PANTHEON

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

D2.1

COMMUNITY BASED DRM ANALYSIS AND REGIONAL ECOSYSTEM

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TASK ABSTRACT

The present Deliverable “Community based DRM analysis and Regional Ecosystem” is the outcome of T.2.1 “Analysis of CBDRM National and Regional policies, existing platforms and uptakes” and provides an overview of existing disaster risk reduction strategies in the European Union, more specifically in Greece and France, and of existing platforms for a community-based disaster management.

[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
BDIFF	Base de Donnees sur les Incendies de Forets en France
CBDRM	Community Based Disaster Risk Management
CCA	Climate Change Adaptation
CCIP	Chambre de commerce et d'industrie de Paris
CECIS	Common Emergency Communication and Information System
CGCT	Code general des collectives territoriales
CIP	Critical Infrastructure Protection
CISE	Common Information Sharing Environment
CIWIN	Critical Infrastructure Warning Information Network
CVO	La centre de veille operationelle
DG ECHO	Directorate-General for European Civil Protection and Humanitarian Aid Operations
DG ECHO	Directorate General for European Civil Protection and Humanitarian Aid Operations
DGPR	Direction generale de la prevention des risques
DPP	Direction de la Prevention et de la Protection
DPPI	Disaster Preparedness and Prevention Initiative
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EC	The European Commission
EERC	European Emergency Response Capacity
EFDRR	European Forum for Disaster Risk Reduction
EMS	Emergency Medical System
EPCIP	European Programme for Critical Infrastructure Protection
ERCC	European Response Coordination Centre
ERPUS	L'etablissement de preparation et de response aux urgences sanitaires
EU	The European Union
EURI	European Union Recovery Instrument
FNCP	Federation Nationale de Protection Civile
GEMAPI	Gestion des milieux Aquatiques et Prevention des inondations
GSCP	General Secretariat of Civil Protection
HFA	Hyogo Framework for Action
HNMS	Hellenic National Meteorological Service
IAURIF	Institut d'Aménagement et d'Urbanisme de la Région d'Ile de France
IAVCEI	International Association of Volcanology and Chemistry of the Earth's Interior
ICPE	Installation Classee pour la Protection de l'Environment
INERIS	Institut National de l' Environment Industriel et des Risques
Nat-CHAMM	National Crisis and Hazard Management Mechanism
NEAMTWS/ IOC/UNESCO	Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North-eastern Atlantic, the Mediterranean and Connected Seas
NOA	National Observatory of Athens
OECD	Organisation for Economic Cooperation and Development
ORSEC	Organisation de la Response de Securite Civile
OSOCC	On-site operations coordination centre
PAPI	Programmes d' Actions de Prevention des Inondations
PCA	Plan de continuite d'activite
PCS	Plan Communal de Sauvegarde

PCPS	Protection Civile Paris Seine
PDUIF	Plan de deplacements urbains d'Ile de France
PICS	Plan Intercommunal de Sauvegarde
PLU	Plan Local d'Urbanisme
PPFCI	Plan de Prevention des Forets Contre l'Incendie
PPI	Plan particulier d'intervention
PPRI	Plan de prevention du risqué d'inondation
PPRIF	Plan de Prevention des Risques d'Incendies de Forets
PPRN	Plan de Prevention des Risques Naturels
PPRT	Plan de Prevention des Risques Technologiques
PSE	Premiers Secours en Equipe
PSIM	Physical Security Integration Management
RCC	Regional Cooperation Council
RCSC	La reserve communale de securite civile
SAMU	Service d'aide medicale urgente
SEEVCCC	South-Eastern Europe Virtual Climate Change Center
SDIS	Service Departmental d'Incindie et de Secours
SIDPC	Service Interministeriel de Protection Civile
SHOM	Service hydrographique et océanographique de la Marine
SNGRI	Strategie Nationale de Gestion des Risques d'Inondation
TFEU	Treaty on the Functioning of the European Union
UCPM	Union Civil Protection Mechanism
UNDAC	The United Nations disaster assessment
UNDRR	United Nations Office for Disaster Risk Reduction
UNISDR	United Nations International Strategy for Disaster Reduction
VOSOCC	Virtual on-site operations coordination centre

EXECUTIVE SUMMARY

This Deliverable is the outcome of Task 2.1 “Analysis of CBDRM National and Regional policies, existing platforms and uptakes”. The aim of the document is to provide a mapping and description of existing disaster risk reduction strategies at three levels, the global and EU level, the national level of the two pilot countries of the project i.e., Greece and France, and, finally, the regional level for the Regions of Attica and Île de France respectively. The document refers to the most significant strategies and plans at the three levels and covers all four phases of the disaster management cycle i.e., prevention, preparedness, response and recovery.

In addition to the policies, initiatives and other disaster management strategies, the document adduces and describes platforms, which enable and facilitate decision making, while also encouraging and encompassing a community-based approach in disaster risk management. Such platforms may vary from technological systems, produced by SMEs or industries, to the outcomes of disaster-related EU funded projects and initiatives.

Along with the Deliverables of the Tasks 2.2 “*Regional Multi-Hazards/risk data and assessment*” and 2.3 “*Community vulnerability and capacity assessments*”, an endeavor to holistically approach disaster management is undertaken. This includes the mapping and assessment of hazards affecting the pilot areas, the mapping and description of tactics and initiatives to tackle and mitigate disaster risk, and the assessment of vulnerable groups’ and minorities’ involvement in the planning and implementation of disaster management strategies.

1 INTRODUCTION

Although significant actions have been implemented, aiming at reducing the impact of disasters and crises to the natural and anthropogenic environment, their consequences on communities, infrastructures and countries as a whole, remain heavy. It is important to note, that during the 10-year period of validity of the Hyogo Framework for Action (2005-2015), more than 700,000 people lost their lives due to disasters and about 1.7 billion people were affected to a minor or major degree, whereas economic losses exceeded the number of 1.4 trillion USD (UNDRR, n.d.). According to the 2021 Global Natural Disaster Assessment Report (Government of the People's Republic of China, 2022), disasters occurred about 13% more frequently in 2021 than the average frequency of occurrence during the 30-year period of 1991 to 2020. Among the various risks, floods increased by 48% with economic losses exceeding the number of 137.7 billion USD, wildfires affected populations about 219% more than the average and economic losses were 109% higher. Overall, more than 104 million people were affected by 367 major disasters, occurring in 127 countries and regions. Moreover, it is evident that disasters are exacerbated by climate change and increasingly hinder progress and actions towards sustainable development and effective management of the impact they have on lives, livelihoods, assets and infrastructures.

To this direction, one efficient way to tackle the problems imposed by crises and disasters is the enhancement of political involvement and commitment. Through the implementation of policies, regulations and measures at all levels, i.e., at the economic, social, technological and environmental level, vulnerability can be reduced, and, concurrently, the overall capacity of the society could be enhanced.

Furthermore, the implementation of Disaster Risk Reduction (DRR) policies is one of the seven basic targets of the Sendai Framework for Disaster Risk Reduction (U.N., 2015), which dictates the significant increase of countries, and especially developing ones, which implement local and national DRR strategies. The Sendai Framework sets the strengthening of disaster risk governance as a top priority for the timeframe of its validity (2015-2030). It is crucial for governments to review existing regulations and frameworks and develop new ones, with the participation of all relevant stakeholders, i.e., practitioners, researchers, technological developers, decision makers, governmental and community representatives, in order to holistically approach the issue of disaster risk reduction. Policies and plans should be systematically reviewed at all levels, from the local to the national and international level, while indicators and targets must be set for the assessment of the level of accomplishment and implementation of these policies. Transboundary cooperation could also prove essential for the effective implementation of policies and the exchange of ideas, good practices and lessons learnt from past situations experience.

This document can be used as a map for existing policies, plans and strategies implemented in the European Union (EU) and, more specifically, in Greece and France, which are the pilot areas of the PANTHEON project. A review of DRR policies against specific natural as well as man-made hazards has been undertaken. These hazards have been defined in the context of Task 2.2 "*Regional Multi-Hazards/risk data and assessment*" and are presented in Table 1.

Table 1: Most significant natural hazards affecting the pilot areas of the project.

