RESILIAGE

Revolutionising
community resilience

FROM FIELD TO MANAGEMENT: COOPERATING FOR RESILIENCE IN THE CORE LABS OF RESILIAGE

2nd Edition - 15th November 2024

www.resiliage.eu

Funded by
the European Union

INTRODUCTION

RESILIAGE is a three-year European research project (2023-2026) focused on enhancing community resilience through the integration of cultural and natural heritage in Disaster Risk Reduction (DRR). Funded by Horizon Europe, it explores how heritage, as a significant resource of local communities, can strengthen societal resilience in the face of natural hazards and extreme events. By conducting field research and engaging communities in multi-hazard scenarios, RESILIAGE aims to co-generate actionable knowledge, empowering communities to better prepare for and mitigate disaster risks, while also addressing the effects of climate change.

The project is led by Politecnico di Torino and involves 18 partners from 10 countries, including first responders, policymakers, citizen associations, and heritage organisations. Through its **five CORE Labs** established in different countries, RESILIAGE uses a **S**ystemic **R**esilience **I**nnovation (**SyRI**) framework to analyse governance, social interaction, and other critical factors. This framework identifies and improves practices that strengthen community resilience, using cultural heritage in disaster risk management and climate change adaptation. In addition, each CORE Lab specialises in a specific governance scale, including city district, municipality, municipality network, regional, and cross-regional.

By engaging stakeholders in collaborative and participatory processes, the project seeks to **create digital tools** and **soft solutions** that strengthen community preparedness and promote long-term strategies for disaster resilience.

CONTENT

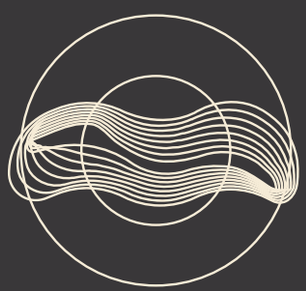
In this **Booklet #2 From field to management: Cooperating for resilience in the CORE Labs of RESILIAGE**, we explore the core findings of our field research conducted in various regions, including **Famenne-Ardenne, Crete, Naturtejo, Trondheim, and Karsiyaka**. These locations serve as key case studies for understanding the intersection of local heritage and community responses to diverse natural hazards, such as floods, earthquakes, wildfires, landslides, and heatwaves.

The results of the field research are inherently subjective, influenced by the unique experiences and perspectives of the participants. As such, this booklet captures and reflects their opinions and insights on the subject matter, providing a snapshot of their collective viewpoints.

Throughout 2024, RESILIAGE researchers engaged in **focus groups, interviews, and participatory workshops** with **local stakeholders, first responders**, and **community leaders**. These interactions revealed critical gaps in communication, preparedness, and the local governance of disaster risk. They also highlighted best practices that have been adopted by communities to address these challenges.

For instance, in the Famenne-Ardenne region, the 2021 flood was a devastating event that exposed **weaknesses in crisis coordination but also demonstrated the importance of community-based early warning systems**. Similarly, the Crete CORE Lab focused on the aftermath of earthquakes and the **role of local heritage in recovery efforts**, while the Naturtejo CORE Lab **underscored the struggles of rural areas to respond effectively to increasing wildfire risks.** In Trondheim, the focus was on the potential risks of quick clay slides, revealing both the **challenges and strengths of local disaster preparedness**. Meanwhile, the Karsiyaka CORE Lab examined the **impacts of extreme heatwaves**, highlighting the **importance of community-driven responses** in the absence of formal disaster classification.

Each region presents unique challenges and opportunities for improving local resilience, and **this document outlines both the obstacles faced and the strategies developed by communities to strengthen their response capabilities**. From enhancing early warning systems to fostering better coordination among local and national actors, the lessons learned across these CORE Labs are crucial for informing future DRR strategies.



Core Lab

Famenne - Ardenne
BELGIUM

FAMENNE-ARDENNE CORE LAB

THE RIVER: SHE IS OUR BIG BOSS

Core Lab
Famenne - Ardenne
BELGIUM

- **SyRI Framework**
  Socio-economic Resilience
- **Governance Scale**
  Cross-Regional

Recent floods in the
Famenne-Ardenne Geopark region

"The Geopark Famenne-Ardenne community is adapting its habits and learning to live to the rhythm of the rivers and floods."

Alain Petit,
Famenne-Ardenne
UNESCO Global Geopark Director

Description of field study

From **3 to 4 April 2024**, members of the **RESILIAGE Consortium**, including **sociologists, psychologists, and architects**, visited the **Famenne-Ardenne region**, hosted by local partners at the **UNESCO Geopark Famenne-Ardenne**. The purpose of the visit was to explore the region and learn from **local stakeholders** about their experiences with the **past and ongoing threat of flooding**.

On the first day, the visiting team went on a field trip around the **geopark**, exploring the local landscape and its attractions, including the renowned **caves of Han-sur-Lesse**, all of which were affected by the **July 2021 floods**. After this excursion, the **RESILIAGE Consortium** gathered at the **Domaine de Lomme** in **Rochefort**, where local partners facilitated **four focus groups** and **interactive workshops** with **community leaders, first responders, and local officials**. These sessions focused on assessing the **coordination and communication during the crisis**, identifying **gaps and challenges**, and drawing lessons from the response to protect the region's **cultural heritage**.

