PANTHEON

Community-Based Smart City Digital Twin Platform for Optimised DRM operations and Enhanced Community Disaster Resilience

D2.6

PANTHEON DISASTER-RESILIENT COMMUNITIES REPORT

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TASK ABSTRACT

The present deliverable "PANTHEON Disaster-Resilient Communities report" is the outcome of T2.6 "PANTHEON Report on Disaster-Resilient Communities for the under-study regions" and provides insights on how the under-study regions, but also other EU regions, can be enabled to build Disaster resilient communities.

[1] **Please indicate the type of the deliverable using one of the following codes**:
R = Document, report
DEM = Demonstrator, pilot, prototype, plan designs
DEC = Websites, patents filing, press & media actions, videos
DATA = data sets, microdata
DMP = Data Management Plan
ETHICS: Deliverables related to ethics issues.
OTHER: Software, technical diagram, algorithms, models, etc.

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LIST OF ABBREVIATIONS

Abbreviation	Definition
CBDRM	Community Based Disaster Risk Management
CCA	Climate Change Adaptation
CoP	Community of Practice
DR	Disaster Resiliency / Disaster Resilient
DMC	Disaster Management Cycle
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EC	The European Commission
EU	The European Union
GIS	Geographic Information System
NCPA	National Civil Protection Authority
PI	Protected Interests (lives and health of persons, property and the environment, but also livestock, fauna and flora, cultural heritage, social and economy stability etc.)
PSAP	Public Safety Answering Point (systems)
SCDT	Smart City Digital Twin
UCPM	Union Civil Protection Mechanism
UN	United Nations
VCAs	Vulnerability (assessment) and capacity assessment (against disasters)

EXECUTIVE SUMMARY

This Deliverable is the outcome of Task 2.6 “PANTHEON Report on Disaster-Resilient Communities for the under-study regions”. The PANTHEON project is working with two particular areas which are referred to as “under-study regions”:

- Attica, Athens, Greece and
- Île de France, Paris, France.

The document is based on previous tasks and related outcomes, namely:

- D2.1 Community based DRM analysis and regional ecosystem, which is the outcome of Analysis of CBDRM National and Regional policies, existing platforms and uptakes,
- D2.2 Multi-Hazards/risk data and assessment report, representing output of Regional Multi-Hazards/risk data and assessment, and
- D2.3 Community vulnerability and capacity assessments (VCAs) report as the result of the same name activity.

The aim of the document is not only to provide a solid report on how the under-study regions will be enabled to build a Disaster resilient community, but to also offer guidance on building such a community in any region of the EU or beyond, utilising the under-study regions by pointing out the practical examples. The first part of the document presents general principles and the next part deals with specific cases.

INTRODUCTION

Disasters and extraordinary events have always been part of human life and the existence of society. They are caused by various threats, and it is impossible to eliminate them entirely. Their consequences depend on the prevailing conditions and an important variable affecting their development and outcomes is the level of preparedness.

People living, working or having interests in certain areas can be grouped together with the aim of effective preparation for extraordinary events. Possible threats and their effects can be identified for a particular territory, the risk can be analysed and appropriate measures can be taken to increase disaster resiliency of the community.

This document targets various geographical areas in which the persons dedicated to help increase disaster resilience, including leaders, are usually not experts. Disaster resiliency, crisis management, civil protection or similar topics are only part of their job or volunteer work. Different tools, platforms, knowledge and best-practice databases exist in this area; however, navigating them can be a complex task. One of the main aims of this document is to enable better understanding of this topic and to provide a simple guide on how to establish and operate a Disaster Resilient community.

1.1. JUSTIFICATION

PANTHEON focuses on the creation of knowledge and tools in order to develop and implement an extensive, realistic and detailed Community-based Digital Ecosystem, utilising Smart City Digital Twin (SCDT) technology and complex interdependent visual and data analytics that will allow human-infrastructure technology interactions to achieve urban sustainability and resilience objectives.

The project will enhance the current state-of-the-art in disaster resilience models by providing communities with tools for evidence-based policy making, analysis and evaluation of a large variety of issues and criteria. By developing a community platform that will enhance disaster risk management (CBDRM), PANTHEON SCDT will use advanced technologies to sense the conditions of important systems and use virtual images for computer simulation of community systems to predict impacts. The community-level SCDT will be integrated across built and social infrastructure systems, based on sensor technologies and conditions' forecasts. Available real-time data will improve decision-making efficiency by creating a novel paradigm in community-based disaster management during and after disasters.

The scope of WP2 is to analyse and detail the overall PANTHEON ecosystem and provide all the required design considerations towards building a community-based operational resilient system. This work will be based on analysis of EU and regional CBDRM environment and stakeholders, analysis of disaster models based on historical data and regional features and multi-criteria analysis for prioritising Adaptation and Mitigation of the PANTHEON Technologies with stakeholders and SSH experts.

1.2. RATIONALE AND OBJECTIVES

This document aims to analysing, describing and providing a solid report on how to build a Disaster resilient community with a focus on specific areas, although the principles should be applicable in any other region.

Focus is put on natural catastrophes as well as on aspects of other extraordinary events, man-made accidents, socio-economic crises which will also be considered. Finally, domino effects such as hydro-meteorological events that could cause technological accidents, will be considered.

Disaster resilient community is understood as one of the significant elements to reach resistance to the adverse effects of disasters or other extraordinary events.

To better understand this topic, an explanation of the following terms is required:

- community / communities
- disaster resiliency
- DRS community

1.3. COMMUNITY / COMMUNITIES

What does the term "community" mean? To lay down some theoretical principles, best practices on the set-up and management of communities are presented, using the research of Etienne Wenger and the book by the Joint Research Centre (JRC) named 'The Communities of Practice Playbook'[3]. This approach is used in other relevant projects such as the iProcureNet project, where a dedicated topical group is focused on Disaster resilient societies (DRS) [4].

In the nineties, Jean Lave and Etienne Wenger developed the concept of Community of Practice (CoP). They defined a CoP as "a group of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly". The CoP exists if this group of people unites around a specific set of issues or topics in a structured way to produce knowledge and encourages cross-organisation cooperation, exchange and relationships. According to Lave and Wenger, a CoP is a living ecosystem that grows as the community grows. As such, the CoP is never 'complete', it evolves and improves constantly. For this reason, CoPs should be designed to allow progression, especially since different people will have different levels of engagement in the community based on their individual interests. Each level of participation brings about specific benefits and supports the healthy functioning of the CoP.

In its playbook, the JRC identified different types of Communities, which are presented in Table 1.

Table 1: Types of Communities

Communities	Definition
Network	A group or system of interconnected people building social relationships by interacting regarding a specific interest/circumstance.
Community of place	Communities of people brought together by geographic boundaries.
Community of circumstance	Community of people brought together by external events/situations.
Community of interest	Communities of people who share the same interest or passion.
Community of action	Communities of people trying to bring about a change.
Community of practice	Community of people practitioners sharing and stewarding a domain of knowledge with a collection intention..

[3] https://publications.jrc.ec.europa.eu/repository/handle/JRC122830
[4] https://www.iprocurenet.eu/ and https://iprocurenet.hivebrite.com/topics/36254/feed

Knowledge/competence centre	Virtual entities that bring together experts and knowledge from different locations within and outside the European Commission supporting evidence-based policymaking.

Furthermore, the JRC defined “community ecosystem” as “a knowledge and collaboration universe around a community. This covers all external and internal, formal and informal structures, networks, communities and stakeholders in relation or interacting with the community”.

When we refer to the Community, we refer to the entire ecosystem and not just the membership. Formalizing of the conditions of activities – platform of the ecosystem is an important aspect.

1.4. DRS COMMUNITY

Disaster resilience refers to the ability of individuals, communities, organizations and systems to prepare for, absorb, recover from and adapt to adverse events such as natural disasters, pandemics, cyber-attacks or other emergencies. It includes the ability to withstand disruptive events and recover quickly from them while minimizing negative impacts on people's lives, property and well-being.

Disaster resilience is not only about responding to crises, but mainly about preventing and reducing the risk of disasters by implementing measures that strengthen system resilience. This can include building physical infrastructure that is resilient to natural disasters, creating emergency plans and procedures, improving communication and information sharing, and promoting social cohesion and community engagement.

Disaster resilience is essential in today's world that is facing an increasing number of complex and interconnected risks. Building resilience can help prevent crises, mitigate the effects of disasters and allow communities to recover more quickly. A DRS community is therefore a combination of:

- Community of place – it is related to a particular region with exact borders,
- Community of interest – common interest is to improve disaster resiliency,
- Community of circumstance – it is the possibility of extraordinary events that unites its members,
- Community of practice – practitioners and experts sharing and stewarding a domain of knowledge,
- Community of action –its final goal is to try to bring about a positive change.

1.5. DISASTER RESILIENCE

During the past few years, the frequency and intensity of natural disasters have been increasing, mainly due to climate change and other factors. These disasters often have catastrophic consequences for communities, the environment and, in general, for their so-called “protected interests” (lives and health of persons, property and the environment, but also livestock, fauna and flora, cultural heritage, also social and economy stability etc.). In such situations, it is important to build communities that are disaster-resilient and able to face hazards and recover from their consequences quickly and efficiently. This will enable them to significantly prevent and mitigate the consequences of extraordinary events and to contribute to subsequent recovery.

Building disaster resilient communities requires a comprehensive approach that includes both physical infrastructure and community capacity building. While people are in the center of this effort, hardware,

orgware, cooperation, motivation, proactive approach and willingness to participate must be considered from the very beginning. The basic aspects include:

- **Awareness**. The first and most crucial step in building disaster-resilient communities is to understand the nature of the disasters that are likely to occur in a particular area. For example, if a community is located in an earthquake-prone area, it should focus on seismic-resistant building design and infrastructure. Similarly, if a region is susceptible to floods or hurricanes, the community should prepare itself with adequate drainage systems and evacuation plans. Subsequently, communities should also have a clear understanding of their vulnerabilities and assess their risks, including the potential impact of disasters on their infrastructure, environment, and economy. This includes the awareness of professional bodies and also of the public, including vulnerable groups of citizens.
- **Readiness.** A main element is risk assessment, which consists of threat specification and its assessment. This is a process concerning civil protection authorities and crisis management bodies. Cross-sectoral activities with the participation of all stakeholders is recommended. Such an assessment leads to a list of threats which are relevant for a particular area, including level of risk for each identified threat. Vulnerable targets (points) are defined. Measures for mitigation should primarily be taken for those with high level of risk. It is essential to develop an emergency preparedness plan. An emergency/disaster management plan outlines the steps that need to be taken before, during, and after a disaster to minimize its impact.
- **Resilient infrastructure.** Another critical aspect of building disaster-resilient communities is ensuring that the infrastructure is designed and built to withstand natural disasters. This includes building codes and regulations that mandate the use of earthquake-resistant materials, flood-resistant building techniques, and other disaster-resilient designs. Retrofitting existing infrastructure with disaster-resistant features is also crucial, especially for critical facilities such as hospitals, schools, and government buildings. Infrastructure also includes roads, bridges, and other transportation systems that are critical for emergency response. Significant attention must be paid on ensuring availability of energy supplies, communication, social and other assistance.
- **Capacity building.** In addition to building resilient infrastructure, communities should also focus on developing sustainable practices that can reduce the impact of disasters on the environment. For example, communities can invest in renewable energy sources, water harvesting and management, and sustainable agricultural practices. These measures not only reduce the impact of disasters but also improve the community's overall well-being.