Natural Hazards	Man-made Hazards
Earthquake	Technological Accident
Volcanic Eruption	Cyber Threat
Tsunami	Terrorist Attack
Landslide	CBRNe Malicious Act

Heatwave	
Storm	
Blizzard	
Flood	
Drought	
Wildfire	
Epidemics/Pandemics	

Natural hazards can be combined and integrated into two main categories, the geophysical and the hydrometeorological, with epidemics/pandemics as a standalone. On the other hand, man-made hazards are categorised as accidental or malicious. DRR strategies can be hazard-specific, as is the case with the Greek civil protection plans, or more generic focusing on response processes and on the delineation of the responsibilities of competent authorities.

The mapping of policies, plans and strategies is being conducted at three levels:

- the global and European level, with the most significant policies and plans being described in chapter 2 of Deliverable 2.1;
- the national level, with Greek and French strategies being described in chapters 3 and 5 of the Deliverable, respectively and
- the regional level, with plans in the Regions of Attica and Île de France being described in chapter 4 and 6, respectively.

Moreover, an enlistment and documentation of existing Community-based Disaster Risk Management (CBDRM) platforms and decision support systems as well as of community centred projects has been conducted in the final chapter (chapter 7). The outcomes of this deliverable, along with those of Tasks 2.2 and 2.3, set the basis and context for the further evolution and development of the project.

2 INTERNATIONAL AND EU DRR AND CLIMATE CHANGE ADAPTATION STRATEGIES

As disasters are becoming increasingly frequent and catastrophic around the EU, subserved also by climate change, strategies, plans and priorities for DRR are developed in order to increase the capacity of the Member States individually and of the Union as a whole. Moreover, synergies between Member States and third countries are encouraged, aiming at the increase of cross-border collaboration for the effective management of imminent disasters, both natural and man-made.

A key aspect of resilience to climate-related hazards lies in the way the governance of risk is undertaken at the national and local level through well-planned policies and projects. The central role of governance in reducing risk is recognized, at the international level, by the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters (U.N.I.S.D.R., 2005).

In Europe, the White Paper "Adapting to climate change: Towards a European framework for action" (The European Commission, 2009) sets clear regional policy guidance on reducing climate-related risks as a central issue for a sound adaptation to a changing climate. The Council of Europe, through its Major Hazards Agreement EUR-OPA (Council of Europe, 1987), has also encouraged the necessary interaction between decision makers and scientists to improve risk governance. In the last decade, a growing number of national programmes and community-based projects have been developed in the European region. There is a growing accumulation of knowledge on "what has worked" (and what has not) in implementing policies, programmes and projects, which address climate adaptation with the objective of reducing risks posed by climate-related hazards. "What has worked" in climate adaptation intervention depends on multiple factors. However, a pre-condition is that national and local policy makers provide clear guidance. There are two reasons for this:

- Adaptation and DRR are both short- and long-term processes. There is no real adaptation to climate change if there is not a long-term vision and strategy on the side of national and local policy makers.
- Adaptation to climate change and interventions need integration at multiple levels. A sound governance of adaptation and DRR is needed to create and maintain a framework of intervention, which well connects the community to the national, the regional and international level.

This chapter provides an overview of significant initiatives and strategies implemented at the EU and the international level.

2.1 THE SENDAI FRAMEWORK FOR DISASTER RISK REDUCTION 2015-2030

The EU is strongly committed to the global goals set by the United Nations (UN). At the global level, one of the most important initiatives regarding disaster risk management and reduction is the Sendai Framework for Disaster Risk Reduction 2015-2030 (United Nations Office for Disaster Risk Reduction (UNDRR), 2015). Its main objective is the prevention of new disaster risks and the reduction of existing ones. The Sendai Framework for Disaster Risk Reduction 2015-2030 is the central global framework for UN states that seeks to reduce risk and strengthen resilience. It was adopted by 187 UN member states at the Third UN World Conference on Disaster Risk Reduction in Sendai, Japan in 2015 and is the first major agreement of the post-2015 development agenda. While it ensures continuity with its predecessor, the Hyogo Framework for Action (2005-2015), it introduces new and innovative elements and specifically recognises the important role of the involvement of local communities and governments for DRR. The Sendai framework essentially aims at

reducing disaster risks and losses in lives, livelihoods, health and in "*the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries over the next 15 years*". It provides UN member states with concrete recommendations and actions on how to achieve these goals and to protect development gains from disaster risk. To this end, the aim is for parties to work to prevent and reduce their exposure to disaster-related risks and vulnerabilities, as well as to increase their response and recovery capacity, thereby strengthening resilience. In order to achieve this the document sets out seven targets:

- To substantially reduce global disaster mortality by 2030, aiming to lower the average per 100,000 global mortality rate in the decade 2020–2030 compared to the period 2005–2015;
- To substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 in the decade 2020–2030 compared to the period 2005–2015;
- To reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030;
- To substantially reduce disaster damage to critical infrastructures and disruption of basic services among health and educational facilities, including through developing their resilience by 2030;
- To substantially increase the number of countries with national and local disaster risk reduction strategies by 2020;
- To substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of the present Framework by 2030;
- To substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030

Moreover, it identifies four priorities:

- Understanding disaster risk
- Strengthening disaster risk management governance
- Investing in disaster risk reduction for resilience
- Improving preparedness for response, recovery, rehabilitation and reconstruction.

The framework emphasises on anticipatory risk management and contains several key implementation guides such as a focus on capability development to empower all partners and stakeholders, with special attention paid to local communities. Since 2016, the European Commission monitors progress of the Sendai Framework on the basis of the "Action Plan on the Sendai Framework for Disaster Risk Reduction." This plan builds on the global recommendations of the Sendai Framework and defines the necessary steps for implementing them at the EU level by systematically considering existing EU policies, instruments and tools (European Civil Protection and Humanitarian Aid Operations, 2018).

2.2 THE UNITED NATIONS INTERNATIONAL STRATEGY FOR DISASTER REDUCTION

"Disaster Risk Reduction" is defined by the UNISDR as "*the concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and improved preparedness for adverse events.*" The United Nations published in 2009 the International Strategy for Disaster Reduction (U.N.D.R.R., 2009). The UN defined a natural hazard as the "*natural process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption or*

environmental damage". Moreover, according to the European Environmental Agency there are two types of natural hazards: the hydro-meteorological and the geophysical, whereas a third category encompasses the technological hazards (European Environmental Agency, 2011). The former are hazards directly related to climate change, and thus, more prone to increase their impact in the future. The latter include earthquakes, landslides and volcanic eruptions. Although there are areas prone to geophysical hazards e.g., Greece and Italy, overall, the EU is not greatly affected by this type of hazards. On the contrary, the vast majority of disasters were caused by meteorological/climatological hazards, with the same also applying to financial costs.

Predictions on hydro-meteorological hazards include:

- Increase of annual mean temperatures up to 4 degrees, mainly in South and South-East Europe, with potential increase of forest fires among other disasters.
- Reduction of up to 40% of the summer mean precipitations in the Mediterranean area, that will result in increasing drought periods. On the contrary an increase of precipitation is expected in the North of Europe during summers.
- More intense precipitations, storms and extreme winds will affect rivers, with an expected increase of 47% of flood episodes, especially in the Rhine and Danube basins.

The map of Figure 1 shows the vulnerability to natural risks in Europe and was created taking into consideration not only the exposure to risks, but also the sensitivity and response capacity of the regions.