In the following week, **psychologists** from the consortium conducted **eye-tracking experiments** and studied the community's **risk adaptation behaviour**.

Particular characteristics of floods

In the crisis scenarios studied by the RESILIAGE project, **the timing, warning signs, and effects** can vary depending on the situation. In the **Famenne-Ardenne Geopark, high water levels** are a yearly occurrence, and floods happen every few years, with varying intensity. These floods are typically caused by **heavy rain**, which, over several days to a week, leads to **rising rivers**.

One early sign is **continuous rainfall** at a certain intensity. Since there are **known spots** where rivers tend to overflow first, **local communities and emergency responders** can prepare for potential flooding. Although the severity of each flood can vary, the overall progression generally follows a **predictable pattern** of **environmental changes**. This makes floods different from **sudden events** like earthquakes, landslides, or wildfires.

In most cases, **floods are somewhat predictable** and develop at a slower pace. However, when **heavy rain combines with rising rivers**, the situation can escalate more rapidly, leaving **citizens and authorities unprepared**. In **2021**, such a scenario reached an **unprecedented scale** and had **devastating consequences**.

The local context: the flood of the century

In **mid-July 2021**, the **Famenne-Ardenne region** experienced **catastrophic flooding**, described by experts as a **once-in-a-century event**. Triggered by extreme rainfall over two days, the floods were caused by **intense downpours** that inundated the area, overwhelming its rivers and causing them to overflow. This event followed a period of lighter rain, and just a month earlier, a *tornado* had already caused some damage, leaving the **soil partially saturated** and infrastructure weakened before the heavy rains arrived between **12-15 July**.

The region's river systems, including the **Ourthe, Lhomme**, and Lesse, saw u**nprecedented flow rates**, with the **Ourthe peaking at 374 m^3/s**, far surpassing its previous maximum of 234 m^3/s. The flooding devastated **202 of Belgium's 262 municipalities**, including the **Geopark**, and extended across parts of **western Germany and Luxembourg**. In Belgium alone, **42 lives were lost**, including one fatality within the **Geopark** area itself, in the village of **Hampteau**. Over **4,200 families** in the Geopark were directly affected, many losing their **homes and possessions**.

Public and private **infrastructure**, including **roads, bridges, homes, and businesses**, suffered severe damage, forcing many to close either temporarily or permanently. The floods caused a **partial collapse of communication networks** and disrupted access to **clean drinking water**, with damage across the affected regions amounting to **billions of euros**. Cascading effects included the urgent need for **emergency accommodation**, and many **tourist sites** were forced to close for extended periods, some reopening only after weeks of clean-up and repairs.

The disaster also triggered **contrasting behaviours among tourists**. Some cancelled their visits out of respect or discomfort, while others engaged in **"disaster tourism,"** visiting affected areas to view the damage. This voyeuristic curiosity further exacerbated the distress of residents, who were already struggling with the **emotional toll** of the disaster.

The floods set **historical rainfall records** in the region and marked one of the most **destructive natural disasters** Famenne-Ardenne had ever experienced. In the aftermath, numerous **governmental and scientific assessments** were conducted, including an **international collaboration** to study the event and its causes. Findings warned that **climate change** would likely bring more **frequent and intense rainfall** in the future, along with **periods of drought**. In response, the Geopark is organising **public sessions** to explain the risks posed by such natural disasters and raise awareness about **climate-related hazards**.

Challenges to, and good practice within, local DRR

The **focus groups** organised by RESILIAGE – which included **first responders, citizens, local crisis managers, and experts** – covered various topics surrounding **local crisis management, cooperation, and communication**. We found that the region, including and surrounding the **Famenne-Ardenne Geopark**, faces several **challenges and gaps** in its **crisis management and preparedness**. One of the most significant issues is the general **lack of a risk or crisis culture** among citizens, largely due to **insufficient educational efforts** about potential hazards. This results in poor preparedness and awareness at the citizen level, with many people lacking basic measures like **consistent insurance coverage** and using **inappropriate building practices**, such as putting off-the-grid gas tanks below ground. Additionally, **resilience ordinances**, designed to safeguard against crises, are rarely followed or enforced, further weakening **local resilience**.

Coordination during crises is also problematic, as seen during the **2021 floods**, where cooperation between municipalities faltered, despite **crisis centres** being set up. **Distrust among locals** towards **remote experts and emergency services** hampers formal crisis coordination efforts, often leading to d**elayed evacuations**. The **lack of citizen involvement** in crisis planning, **language barriers with tourists**, and a **lack of clarity** about the roles of **private and tourism-sector actors** further complicate effective crisis response and recovery efforts.

Despite these challenges, **focus group participants** identified several **key practices** that help ensure effective local crisis management. **Citizens**, with their **intimate knowledge of the area**, often play a vital role in **early warning systems**, alerting authorities when they notice a rise in water levels or heavy downpours. Their familiarity with local conditions and past experiences enables them to quickly identify potential threats and alert relevant authorities. Additionally, **local experts**, such as **speleologists and geologists**, provide valuable insights into the region's **unique geological characteristics**, allowing for **highly accurate and timely flood predictions**.