  Another important part of capacity building is the education and training of the community members on disaster preparedness, response, and recovery. It also involves fostering community connections and relationships, which can help to build trust and cooperation during and after a disaster. Investing in social programs that support vulnerable populations such as the elderly, children, and people with disabilities can also foster preparedness and cooperation.

  Resource mobilisation, i.e., to mobilise resources to support disaster resilience initiatives including funding, technical expertise, and equipment is also an important aspect of capacity building.
- **Network of cooperation and support.** Companies and organizations should work with local governments and residents to prepare for disasters and to provide post-disaster assistance. Communities should be set up to help and support each other in the event of a crisis. Good relations and cooperation between governments and residents are key to successful disaster recovery. Formalization of possible ways of cooperation should be clearly defined: It may be a platform with

some basic rules for all the members, aiming to ensure smooth and sustainable operation. Such a platform should also provide conditions for continuous improvement. Disaster resilience is an ongoing process, and it is important to continually evaluate and improve disaster management strategies based on experience and feedback.

Overall, building disaster resilient communities requires long-term commitment and collaboration between all stakeholders, including government, private sector, civil society, and community members themselves. It requires a multi-faceted approach that involves understanding potential risks and vulnerabilities, developing emergency preparedness plans, building disaster-resistant infrastructure, promoting sustainable practices, and building community resilience. These strategies can help communities bounce back from disasters and emerge even stronger than before. It is essential to invest in disaster preparedness and build resilience in communities, as this will help mitigate the impacts of natural disasters and create a safer and more secure future.

LOCAL/REGIONAL DISASTER RESILIENT COMMUNITIES BUILDING

Based on above, it is possible to describe the process and to formulate steps of building local DR communities:

1. to **determine the exact territory** – region. To describe its particular area, its geographical, social and economic scope (boundaries).
2. To conduct **analysis of threats** with the goal to understand possible risks resulting from them.
3. To **identify the vulnerable points**. Who, what and how will be affected by the disaster? This would be based on protected assets:
   3.1. lives and health of persons,
   3.2. property and the environment (including livestock, fauna and flora),
   3.3. social and economy stability,
   3.4. cultural heritage and other aspects.
4. Once the causes and effects are stated, **analysis of stakeholders** should be conducted. Subjects that may be affected must be identified, with attention given to their representatives. Are they grouped already somehow? Are there any specific communities in place? Are they willing to participate? How can they be stimulated? (Based on best practices, an effective approach is to show and explain possible effects of similar disasters on similar places in the world. This is one of the possible starting points.)
   It is also important to include responsible authorities – civil protection, crisis management, responders, but also critical infrastructure operators and related bodies.
5. From the perspective of sustainable collaboration, it is recommended to prepare a **framework of cooperation**. It may be a platform with basic rules of common work, i.e., the place where the content will be stored and shared between the new community members as well as logistic and organizational procedures. Also, the objectives of community, its rationale, the justification of community establishment and the main goals to be achieved. These should be clearly stated and confirmed by members on the first meeting (KoM).
6. At this stage, the following should be already listed: what can happen, what could be the impacts and who will be at risk, who plays dedicated roles in preventive, preparedness, response and recovery phase of crisis management. The platform for mutual work is ready and the first prerequisites are known. This is the time to **launch a collaboration**. To encourage all the stakeholders to meet, clear up the existing status and raise questions / issues / open points.

This is the first part of the building process. The above steps are the most important for the establishment of the community.

Once the community is established, it is necessary to continue with the following steps:

7. step 7 – **coordination of community**, its enlargement, updates (community care)
8. step 8 – **communication**
9. step 9 – specific goals, **working groups**,
10. step 10 – long-term **sustainability** of the community

2.1. DETERMINING THE TERRITORY OF THE TARGET AREA

The key prerequisite for community building is to exactly define the **geographical area of interest**. This is crucial for the identification of threats as well as their possible targets. With regards to the threats, it is necessary to consider also neighbouring areas, respectively higher area level (state / country), as danger does not really respect borders. It is recommended to check not only which threats are recognized in the cose by regions, but also what is the projected risk arising from them, as well as what measures are already taken. This can serve as a basis and inspiration also for the particular region.

2.2. THREAT ASSESSMENT AND RISK ANALYSIS

The main aim of disaster resiliency is to keep the status of risk at a minimum level. Risk is the probability of the occurrence of an undesirable specific effect that will occur during time or under certain circumstances and which is considered from a security point of view to be unwanted. Risk is always associated with a specific type of hazard[5].

The basic logic is to understand the threats and know what the risk is. Taking measures counteracts threats, and thus reduces the level of risk. This is how resilience can be built.

It is recommended to prepare an analysis of the risks applicable in the community area. The analysis should start from the official documentation of the national civil protection authority in which it should be possible to find a list of the possible threats (Threat Register). Every single threat from this register should be analysed. For optimal results, a two-step analysis will be supportive: The first step is preliminary risk analysis, while the second is multicriteria risk analysis.

Threat identification

It is the process of finding, recognizing and describing different types of threats. One approach is that only identified threats should be further analysed and evaluated as some risks may not be applicable for a particular territory or community. The Threat Register is an ideal place to start. Another approach is to consider all risks. In addition, specific threats for a particular area which may not be included in the national Threat Register (as it might not be significant from national perspective), need to be taken into account.

Risk analysis:

To start with, just a quick assessment might be sufficient. Sometimes it is called “pre-assessment” or “preliminary analysis”. It represents the process of determining the consequences and probability of activation of the threat in question. The output is to determine the level of risk. The intention is to categorise the risks according to their significance and to determine the threats for which the measures should be prepared first and on which community activities should be focused.

A possible way is to apply a simple matrix where probability and consequence are compared, while both quantities are categorised into three levels (low, medium, high). Subsequently, for every single threat, it is possible to state risk level, as shown in Table 2

[5] Synchronised methodology for performing of cross-border risk analyses, R-PLAN project, 2022

Table 2: Preliminary Risk Analysis

High pr.			
Medium pr.			
Low pr.			
	Low cons.	**Medium cons.**	**High cons.**

A red area represents high risk, while a green area represents low risk.

This is only the basic assessment. Later, a more detailed multi-criteria analysis should be implemented, especially for high-risk threats.

Risk evaluation:

By comparing the risk analysis results with individually predetermined criteria (multi-criteria analysis), the results specify three groups of the threat:

- acceptable (low) risk – no action needed,
- conditionally acceptable (medium) risk – action is wanted/recommended to take measures,
- unacceptable (high) risk – action is necessary/measures must be prepared and taken.

Importance should be given to the visualization of risk, which is twofold: the geographical position and the significance of the risk. Various geographic information systems (GIS) may be of help. The aim is to present risk in a way that is understandable by everyone (including non-IT experts).

2.3. MULTI-HAZARD/RISK DATA AND ASSESSMENT

The area of multi-hazard/risk data and assessment is quite wide. Details are not in the scope of this document. Within the PANTHEON project, there was a separate document prepared, namely ***D2.2 Multi-Hazard/risk data and assessment report***, which presents the methodology on how to assess the potential impacts of multiple hazards on a specific area (region). This methodology aids in better understanding the complexity and interaction of hazards and their possible impacts on the community and particular assets.

The key steps of this methodology are:

- ✓ Hazard (threat) identification and characterization,
- ✓ Multi-hazard impact including vulnerability assessment,
  - assessment of potential consequences,
  - evaluation of community vulnerabilities,
- ✓ Impact analysis,
- ✓ Mitigation measures and recommendations.

The methodology was applied to the Île de France region where various threats such as floods, heatwaves, technological hazards, terrorism were identified and described, including interactions between them. Determination of impacts from these hazards (physical, health, economic, social, environmental) and multi-hazard risk assessment including risk mapping was provided. It is the mapping which can present the situation effectively, so that understanding of consequences is better understandable. The same methodology was applied to the Attica region. Earthquakes, floods, wildfires, heatwaves and landslides were considered.

2.4. VULNERABLE POINTS IDENTIFICATION

Once a particular territory is determined and the risk is specified, the affected vulnerable points need to be considered. The main groups can be divided using the categories of the protected interests:

- Lives and health of persons – mainly people living and/or present on the territory of the region (including temporary visitors) and with special focus on vulnerable groups (children and youth, elderly people, disabled persons and people with special needs). Pets should be considered here too.
- Property – houses and buildings, industrial objects, in case of agricultural objects also livestock and fertile fields, social facilities and related infrastructure. Not only real estate, but also movable properties. Attention should be paid to critical infrastructure.
- Environment – natural resources. Natural surroundings or conditions in which living organisms, including humans, exist and interact. This encompasses everything around us including the air, water, soil, the plants and animals, and the overall ecosystems that support life.
- Cultural heritage – represents specific parts of property identified to be of cultural or historic value. Specific plans and procedures are required for its protection.
- Social and economic stability – this concerns the relations between the above-mentioned protected interests. It represents something intangible, but keeping this stability is crucial to avoid losses on previous interests.

Similarly with the previous step, importance should be given to the visualization of vulnerable points, ideally on the same map/GIS as for the risks. Points close to the risks are considered more endangered, etc.

Vulnerability assessment and capacity assessment against disasters in civilian areas of the two under-study regions was provided and is described in a separate document of the PANTHEON project, namely the ***D2.3 Community vulnerability and capacity assessments (VCAs) report***.

VCAs should aim to ascertain the extent of vulnerability, to identify vulnerable points, sources of vulnerability, ways to respond to shocks, and gaps between risks and risk management mechanisms. A VCA can be organised into the following five steps: (1) Scoping out the assignment, (2) facilitating assessment design, (3) data collection, (4) data analysis (5) reporting and dissemination.

2.5. SCOPING OUT THE ASSIGNMENT

It is important:

- to identify the type of threat and related level of risk. This information is coming from the threat assessment and risk analysis.

- to specify the target groups for VCA. In case of regional community, it is the population of the particular region, including persons who are or may be present within this area only temporarily,
- to determine the subjects in disaster/crisis management that are active in the region.

Furthermore, the envisioned team structure and skill requirements should be evaluated, as well as time and cost requirements.

2.6. FACILITATING ASSESSMENT DESIGN

Facilitating assessment design involves the process of creating effective and meaningful assessments to measure a hazard and understanding of a related risk. Existing data and literature should be identified and reviewed to detect open questions, known issues and risk factors. Data sources could e.g., be governmental surveys, disaster risk assessments, or city and Geographic Information System (GIS) maps. Based on this data, analysis questions should be formulated, which can be consolidated in an assessment matrix.