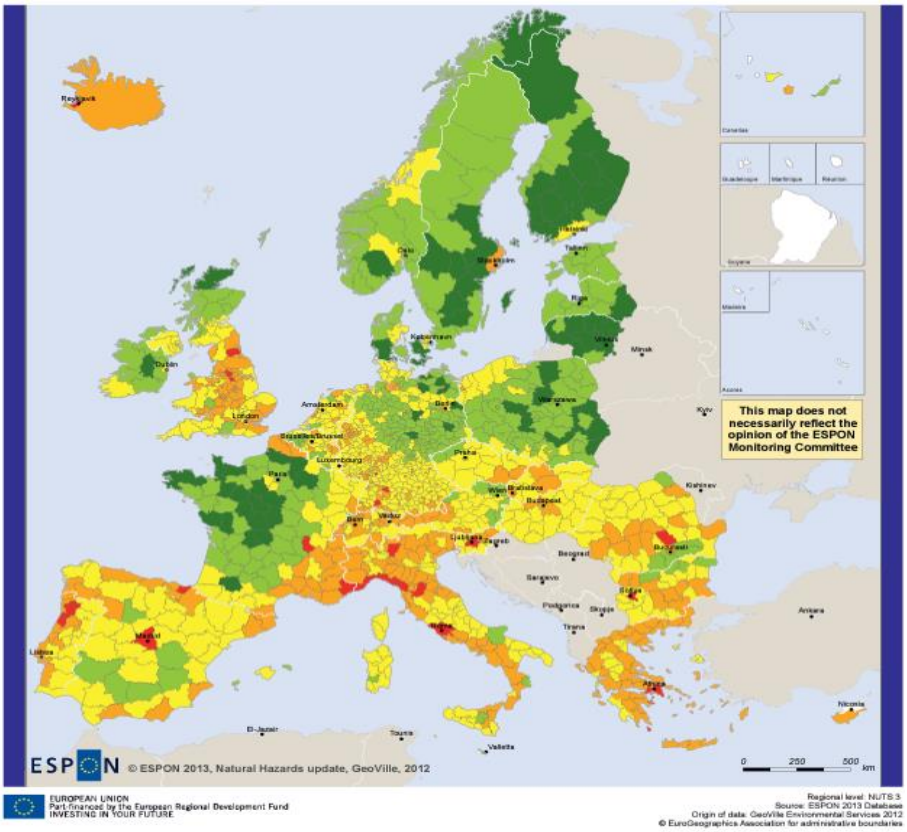

Figure 1: EU vulnerability map. Colours follow the traffic lights convention i.e., red means high vulnerability and green low vulnerability, Source: European Observation Network for Territorial Development and Cohesion (E.S.P.O.N.)

2.3 THE EUROPEAN UNION CIVIL PROTECTION MECHANISM

The EU is certainly not risk-free. Disasters have greatly affected the EU with the most significant instance being the COVID-19 pandemic that caused more than a million deaths, as well as the saturation of health systems, the disruption of public life and massive economic damage. However, there have also been other disasters that have wreaked havoc on EU member states in recent decades. Forest fires in the southernmost regions of the Union have claimed thousands of lives, burned vast areas of land and overwhelmed national and EU emergency services. Storms, extreme rainfall and flooding have continued to cause damage to infrastructure. Hurricanes such as Irma in Saint-Martin (2017) and Lorenzo in the Azores (2019) have also proved particularly destructive. Finally, earthquakes such as the one in Athens in 1999, in Italy in 2016, or the one in Croatia in 2020 have reminded EU citizens of the terrible consequences emanating from seismic risk (European Commisssion, Directorate-General for European Civil Protection and Humanitarian Aid Operations (ECHO), 2021)

Within the EU one of the most important instruments is the Union Civil Protection Mechanism, established by the Decision No 1313/2013/EU (The European Parliament and the Council of Europe, 2013). This mechanism aims to strengthen cooperation between Member States in disaster response and risk reduction. The mechanism facilitates the exchange of resources, knowledge and experience, as well as coordination between Member States in the event of disasters. The decision underlines the responsibility of the European Commission and the Member States in the mechanism, including risk assessment, prevention and preparedness measures, as well as emergency response. The mechanism aims to ensure a more coordinated and efficient response to disasters, thus contributing to the protection of EU citizens and communities.

The EU Civil Protection Mechanism also supports Member States in disaster prevention and preparedness through grants at both national and transnational level. National grants go directly to national civil protection authorities and multi-national grants are channelled through consortia of civil protection stakeholders. In this regard, a study conducted by the World Bank Group (2021) and funded by the European Union concluded that "*investments in disaster and climate resilience are almost always no-regret from an economic perspective and offer many co-benefits to society beyond disaster risk management*" (The World Bank, 2021).

Finally, in terms of targets, the Commission (European Commission, 2023) issued a series of recommendations. The objectives can be divided into five main lines of action:

1. Anticipate. The intent is to improve risk assessment, anticipation and planning for disaster risk management.
2. Prepare. The aim is to increase risk awareness and preparedness of the population.
3. Alerting. The objective is to improve early warning.
4. Respond. The ambition is to improve the response capacity of the European Union Civil Protection Mechanism.
5. Ensure. The intention is to ensure a robust civil protection system.

With the 1313/2013 Decision, also the European Response Coordination Centre (E.R.C.C.), the European Emergency Response Capacity (E.E.R.C.) as well as the Common Emergency Communication and Information System (C.E.C.I.S.) were established. In addition, cooperation with other EU initiatives, such as the European Earth Observation Programme "Copernicus", the Common Information Sharing Environment (C.I.S.E.) and the European Programme for Critical Infrastructure Protection (E.P.C.I.P.) is strengthened for a more efficient and inter-disciplinary management of emergencies. The Decision highlights the significance of the prevention phase and of interoperability between countries, thus, focusing on the enhancement of bonds and joint

actions between, not only the Member States of the EU, but also the nine Participating States i.e., Albania, Bosnia and Herzegovina, Iceland, Montenegro, North Macedonia, Norway, Serbia, Turkey and Ukraine. This multinational cooperation will lead to a common approach regarding disaster management and also to the exchange of ideas, best practices and lessons learnt from previous disastrous events.

In 2019, the 2019/420 Decision was issued with the aim to further enhance the U.C.P.M. in the face of more frequent and impactful disasters, which are expected to affect the EU (The European Parliament and the Council of Europe, 2019). Member States are advised to update and share their risk assessments regularly, whereas the E.E.R.C. is transformed into the European Civil Protection Pool. The Union Civil Protection Knowledge Network is established under the 2019 Decision aiming at stakeholders' training and at the cooperation between Member and Participating States. This amendment also proposed the creation of the rescEU reserve, a fully EU financed initiative that should help protect citizens from disasters, manage emerging risks and strengthen EU's preparedness for disasters. The reserve also aims at boostering Europe's capacity to respond to several hazards and crisis, such as wildfires, medical emergencies and chemical or nuclear incidents by providing emergency shelters, transportation and electricity supplies.

In 2020, a second amendment of the 1313/2013 Decision was proposed (The European Parliament and the Council of Europe, 2020). This amendment concerned the observed difficulty of the Member States to cope with the COVID-19 pandemic and with disasters concurrently affecting several countries. The amendment also proposes the activation of a European Union Recovery Instrument (E.U.R.I.) and of a Multi-Annual Financial Framework for 2021-2027 with the main scope being the enhancement of response capacity to multi-national disasters and crises and the support of the rescEU reserve capabilities. On the 29th of April 2021, the Regulation 2021/836 amending the 1313/2013 Decision was issued focusing, inter alia, on the management of climate-related disasters, the alignment with the objectives and time frames of international agreements e.g., the Sendai Framework, the urging of Member States to review and update their risk assessments, both at the national and sub-national level, and the further reinforcement of rescEU capacities (The European Parliament and the Council of Europe, 2021).

2.4 THE EUROPEAN PROGRAMME FOR CRITICAL INFRASTRUCTURE PROTECTION

In December 2008, the "Council Directive 2008/114/EC on the identification and designation of European critical infrastructures and the assessment of the need to improve their protection" was issued, with the purpose to identify European Critical Infrastructures and create a network in order to increase their level of protection. Thus, the, already proposed since 2007, European Programme for Critical Infrastructures Protection, EPCIP, was established, focusing on the sectors of energy and transport, the disruption of which could have a serious cross-border and cross-sector impact. The programme is based on a multi-hazard approach, emphasising on the threat of terrorism and malicious attacks (The European Commission, 2008).

In order to increase the level of critical infrastructure protection (CIP), networks have been developed, under the framework of the EPCIP, including the Critical Infrastructure Warning Information Network (CIWIN), cooperation between critical infrastructure protection experts has been strengthened, whereas information sharing procedures have been facilitated.

Moreover, the EU Programme "Prevention, Preparedness and Consequence Management of Terrorism and other Security related Risks" has been established for the provision of funding opportunities for the implementation of CIP measures. The latter aims to support both infrastructures and citizens in the

prevention of and preparedness for terrorist attacks. Through the funding of EU and national projects, the programme sets as a primary goal to enable and facilitate the exchange of hands-on experience, lessons learnt from previous incidents and best practices among stakeholders and to organize common exercises to increase the level of interoperability between CIP-related actors (The European Commission, n.d.).

2.5 DIRECTIVES OF THE EUROPEAN UNION

Directives are parts of the secondary law of the EU, which is based on the EU Treaties. Directives are issued at 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. According to the EU legal framework, Directives are not directly applicable in Member States such as Decisions and Regulations. On the contrary they must be transformed into national laws, as a first step, in order to be put into force (EUR-lex Access to European Union Law, 2022). This chapter describes the main EU Directives for the management of crises, natural and man-made. The following table depicts an overview of the Directives and their scope, whereas a more analytical description is provided in the following subchapters.