To enhance crisis response, the region is focusing on **identifying and integrating local resources**. This includes leveraging the potential of **cultural centres as refuge points** and utilising the **expertise of local organisations and individuals**. Furthermore, **improving early warning systems** and enhancing **risk culture** are essential components of disaster preparedness. By promoting risk awareness and developing **educational initiatives**, the region aims to ensure that all stakeholders are equipped to contribute effectively to **crisis prevention and response**.

Core Lab
Crete
GREECE

CRETE GREECE CORE LAB

WHEN NATURAL DISASTERS MEET MAN-MADE CRISES

Core Lab
Crete
GREECE

- **SyRI Framework**
  Active memory
- **Governance Scale**
  Regional

Facade of a house with cracked walls, damaged after an earthquake in Crete

"A sleeping memory is the fertiliser of any disaster, especially in relation to earthquakes."

Babis Fassoulas,
Head of Laboratory at Natural History Museum of the University of Crete

Description of field study

From **21-22 May, sociologists, psychologists, and architects** from the RESILIAGE Consortium, hosted by local partners of the **Natural History Museum**, visited Crete to explore the local terrain and engage with the community. On the first day, the group embarked on a **field trip to Arkalochori**, visiting the area affected by the **earthquake**.

They met with the **local community** and attended a meeting at the **local church**, where they spoke with the clergy, who played a key role in providing **essential supplies** in the immediate aftermath and beyond.

Returning to **Heraklion**, local language partners facilitated **four focus groups** and **interactive workshops** with **community representatives, first responders, and local administrators**. These sessions were designed to investigate the **coordination and communication** during the crisis, as well as the influence of **local heritage**, while identifying **gaps, challenges, and lessons learned**.

Over the next week, **psychologists** from the consortium conducted **eye-tracking experiments** and explored **risk adaptation** within the community.

Particular characteristics of earthquakes

Earthquakes present a range of **specific challenges and characteristics** that make them very different from other natural crises, such as floods, particularly in **Crete. Earthquakes in Crete** are less frequent than other natural disasters, like storms or floods, but when they do occur, they can be **far more destructive**. Unlike floods, which often come with **some warning** due to weather conditions, **earthquakes strike suddenly**, often in just a few seconds or minutes, causing significant damage to **buildings, roads, and infrastructure**, creating **immediate chaos and destruction**.

After the initial earthquake, there is often a period of **aftershocks**, smaller tremors that can follow the main earthquake for **days, weeks, or even months**, adding to the **uncertainty, anxiety, and fear** of further damage. The **recovery period** from an earthquake can last for **months or even years**, and unlike other natural disasters, the **damage tends to leave long-lasting scars** on both the landscape and the community.

Because earthquakes come **without warning** and cause such **rapid destruction**, they provoke a deeper sense of **fear and helplessness**. Unlike floods, where people can sometimes take **protective measures**, earthquakes offer **no immediate protection**, making them particularly **traumatic** for many people.

The Greek context: the polycrisis

In the last two decades, **Greece** has faced a series of overlapping crises, often referred to as a **"polycrisis"**, where multiple challenges occur simultaneously, worsening the country's situation and placing its people under immense strain. Greece has been at the forefront of the **migration crisis**, particularly since the early 2010s, as large numbers of r**efugees and migrants** fled **conflict zones** and war-torn regions, further impacted by **droughts**. This has created a significant **humanitarian challenge**, with Greece struggling to provide adequate **shelter, food, and support** to these migrants while also managing **tensions** between local populations and new arrivals.

Greece's **financial difficulties** intensified in the late 2000s when the country was hit by a **severe debt crisis**. Subsequent **austerity measures** included harsh cuts to **public spending, wages, pensions, and social services**, causing widespread **hardship** for ordinary people. Many lost their jobs, and **unemployment skyrocketed**, particularly among **young people**.

Like many other countries, Greece was severely impacted by the **COVID-19 pandemic**, which brought everyday life to a standstill in 2020. The pandemic strained the already weakened **healthcare system** and severely affected key sectors like **tourism**, a major pillar of the Greek economy.

Greece is also increasingly facing the impacts of **climate change**, with **wildfires, heatwaves**, and **extreme weather events** becoming more frequent and intense. Additionally, the country is experiencing significant **demographic shifts**, with an **ageing population, low birth rate**, and many young people **leaving rural areas** to move to cities or abroad. This trend of **urbanisation and outward migration** is leaving **rural communities** depopulated and struggling to sustain themselves.

Challenges & community-based practices in DRR

Aspects of crisis management, cooperation, and communication were discussed in **two focus groups** involving **first responders, citizens, local crisis managers**, and experts over the course of two days. **Responding to earthquakes in Crete** presents specific challenges that affect the island's ability to prepare for, respond to, and recover from such disasters. These challenges stem from **gaps in preparation, response and recovery efforts**, as well as a **deep-rooted distrust** in state institutions, all of which make managing an earthquake crisis particularly difficult.

One of the main challenges in Crete is the **lack of a strong "risk culture."** While there is some level of **disaster preparedness training** in schools and kindergartens, it is not widespread enough to create a culture of readiness across the population. Additionally, while there are **regulations and protocols** in place for crisis situations, they are often **not followed or monitored**, leading to a lack of awareness and knowledge about how to handle earthquakes, which impacts the **speed and effectiveness of the response** when a crisis occurs.