This step also contains the identification of stakeholders, including a plan on how to engage them in the VCA, and possibly an inception workshop.

2.7. FIELD DATA COLLECTION

The next step is to collect data in the field. This involves training the team and securing permissions, among other necessary preparation steps. The collected data should include a quantitative/ survey component (e.g. a questionnaire) as well as a qualitative component (e.g. interviews).

2.8. DATA ANALYSIS AND SENSE MAKING

This is the process of uncovering relevant risks, key challenges and constraints, and vulnerability and capacity overviews for key stakeholder groups.

To discuss the findings and potential strategies for increasing resilience addressing vulnerabilities of the studied community, one or more stakeholder workshops can be conducted. The quality of the data should be assessed critically and any limitations of the VCA should be identified.

2.9. REPORTING AND DISSEMINATION

The objective of this step is the dissemination of the analysis findings to the community. One of the possible ways is to prepare and share the Assessment report.

Vulnerable groups of people represent the most important objective of all vulnerable points, as lives and health of the people should have the highest priority. In many risks analyses, the added value is assigned to this point in the form of appropriate coefficient (e.g. doubled value). Examples of vulnerable groups, their indicators and dimensions are shown in Table 3.

Table 3: Vulnerable groups, vulnerability indicators and dimensions

Vulnerable groups	Vulnerability factor/Indicator	Dimensions
People with low income	Financial resources	economic
Children/minors	Age/ability to act, mobility problems	social and physical
Elderly people	Age/ability to act, mobility problems	social and physical
Pregnant people	Pregnancy/physical condition	social and physical
Single parent families with minor children	Parenthood/ role or responsibility and duty of care	social and economic
Homeless people	Financial resources and social involvement, living conditions	social, physical and economic
People with mental disorder/disability/illness	Mental health	social
People with physical disorder/disability/illness	Physical health, mobility problems	physical
Migrants, refugees, asylum seekers	Migration background, language issues	cultural and political

2.10. STAKEHOLDERS ANALYSIS

The essence of increasing the level of resistance to disasters is the reduction of risks arising from the threats present in the given territory. This is the target of the DRS community. This can be done by proper measures which have to be prepared and implemented by subjects and/or individuals living, working or having interests in the particular area.

It is recommended to make an analysis on which type of suitable stakeholders are present in the region:

- ✓ civil protection authority,
- ✓ units of responders,
- ✓ critical infrastructure operators,
- ✓ sensitive objects operators,
  - industrial facilities with higher risk level,
  - hospitals, schools and social facilities,
  - places with high concentration of people, etc.,
- ✓ other subjects, which might support disaster resiliency / response action (transport companies, building firms including ones having heavy machines and equipment, etc.),
- ✓ academia and research subjects
- ✓ last but not least, local communities and interested individuals, with focus on for example:
  - youth, elderly and/or disabled people,
  - social, economic, environment area,
  - voluntary organizations, etc.

After identifying all the interested partners, it is appropriate to describe the relationships between them. Focus must be put on the aspects of crisis management, i.e. what are their specific capacities and capabilities and what might their common abilities be. This will enable the community to better understand where there is room for future improvements and for further societal engagement.

Identified subjects/persons should be officially asked to join the community and their membership and willingness for cooperation on community activities should be confirmed.

It is recommended to structuralize community members and to set-up basic rules and responsibilities. The benefit from their contributions, which is not necessarily monetary, must be made clear. Increasing disaster resilience is undoubtedly beneficial, as the interests of each community member are better protected.

Special attention should be paid on local/regional NGOs. Based on their experience and research activity, this type of organization can play a crucial role for optimal results in community building as well as in its operation[6].

Within the above-mentioned document *D2.2 Multi-Hazard/risk data and assessment report*, a separate part is dedicated on the interaction with key stakeholders within both under-study regions. Suggestions and recommendations are provided here as well. Also, the need for expanding the partnerships has been identified.

2.11. FRAMEWORK OF COOPERATION

Based on analysis of the points mentioned above, it is crucial to understand in which ways a particular area is prepared for possible disasters, which threats exist, what could be the consequences, and also if, by whom and how the risk can be reduced. These individual attributes must be interconnected and properly managed. The missing part is the cooperation framework which provides the principles of how the community can communicate both internally and with external entities. Rules of work within the community must be laid down, while transparency is highly important. Nowadays, it is beneficial to make use of suitable IT tools, usually web platforms. These are importants directions recommended for establishing the cooperation framework of a particular community.

Based on the analysis of the interested parties and the definition of the cooperation framework, it is necessary to set the **organizational structure**. A **Community Manager** should be appointed, who will be acting as the coordinator and main leader of the community. It is also important to specify the **Core Group**, the **"sponsors"** and the rest of the members as well as the so-called **senior and middle management**. It is also beneficial to establish a position of a **Communication Manager**. Working Groups play a key role, described in more detail below.

2.12. COMMUNITY ACTIVITIES

The previous points present the main bricks for the establishment of a disaster resilient community. They form its basis which should be clear even before the community work begins.

[6] Building Disaster Resilient Communities - Good Practices and Lessons Learned (A Publication of the "Global Network of NGOs" for Disaster Risk Reduction); 2007; https://www.unisdr.org/files/596_10307.pdf

A good way to launch community work is by linking it with some social activity which it aims to promote. The community includes an important social aspect, since it plays a significant role in fostering a sense of belonging, social support, and shared identity. It allows individuals as well as organizations, to connect with others, build relationships, and contribute to a larger collective. Communities provide opportunities for collaboration, learning, and personal growth, and they can have a positive impact on individual well-being and societal development.

It is precisely the level of active involvement of community members that creates, maintains and determines the functionality of the community itself. This is also the reason why dissemination and exploitation of the community results must be effectively presented to the public.

Activities can be divided into four main areas:

- **coordination of the community** – focused on the work with the community members, their active involvement and their satisfaction with ongoing activities and achieved results;
- **communication** – understanding of communication among the members of the community (including various bodies/roles/positions), but also communication with community partners who are 1) the public of the particular region (people affected by disaster with focus on vulnerable groups) and 2) subjects for cooperation who can support disaster resiliency before the extraordinary event (prevention and preparedness) and during/after the disaster (response and recovery);
- **working groups** – it is expected that the community will specify particular issues/areas to be addressed and recommended to establish a specific working group for each point. A working group is composed by the community members mostly oriented to a related topic, together with persons responsible for coordination and communication. Once the issue is resolved, the working group is disbanded. This represents the main work of the community.
- a significant effort needs to be paid in **long-term sustainability** of the community. It is necessary to care about the health of community structure, which is not only about the work carried out. That is why "teambuilding" and similar activities are recommended. Also, possible next steps and goals from a strategic point of view would be set and communicated in proper time.

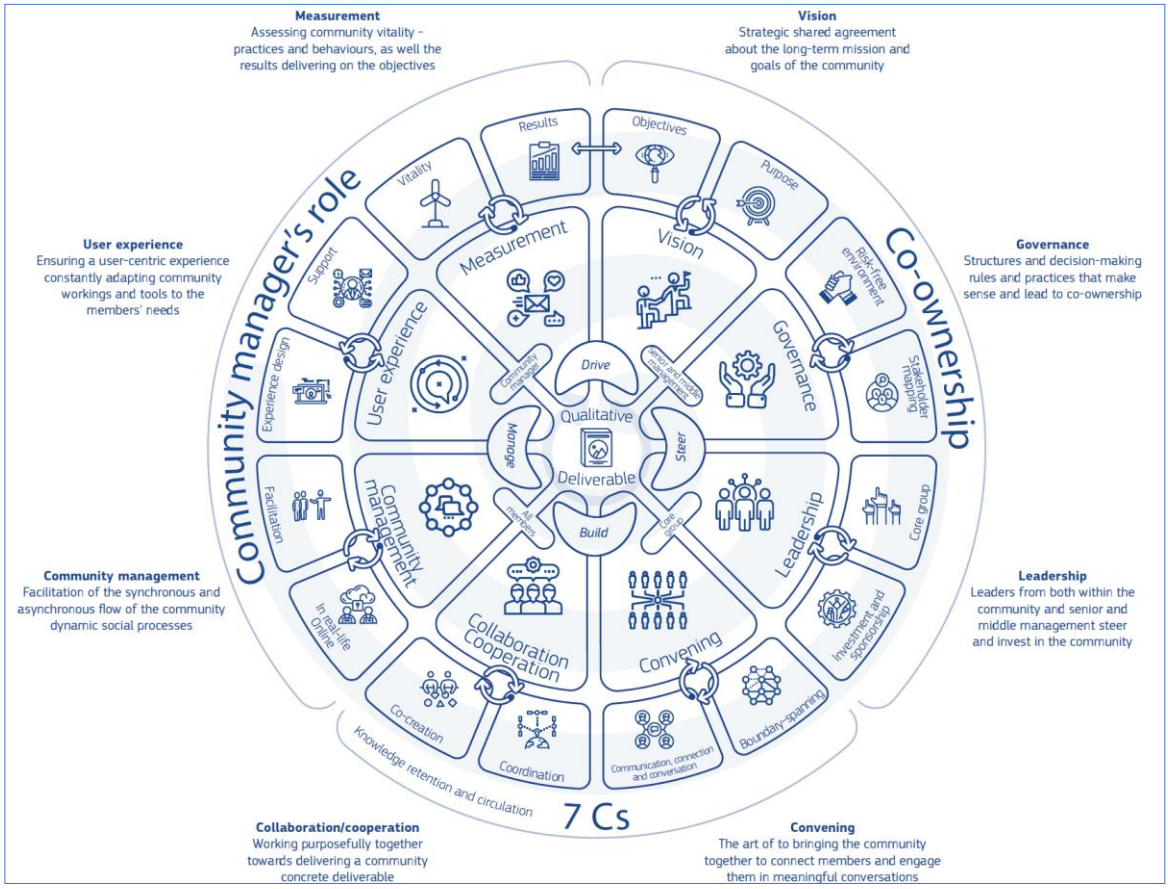
Figure 1 – Community building elements

It is important to state that these activities are only the basis for the community building. Much more material and recommendations are available for fostering the process of establishment of the community and its

successful operation, e.g., the above mentioned The Communities of Practice Playbook[7]. Even though it is focused on "Communities of Practice", the principles are fully applicable also on Disaster-Resilient Communities.

This book mentions the tools and processes towards creating a community roadmap, which are also described as "community success facets": 1) vision, 2) governance, 3) leadership, 4) convening, 5) collaboration and cooperation, 6) community management, 7) user experience and 8) measurement. The interaction among them and with other community elements and aspects is visualized in a "success wheel":

Figure 2 – Community of Practice Success Whell[7]



In Appendix 1, there is a proposal of a possible checklist (worksheet), which should be prepared in advance for the establishment of a regional disaster resilient community.

