAD, the emergency body of the central government, lacks manpower and financing

76	Karsiyaka	Gap	AFAD does not recruit volunteers
77	Karsiyaka	Gap	Local volunteer organisations cannot act without AFAD's prior coordination
78	Karsiyaka	Gap	The roles of healthcare units and workers during heatwaves are poorly defined
79	Karsiyaka	Gap	The number of deaths or afflictions from past heatwaves is unknown
80	Karsiyaka	Gap	Heatwaves go hand-in-hand with power outages
81	Karsiyaka	Gap	Heatwaves are not seen as dangerous by some officials, nor by local citizens
82	Karsiyaka	Lesson Learned	Profit from the knowledge and skills of neighbourhood leaders
83	Karsiyaka	Lesson Learned	Establish an emergency telephone hotline for heatwave matters
84	Karsiyaka	Lesson Learned	Construct public cooling centres for citizens to use
85	Karsiyaka	Lesson Learned	Establish a back-up internet system, or strategies for operating offline
86	Karsiyaka	Lesson Learned	Mitigation and response strategies must also encompass environmental care, saving local flora and fauna
87	Karsiyaka	Potential pathway	Create a list of vulnerable individuals
88	Karsiyaka	Potential pathway	Create an inventory of energy-poor households and of buildings' thermal insulation
89	Karsiyaka	Potential pathway	Identify problems with the built environment
90	Karsiyaka	Potential pathway	Create a protocol of information-sharing & pre-determine actors' specific roles
91	Karsiyaka	Potential pathway	Integrate cascading effects into coordination protocols
92	Karsiyaka	Potential pathway	Synchronise FLRs' radio frequencies

93	Trondheim	Gap	Nationally: campaigns should inform citizenry of quick clay slides
94	Trondheim	Gap	Locally: signage and awareness should be improved
95	Trondheim	Gap	Individually: local residents should be contacted door-to-door
96	Trondheim	Gap	Legally: property sellers, landlords, or realtors should disclose potential risks to buyers or renters
97	Trondheim	Gap	Lack of clarity on which actor bears the brunt of responsibility for inter-agency coordination and reporting
98	Trondheim	Gap	For crisis-proof coordination, more communication channels must be in use
99	Trondheim	Gap	Too much information is digital-only nowadays
100	Trondheim	Gap	The digital coordination tool hasn't been battle-tested
101	Trondheim	Gap	Norway's civil defence education should be continuity-proofed
102	Naturtejo	Gap	Need for formal regulation
103	Naturtejo	Gap	Gap between formal policies and ground realities
104	Naturtejo	Gap	Gap in policy implementation
105	Naturtejo	Gap	Gap between formal policies and compliance/enforcement
106	Naturtejo	Gap	Good practices & resources limited to only high-risk areas
107	Naturtejo	Gap	Demographic and socio-economic problems
108	Naturtejo	Gap	Lack of trust and cooperation of citizens
109	Naturtejo	Gap	Loss of local practices and knowledge
110	Naturtejo	Gap	Lack of infrastructure

111	Naturtejo	Gap	Limits of digital communication and solutions
112	Naturtejo	Gap	Challenges in integrating volunteers and citizens
113	Naturtejo	Gap	Managing tourists during the crisis
114	Naturtejo	Gap	Lack of recovery measures
115	Naturtejo	Lesson Learned	Remaining local knowledge
116	Naturtejo	Lesson Learned	Local projects involving citizens aiming to diversify the forest
117	Naturtejo	Gap	Lack of prevention and mitigation training
118	Naturtejo	Gap	Lack of impact of information campaigns
119	Naturtejo	Gap	Lack of foresight/focus only on wildfire period
120	Naturtejo	Lesson Learned	Increased professionalisation of fire fighters
121	Trondheim	Lesson Learned	Tap the knowledge and capabilities of clubs, sports teams, faith communities, etc.
122	Trondheim	Lesson Learned	Formalise coordination plans, to prevent *ad-hoc* crisis response
123	Trondheim	Lesson Learned	Promote citizens' self-coordination
124	Trondheim	Lesson Learned	Use findings from past crisis reports to aid coordination plans
125	Trondheim	Lesson Learned	Micro-target specific vulnerable groups
126	Trondheim	Lesson Learned	Make use of the local culture of neighbourliness and cooperation
127	Naturtejo	Potential pathway	Improving criminal investigations through surveillance
128	Crete	Potential pathway	Mobilising the vast number of groups and associations
129	Trondheim	Potential pathway	Target preparation messaging to specific vulnerable groups

130	Trondheim	Potential pathway	An interpreting service would help coordination practical manoeuvres
131	Trondheim	Potential pathway	Coordination plans should have pre-set geographical coordinates for meetings and evacuation efforts
132	Trondheim	Potential pathway	Create table-top exercises for the home, to help citizens self-coordinate
133	Trondheim	Potential pathway	Integrate a situational plot, or layered map service, into existing emergency tools

RESILIAGE
Revolutionising
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