Table 2: EC Directives, their scope and Greek / French legislation.

Directive	Scope	Legislation integrating the Directive in Greece	Legislation integrating the Directive in France
2000/60/EC	Maintenance and improvement of the water environment in the EU.	National Law No. 3199/2003 for the Protection and Management of Waters	Law project reforming the water policy
2007/60/EC	Management of flood risk in the EU.	Common Ministerial Decision No. 31822/1542/E103/2010, Assessment and Management of Flood Risks in compliance with Directive 2007/60/EC	Strategie nationale de gestion des risques d'inondation
2008/68/EC	Inland transport of dangerous goods by road, rail or inland waterways.	Ministerial Decision 35043/2524/2010 for the compliance with the 2008/68/EC Directive	Arrêté du 29 mai 2009 relatif aux transports de marchandises dangereuses par voies terrestres
2012/18/EU	Control of major accident hazards, resulting from dangerous substances	Ministerial Decision 172058/2016 for the compliance with the 2012/18/EU Directive	Plan de Prevention des Risques Technologiques, PPRT
2018/1972/EU	Establishment of the European communications code, ensuring, inter alia, citizens' access to the 112-emergency number.	Law No. 4727/2020 regarding digital governance and compliance with Directives 2016/2102, 2019/1024 and 2018/1972	Ordonnance n° 2021-650 du 26 mai 2021 portant transposition de la directive (UE) 2018/1972 du Parlement européen et du Conseil du 11 décembre 2018 établissant le code des communications électroniques européen et relative aux mesures

			d'adaptation des pouvoirs de l'Autorité de régulation des communications électroniques, des postes et de la distribution de la presse
2022/2555/EU	Ensure and increase the level of cybersecurity in the EU.	To be transposed to national Laws till October 2024. Currently Law No. 4557/2018 is into force, compliant to the 2016/1148/EU Directive.	To be transposed to national Laws till October 2024. Currently the Strategie Nationale pour la Securite du Numerique is into force, compliant to the 2016/1148/EU Directive
2022/2557/EU	Increase the level of security of critical infrastructures in the EU.	To be transposed to national Laws till October 2024. Currently the Presidential Decree 39/2011 for the compliance of the Hellenic legislation to the 2008/114/EC is into force.	To be transposed to national Laws till October 2024. Currently the INSTRUCTION GENERALE INTERMINISTERIELLE RELATIVE A LA SECURITE DES ACTIVITES D'IMPORTANCE VITALE is in force, compliant to the 2008/114/EC Directive.

2.5.1 DIRECTIVE 2000/60/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ESTABLISHING A FRAMEWORK FOR COMMUNITY ACTION IN THE FIELD OF WATER POLICY

The Directive was issued in October 2020 in order to develop an integrated and uniform European framework on water policy (The European Parliament an the Council of Europe, 2000). The main objective of the Directive 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. Member States should adjust their policies regarding the management of the water status in their territories by implementing specific measures and actions. Moreover, the Directive applies, inter alia, to groundwater status. Each country has to keep levels of groundwater pollution low and eliminate any possible upward trends should they appear.

2.5.2 DIRECTIVE 2007/60/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON THE ASSESSMENT AND MANAGEMENT OF FLOOD RISKS

The 2007/60/EC Directive was issued in order for Member States to effectively manage flood risk, which is increased by the underlying climate change (The European Parliament an the Council of Europe, 2007). The Directive sets the context for the management of the river basins of each State. In addition, the Directive provides suggestions for coordinated mitigation actions, not only between Member States, but also with third countries. Each State has to develop national civil protection plans and strategies, taking into consideration the provisions of the Directive and making the appropriate adjustments and adaptations according to the climatic, geological and geomorphological characteristics of the country.

2.5.3 DIRECTIVE 2008/68/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON THE INLAND TRANSPORT OF DANGEROUS GOODS

On the 24th of September 2008, the European Parliament and the Council of the European Union issued the 2088/68/EC Directive for the transport of dangerous goods (The European Parliament an the Council of Europe, 2008). 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.

Initially, two Directives were issued, the 94/55/EC and the 96/49/EC for the transport of dangerous goods by road and rail respectively, but it was deemed necessary that a uniform Directive covering both transport means should be developed. Moreover, most Member States apply the rules of the International Carriage of Dangerous Goods by Road (ADR), the International Carriage of Dangerous Goods by Rail (RID) and the International Carriage of Dangerous Goods by Inland Waterways (AND) regulations. The 2008/68/EC Directive applies to the rail/road/inland waterway transport of dangerous goods of the Member States. Each State has to develop a strategy, within the competence of the respective civil protection agencies, incorporating the provisions of the Directive and laying out the measures and actions to be implemented for the safe transport of dangerous goods.

2.5.4 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 were issued in 1996 with the 96/82/EC Council Directive. The Directive greatly reduced the, until then, increased frequency of industrial accidents e.g., the ones in Seveso and Toulouse among others. Through the Directive an increased level of protection was achieved.

However, additional measures for a further improvement of resilience needed to be implemented. Moreover, changes in the methods for the classification of dangerous substances were implemented, thus differing from the ones integrated in the 96/82/EC Directive. This led to the issue of the 2012/18/EU Directive, which replaced the former and provided additional measures in order to increase and improve the level of protection (The European Parliament an the Council of Europe, 2012).

2.5.5 DIRECTIVE (EU) 2018/1972 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL OF 11 DECEMBER 2018 ESTABLISHING THE EUROPEAN ELECTRONIC COMMUNICATIONS CODE

The Directive, along with the now recast 2002/19/EC, 2002/20/EC, 2002/21/EC and 2002/22/EC, is 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. The Directive ensures and increases, among others, the level of awareness of emergency services e.g., the 112 European emergency number and ensures accessibility to all end users without exceptions, thus including end users with disabilities. The Directive provides for a biennial report of the Commission to the Parliament regarding the results, efficiency and effectiveness of the implementation of the 112 European emergency number (The European Parliament and the Council of Europe, 2018).

2.5.6 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)

The 2016/1148 Directive was the first legislative document providing measures to increase the level of cyber security among the Member States of the EU. National strategies, based on the Directive, were developed to increase resilience against cyber threats.

However, the increased digitisation of the internal market led to the increase of cyber risks and demanded a revision of countermeasures provided by the Directive. Therefore, the 2022/2555 Directive was issued on the 14th of December 2022 with the aim to update and upgrade cyber security strategies, wherever necessary, and lay the basis for the establishment of competent authorities (The European Parliament and the Council of Europe, 2022).

2.5.7 DIRECTIVE 2022/2557 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON THE RESILIENCE OF CRITICAL ENTITIES AND REPEALING COUNCIL DIRECTIVE 2008/114/EC

Critical entities play a significant role in the normal financial activities and functions of the Member States of the EU. Moreover, financial interdependencies among the States highlight the importance of an undisrupted operation of critical infrastructures. The 2008/114/EC designated the infrastructure, in the energy and transport domains, that should be protected against various threats, while the disruption of which would have serious consequences.

In 2019 the Directive was evaluated and showcased that the proposed measures are insufficient, considering the inter-dependencies between States and entities and also the increased frequency and impact of disasters. Although initiatives have been taken at the European level, with the European Programme for Critical Infrastructure Protection, and at a national level, additional measures and actions have to be implemented for the prevention of and response to crises resulting from natural phenomena or human activities.

The scope of the 2022/2557 Directive is to provide the requirements that each Member State has to implement in order to adopt specific measures for the protection of critical infrastructures and the enhancement of their resilience against threats and natural hazards (The European Parliament and the Council of Europe, 2022). Moreover, the Directive lays the basis for the establishment of collaboration between entities and for common approaches in the reporting of incidents and impact that occurs to them.

As already mentioned, these Directives are transposed into national regulations and laws, thus they will be greatly considered during the development of the Pantheon project, as its envisaged outcomes will be aligned with the national regulatory framework of the pilot countries.

2.6 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 are briefly described the most significant programmes, policies and plans for the management of disasters and crises.

2.6.1 STANDARDISATION AT THE GLOBAL AND EU LEVEL

One of the most important aspects of disaster management is interoperability. Interoperability can be clustered into two main categories i.e., technical and procedural. Technical interoperability refers to the connection and communication between technological systems and tools, whereas procedural interoperability concerns the interaction and collaboration between different entities e.g., individuals and organisations. Both clusters of interoperability greatly assist and enable a common operational picture when discussion comes to the management of and response to an emergency or crisis, which is extremely important for timely, efficient and successful operations.