[7] https://publications.jrc.ec.europa.eu/repository/handle/JRC122830

CBDRM POLICIES, PLATFORMS AND DECISION SUPPORT SYSTEMS

3.1. CBDRM NATIONAL AND REGIONAL POLICIES, EXISTING PLATFORMS AND UPTAKES,

Analysis of CBDRM policies on global, national as well as regional level has been already provided within the PANTHEON project. These policies represent important input for regional DR community building. Therefore, a summary of the analysis findings is also part of this document. More details are stated in a separate document produced by PANTHEON ***D2.1 Community based DRM analysis and regional ecosystem***. tHIS refers to the most significant strategies and plans and covers all DMC cycles. i.e., prevention, preparedness, response and recovery.

One of the effective ways to solve problems caused by crises and disasters is to strengthen political involvement and commitment. By implementing policies, regulations and measures from various perspectives, i.e., from an economic, social, technological and environmental perspective, it is possible to reduce vulnerability and at the same time increase the overall capacity of society. This is the prerequisite also for regional level of DRM where A related community can play a significant role.

Resilience analysis always begins with threat analysis. The threats can be divided into two main groups. Considering the EU as our main target area, the most significant threats are stated in the table below.

Table 4: The EU most significant threats

Natural Hazards	Man-made Hazards
Earthquake	Industrial Accident/Technological Failure
Volcanic Eruption	Cyber/Hybrid Event
Tsunami	Terrorist Attack
Landslide	CBRNe Malicious Act
Heatwave	
Storm	
Blizzard	
Flood	
Drought	
Wildfire	
Epidemics/Pandemics	

To this end, attention should be paid also to cascading effects. Cascading effects in disasters refer to a series of interconnected events or consequences that result from the initial occurrence of a disaster. These effects can amplify the impacts of the disaster and make the situation more challenging to manage and recover from.

Here are a few examples of cascading effects in different types of disasters.

Table 5: Cascading effects examples

Natural Disaster	An earthquake can trigger landslides, which can block roads and disrupt transportation. It can also rupture gas pipelines, leading to fires or explosions.
	A hurricane can cause storm surges, which can result in flooding and damage to coastal infrastructure. Power outages may occur, affecting critical services like hospitals and emergency response systems.
Industrial Accident	A chemical spill can contaminate water sources, leading to health risks and impacting agriculture and local ecosystems. It may necessitate the evacuation of nearby community.
	A nuclear accident can release radioactive material, leading to widespread contamination. It can cause long-term health effects, necessitate evacuation, and have ecological consequences.
Technological Failures	A major power outage can disrupt communication systems, transportation networks, and healthcare facilities. It can lead to disruptions in the supply chain, affecting food and water availability.
	A large-scale cyberattack can compromise critical infrastructure systems, such as energy grids or transportation networks. This can result in service disruptions, economic losses, and compromised data security.
Pandemics	A severe pandemic can overwhelm healthcare systems, leading to shortages of medical supplies, hospital beds, and healthcare workers. This can impact the overall response to the pandemic and increase mortality rates.
	Pandemics can disrupt supply chains, force business closures, and result in job losses. This can lead to a decline in economic activity, affecting various sectors and exacerbating social and financial vulnerabilities.

Addressing cascading effects in disasters requires a comprehensive and coordinated approach, involving preparedness measures, effective emergency response, and long-term recovery strategies. It is crucial to consider interdependencies among different systems and develop resilience strategies to mitigate cascading effects and minimize the overall impact of disasters.

For planning, as well as for risk analysis, it is always necessary to consider the worst case scenario. That is why the attention needs to be paid to cascading effects (sometimes also the term “domino effect” is used).

3.1.1. THE SENDAI FRAMEWORKS FOR DISASTER RISK REDUCTION 2015-2030

The SENDAI framework is one of the most important initiatives regarding disaster risk management and reduction at the global level, set by the United Nations (UN) with the commitment of the EU. Its main objective is the prevention of new disaster risks and the reduction of existing ones. It is the central global framework for UN states that seeks to reduce risk and strengthen resilience. Please see also point 3.7 listed below.

3.1.2. THE UNITED NATIONS INTERNATIONAL STRATEGY FOR DISASTER REDUCTION

The framework is defined by the UNISDR as "*the concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and improved preparedness for adverse events.*"[8]

It contains predictions on hydro-meteorological hazards (one of the two triggers for natural disasters) and expects increase of annual temperatures up to 4 °C with potential increase of forest fires. Predictions about a reduction of up to 40% of the average summer precipitations in the Mediterranean area resulting in increase of drought periods are also part of the framework. Another area of interest is the prediction of increase of precipitation in the North of Europe during summers with intense storms and extreme winds which will affect rivers with an expected increase of 47% of flood episodes, especially in the Rhine and Danube basins.

3.1.3. THE EUROPEAN UNION CIVIL PROTECTION MECHANISM

The European Union Civil Protection mechanism (UCPM) is one of the most important tools within the EU. This mechanism aims to strengthen cooperation among Member States in disaster response and risk reduction. It facilitates the exchange of resources, knowledge and experience, as well as the coordination among Member States in the event of disasters. Its decisions underline the responsibility of the European Commission and the Member States in the mechanism.

Utilisation of the UCPM is possible on a regional level also, but only in cooperation with particular National Civil Protection Authorities (NCPA).

3.1.4. DIRECTIVES OF THE EUROPEAN UNION

Directives are part of the secondary law of the EU, which is based on the EU Treaties. They are issued in the pan-European level and consequently become laws at the national level of the Member States. Member States adopt the Directives and make adaptations to align them with the institutional framework of the country. It is recommended to analyse how individual directives are implemented in the country or the region where the community is located. Depending on the case, a risk related to a particular directive can be evaluated as conditionally acceptable or unacceptable. More details are stated in D2.1 Community based DRM analysis and regional ecosystem (separate document of PANTHEON project).

Table 6: Directives of the EU related to Crisis Management

DIRECTIVE 2000/60/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ESTABLISHING A FRAMEWORK FOR COMMUNITY ACTION IN THE FIELD OF WATER POLICY	Issued in order to develop an integrated and uniform European framework on water policy. The main objective is the maintenance and improvement of the water environment of the EU by reducing pollution and emissions of hazardous chemical or other substances into the water.

[8] United Nations Office for Disaster Risk Reduction, UNISDR Terminology and Disaster Risk Reduction (Geneva, 2009)

DIRECTIVE 2007/60/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON THE ASSESSMENT AND MANAGEMENT OF FLOOD RISKS	Issued in order for Member States to effectively manage flood risk, which is increased by the underlying climate change. The Directive sets the context for the management of the river basins of each State.
DIRECTIVE 2008/68/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON THE INLAND TRANSPORT OF DANGEROUS GOODS	Directive for the transport of dangerous goods. Inland transportation of dangerous goods, either by road or by rail or inland waterways, may pose serious threats and lead to possible accidents with disastrous consequences for the citizens' welfare, the economy and the environment.
DIRECTIVE 2010/75/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON INDUSTRIAL EMISSIONS (INTEGRATED POLLUTION PREVENTION AND CONTROL)	Pollution within the EU territory is largely produced by industrial emissions in the air, earth and water reservoirs. The EU greatly considered the threats these emissions pose to the environment and to public health and developed the Industrial Emissions Directive, which currently is the main instrument that the EU uses in order to reduce pollutants from industrial facilities.
DIRECTIVE 2012/18/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON THE CONTROL OF MAJOR-ACCIDENT HAZARDS INVOLVING DANGEROUS SUBSTANCES, AMENDING AND SUBSEQUENTLY REPEALING COUNCIL DIRECTIVE 96/82/EC	The rules, measures and actions regarding the management of major accidents due to dangerous substances. The Directive greatly reduced the, until then, increased frequency of industrial accidents e.g., the ones in Seveso and Toulouse among others.
DIRECTIVE (EU) 2018/1972 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL OF 11 DECEMBER 2018 ESTABLISHING THE EUROPEAN ELECTRONIC COMMUNICATIONS CODE	Part of the regulatory framework for electronic communications networks. Although the Directive is not directly linked to disaster management and risk reduction, it ensures connection and access of the public to emergency services through the direct implementation of standards and related Public Safety Answering Point (PSAP) systems.
DIRECTIVE (EU) 2022/2555 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON MEASURES FOR A HIGH COMMON LEVEL OF CYBERSECURITY ACROSS THE UNION, AMENDING REGULATION (EU) NO 910/2014 AND DIRECTIVE (EU) 2018/1972 AND REPEALING DIRECTIVE (EU) 2016/1148 (NIS 2 DIRECTIVE)	Legislative document providing measures to increase the level of cyber security among the Member States of the EU has been updated by this directive with the aim to update and upgrade, wherever necessary, cyber security strategies and lay the basis for the establishment of competent authorities.
DIRECTIVE 2022/2557 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON THE RESILIENCE OF CRITICAL ENTITIES AND REPEALING COUNCIL DIRECTIVE 2008/114/EC	Directive is to provide the requirements that each Member State must implement in order to adopt specific measures for the protection of critical infrastructures and the enhancement of their resilience against threats and natural hazards.

3.1.5. OTHER DRR INITIATIVES AT THE EUROPEAN LEVEL

Apart from the Directives and Decisions of the European Parliament several other DRR initiatives and strategies exist at a European level, also including frameworks of cooperation among countries outside of the Union. Herein briefly described are the most significant programs, policies and plans for the management of disasters and crises.

3.1.6. STANDARDIZATION AT THE GLOBAL AND EU LEVEL

Standards play an important role in the achievement of interoperability, which is key prerequisite of disaster management, especially in cases of multi-agency response or cross-border incidents. Standardization can provide an efficient tool of both operational procedures and technical interconnectivity. Several bodies deal with the topic of standardization based on the level of interest and particular technical committees (ISO, ITU-T, IEE, CEN, CEN/CLC, ETSI). At the same time several EU projects and initiatives focus on these issues, mainly from the innovation perspective.

3.1.7. NATIONAL PLATFORMS FOR DISASTER RISK REDUCTION

Such platforms represent the national level of the SENDAI FRAMEWORK, which is mentioned in the above point 3.1. It is recommended to check whether such a platform is established in the country of the community region and to discuss/invite them to become a partner of the community.

3.1.8. TREATY ON THE FUNCTIONING OF THE EUROPEAN UNION

Cooperation on Disaster Risk Management (DRM) and Disaster Risk Reduction (DRR) is essential at the EU level. In certain conditions it is possible to use this tool for financing or another type of support for the prevention and protection against natural or man-made disasters. Again, this needs to be applied in cooperation with NCPA.