When an earthquake strikes, the initial response in Crete is often **improvised by local volunteers** and **first responders** before the national response mechanism is activated. This **community-based response**, often organised by or with the **Greek Orthodox Church**, shows a strong sense of **local solidarity**, but there are significant challenges. The **roles and responsibilities** of those involved in the response are often **unclear**, leading to **confusion and delays** in action.

The **recovery process** remains largely **localised**. Local municipalities often lack the **financial resources** needed to assess and repair the damage caused by the earthquake. Moreover, the process of obtaining **national approvals and funds** to support recovery is **slow**, leaving communities in a prolonged state of **uncertainty**. People who attempt to **rebuild privately** face risks, as they may not be reimbursed for their efforts due to **delays in fund distribution**. As a result, what begins as a natural disaster often turns into a **man-made crisis** during the recovery phase, as **temporary solutions** like container housing become **permanent**. This prolonged instability can lead to **social problems**, including **alcoholism and domestic violence**.

One of the most significant challenges is the **high level of distrust towards state actors**. People are wary of the state's intrusive measures during the immediate response to an earthquake, and there is **mistrust in how recovery funds are managed**. In many regions, particularly deprived ones, there is a belief that daily life continues not because of government regulations, but **despite them**. This creates a barrier to the **implementation of policies** and effective cooperation between the state and local communities. An important problem in recent years is the spread of fake news by social media, which was very intense in the case of this earthquake.

Vulnerable groups, such as the **elderly** and **people with disabilities**, are at greater risk during and after an earthquake. While there are **mutual support groups** and organisations that could provide help, these resources are often **underutilised** in disaster planning and response. **Tapping into the potential** of these societies could significantly improve outcomes for vulnerable populations.

Despite these challenges, there is a **strong culture of help, charity, and volunteerism** in Crete. When disasters strike, people come together to offer donations and **voluntary assistance**. However, these efforts often suffer from **poor coordination** and **ineffective management**, which limits their overall impact. With better organisation, these **community-based efforts** could play a crucial role in improving both **immediate responses** and **long-term recovery**.

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Naturtejo
PORTUGAL

NATURTEJO CORE LAB

NAVIGATING WILDFIRES: CHALLENGES AND LOCAL RESILIENCE

Core Lab
Naturtejo
PORTUGAL

- **SyRI Framework**
  Social interaction and inclusiveness
- **Governance Scale**
  Municipality network

View from the Naturtejo Geopark area after wildfire

"If there are 200 ignitions within a few hours, the cause cannot be natural."

Carlos Carvalho,
Scientific Coordinator of the Naturtejo UNESCO Global Geopark

Description of field study

From **22-23 April, sociologists, psychologists, and architects** from the RESILIAGE Consortium, hosted by local partners of the **UNESCO Geopark**, visited **Naturtejo** to explore the local terrain and engage with the community.

On the first day, the group embarked on a **field trip** to **Figueira, Siza Vieira on the Talhadas Mountain, Sobral Fernando**, and **Portas de Almourão**, visiting areas affected by wildfires. They met with the local community and visited the **local fire station**, which played a key role in the ongoing response during the fires.

Local partners facilitated **four focus groups** and **interactive workshops** with **community representatives, first responders, and local administrators**. These sessions were designed to investigate **coordination and communication during the crisis**, as well as to identify local heritage drivers, **gaps, challenges, and lessons learned**.

Over the following week, **psychologists from the consortium** conducted **eye-tracking experiments** and explored the community's **risk adaptation** strategies.

Particular characteristics of wildfires

The crisis in **Naturtejo** is marked by a dangerous combination of increasingly **intense wildfires** and a community struggling to respond effectively to emergencies. This vast rural area, which is **sparsely populated**, primarily relies on **informal, face-to-face communication** for decision-making—a method that is slow and clashes with the need for quick actions in modern emergencies. The situation is further complicated as wildfires and heat frequently **damage communication systems**. The **elderly and remote population** depends on landline phones, which often fail during fires, making communication difficult.

Traditionally, locals detect fires using their senses — **feeling the wind, smelling smoke, or spotting flames**. Even today, some citizens continue to rely on this traditional method. With a predominantly **older and scarce population**, there **are limits to the communal support** (food, drinking water supply) to firefighters, during the intense fire periods.

Years of **government policies focused on centralisation** and encouraging migration to cities have caused the **population to shrink and age**, leading to a decline in **farming** and the local economy. This worsens the fire risk, as fewer people are engaged in agriculture and traditional practices like forest maintenance, leaving the land **dried out** and increasingly prone to wildfires. Despite this, **agriculture, particularly vineyards**, remains vital to the local culture and economy. As a primary focus of firefighters is on the immediate control of the fires itself, this natural heritage is at particular risk. Economic struggles in the region have also led to **fires being deliberately started for profit**. People may clear land by burning it or sell burnt timber. Efforts to protect the forests have been less effective because **most of the land is privately owned**. Finally, **climate change** is exacerbating the problem, bringing more **intense heatwaves** and altering **wind patterns**, making fire prediction and response even more challenging in the region