Standards play an important role in the achievement of interoperability. Standards are documents, developed by consortia of experts, which ensure and guarantee quality. Standardisation can provide an efficient tool for the homogenisation of both operational procedures and of technical interconnectivity. Standardisation bodies at all levels, from the national to the international, encompass specific technical committees and working groups, that are dedicated to the development of crisis management-related standards. The Valkyries project with its Deliverable 4.2 "*Harmonisation opportunities on the technological landscape for first aid response on multi-casualty disasters*" (VALKYRIES Consortium, 2022) have identified a number of standardisation bodies and technical committees, with the most relevant for the Pantheon project listed in Table 3.

Table 3: Crisis management related international and EU standardisation bodies and technical committees.

Level	Standardisation Body	Technical Committees
International	ISO	TC 292 Security and resilience
	ITU-T	SG17: Security SG20: Internet of Things (IoT), smart cities and communities (SC&C)
	IEEE	C/CPSC Cybersecurity and Privacy Standards Committee
EU	CEN	TC 391 Societal and citizen security
	CEN/CLC	JTC 13 Cybersecurity and data protection
	ETSI	TC Cyber (Cybersecurity)

2.6.2 NATIONAL PLATFORMS FOR DISASTER RISK REDUCTION

An important component of risk governance is the National Platforms promoted by the Hyogo Framework for Action (HFA) to help facilitate more effective strategies for DRR by helping to implement and coordinate such strategies at the national level. The way a National Platform is set up also affects its focus and approach to Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR). In Europe, "*governments often due to international obligations entrust the task of facilitating the establishment of national platforms to their respective civil protection organisations*". Traditionally, they often deal with preparedness for response and often do not possess full competence for the coordination of all multidisciplinary disaster risk reduction issues, which can cause a lack of awareness and thereby poor functionality and accessibility. As such, many

European National Platforms lack direct political influence and are often focused on short-term recovery strategies instead of long-term adaptation and risk reduction strategies.

In the EU, at the regional level, the platform for DRR is the European Forum for Disaster Risk Reduction (EFDRR). The platform includes HFA Focal Points and representatives of National Platforms in the European region, United Nations International Strategy for Disaster Reduction (UNISDR)-Europe, regional organisations (in particular representatives from the Council of Europe and representatives from the European Commission, Civil Protection – Prevention and Preparedness Unit DG ECHO) and sub-regional organisations/institutions.

The EFDRR is intended to serve as a forum to stimulate and facilitate the exchange of information and knowledge among participating National HFA Focal Points and Platforms and regional/sub-regional partners. It has also created internal informal working groups in European countries, with a specific group of countries (North Macedonia, Norway, Germany and France) focusing on issues related to CA and risk reduction.

At a sub-regional level (South-Eastern Europe) there are organisations and initiatives which have a specific mandate in disaster prevention and risk reduction and climate adaptation, such as the Disaster Preparedness and Prevention Initiative (DPPI) and the South-Eastern Europe Virtual Climate Change Center (SEEVCCC), or in disaster management related field such as the Regional Cooperation Council (RCC).

Increasing the effectiveness and number of National Platforms for DRR.

National Platforms for DRR were created to fill a gap in the way disasters were addressed. They are a primary component of the Hyogo Framework for Action (HFA) and offer potential for promoting collaboration across ministries and sectors as well as various stakeholders in society. National Platforms need to be set up with enough influence and links to the highest levels of authority and leadership in order to enable change. They need to continue to focus on increasing public awareness, investigating technical solutions and developing and serving as a platform for the exchange of knowledge. National Platforms must play a greater coordination role and help facilitate further cooperation among governments and non-government organisations. National Platforms sit in a strategic location within the research and policy community on both the national and regional level. They have the potential to help coordinate and increase cooperation among the various government sectors around DRR as well as provide links to the research community. They also have links to the international community through their relationships/connections to the HFA, the UNISDR and other international organisations. In addition to their governmental links, National Platforms need to have strong links with NGOs, private sector, academic institutions, the media and community institutions. They are in a unique position to support research initiatives and influence policy.

Recommendations:

1. National Platforms need to serve as an intermediate body between policy and researchers, playing an active role in research by joining the steering committees of their country's major research projects as well as becoming more involved with the relevant European research projects. They also need to increase interaction between researchers and policy makers and help broker contacts and information regarding CCA and DRR.
2. National Platforms can create partnerships among research communities, governments and the private sector. They play an important role in building the capacity of their DRR policy makers in assimilating research findings and improving the interface between policy and research, thus ensuring that academia and research institutions are represented in the platform.

3. National Platforms need to extend beyond their countries' borders. Twinning among European National Platforms is a cost-efficient tool to share best practice and techniques on practical issues. This can be done as part of, or in parallel to, EU Exchange of Expert in civil protection programme.

Suggested steps forward:

1. National Platforms interface between policy makers and researchers.
2. Increase National Platforms involvement in national research projects.
3. Increase National Platforms participation in thematic group of EFDRR.

2.6.3 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, apart from the global agenda. Cooperation between Member States in the event of natural disasters is enshrined in EU primary law, in particular in the Treaty on the Functioning of the European Union (TFEU) (Treaty on the Functioning of the European Union, 2009). In Article 122(2), the treaty states that "*where a Member State is in difficulties or is seriously threatened with severe difficulties caused by natural disasters or exceptional occurrences beyond its control, the Council, on a proposal from the Commission, may grant, under certain conditions, Union financial assistance to the Member State concerned.*" Furthermore, Article 196.1. stipulates that "*the Union shall encourage cooperation between Member States in order to improve the effectiveness of systems for preventing and protecting against natural or man-made disasters.*".

2.6.4 EUROPEAN UNION EXTERNAL ACTION

Similarly, the Strategic Compass (The Diplomatic Service of the European Union, 2022), although more focused on foreign policy, recognises that "*climate change and environmental degradation are not only threats in themselves, but risk multipliers. Global warming leads to more frequent and extreme weather events and natural disasters as well as degradation of eco-systems across the globe that increase vulnerability and exposure.* [...]", being necessary "*an integrated approach to respond to major crises is essential*". Therefore, it is seen that the European Union is aware of the threat posed by natural disasters and is willing to strengthen cooperation among its members in order to improve their joint response.

2.6.5 THE EU WHITE PAPER "ADAPTING TO CLIMATE CHANGE: TOWARDS A EUROPEAN FRAMEWORK FOR ACTION"

The CCA and DRR fields, in Europe, are complex and fragmented. They involve multiple actors on the local, sub-national, national and international level. Major disasters often cross borders and countries must collaborate to find effective DRR solutions. DRR is not always directly associated with CCA, either being viewed as its own field or as part of disaster management.

Climate risks are the result of the dangers associated with climate change, the impact on society and its vulnerability. These major climate-related hazards include temperature change, precipitation intensity, hurricanes, and sea level rise, among others. Natural variability and anthropogenic climate change influence these factors. Vulnerability and insecurity are influenced by socio-economic processes in society, including the path of socio-economic development, measures taken by society for both adaptation and mitigation, and governance. It should be noted that the inequalities arising from the uneven developmental processes in a society can led to differentiated vulnerability and insecurity. As a result, different groups in society may be exposed to risks associated with climate change at different levels.

The EU White Paper on "Adapting to Climate Change" was adopted in 2009 and sets out a framework for reducing vulnerability of the European Union to the impact of climate change by targeting the reduction of greenhouse gas emissions, on one hand, and by taking adaptation actions to deal with the unavoidable impact of climate change on the other (European Commission, 2009). The White Paper thus essentially aims at mitigating the impact of climate change in a number of sectors such as agriculture, forestry, fishery and the aquaculture sector, the energy sector, infrastructure, tourism as well as coasts and marine ecosystems. Understanding the impacts of climate change on these sectors is imperative for policy makers in order to be able to develop and implement policies that ensure an optimal level of adaptation. According to the White Paper "*Strategies focused on managing and conserving water, land and biological resources to maintain and restore healthy, effectively functioning and climate change-resilient ecosystems are one way to deal with the impact and can also contribute to the prevention of disaster […]*". The EU White Paper thus proposes promoting "*strategies, which increase the resilience to climate change of health, property and the productive functions of land, inter alia by improving the management of water resources and ecosystems*".