Several more initiatives have been identified, but their usability on the regional level is rather marginal. However, it is important to identify them, as they might be useful in specific cases. Thei application should be discussed with NCPA or other related authorities. These are:

- EUROPEAN UNION EXTERNAL ACTION
- THE EU WHITE PAPER “ADAPTING TO CLIMATE CHANGE: TOWARDS A EUROPEAN FRAMEWORK FOR ACTION”
- GREEN PAPER FOR THE PROTECTION OF FORESTS FROM CLIMATE CHANGE
- THE EUROPEAN STRATEGY TO ADAPT TO CLIMATE CHANGE AND THE EUROPEAN SPATIAL PLANNING OBSERVATION NETWORK
- BLACK SEA ECONOMIC COOPERATION PROTOCOL
- SOUTHEAST EUROPEAN COOPERATION PROCESS
- EUR-OPA MAJOR HAZARDS AGREEMENT 12TH MINISTERIAL SESSION
- COUNCIL OF EUROPE RESOLUTION 339: MAKING CITIES RESILIENT
- EU ACTION PLAN ON THE SENDAI FRAMEWORK AND THE 17 OUTCOMES OF THE ISTANBUL E.F.D.R.R. SESSION
- THE W.H.O. ACTION PLAN FOR THE IMPROVEMENT OF PUBLIC HEALTH PREPAREDNESS AND RESPONSE IN THE EUROPEAN REGION
- EU4HEALTH PROGRAMME

3.2. DECISION SUPPORT SYSTEMS FOR CBDRM

Analysis of CBDRM platforms and decision support systems has been already provided within this project. Details are stated in the document *D2.1 Community based DRM analysis and regional ecosystem* (separate document of the PANTHEON project).

Nowadays, various platforms, systems and IT tools play a significant role in many areas of human workand disaster resiliency is not an exception. This document is targeted on the regional level of DRM. The field of crisis management is very complex, dealing with threats existing in a given territory and, above all, their possible consequences. As the level of risk management decreases, this capability also decreases. Thus, the need for suitable tools supported by advanced technologies is even more significant in such cases.

Experience from past events shows that the responsible persons could not even imagine the possibility of certain incidents, for example, that a local stream could cause such great damage, that such a large amount of snow could fall in the given area, that a tornado or a strong earthquake could occur in the given area, etc. They often say that, if they had known earlier, they would have been prepared, or would have reacted differently. Again, modern technologies such as digital twins present great potential to substantially improve the situation in the prediction area.

In addition, the conditions are changing relatively quickly. Climate change plays a crucial role and can potentially lead to unprecedented situations, thus delimiting the capability of response. Another factor is that population continues to grow in vulnerable areas with the same applying also to economic activities, critical infrastructures and industrial establishments concentrated in areas prone to various risks. In addition, due to the increasing complexity of emergencies, it is important to take into consideration the viewpoint of multiple stakeholders, apart from the first responders', i.e., researchers' and the community's viewpoint.

Some of the tools are already available. Many of them are under development. Based on implemented analysis, here is a list of the ones that currently exist.

Table 7: Platforms and decision support systems for CBDRM

COPERNICUS Emergency Management Services (CEMS)	The Copernicus Emergency Management Service (CEMS)[9] is a European initiative that aims to provide timely and accurate geospatial information and services to support emergency management and response activities. Its use needs to be discussed with NCPA.
The ACTAREA tool	Developed by ESPON, the European Territorial Observation Network, the on-line tool ACTAREA[10] aims at promoting a common mental perception of an area to stakeholders interested in soft territorial cooperation. The tool is a web-based application able to generate two types of maps: map-shots and institutional maps.
The PUMA-X Universal Multi-Alert Platform	The platform is the result of the cooperation between seven stakeholders, engaged in the areas of security, defence and environmental protection. The scope of the platform is to facilitate first responders and competent agencies to increase their response capacities in the face of more frequent and impactful emergencies.[11]

[9] https://emergency.copernicus.eu/index.html
[10] https://actarea.espon.eu/
[11] https://puma-x.fr/en/

Predict Platform	Predict solutions[12] aim to support the design of plans at the municipal and inter-municipal levels. It provides competent authorities with early warning notifications for imminent hydrometeorological risks expected to affect a specific area.
The SAHANA EDEN Platform	Sahana Eden is an open-source software platform that can be used for Community-Based Disaster Risk Management (CBDRM)[13]. It offers a range of modules and features to support various aspects of disaster management and response.
The Open Fortis Tool	Open Foris is a suite of open-source tools developed by the FAO. It is primarily focused on forest monitoring and management, some of its tools can be applicable to CBDRM initiatives as well. It can assist in data collection, analysis, and management, including Collect Earth – a tool designed for participatory mapping and data collection using satellite imagery.
The USHAHIDI Platform	Open-source platform that has been used for various purposes, including community-based disaster risk management (CBDRM). It allows for the collection, visualization, and mapping of crowdsourced data. Ushahidi enables individuals and communities to report incidents, share information, and contribute to situational awareness during disasters. It can be used to gather real-time data on hazards, impacts, and community needs, allowing for better coordination and decision-making in CBDRM initiatives[14].
The OSOCC Platform	The OSOCC (On-site operations coordination centre) is a real-time online coordination tool/platform used by disaster response professionals, that facilitates the exchange of information among different actors and stakeholders as early as possible in the case of emergency. The use of the OSOCC is not restricted to governments, but can also be utilised by international and regional response organizations when responding to emergencies, i.e. by coordinating the assistance to affected populations.
Community Based Projects	Various projects are focused on this topic. Based on recent analysis within this project they are (Again, for details please see *D2.1 Community based DRM analysis and regional ecosystem*): ➢ The ResALLience Project[15] (ResAllience, n.d.), ➢ C2IMPRESS Project[16] (MEDEA project, n.d.), ➢ FIRE-IN[17] (FIRE-IN The first European Fire and Rescue Innovation Network, n.d.). ➢ MEDEA[18] (https://www.medea-project.eu/) ➢ BuildERS[19] (https://buildersproject.eu/) ➢ TEAMS project[20] (TEAMS, n.d.),

[12] https://www.predictservices.com/en/citizens/
[13] https://sahanafoundation.org/
[14] (Sijbren de Jong, 2016)
[15] https://www.resalliance.eu/the-project/
[16] https://www.medea-project.eu/
[17] https://workspace.fire-in.eu/en/
[18] https://www.medea-project.eu/
[19] https://buildersproject.eu/
[20] https://www.teams-project.eu/teams-3-0/

SITUATION IN "UNDER-STUDY" REGIONS

The aim of this document is to provide an overview of possible ways and an orientation for an approach for disaster-resilient community building on the regional level. Basic principles and recommendations are stated above and findings from implemented analysis are summarized. This chapter is focused on the analysis of results linked to two predefined regions:

- Attica, Athens, Greece and
- Île de France, Paris, France.

From the perspective of regional community building, they serve as cases for a better understanding of the interconnectedness of the described points on specific examples. It is assumed that a similar situation may arise in the building of a community in another European region.

It is important to mention that the communities of these regions were established before the PANTHEON project. This is a summary of the findings regarding the current status. Therefore, it may not be fully consistent with the principles of DR community building as described above.

Within this document, only the basic analysis findings are mentioned. More details can be found in the already mentioned analysis and regional ecosystem description *D2.1 Community based DRM analysis and regional ecosystem* (separate document of PANTHEON project).

4.1. DISASTER RISK REDUCTION POLICIES, PLANS AND STRATEGIES IN GREECE

Greece, like many other countries, has been working on disaster risk reduction strategies to mitigate the impact of various natural and man-made disasters. These strategies are aimed at minimizing the loss of life, property, and infrastructure, as well as enhancing the country's resilience to potential disasters. Some of the key disaster risk reduction strategies in Greece include:

- Earthquake Preparedness: Greece is located in a seismically active region, making earthquake preparedness a crucial aspect of its disaster risk reduction efforts. The country has been focusing on improving building codes and standards to ensure that structures can withstand seismic activity. Additionally, public awareness campaigns and drills are conducted to educate citizens on how to react during earthquakes and to increase preparedness.
- Wildfire Management: Greece faces the threat of wildfires, especially during hot and dry summers. Disaster risk reduction strategies include the establishment of firebreaks, controlled burning to reduce fuel load, and improved firefighting capabilities and resources. Early warning systems are also in place to detect and respond to wildfires quickly.
- Flood Management: Floods can occur in Greece due to heavy rainfall and flash floods. The country has been working on implementing flood control measures, such as building flood protection infrastructure like levees and flood barriers. Moreover, effective urban planning and the preservation of natural wetlands can help mitigate flood risks.
- Tsunami Preparedness: As a country with a coastline, Greece is also at risk of tsunamis, often triggered by underwater earthquakes. Disaster risk reduction strategies include early warning systems and evacuation plans for coastal communities.
- Landslide Mitigation: Greece has been working on identifying landslide-prone areas and implementing measures to stabilize slopes and prevent landslides. This involves geological studies, mapping, and engineering solutions.

- Climate Change Adaptation: Greece, like many other countries, is experiencing the impacts of climate change, which can exacerbate existing natural hazards and introduce new risks. Disaster risk reduction strategies include initiatives to adapt to changing climatic conditions, such as sustainable land use planning and infrastructure design to cope with more extreme weather events.
- Public Awareness and Education: Educating the public about disaster risks and preparedness is a crucial component of disaster risk reduction. Greece has been conducting awareness campaigns to inform citizens about potential hazards and the actions they can take to protect themselves and their communities.
- Coordination and International Cooperation: Collaboration between different government agencies, local authorities, non-governmental organizations, and international partners. Sharing knowledge, expertise, and resources is essential in enhancing disaster preparedness and response capabilities.

Please note that these strategies may be updated and/ or new initiatives might arise. For the most current information on disaster risk reduction strategies in Greece, it is recommended to refer to official government sources and reports or to discuss with the official subjects.

4.2. CIVIL PROTECTION STRUCTURE IN GREECE

The civil protection structure in Greece is organized at both national and regional levels to respond to emergencies and disasters. It is primarily overseen by the General Secretariat for Civil Protection, which operates under the Ministry of Citizen Protection.

General Secretariat for Civil Protection (GSCP): The GSCP is the main responsible body for coordinating and implementing civil protection policies and measures at the national level. It formulates emergency plans, establishes guidelines, and ensures effective communication between various stakeholders involved in disaster response.

Civil Protection Regional Directorates: Greece is divided into several administrative regions, and each region has its own Civil Protection Directorate. These regional directorates are responsible for implementing national policies and plans at the local level. They coordinate emergency response activities within their respective regions and work closely with local authorities and emergency services.

Municipalities and Local Authorities: At the local level, municipalities and local authorities play a crucial role in civil protection. They are responsible for managing emergencies and disasters that occur within their jurisdictions. They work closely with regional directorates and other relevant agencies to coordinate response efforts.

Fire Service: The Hellenic Fire Service (Greek Fire Brigade) is an essential component of civil protection in Greece. They handle various types of emergencies, including fires, rescue operations, and hazardous material incidents. The Fire Service is under the General Secretariat for Civil Protection and works closely with other emergency services.