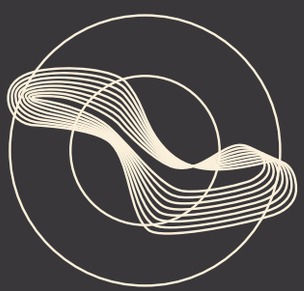
Community-based practices in DRR

In Naturtejo, wildfire **management and prevention** efforts have good intentions but face several challenges in their execution. National programs like the **"Safe Village, Safe People"** aim to improve community coordination and communication during wildfires. This program assigns specific responsibilities to local individuals and designates safe gathering spots for residents during emergencies. However, its **implementation is uneven**. Some residents receive emergency kits and training, while others do not, showing gaps in resource distributionand community preparedness. The **civil protection strategy** in Portugal focuses on four key areas: planning, prevention, response, and recovery. Unfortunately, planning and prevention—two critical pillars—are often neglected. **Forests** are not adequately maintained, and preventive measures like clearing and managing forestland are insufficient, which allows fires to spread more easily and become harder to control. Although some villages have implemented **safety and evacuation plans**, the consistency of these efforts varies. Initial training may take place, including simulations using whistles or other signalling methods, but follow-up sessions are rare, limiting their effectiveness in preparing communities for emergencies. The central issue with these programs is the **inconsistency in execution**. While the goal is to involve communities in wildfire risk management, the reality is that the programs lack uniformity in training, resource allocation, and preventive action. To improve these efforts, a more consistent approach to training, forest management, and the implementation of safety measures is needed across all levels of civil protection.

When a fire breaks out, **local leaders often coordinate** the initial response. In some villages, traditional methods like ringing church bells are still used to alert the community, although this is not common everywhere. However, the broader coordination of **emergency responses tends to be centralised**, with key decision-makers based in urban centres like Lisbon. On the front lines, emergency responders primarily use radio systems to communicate with command centres and each other during firefighting efforts. After fires are extinguished, post-fire recovery includes tasks like clearing debris and rebuilding. Various stakeholders play a role in this process. **Public agencies** focus on restoring safety and infrastructure, while **private companies** often focus on salvaging burned timber for profit. This division highlights different priorities in the recovery phase: public efforts aim to restore order, while private interests may seek economic gains from the aftermath. In summary, while Portugal's wildfire management programs aim to protect communities and improve response efforts, inconsistencies in training, forest management, and centralised decision-making hamper their overall effectiveness. A **more coordinated, consistent approach** is essential for improving fire prevention and response in the country.

Good local practices

Preservation of Local Knowledge	• Despite the challenges faced by the region, the remaining population in **Naturtejo** still holds valuable **traditional knowledge** and skills related to **forest management**. These practices, such as maintaining clean and healthy forests, contribute to making these areas more **resilient to wildfires**. The community's experience in **land management** and **fire hazard reduction** plays a crucial role in preventing the spread of fires.
Local Projects for Forest Diversification	• Various **local projects** have successfully engaged the community in **forest management** and **land use changes** to reduce fire risks. These initiatives focus on **diversifying forested areas** by encouraging the planting of **different tree species** and converting certain forest sections into **agricultural land**. By clearing specific forest sections and promoting **sustainable land use**, these efforts not only involve citizens but also foster collaboration between l**ocal authorities and residents**, leading to **positive changes in the landscape** and contributing to better fire prevention.
Need for increased Mitigation and Prevention	• Since **local fire brigades** are tasked with fire response, there is growing recognition of the need to improve **prevention and mitigation strategies**. This includes improving partnerships of various professionals to implement **forest management techniques** that can help prevent fires from starting or spreading.
Increased Professionalization of Firefighters	• Over the past decades, firefighting teams in **Portugal** have become proficient in wildfire response. Their training, skills, and preparedness have led them to train other fire departments internationally. Firefighters now utilise **advanced tools and technologies**, including **satellite imagery** and **moisture measurements of fine fuels** (such as grasses and shrubs), to inform their decisions. These **data-driven strategies** enable more **effective firefighting and planning**, allowing teams to act more efficiently and strategically during fire emergencies.



Core Lab
Trondheim
NORWAY

TRONDHEIM NORWAY CORE LAB

PREPAREDNESS VS. RESILIENCE: MANAGING LANDSLIDE RISKS

Core Lab
Trondheim
NORWAY

- **SyRI Framework**
  Health and wellbeing
- **Governance Scale**
  Municipality

Trondheim's areas prone to landslides

"A landslide in the centre of Trondheim would be a catastrophe."

Henning L. Irvung,
Emergency Preparedness Advisor,
Trondheim Municipality, Unit for Civil Protection and Emergency Preparedness

Description of field study

From **12-13 June 2024**, members of the **RESILIAGE Consortium**, including **sociologists, psychologists, and architects**, visited **Trondheim**, hosted by local partners at the **Trondheim Red Cross**. The aim of the visit was to explore the city and engage with local stakeholders, gaining insights into their **experiences, knowledge**, and **preparedness** related to the **local risk of quick clay slides**.

On day one, the team embarked on a **guided tour of the city**, examining the cityscape and visiting key sites such as **Nidaros Cathedral** and the **Bakklandet neighbourhood**. These areas are of particular concern as they would be severely impacted in the event of a major quick clay slide within the city limits.

Following the tour, the **RESILIAGE Consortium** convened at the **Trondheim Red Cross headquarters**, where local partners organised **three focus groups** and **interactive workshops** with **community leaders, first responders, and local officials**. These sessions were designed to evaluate **crisis communication and coordination**, identify **challenges and gaps**, and assess the potential impact of a disaster on **local cultural heritage**.