While most adaptation measures, concerning the impact of climate change, are taken at the national, regional or local level, an integrated and coordinated approach at the EU level can help to support and strengthen these measures, especially when the impact of climate change transcends the borders of individual States. Hence, the EU White Paper argues that adaptation will *"require solidarity among EU Member States to ensure that disadvantaged regions and regions most affected by climate change will be capable of taking the measures needed to adapt. Moreover, coordinated EU action will be necessary in certain sectors e.g., agriculture, water, biodiversity, fisheries, and energy networks) that are closely integrated at EU level through the single market and common policies"*.

The proposed framework for improving EU resilience to deal with the impact of climate change adopts a two phased approach. Phase 1 (2009 – 2012) laid out the ground work for preparing a comprehensive EU adaptation strategy, that would be implemented during phase 2, which commenced in 2013. Phase 1 focused on the followig four pillars of action:

1. building a solid knowledge base on the impact and consequences of climate change 26for the EU;
2. integrating adaptation into EU key policy areas;
3. employing a combination of policy instruments to ensure effective delivery of adaptation and
4. stepping up international cooperation on adaptation.

In 2013, the EU published its comprehensive strategy on adapting to climate change, which was updated in February 2021, when a new EU strategy on adaptation to climate change was adopted (The European Parliament and the Council of Europe, 2021). Essentially building on the 2013 EU Adaptation Strategy, the new EU strategy envisages "*that in 2050, the EU will be a climate-resilient society, fully adapted to the unavoidable impacts of climate change*". "*The European Climate Law proposal provides the foundation for increased ambition and policy coherence on adaptation. It sets both the framework for achieving climate neutrality and the ambition on adaptation by 2050 by integrating the internationally shared vision for action into EU law i.e., the global goal on adaptation in Article 7 of the Paris Agreement and Sustainable Development Goal 13*". According to this proposal, the European Union and its Member States committed "*to make continuous progress to boost adaptive capacity, strengthen resilience and reduce vulnerability to climate change*". As an outcome of the 2013 Adaptation Strategy, all EU Member States now have a national adaptation strategy or plan and "*adaptation has been mainstreamed into the EU's policies long-term budget*". According to the New Strategy on adapting to climate change, the European Commission provides and finances several programmes that should help to close knowledge gaps on climate impacts and resilience, such as Horizon Europe, Digital Europe, Copernicus and EMODnet and also helps to "*improve the state of the art on adaptation modelling, risk assessment and management tools – towards asset-level modelling*".

Given that climate change has a pervasive impact on nature, peoples' lives and the economy, the New Strategy emphasises that response to it must be systematic and adaptation has to be faster. The New EU Strategy supports policy development at all levels and sectors of governance. The three cross-cutting priorities in this systemic approach are: "*integrating adaptation into macro-fiscal policy, nature-based solutions for adaptation, and local adaptation action*". It also aims at speeding up adaptation by increasing the spending target for climate action by 30 % which should help further strengthening the social dimension by unlocking "*more support to protect the most vulnerable*".

2.6.6 GREEN PAPER FOR THE PROTECTION OF FORESTS FROM CLIMATE CHANGE

Forests play a significant role in the absorption of greenhouse gases and specifically of CO_2. The EC issued a Green Paper, in 2010, focusing on the protection of forests, which cover more than 42% of the total EU surface (European Commission, 2010). This Green Paper provides a description of the characteristics of European forests, an overview of the main challenges faced by forested areas in Europe and essential tools, that need to be exploited, with the aim to ensure forest protection. Moreover, it includes suggestions for forest owners, either private or public, for a sustainable use of forests, as well as, for increasing awareness of the impact climate change has on forests and measures of mitigation.

2.6.7 THE EUROPEAN STRATEGY TO ADAPT TO CLIMATE CHANGE AND THE EUROPEAN SPATIAL PLANNING OBSERVATION NETWORK

The Europe 2020 Strategy identifies two main global challenges affecting Europe the economic and financial growth and climate change. In this document two actions are proposed in response to climate change: the adaptation and the prevention of risks. It was agreed to seek a reduction in the greenhouse gas emissions, with respect to 1990, and an increase of the renewable sources of energy and of the efficiency of all sources of energy.

As a consequence, the European Commission has been relying upon the programme ESPON (European Spatial Planning Observation Network), to fund projects that help to address natural hazards resulting from climate change (ESPON Pogramme, 2013). Currently ESPON is a network of European territorial observatories that create hazard maps. Areas with high risk of flood, drought, landslide or extreme temperatures are represented. The map of Figure 2 presents the European areas with most aggregated risk (darker color indicates areas with increased risk).

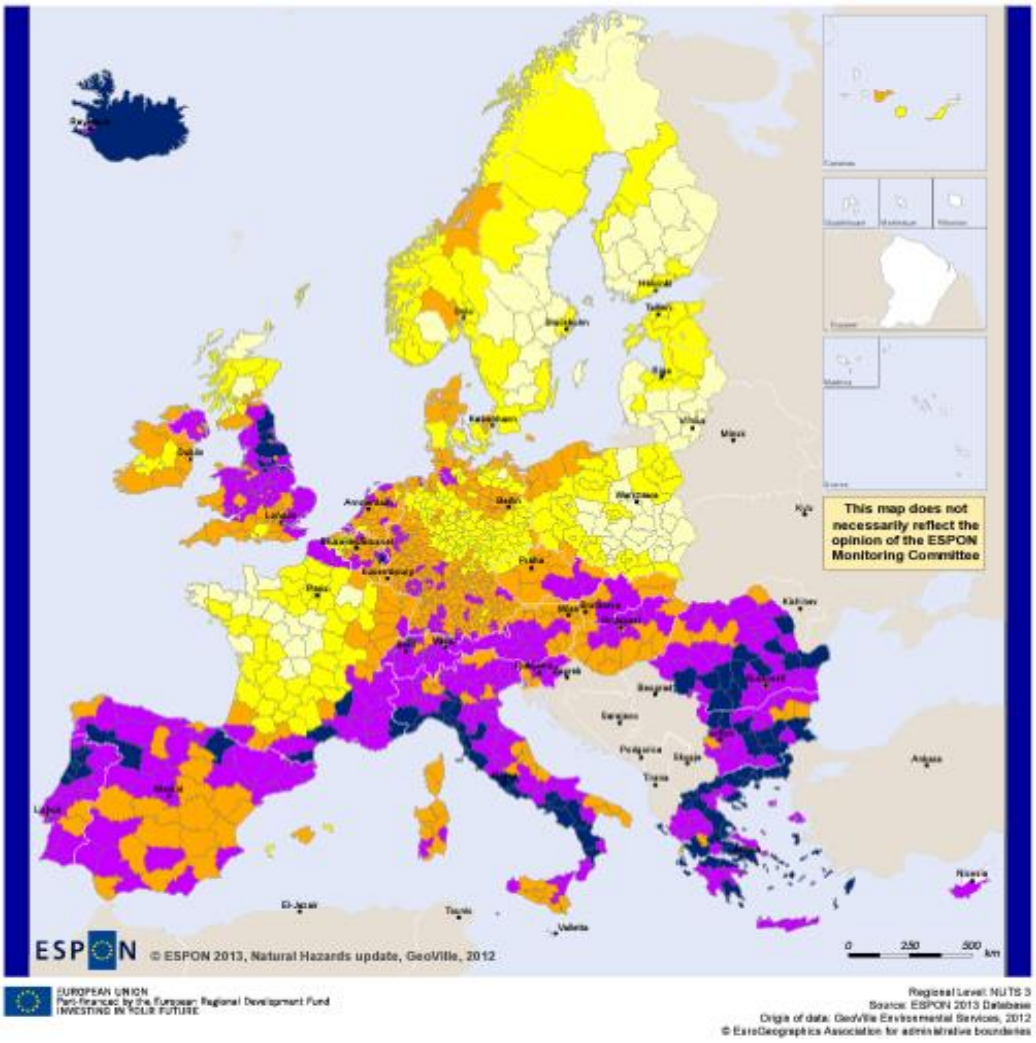

Figure 2: EU aggregated risk map, Source: E.S.P.O.N.

For the calculation of the risk map of Figure 2, a weighted value was used, which considers the weights of each risk as shown in the table below:

Table 4: Aggregated hazard exposure calculation using the weighted combination of 11 natural hazards.