Emergency Services: Apart from the Fire Service, other emergency services, such as police, medical services, and the coast guard, play vital roles in disaster response and management. They collaborate with civil protection authorities during emergencies to ensure an effective and coordinated response.

Volunteers and Non-Governmental Organizations (NGOs): Greece also relies on volunteers and NGOs to support civil protection efforts. These organizations often provide additional resources, manpower, and expertise during emergencies.

Emergency Operations Centers (EOCs): During major incidents, Emergency Operations Centers are activated at the national, regional, and local levels. These centers serve as command and coordination hubs where various agencies come together to manage the response to the crisis.

The Hellenic Government issues the Ministerial Decision with the code name "Xenokratis"[21]. It is the general plan for efficient disaster management which also identifies first responders' organizations, maps and assesses risks and proposes the development of communication and information exchange systems. Based on this, the specific plans for the prevention of, preparedness for and response to hazards are developed.

In 2020 the National Crisis and Hazard Management Mechanism[22] was issued. It sets the basis for the establishment of a National Database for Hazards, Threats and Losses from Disasters, which is regularly updated.

The hazard-specific plans and strategies for disaster risk reduction are stated below. The plans are segmented into the four disaster management phases. In Greece, the GSCP has developed detailed plans for each major hazard affecting the country, providing specific measures and actions for all four phases of disaster management. In addition, the Hellenic Police has also developed specific plans with the aim to address criminality and potentially high-impact anthropogenic risks.

From the point of view of DR community building within the particular region of Greece, it is important to know this structure and plans. They represent valuable inputs and basis for planning, preparedness, but also reaction and recovery in case of extraordinary events.

Table 8: List of hazards affecting Greece and corresponding disaster management plans

Natural and man-made hazards affecting Greece	Plans and strategies implemented in Greece
Earthquake	• General civil protection plan "Egkelados 2" • Actions implemented by the Earthquake Planning and Protection Organisation i.e., the development of the earthquake resilience regulation, pre-earthquake inspection of structures, information campaigns for citizens. • Monitoring of seismic activity by research centres and universities.
Flood	General civil protection plan "Dardanos 2"
Snowfalls and frost	General civil protection plan "Voreas 2"
Forest fire	General civil protection plan "Iolaos 2"
Volcanic eruption	General civil protection plan "Talos"
Climate Change	Climate change adaptation strategy for Greece
Technological accident	General civil protection plan "Irakleitos"
Accident during the transportation of dangerous goods	• General civil protection plan following the ADR/RID European agreements • General civil protection plan for the management of accidents during the transportation and distribution of natural gas

[21] Ministerial Decision 1299/2003: "Xenokratis" general civil protection plan, 2003
[22] Hellenic Government, Law 4662/2020, 2020

Multi-casualty incident	Civil protection plan for the management of human loss
CBRN	• General civil protection plan "Pandora" • Hellenic police plan "Thiseas"
Hostage and criminal crisis	Hellenic police plan "Nikias"

4.3. DRR INITIATIVES AND POLICIES IMPLEMENTED IN THE REGION OF ATTICA, GREECE

The Region of Attica is a secondary local administration body and comprises of eight (8) Regional Units and 66 Municipalities. Overall, the Region covers an area of 3808 km^2 and is the most densely populated area in Greece, due to the fact that the metropolitan area of Athens lies within the Region. More than 1/3 of the overall Greek population lives in the Attica Region, with 3.761.810 residents according to the 2001 population census.

Figure 3 – The Regions of Attica, Athens, Greece

[23]

According to the "Xenokratis" Ministerial Decision, Regions are obliged to draft and issue special action plans per hazard, following and adjusting to the General Plans of the Secretariat[24] (Hellenic Government, 2020). These action plans are forwarded for approval by the G.S.C.P. and are communicated to stakeholders in order to have their operational plans harmonized. In the context of its responsibilities, the Region of Attica actively participates in civil protection procedures by formulating suggestions and propositions concerning civil protection planning in the area of its responsibility and drafting of prevention, response and awareness measures and actions.

A set of specific plans are available for this particular region:

- Specific Action Plan of the Attica Region for the Management of Forest Fires
- Specific Action Plan of the Attica Region for the Management of Earthquakes
- Specific Action Plan of the Attica Region for the Management of Floods
- Specific Action Plan of the Attica Region for the Management of Frost and Snowfalls
- Plan for the Adaptation of the Attica Region to Climate Change

[23] https://en.wikipedia.org/wiki/Attica_%28region%29
[24] Hellenic Government, Law 4662/2020, 2020

4.4. DISASTER RISK REDUCTION STRATEGIES IN FRANCE

France is actively engaged in DRR strategies to mitigate the impact of various hazards and improve its resilience to disasters. Here are some of the key disaster risk reduction strategies in France:

- Risk Assessment and Mapping – comprehensive risk assessments to identify areas vulnerable to natural disasters such as floods, earthquakes, landslides, and wildfires. This information is used to create hazard maps that guide land-use planning and development regulations.
- Early Warning Systems – sophisticated early warning systems for various hazards, including floods and extreme weather events. These systems enable timely alerts to be sent to the public and relevant authorities, allowing them to take precautionary measures.
- Urban Planning and Building Codes – considerations into urban planning and building codes to ensure that new infrastructure and buildings are designed to withstand potential hazards.
- Public Awareness and Education – the French government actively promotes public awareness and education campaigns to inform citizens about potential risks and the appropriate actions to take in the event of a disaster.
- Flood Management – implementation of various flood management strategies such as building flood barriers, levees, and reservoirs to control and mitigate the impact of floods. Priority is given in certain regions with higher risk of flooding.
- Forest Fire Prevention – measures to prevent and control forest fires, including the establishment of firebreaks, regular forest management, and public awareness campaigns during the dry season.
- Earthquake Preparedness – although France is not known for high seismic activity, it still takes measures to prepare for potential earthquakes, including retrofitting vulnerable structures and conducting earthquake drills.
- Climate Change Adaptation – recognizing the increasing risk of climate-related disasters, France has been actively working on climate change adaptation strategies to address the impact of extreme weather events and other climate-related hazards.
- International Cooperation – engagement in international cooperation and collaboration on disaster risk reduction, sharing its expertise and experiences with other countries and participating in global initiatives.

It's important to note that disaster risk reduction strategies are continually evolving based on changing risk profiles, technological advancements, and lessons learned from past events. Therefore, there might be additional or updated strategies implemented which should be checked. It is recommended to refer to official government sources and disaster management agencies in France.

4.5. CIVIL PROTECTION STRUCTURE IN FRANCE

In France, various Ministries are engaged in disaster management as it is listed below. This is an example of why it is important to know the structure and system of work of civil protection in a country as related to particular regions and its DR community (differences compared to the situation in Greece – point 5.1.1 – are obvious).

- The Ministry of Environment is competent for risk reduction, prevention and management,
    - The General Directorate for Risk Prevention (Direction generale de la prevention des risques, DGPR) of the Ministry of the Environment, headed by the Delegate for Major Risks, brings together four services:

        - Technological risks department
        - Nuisance prevention and quality service for the environment
        - Natural and hydraulic risks department
        - Office of General Affairs and Information Systems
- the Ministry of Housing considers risks in urban planning and compliance with construction rules and regulations,
- the Ministry of the Economy supervises the insurance in charge of compensation in the event of a claim, whereas
- the Ministry of Interior is responsible for crises preparation and management.
    - General Directorate of Civil Security and Crisis Management,
        - with the mission to protect lives, properties and the environment, to inform and alert the population of imminent threats and the overall promotion of CP.
        - The main purpose is the monitoring and preparation for potential hazards.
        - Through its operational centre, it coordinates an inter-Ministerial planning by implementing an inter-Ministerial crisis cell.
        - Also raises campaigns for the increase of social awareness and develops programmes and material with the aim to further educate, train and increase the competence and capacity of stakeholders.
- Apart from these four key ministries, the Ministries of Agriculture Health, Foreign Affairs and Education contribute to their fields of competence in Disaster Risk Reduction.

The civil protection system in France is organized into several components that work together to ensure the safety and security of the population during emergencies and disasters.

Ministry of the Interior (Ministère de l'Intérieur) is responsible for civil protection at the national level. It oversees and coordinates emergency response efforts across the country. The minister of the interior is in charge of this department.

Civil Protection Directorate (Direction générale de la sécurité civile et de la gestion des crises - DGSCGC) is a part of the Ministry of the Interior and is responsible for planning, coordinating, and managing civil protection operations at the national level. It plays a crucial role in preparing for and responding to various emergencies, including natural disasters, industrial accidents, and other crises.

Departmental Fire and Rescue Services (Service départemental d'incendie et de secours - SDIS). At the departmental level, France is divided into administrative regions called departments. Each department has its own Departmental Fire and Rescue Service responsible for firefighting, medical emergencies, and disaster response within their area. The SDIS teams are highly trained and well-equipped to handle various emergency situations.

National Police (Police Nationale) **and Gendarmerie** (Gendarmerie Nationale) both play a role in civil protection. The National Police primarily operate in urban areas, while the Gendarmerie are responsible for law enforcement in rural areas and small towns. During emergencies, they assist with maintaining public order, ensuring safety, and providing support during disaster relief efforts.

French Red Cross (Croix-Rouge Française) is a humanitarian organization that collaborates with government agencies in civil protection operations. They provide medical assistance, disaster relief, and social support during emergencies and crises. It is recommended to check if and which similar organizations are active in particular regions.

Municipal and Local Authorities have their own civil protection and emergency response mechanisms. They are the first line of defence during most emergencies and are responsible for alerting residents, coordinating evacuations, and providing immediate assistance until higher-level resources arrive.

Volunteers and Civil Defence Organizations. France also has volunteers and civil defence organizations that support official agencies during emergencies. These volunteers are trained to assist with various tasks, such as search and rescue, medical aid, and humanitarian support. It is recommended to check if such organizations are active in particular region.

Civil protection is organised at the national and territorial/regional levels. At the national level, the General Secretariat for National Defence and Security, in collaboration with the aforementioned Ministries and the General Secretariat for the Sea designs and implements security and defence policies, while at the regional level the organisation and planning for defence and civil protection is carried out by the prefects.