In the week following the visit, consortium **psychologists** conducted **eye-tracking experiments** to further investigate how the community adapts to the risks posed by potential quick clay slides.

Particular characteristics of a quick clay slide

Quick clay slides are a unique and highly dangerous type of landslide that occurs in areas with **subterranean layers of quick clay,** formed thousands of years ago during the **Scandinavian glaciation**. Quick clay is **extremely sensitive to stress**, such as **vibrations, heavy loads, or digging**. When disturbed, it can suddenly shift from a stable, solid ground into a **liquefied, watery state**, leading to massive landslides. These slides not only devastated landscapes and infrastructure but also caused the collapse of the ground above, threatening any structures built on quick clay deposits.

In **Trondheim**, more than **27,000 residents** live in areas mapped as **quick clay zones**. The **Norwegian Directorate for Civil Protection** outlines a **worst-case scenario** involving a quick clay avalanche in densely populated urban areas like **Øvre Bakklandet**, which could result in **devastating consequences**. Over the past **150 years**, landslides have claimed around **2,000 lives** in Norway, and experts warn that **climate change** is likely to increase the frequency of such events.

Quick clay slides also pose the risk of triggering **secondary hazards**, such as **urban fires and wildfires**. As **climate change** leads to longer, warmer, and drier summers, **Trondheim** and the wider Scandinavian region may face more frequent and severe wildfires, further compounding the dangers posed by quick clay landslides.

The local context: the what-if

If a **major quick clay slide** were to occur in the centre of **Trondheim**, it could lead to **loss of life, significant infrastructure damage**, and **environmental harm**. Moreover, the **cascading effects** — including **dangerous waves, flooding**, and even **urban fires** — could greatly exacerbate the devastation. To mitigate such risks, both **public and private organisations** are required to take stringent precautions when working or making alterations to the environment. For example, **construction and roadwork projects** are meticulously planned to avoid triggering quick clay slides, and **high-risk area maps** are regularly updated and shared among relevant stakeholders.

Thanks to these **safety measures**, Trondheim has so far avoided a major quick clay slide. Consequently, the city's **coordination plans** for such an event remain largely **theoretical**. Although **training exercises** are conducted on a regular basis, these plans have yet to be tested in an **actual emergency**.

Despite widespread awareness of the risks, the lack of real-world incidents means that **coordination strategies** haven't been fully refined through practical experience. This gap has left some residents and even **emergency responders** less aware of the full extent of the potential danger. In fact, during a focus group, one local first responder admitted that he hadn't realised just how **destructive** a major quick clay slide and its cascading effects could be until the scenario was discussed in detail during the session.

Challenges & community-based practices in DRR

Crisis management in **Trondheim** faces several key challenges. A significant issue is the **lack of clarity** regarding which agency should take the lead in coordinating and reporting during emergencies. This ambiguity creates **confusion** among emergency responders, complicating their roles in crisis situations. Additionally, there is a heavy reliance on **digital communication channels**, such as the **RAVEN digital tool**, which poses a risk if **power** or **internet connectivity** is lost. RAVEN itself is relatively new and **untested in major real-life emergencies**, raising concerns about its reliability.

Another challenge is that up to **10% of Norwegians** lack strong **digital skills**, which could hinder **effective communication** between authorities and citizens during a crisis. This highlights the need for more **face-to-face communication options** as a backup to ensure reliable coordination in a crisis. Moreover, **Norway's civil defence education system** faces a continuity risk, with the potential loss of **key expertise** if experienced professionals retire or leave without passing on their knowledge effectively.

On the positive side, Trondheim has identified **good practices** to strengthen preparedness. **Local clubs, sports teams**, and **faith communities** possess valuable knowledge about their members and could be mobilised to support communication and cooperation during emergencies. **Formalising coordination plans** before disasters occur is another important lesson, as it could prevent the need for **ad-hoc crisis responses** and establish clear roles, **evacuation points**, and communication lines in advance.

Encouraging **citizen self-coordination**, especially in light of the **COVID-19 pandemic**, has become a priority. The municipality recognises that households may need to take charge of their own emergency affairs. Additionally, **using past crisis reports** to inform current planning and **micro-targeting vulnerable groups**, such as **international truck drivers**, are areas identified for improvement.

Lastly, Trondheim can leverage the local culture of **"dugnad"**—a tradition of neighbourly cooperation—though there are concerns that overemphasise this concept may alienate **younger generations**, who may feel less connected to this tradition.