The aggregated hazard exposure potential was calculated as a weighted combination of 11 natural hazards	
Hazard	**Weight**
Average floods per year/catchment, 1985-2011	19
Observed forest fires; biogeographic regions, 1997-2012	14
Drought frequency, 1991-2010	13
Modelled earthquake hazard, 2010	12
Occurrence of winter and tropical storms, 2006	10
Extreme temperatures (Occurrence of warm and cold spells), 1981-2010	9

Landslide occurrence, 2012	8
Storm surge occurrence, 2012	7
Potential avalanche occurrence, 2000-2011	3
Occurrence of volcanic eruptions, 10000 B.C.-2012	3
Tsunami occurrence, 2000 B.C.-2012	2

However, the vulnerability of a region is not only determined by the risk exposure. Other influencing factors are the sensitivity of a region and its response capacity.

- Sensitivity takes into account the potential damage, which includes the people density, the habitants' wealthiness and the naturalness of the area. Naturalness is the portion of land that is covered by nature.
- Response capacity means resources available for responding to a hazard. In the short-term the resources are used to coping with the hazard and its immediate consequences. In the long-term the resources are tools to anticipate the hazard and plan for mitigations.

The definition of vulnerability, agreed in the Europe2020 Strategy, is the degree to which a system is susceptible to adverse effects that is unable to cope with.

2.6.8 BLACK SEA ECONOMIC COOPERATION PROTOCOL

The Black Sea Economic Cooperation is an international organisation focusing on economic and political initiatives boosting cooperation and stability among the neighboring of the Black Sea (BSEC). The organisation consists of Albania, Armenia, Azerbaijan, Bulgaria, Georgia, Greece, Moldova, Romania, Russia, Turkey and Ukraine, whereas North Macedonia and Serbia were included at a later stage, and came into existence with the signing of the Istanbul Summit Declaration and the Bosporus Statement by the Heads of State of the aforementioned countries. Among others, the B.S.E.C. ensures cooperation between the countries in case of large emergencies with the 2005 Protocol on collaboration of the participating States. This protocol fosters solidarity and provision of assistance in large scale disasters and establishes and enhances interactions between liaison officers and stakeholders, thus improving information exchange and coordination in response operations.

2.6.9 SOUTH EAST EUROPEAN COOPERATION PROCESS

Similar to the B.S.E.C., the South East European Cooperation Process was initiated in 1996 in Sofia with the aim to enhance relations and ensure stability among countries of the southeastern part of Europe. Albania, Bosnia and Herzegovina, Bulgaria, Greece, North Macedonia, Romania, Serbia and Turkey are included in the Cooperation Process, with Croatia, Moldova, Montenegro, Slovenia and Kosovo joining later. Among the priorities of the S.E.E.C.P. the strengthening of the capacities of the countries to respond to major disasters is crucial. In 2010, a declaration was signed in Antalya, Turkey regarding collaboration and assistance in the management of crises and critical infrastructure protection.

2.6.10 EUR-OPA MAJOR HAZARDS AGREEMENT 12TH MINISTERIAL SESSION

The EUR-OPA Major Hazards Agreement is a cooperation platform for the management of natural and technological disasters in Europe and the Mediterranean. With the 12th Ministerial Session, which was held in St. Petersburg in 2010 (12th Ministerial Session of the EUR-OPA Major Hazards Agreement, 2010) disaster risk reduction is promoted to all governmental levels, from the national to the local, whereas more countries were encouraged to be involved in the Agreement. Nowadays, it consists of 22 member states.

2.6.11 COUNCIL OF EUROPE RESOLUTION 339: MAKING CITIES RESILIENT

Through this resolution, which was signed in 2012 by the Congress of Local and Regional Authorities (Council of Europe, UNDRR, 2012), the C.o.E urges governments to align their policies and strategies with the "ten essentials" of the "Making Cities Resilient" campaign of the United Nations Office for Disaster Risk Reduction (UNDRR). The "ten essentials" are practically steps for the adoption of the Sendai framework at the local level and are the following:

1. Organisation of disaster resilience
2. Identification and consideration of current and future risk scenarios
3. Financial enhancement
4. Resilient urban planning
5. Safeguarding of natural buffers for the enhancement of the protective functions of natural ecosystems
6. Enhancement of institutional capacity
7. Strengthening of social capacity
8. Critical infrastructure resilience
9. Measures for effective preparedness for and response to disasters
10. Exploitation of recovery and rehabilitation measures

2.6.12 EU ACTION PLAN ON THE SENDAI FRAMEWORK AND THE 17 OUTCOMES OF THE ISTANBUL E.F.D.R.R. SESSION

In 2015, the EC published the Action Plan on the Sendai Framework with the aim to apply measures and take actions for the accomplishment of the four priorities and seven objectives of the Sendai Framework by the Member States. In addition, in 2017, the European Forum for Disaster Risk Reduction (E.F.D.R.R.) issued the outcomes that emerged from a session of the Forum, which was held in Istanbul Turkey. The outcomes were 17 and include, among others, the participation of vulnerable groups in local and national DRR strategies, the enhancement of the resilience of communities, the commitment of the Union to achieve the goals of the Sendai Framework, the inclusion of the protection of national heritage sites as a priority in national strategies and the development of people-centered multi-hazard early warning systems (EFDRR, 2017).

2.6.13 THE PEER REVIEW PROGRAMME OF DG ECHO

DG ECHO with its peer review programme provides the opportunity to Member and Participating States to reflect on their disaster management strategies and their capacity and readiness to cope with disasters and crises (Peer Review Programme, n.d.). The Review is conducted with the participation of the Commission and a team of peers comprising of civil protection experts and authorities as well as operational organisations. The Programmes is supported also by the Euro-Mediterranean Centre for Climate Change (CMCC).

Specific guidelines exist for the development of the Review e.g., the Peer Review Assessment Framework, issued in 2021, which describes the disaster risk management thematic areas to be reviewed, the Peer Review Guidelines, which provide the basic steps for an effective peer review, and the Wildfire Peer Review Assessment Framework, published in 2023, specifying in reviews of wildfire risk management in the context of the UCPM. Based on the aforementioned context, countries and regions can self-assess their capacities to manage wildfires.

The Peer Review Programme has been implemented by 16 countries, both Member States and third countries including, indicatively, Cyprus, Romania, Finland, Bulgaria, Tunisia, Serbia and Turkey.

2.6.14 THE W.H.O. ACTION PLAN FOR THE IMPROVEMENT OF PUBLIC HEALTH PREPAREDNESS AND RESPONSE IN THE EUROPEAN REGION

The Action Plan was published in 2019, in Rome and has a timeframe of five years (2018-2023) (WHO, 2019). Its scope is to enhance resilience at a national and subnational level against public health threats. The Action Plan builds upon past experience and lessons learnt since the International Health Regulations entered into force (2007) and is adjusted to the needs of the European Region. The main objectives of the Plan are the capacity strengthening of the member states of the WHO to cope with and respond to public health risks, the maintenance and further building of this capacity and the measuring of the progress regarding the achievement of the set goals.

2.6.15 EU4HEALTH PROGRAMME

The COVID-19 pandemic showcased the need for a more coordinated preparedness and response to health crises in the European Union. The EU4HEALTH Civil Society Alliance creates a pool of 26 European institutions and health organisations aiming at the increase and enhancement of the citizens' health protection. It was established with the Regulation (EU) 2021/522 (The European Parliament and the Council of Europe, 2021). The main objectives of the programme are the enhancement of long-term health protection via actions and promotion of disease prevention best practices, the assurance of EU citizens' access to hospitals and healthcare facilities and the reinforcement of the European health system in the years following the outbreak of the COVID-19 pandemic. Additionally, the EU4HEALTH programme coordinates with the UCPM by including large medical reserves, in the form of not only medical equipment but also of staff, for the management of large medical emergencies.

After the description of the basic DRR strategies, implemented at the EU level, as well as of the commitments of the Union to the international DRR frameworks, the following chapters provide an in-depth analysis of disaster management plans and initiatives in Greece and France and, more specifically, in the regions of Attica and Ile-de-France respectively, which are the areas of interest for the Pantheon project.