The most significant plans and tools for the management of disasters and risks are:

- The Natural Risk Prevention Plan (Plan de Prevention des Risques Naturels, PPRN)
- The Plan for the Prevention against Technological Risk (Plan de Prevention des Risques Technologiques, PPRT)
- Forest Fire Prevention Plan (PPRIF)
- Flood Prevention Plan
- Plans at the Inter-refional, Regional and Local Level
    - role of the Prefect of the Department
    - role of the Mayor of the Community
    - Communal Safeguarding Plan
    - Intercommunal Safeguarding Plan
    - Communal information document on major risks
- other DRR strategies
    - Strategy for the risk of earthquakes
    - Coastal risk and Tsunami Prevention in France
    - International Action of France Against Terrorism

Table 9: Most significant hazards and the principles to manage disasters in France

Eight main Hazards affecting France	Seven main Principles for disaster management
Floods	Knowledge of phenomena, hazard, and risk
Earthquakes	Monitoring, forecasting, and warning
Volcanic eruptions	Preventive information and education of the population
Land movements	Taking risks into account in planning and urban planning
Avalanches	Reducing vulnerability, Mitigation Collective means (dike, firewall breaks…), Individual means
Forest fires	Crisis preparedness and management The organisation of the civil security response (ORSEC) The Communal Safeguarding Plan (PCS) The Special Security Plan (PPMS)
Tropical cyclones	Post-crisis management and return on experience
Storms	

4.6. DRR INITIATIVES AND POLICIES IMPLEMENTED IN THE REGION OF ÎLE-DE-FRANCE, FRANCE

The Region The Île-de-France is the most populous of the eighteen regions of France, with an official estimated population of 12,271,794 residents on 1 January 2023. Centred in the capital Paris, it is located in the north-central part of the country and often called the Paris Region. Île-de-France is densely populated and retains a prime economic position on the national stage: though it covers only 12,012 square kilometres (about 2% of metropolitan French territory) its 2017 population was nearly one-fifth of the national total. The region is made up of eight administrative departments: Paris, Essonne, Hauts-de-Seine, Seine-Saint-Denis, Seine-et-Marne, Val-de-Marne, Val-d'Oise and Yvelines. It was created as the "District of the Paris Region" in 1961. In 1976, when its status was aligned with the French administrative regions created in 1972, it was renamed after the historic province of Île-de-France. Residents are sometimes referred to as “Franciliens”, an administrative word created in the 1980s. The GDP of the region in 2019 was nearly one-third of the French, and 5% of the European Union's. [25]

Figure 4 – The Region Île-de-France, France

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The region is not greatly exposed to natural hazards. Regarding geological hazards, Île de France lies far from tectonically active zones, in which the majority of geological phenomena e.g., earthquakes and volcanic eruptions, are observed. In addition, extreme weather phenomena are also scarce and are limited to occasional severe storms or snowfalls during winter. On the other hand, Île de France lies at the confluence of major hydrographic networks, with the most important being that of the river Seine, which runs across the city of Paris. The risk of flooding from overflows of the Seine River and its tributaries is high and common to all eight (8) departments of the Region. Another major threat is related to runoff flooding. Apart from floods, the Departments of Île de France are affected by land movements, especially soil subsidence, landslides and undermining.

Although the region is at the stage of serious de-industrialisation, it remains the leading industrial area throughout France. Man-made accidents’ threat is presented here, including malicious acts and disruption of the socio-economic status.

[25] https://en.wikipedia.org/wiki/%C3%8Ele-de-France

Important stakeholders in area of civil protection are:

- Department for prevention and protection (Direction de la Prevention et de la Protection, DPP),
- The municipal civil security reserve of Paris (La reserve communale de securite civile de la Ville, RCSC),
- City of Paris,
- Operational monitoring centre (La centre de veille operationelle de la Ville de Paris, CVO),
- Paris defence and security zone,
- Protection Civile Paris Seine (PCPS),
- The Eau de Paris authority

Prevention and Response Actions

Île de France, although not directly exposed to natural hazards, has developed response mechanisms and activities, in the form of either suggestions for actions undertaken by citizens or official risk prevention and response plans. The same also applies to technological accidents, which are more common in terms of frequency, and for malicious acts (The PCS plan for Paris)

Table 10: Most common hazards affecting the city of Paris and strategies for the management of emergencies

Natural and man-made hazards affecting the city of Paris	Actions and plans for prevention and response to related emergencies
Flood	• The flood risk prevention plan • The local urban plan of Paris which integrates the PPRI. • The flood prevention action program for the Seine and the Marne • Additional measures, such as the construction of dams controlling the overflows of Seine and its tributaries.
Drought	• Monitoring of the weather and of water levels. • Water from the Seine and the Marne rivers is storage and distribution rules
Storm	• Restrictions in case of strong winds from authorities • Messages are broadcasted to citizens through messages, the city of Paris website and social media • Recovery plans of authorities (removing debris and fallen trees, etc.).
Extreme temperatures	• Issuing of extreme weather forecasts • Winter emergency plan, in force from November to March • Heatwave plan in force, from June till August. • Protection guidelines for vulnerable groups e.g., elderly/disabled people, etc. • Citizen awareness through a communication system
Technological accidents	• Issuing of protection measures for the potentially affected population and orders the cessation of the activities by authorities of the city
Transportation accidents	• The urban transportation plan of the Ile-de France Region • protection campaigns launched by the Chamber of Commerce and Industry of Paris, along with major transportation companies • Messaging the population for information purposes • Proper maintenance of canals is ensured for the safety of river traffic.

Transportation of dangerous goods	• Specific regulations for pipeline transport. • Speed and other restrictions to vehicles containing dangerous goods. • The Fire Brigade with its adequately equipped vehicles is responsible for the response
Risk to power and gas network	• Internal operation plans of the companies managing the power and gas network to manage potential incidents
Nuclear risk	• The provision of potassium iodide tablets (Interministerial circular No. DGS/DUS/DSC/2011/64)
Biological risk	• The business continuity plan of the city (Un plan de continuite d'activite, PCA)

Special attention is paid to floods and planning and increasing resilience to this phenomenon as well as to technological risk prevention.

RECOMMENDATIONS

The main goal of this subchapter is to define key recommendations and actions based on the outcomes and findings from previous tasks (T2.1 Analysis of CBDRM National and regional policies, existing platforms and uptakes; T2.2 Regional Multi-Hazards/risk data and assessment, and T2.3 Community vulnerability and capacity assessments) on how the under-study regions can improve disaster resilient systems and the local communities.

The specific recommendation is to focus on basic statements stated in chapter 2 and to (re)check the main steps for building a local DR community. These steps do not only concern the building of a new community but are also recommended after a certain period from its creation, especially if significant unforeseen extraordinary events take place, national regulations national regulations have been updated, new threats appear due to the industrial development/cross-regional effects, etc. or when a need for a re-start of community activities is identified for any reason. The worksheet listed in Appendix 1 can be used for this purpose.

KEMEA who are the leaders of the PANTHEON tasks T2.1 T2.2, performed an **interview study** with Civil Protection Agencies (CPAs) stakeholders. The interview process included 7 stakeholders including authorities relevant to civil protection and disaster risk management from both under-study regions - Greece and France. All stakeholders were identified based on stakeholder expertise, i.e., their qualifications and experience. Stakeholders represent governmental sectors at various scale/levels of operation (national, sub-national, regional). The objective has been to obtain insights from the status quo of national hazards, risk assessment and disaster management tools used in the two countries, as well as from the potential approaches for improvements and recommendations for community outreach. Furthermore, gaps and challenges to be considered during the risk assessment and planning process were identified, to enhance Civil Protection and emergency management capabilities in the face of single and multi-hazard events.

An important issue raised by the experts is the need for strengthening risk assessment and planning with more resources and educational actions. In association to these suggestions, the need to improve risk analysis based on either scenario or probabilistic tools have also been underlined. Such improvements are seen from the technological progress point of view but also from the perspective of better knowledge, information and research outcomes.

Forecasting, which is an essential part of risk assessment, is considered to be one of the most important tools in emergency management. Room for improvements has been pointed out regarding forecasting accuracy, reliability, resolution (e.g., wildfire daily map) and adequate for advance forecasting of a potentially impactful event.
Deeply related to the EWS issue is the common sense that the emergency phone number 112 is a tool of early warning. Within this frame, 112 SMS notifications prior to meteorological hazards (e.g., severe weather, floods, wildfires) are effective awareness tools for taking countermeasures.

Regarding the challenges in national legislation, some stakeholders pointed out the need for increasing the interoperability between all the relevant stakeholders and organizations. To reinforce the capacity in Disaster Risk Management (DRM) in the face of multi-hazard events, some suggestions are stated herewith:
• Enhancement of the involvement of citizens in the emergency management in a proactive way, e.g., through training and awareness activities. This is especially relevant in events affecting a large group of population, when self-protection and the use of their own capabilities to manage the situations are essential.

• The need for improvement of forecasting tools with a better integration of climate change challenges by considering the severity and the recurrence of unprecedented hazardous events.
• Clear planning per hazard type with distinct responsibilities and liabilities for each organization involved.

4.7. SUGGESTIONS AND RECOMMENDATIONS RESULTED FROM PERFORMED INTERVIEW:

For sustainable development in the disaster risk management, stakeholders expect to see a stronger research and technical influence to support CPAs in the management of risks in their regions. Various strategies are needed with both top-down and bottom-up approaches that can be used depending on the context. CPAs need to expand their partnerships in the region in a strategic manner. The outcomes of research studies need to be better disseminated and relevant tools should be utilized for a wider benefit sharing. Some of the suggestions supported that DRM could include several actions such as maintenance of regional approaches, but with consideration to the local context through high-quality procedures and increase of the harmonization of guidelines and tools at the national level. In addition, other suggested actions focus on better implementation management plans and strategies and state that for the improvement of the capacity in the DRM it is important to strengthen partnerships, broaden the engagement among the various stakeholders and better clarify responsibilities and roles. Concrete recommendations for improvement of the capacity in the DRM are stated below:

- Train the public and increase its level of awareness regarding risks with the highest probability of occurrence;
- Adequate training of first responders both in terms of new technologies and of operational procedures;
- Maintenance and upgrade of technological equipment;
- Clear planning per hazard with distinct responsibilities and liabilities for each organization;
- Invest in artificial intelligence to help the maintenance of the plans, the building of scenarios for risks assessments and the development of predictive systems;
- The national legislation needs improvement.

In addition to the interviews, a **questionnaire survey** was also conducted. In this research the opinions of persons (39 respondents; 27 fully completed, 12 partly completed) affiliated with several operational organizations in both France and Greece were collected. The investigation focused on a variety of risk management issues.

About half of the respondents replied that in their organisation an up-to-date disaster management plan/strategy either exists or is under development. However, such plans, are not updated very often. For minimizing future disaster impact and losses, the organizations focus mainly to training actions for both the public and the emergency services personnel. However, less than 40% of the respondents believe that their organization has integrated international/EU standards in its operational procedures.

Important findings were identified regarding the extent to which the four disaster management phases (prevention, preparedness, response, recovery) are addressed by national policies and initiatives. About half of the respondents declared that the prevention phase is addressed only at a “Limited” degree. Furthermore, only one third of the respondents declared that the preparedness phase is addressed at a satisfactory degree by national policies and initiatives. With regard to the response phase, more than half of the respondents replied positively. However, the results about the recovery phase are not encouraging since a percentage of

37% of the respondents remained “Neutral”. In addition, no respondent chose the degree “Great”, while about one third of them replied that this issue is addressed only at a “Limited” degree.