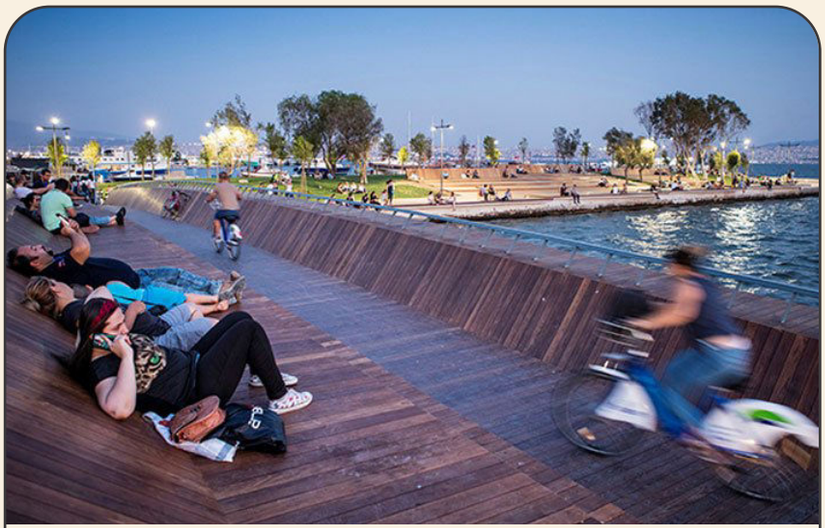
Core Lab
Karsiyaka
TURKEY

KARSIYAKA CORE LAB

THE INVISIBLE CRISIS

Core Lab
Karsiyaka
TURKEY

- **SyRI Framework**
  Adaptive Governance
- **Governance Scale**
  City District



Karsiyaka's seaside area, to where citizens often go in times of heatwaves.

"Heatwaves often go unnoticed as disasters, hidden in plain sight."

Dilan Cengiz,
DEMIR Sustainable Cities Consultant

Description of field study

From **May 7-8, sociologists, psychologists, and architects** from the **RESILIAGE Consortium**, hosted by local partners of the **Municipality of Izmir**, visited **Karsiyaka** to explore the local terrain and engage with the community.

On the first day, the group embarked on a **field trip** to the **Gediz Delta, Yamanlar Mountain**, and the **centre of Karsiyaka**, visiting areas and people affected by **heat waves**. At the **Kal Kadoş Synagogue**, local partners organised **four focus groups and interactive workshops with community representatives, first responders, and local administrators**. These sessions were designed to investigate **crisis coordination and communication**,
as well as to identify **local heritage drivers, gaps, challenges, and lessons learned**.

In **July**, consortium psychologists conducted **eye-tracking experiments** and explored how the community adapted to **risk and heat wave conditions**.

Particular characteristics of heatwaves

In **Türkiye, heatwaves** are not officially classified as **disasters**, meaning no formal **warnings** are issued to the public when temperatures are expected to rise. Typically, in the event of a disaster, the **Disaster and Emergency Management Presidency (AFAD)** would coordinate the crisis response. However, since heatwaves do not fall under this category, the response to **extreme heat** is often inconsistent and lacks **central coordination**. For instance, during particularly hot periods, some **local authorities or companies** might allow vulnerable employees to take **administrative leave**, but such actions are not uniformly enforced through formal policies.

The absence of heatwaves in the official disaster classification also impacts **public awareness**. Many people in Türkiye perceive **extreme heat** as a **normal** aspect of life, given the country's warm climate. As a result, the **dangers associated with heatwaves** are often **underestimated** or overlooked by the general public.

Despite this, local **customs and practices** help mitigate the risks of heatwaves. A strong sense of **community** encourages people to check on their **neighbours**, and the tradition of living in close proximity fosters **continuous contact** between individuals. Additionally, it is common to **avoid outdoor activities** or limit exposure to the sun during the hottest hours of the day, typically from **noon to 3:00 PM**. These **cultural habits** offer informal but valuable ways to cope with the dangers of extreme heat, even in the absence of formal disaster recognition and response mechanisms.

Coordination challenges

In **Türkiye**, crisis events are generally classified into two main categories: **emergencies and disasters**. When an emergency occurs, **local first-line responders (FLRs)** typically manage the situation independently, without involvement from national authorities. However, if the crisis is classified as a **disaster, the Disaster and Emergency Management Presidency (AFAD)**, operating under the **Ministry of Interio**r, takes charge. AFAD issues **coordination orders** and establishes **local emergency coordination centres** to ensure a unified and effective disaster response.

Whether an event is treated as an **emergency or a disaster** often starts with citizens reporting the situation via **112**. Emergency system experts assess the **severity** and determine whether **local or regional resources** are sufficient or if **national-level interventio**n is required. In disaster scenarios, AFAD coordinates the local response, and may also direct the actions of local **NGOs**.

In the case of **heatwaves**, important local actors would include **hospital staff**, **neighbourhood representatives, building managers, and family doctors**, who often have a better understanding of the community's **specific needs and vulnerabilities** compared to larger administrative bodies like AFAD. Historically, the **Turkish military** played a central role in responding to disasters, but since the establishment of AFAD about **15 years ago**, the military's role has diminished. However, **coordination issues** and **communication breakdowns** between military personnel, AFAD officials, and local responders can sometimes undermine disaster response efforts.

For **heatwaves**, which are not officially classified as disasters, these coordination challenges can be even more pronounced. The lack of an official framework often leaves **local actors** to respond **ad hoc**, filling in gaps to meet the needs of their communities. This inconsistency may hinder a **rapid and organised response**, as various actors struggle to align their efforts in protecting **vulnerable populations** during extreme heat events.

Local challenges

Responding to **heatwaves** in **İzmir** presents several challenges, particularly due to **AFAD's** (Disaster and Emergency Management Presidency) **limited manpower and financial resources**, which hamper its ability to effectively coordinate disaster responses. Adequate disaster response requires significant capacity, which AFAD currently lacks.