The replies received to the question about the main gaps in disaster management preparation and mitigation are quite fragmented given that no predominant reply has been received and the replies are distributed in 13 different options with percentages ranging from 14% to 3%. The participating experts expressed the opinion that the main gaps in disaster management preparation and mitigation can be recognized in the “Training of the public”, in the “Early warning systems” as well as in the “Prevention of the hazards”. About half of the respondents replied that Early Warning Systems are available in their region. This is consistent with the fact that about half of the respondents indicated that their organization receive notifications for upcoming events through early warning mechanisms, mainly via the 112 emergency number but also via other means of communication including regular phone, fax, email, television and radio.

4.8. RESULTS OF THE QUESTIONNAIRE SURVEY IN TERMS OF COMMUNITY VULNERABILITY

The most relevant vulnerable groups that were identified via open questions and closed questions were the elderly, children/ minors, and people with mental or physical disorders/ disabilities/ illnesses. The questionnaires showed that there is a general awareness of the importance of disaster management and the need to include vulnerable groups in disaster planning. However, there also seem to be some gaps in terms of implementation and effectiveness of current disaster management plans, with most respondents indicating that the plans serve vulnerable groups rather poorly. There also appears to be lack of awareness and initiatives in place to reach vulnerable groups, specifically in terms of disaster management education, with half of respondents not being aware of any such initiatives.

In terms of measures that can help people to rebuild and bounce back after a disaster, there seems to be some consensus among respondents, with the most mentioned measures being rebuilding infrastructure and building strong social ties within the community.

CONCLUSIONS

The document presents the outcomes of the PANTHEON study on disaster resilience and community-based disaster risk management (CBDRM) in the two PANTHEON pilot areas. However, it aims to provide an overview of ways and requirements for building a DR community in any region, while illustrating existing approaches in the pilot regions. It highlights the significance of community involvement and the need for effective risk management strategies, focusing on building disaster-resilient communities at the local and regional levels. The subsections cover key steps and processes involved in the community-building efforts, such as determining the target area, conducting threat assessments, identifying vulnerable points, and involving stakeholders. The analysis explores existing policies, frameworks, and initiatives related to community-based disaster risk management at the national and regional levels. The inclusion of international frameworks like the SENDAI Framework and EU directives indicates the consideration of global and regional cooperation for disaster risk reduction. Various platforms and decision support systems for community-based disaster risk management are discussed, as they can play a crucial role in enhancing preparedness, response, and recovery efforts. Mentioning specific platforms like the Copernicus Emergency Management Services, Actarea Tool and others, implies a focus on technological solutions for disaster management.

The effectiveness of community-based disaster risk management, the importance of international cooperation and frameworks, the relevance of technological platforms, and key insights from the case studies of Greece and France are also highlighted.

The comparative analysis of disaster risk reduction policies and strategies in the regions of Greece and France allows for a better understanding of regional approaches to disaster resilience and can serve as a basis for identifying best practices and lessons learned which can be widely applicable.

Findings on Disaster Risk Reduction Policies, Plans and Strategies in Greece:

Disaster Risk Reduction Strategies: Greece has implemented various strategies to reduce the impact of natural and man-made disasters. Key strategies include earthquake preparedness, wildfire management, flood management, tsunami preparedness, and landslide mitigation.

Climate Change Adaptation: Greece is experiencing the impacts of climate change and its disaster risk reduction efforts include initiatives to adapt to changing climatic conditions. Sustainable land use planning and infrastructure design are part of this strategy.

Public Awareness and Education: Educating the public about disaster risks and preparedness is crucial. Greece conducts awareness campaigns to inform citizens about potential hazards and actions they can take to protect themselves and their communities.

Coordination and International Cooperation: Collaboration between different government agencies, local authorities, NGOs, and international partners is essential in enhancing disaster preparedness and response capabilities.

Civil Protection Structure in Greece:

General Secretariat for Civil Protection (GSCP): The GSCP is responsible for coordinating and implementing civil protection policies and measures at the national level. It formulates emergency plans and ensures effective communication between stakeholders.

Civil Protection Regional Directorates: Each administrative region in Greece has its own Civil Protection Directorate responsible for implementing national policies and coordinating emergency response activities.

Municipalities and Local Authorities: Local municipalities play a crucial role in managing emergencies within their jurisdictions and work closely with regional directorates and other relevant agencies.

Fire Service: The Hellenic Fire Service is an essential component of civil protection in Greece, handling various emergencies, including fires and rescue operations.

Emergency Services: Police, medical services and the coast guard play vital roles in disaster response and management, collaborating with civil protection authorities during emergencies.

Volunteers and NGOs: Volunteers and NGOs support civil protection efforts by providing additional resources and expertise during emergencies.

Disaster Risk Reduction Initiatives in the Region of Attica, Greece:

Special Action Plans: The Region of Attica has developed specific action plans for managing various hazards, including forest fires, earthquakes, floods, frost and snowfalls, and climate change adaptation.

Active Participation: The Region of Attica actively participates in civil protection procedures by formulating suggestions and propositions for civil protection planning in its area of responsibility.

These findings indicate that Greece has taken comprehensive steps to address disaster risk reduction, including the development of specific plans for different hazards, awareness campaigns, and international cooperation. The region of Attica, being densely populated and housing the metropolitan area of Athens, faces unique challenges in disaster management and has formulated specific action plans to address various hazards.

Findings on Disaster Risk Reduction Strategies in France:

Risk Assessment and Mapping: France conducts comprehensive risk assessments to identify areas vulnerable to natural disasters such as floods, earthquakes, landslides, and wildfires. These assessments help create hazard maps for land-use planning and development regulations.

Early Warning Systems: France has sophisticated early warning systems for various hazards, including floods and extreme weather events, allowing timely alerts to be sent to the public and authorities.

Urban Planning and Building Codes: Urban planning and building codes are considered to ensure that new infrastructure and buildings are designed to withstand potential hazards.

Public Awareness and Education: The French government actively promotes public awareness and education campaigns to inform citizens about potential risks and appropriate actions during disasters.

Flood Management: France implements various flood management strategies, including the construction of flood barriers, levees, and reservoirs to control and mitigate floods, with priority given to regions with higher flood risk.

Forest Fire Prevention: Measures are taken to prevent and control forest fires, such as creating firebreaks, implementing regular forest management, and conducting public awareness campaigns during dry seasons.

Earthquake Preparedness: Despite low seismic activity, France prepares for potential earthquakes by retrofitting vulnerable structures and conducting earthquake drills.

Climate Change Adaptation: France actively works on climate change adaptation strategies to address the impact of extreme weather events and other climate-related hazards.

International Cooperation: France engages in international cooperation and collaboration on disaster risk reduction, sharing expertise and experiences with other countries and participating in global initiatives.

Civil Protection Structure in France:

Ministries Involved: Different ministries in France are engaged in disaster management, including the Ministry of Environment, Ministry of Housing, Ministry of Economy, and Ministry of Interior.

General Directorate of Civil Security and Crisis Management: This organization is responsible for protecting lives, properties, and the environment. It coordinates inter-ministerial planning and implements an inter-ministerial crisis cell during emergencies.

Departmental Fire and Rescue Services (SDIS): Each department in France has its own SDIS responsible for firefighting, medical emergencies, and disaster response within their area.

National Police and Gendarmerie: The National Police and Gendarmerie assist with maintaining public order and providing support for disaster relief efforts during emergencies.

French Red Cross: The French Red Cross collaborates with government agencies in civil protection operations, providing medical assistance, disaster relief, and social support during emergencies.

Disaster Risk Reduction Initiatives in the Region of Île-de-France, France:

Hazards in Île-de-France: The region faces flood risks from the Seine River and its tributaries, land movements, and potential technological accidents.

Stakeholders: Important stakeholders in civil protection include the Department for Prevention and Protection (DPP), municipal civil security reserve of Paris (RCSC), City of Paris, operational monitoring center (CVO), Paris defence and security zone, and Protection Civile Paris Seine (PCPS).

Prevention and Response Actions: The region has developed response mechanisms and activities, including risk prevention and response plans for various hazards like floods, droughts, storms, extreme temperatures, and technological accidents.

The findings highlight France's comprehensive approach to disaster risk reduction, including risk assessment, early warning systems, and specific strategies for different hazards. The region of Île-de-France focuses on flood management and increasing resilience to floods and technological risk prevention.

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APPENDIX A

CHECK LIST FOR ESTABLISHMENT DISASTER RESILIENCY COMMUNITY

1. **What is the exact territory of the community?**

Try to describe the particular area, its geographical, social and economic scope/boundaries with as much detail as possible. Consult maps and official division (regions, districts, local areas).
Annexes, sources, references:

2. **Pre-analysis of threats and risks**

Are there any official threat (hazard) analyses including the territory of the region? Starting from national level – "top down" principle.
Are there any Threat registers (lists of hazards in understanding of civil security / crisis management? Starting from national level – "top down" principle. (This should also be part of the above analysis)
What are the risks resulting from identified threats? What are the measures and recommendations? (This should also be part of the above analysis) Is there room (ideas) for improvement?
Annexes, sources, references:

3. **Vulnerable points**.

Lives and health of persons. What are the vulnerable groups of people within the region? Are they organized somehow? Is there a way to interact with them and include them in the DR community?
Property and assets. What types of assets are present within the region? Do any groups/representatives of their owners/operators exist? Are they part of crisis management / civil protection?
Environment. What does the environment include in the region? Natural parks, protected areas, territories with special significance, other areas with specific significance (social, economic, etc.)? Do any plans/rules/restrictions exist for these areas?
Cultural heritage. Are there any objects of cultural heritage in the area? Do any plans/rules/restrictions exist for these objects (including unofficial protection rules)?
Social and economy stability. What might be the consequences of extraordinary events (threats) to social and economy stability within the region? Considering past events or events in neighbouring regions could be supportive.
Annexes, sources, references:

4. **Stakeholders**. What types of organizations are present or have activities within the region (including responsibilities – e.g. river flow operator, official bodies, responders, etc.)

Civil protection authority (national, regional)
Units of responders (national, regional, local, industrial, voluntary, etc.)
Critical infrastructure operators (Which are the critical infrastructure objects in the region?)
Sensitive infrastructure operators (Which are the sensitive infrastructure objects in the region? (They may not be officially characterised as "critical", but may have high significance for the region)
Other subjects (active in the area of civil protection / crisis management, respectively with the potential to improve disaster resiliency, including response capacity)
Academia and research (active in the area of civil security)
Communities and individuals (vulnerable groups and entities active/interested in the topic)

5. **Framework of cooperation**

What are your basic needs? Consider the structure of the community.
Which technological tools are in use in your country/region? Please check possibilities listed in this document. State your findings here for next discussions.
Annexes, sources, references:

6. **Launch a collaboration**

Investigate possible suitable activities for launching the community and list them here. Consider community stakeholders and members, time needed and their availabilities.

SUMMARY

The above mentioned findings should be discussed within the community (core group). Final decisions should be registered.