Citizens who wish to assist during emergencies must be a "AFAD Volunteer" (with an official certificate) or must register with **local NGOs** and they are coordinated by AFAD. Additionally, **local volunteer organisations** are restricted in their actions and cannot operate without AFAD's prior coordination. This limits **proactive interventions** by local actors, such as municipalities or disaster teams, who could otherwise respond more efficiently. Some believe the **pre-AFAD system**, which granted more local autonomy, was better suited to handle such situations.

Another challenge lies in the **healthcare sector**, where the roles of healthcare workers during heatwaves are poorly defined. There is no central **response protocol** for them, despite their crucial ability to mitigate heatwave-related health issues. This is a missed opportunity to leverage healthcare professionals' skills during crises.

A critical gap is the **lack of data** on the impacts of past heatwaves. No comprehensive studies have been conducted to assess how many people have died or suffered health issues due to heatwaves. This includes a lack of information about **victims' socioeconomic backgrounds**, residential locations, or health histories. Without this data, it is difficult to develop effective strategies to mitigate future risks.

Power outages are another concern during heatwaves, as increased **air conditioning usage** strains the local power grid. These outages can escalate crises and even lead to more severe disasters. Unfortunately, **power outages** are neither **predictable** nor communicated in advance, increasing the risks they pose.

Additionally, both **public and official awareness** of the dangers posed by heatwaves is generally low. Many Turkish citizens do not fully recognise the risks associated with extreme heat, and there is often a **fatalistic attitude** towards disaster preparedness and government support. Some **municipalities** also fail to take heatwaves seriously, contributing little to planning or coordination efforts. This lack of engagement further undermines effective crisis management.

In summary, **İzmir** faces significant challenges in responding to heatwaves, ranging from AFAD's **capacity limitations** to a broader lack of awareness and preparedness at both the public and official levels. Addressing these issues will require better **coordination**, more **direct involvement** of local actors, and increased **public education** on the dangers of extreme heat.

Needs

The current **patchwork of policies** in response to **heatwaves** poses a significant risk to the effectiveness of local crisis management in **İzmir**. The lack of clarity around the roles of various actors and agencies often leads to **overlaps** or **confusion** in responsibilities, weakening the overall response. To address these issues, several key improvements were identified by focus group respondents in **Karsiyaka** regarding formal crisis response:

Consistent public warning system	• At present, there is no **uniform method** for informing the public or relevant authorities about an impending heatwave. This inconsistency results in different actors implementing their coordination strategies at **different times** and in different ways, leading to a disjointed response. A **uniform and timely warning system** is essential to ensure everyone is **aware and prepared** for the heatwave, allowing for a more cohesive response.
Clearly defined roles for local actors	• Establishing **predefined roles** for local actors, from **neighbourhood representatives to municipal and regional authorities**, is crucial. These roles should be communicated clearly so that each actor knows their exact responsibilities **before, during, and after** a heatwave. This would help prevent confusion and enable a more **coordinated and effective** response.
Involvement of experts	• To improve and **synchronise existing response plans**, it is important to involve experts such as **emergency planners**, **urban planners**, and **public health professionals** from **local universities**. Their expertise can help design strategies for managing heatwaves that are based on **evidence** and **best practices**.

By addressing these needs, İzmir can develop a more **cohesive and efficient system** for managing heatwaves and better **protect its citizens**.

Pathways for improvement

Leverage the Expertise of Neighbourhood Leaders	• During the COVID-19 pandemic, neighbourhood leaders (mahalle yöneticileri) played a crucial role by checking in on households and relaying their needs to relevant departments. A similar system could be implemented during heatwaves, where these leaders monitor the well-being of residents and report issues such as health concerns or power outages. This would not only provide support to citizens but also help the government gather real-time information and respond more effectively.
Create a Heatwave Emergency Hotline	• During the pandemic, a telephone hotline allowed citizens to report their needs, which helped the government provide relief efficiently. Establishing a similar hotline during heatwaves, where people can request water, food, or medical assistance, would be an effective tool for crisis management and ensure that those in need can be promptly helped.
Set Up Public Cooling Centers	• Much like shelters for homeless individuals during cold weather, public cooling centres could be established during heatwaves. These centres would provide a space for people to cool down and access water. They could also help alleviate pressure on the power grid by reducing the need for individual air conditioning units. Additionally, gathering people in a communal space aligns with local customs, like socialising in tea gardens, and allows authorities to monitor residents' health more easily.
Establish Backup Communication Systems	• In 2023, a major flood caused the municipal internet and communication networks to fail, hampering coordination efforts. To prevent this during heatwaves, a backup communication system should be put in place. While first responders (FLRs) already have satellite phones, other public institutions should adopt similar backup measures to maintain communication in the event of an outage.
Include Environmental Protection in Heatwave Strategies	• In addition to focusing on human safety, heatwave response plans should also address the protection of local wildlife and ecosystems. Heatwaves can cause the death of bees, birds, and other animals, as well as damage crops, which can lead to disease outbreaks and other cascading effects. Moreover, excessive water use during heatwaves can exacerbate droughts, leading to long-term problems like crop failure and contaminated drinking water. A balanced response plan must therefore consider the well-being of both people and the environment.

By implementing these solutions, İzmir can **build a more comprehensive and effective strategy to respond to heatwaves, protecting both its citizens and its natural surroundings**.

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