3 DISASTER RISK REDUCTION POLICIES, PLANS & STRATEGIES IN GREECE

The General Secretariat of Civil Protection (G.S.C.P.) of Greece is the main responsible body for the management of disasters, either natural or man-made. There are numerous laws that are directly or indirectly linked to civil protection matters. The majority of these laws were developed following major disastrous events. However, the G.S.C.P. was officially formed in 1995 under the Law 2344/1995 "*Organisation of Civil Protection and other provisions*" (Hellenic Government, 1995). This Law proposed and established the governmental council of civil protection, the General Secretariat of Civil Protection, which is responsible for the preparation, planning, organisation and coordination of the country against potential natural and technological disasters as well as for the composition of plans for the management of crises with the support of operational agencies, and the civil protection scientific council, comprising of relevant scientists and researchers who provide their opinions and propose actions to enhance the capacity of civil protection agencies. With the Law 3013/2002 "Upgrade of civil protection and other provisions" (Hellenic Government, 2002) the scope and areas of interest of the G.S.C.P. are expanded covering also CBRN hazards.

Considering the provisions and suggestions of the Law 3013/2002, the Hellenic Government issues the Ministerial Decision 1299/2003 with the code name "Xenokratis". "Xenokratis" is the general plan, which lays the foundation for efficient management of disastrous events, identifies first responders' organisations responsible for the response to such incidents, maps and assesses risks that can potentially affect the Hellenic territory and proposes the development of communication and information exchange systems for the efficient cooperation among stakeholders (Hellenic Government, 2003). Based on this general plan, the specific plans for the prevention of, preparedness for and response to natural and man-made hazards, which can potentially affect Greece, are developed and described in the present document.

Another important step was made in 2014 with the Law 4249/2014, with which operational forces such as the Hellenic Police and the Hellenic Fire Service as well as the G.S.C.P. are reorganised with the aim to support and upgrade the services provided by the Ministry of Public Order and Citizen Protection. In addition, the Law introduced for the first time the term "disaster risk reduction (DRR)" and provided for the development of a "National Policy for Disaster Risk Reduction", the aim of which is to increase and enhance citizens' resilience against different types of hazards and the sustainable development of the country. The latter is compiled every five years (Hellenic Government, 2014).

In 2020 the Law 4662/2020 "National Crisis and Hazard Management Mechanism, restructuring of the General Secretariat of Civil Protection, upgrade of civil protection volunteering system, reorganisation of the Fire Brigade and other provisions" was issued (Hellenic Government, 2020). Through this Law, the National Crisis and Hazard Management Mechanism (Nat-CHAMM) is proposed, which aims to cover all phases of the disaster management cycle, from prevention to recovery. The focus of the Mechanism is the protection of citizens' lives and livelihoods, the natural and built environment, the cultural and historical heritage and of the critical infrastructures of the country. Moreover, the Law sets the basis for the establishment of a National Database for Hazards, Threats and Losses from Disasters, which is regularly updated. In addition, the Law sets the frame for the training and terms for activation of volunteering organisations.

In the following chapters an informative description of the hazard-specific plans and strategies for disaster risk reduction is attempted. The plans are segmented into the four disaster management phases, which correspond to different subchapters.

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. The following table concisely presents these hazards and the corresponding strategies, which are analysed in detail in the following chapter.

Table 5: 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
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"

3.1 DISASTER AND CRISIS MANAGEMENT PLANS AND STRATEGIES IN GREECE

In this chapter, the plans of the General Secretariat of Civil Protection, as well as of the Hellenic Police are described. These plans mainly address the phases of preparedness and response. The recovery phase is the least addressed by the various DRR strategies in Greece. However, a series of measures related to the recovery phase, included in the plans, are proposed and presented.

3.1.1 GENERAL PLAN "EGKELADOS 2" FOR THE EMERGENCY RESPONSE AND MANAGEMENT OF EARTHQUAKES

According to earthquake statistics, Greece is characterised by the highest seismicity in western Eurasia. The reasons behind this, is that the area of Greece lies right above the convergence and subduction zone of the Eurasian and the African tectonic plates. In addition to the immediate consequences, that emerge from the occurrence of a strong earthquake, the latter can potentially be the triggering factor of secondary but dangerous natural phenomena, such as soil liquefaction, landslides and tsunami waves.

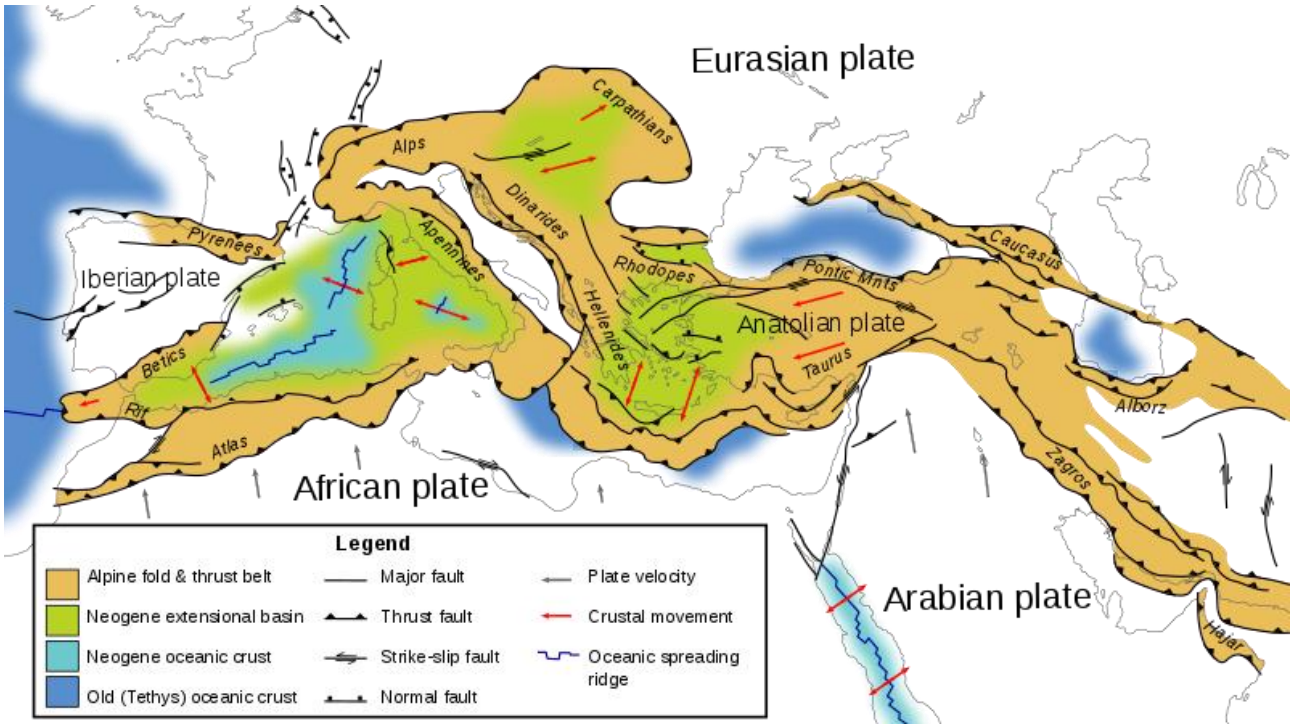

Figure 3: Tectonic plate motions and the subduction zone of the African and Eurasian and Arabian plates, Source: Wikimedia

In Greece, the last updated version of the "Egkelados" general plan was issued by the Directorate for Emergency Planning and Management of the General Secretariat for Civil Protection (GSCP) in cooperation with all relevant stakeholders on the 20th January of 2020. More recently, on 22nd November 2022, due to administrative and organisational changes, such as ministerial renames and changes in the subordination of first responders' Agencies, an update of the Plan was deemed essential, thus the "*Egkelados 2*" emerged (Hellenic Ministry of Climate Crisis and Civil Protection, 2022). The scope, objectives and main actions, which are dictated by this Plan are shortly presented herein.

Scope

The "Egkelados 2" plan aims at the direct and coordinated response to, and management of, earthquakes and their consequences at all levels, from the local scaling up to the regional and national level. The main scope of the plan is to protect the lives of citizens, their livelihoods, public health, critical infrastructures, sites of historical and cultural heritage, as well as of the natural and built environment.

Main objectives

There are four objectives to be achieved through the implementation of the plan:

1. To define and delineate roles and responsibilities of engaged stakeholders, from the local to the national level, through all four phases of the disaster management cycle i.e., prevention, preparedness, response and recovery.
2. To plan and develop preparatory measures and strategies, which will facilitate and enhance practitioners' capacity, increase the number of deployable resources and, overall, enrich means for the response to, and management of, earthquakes and the emergencies that arise as a consequence of the occurrence of the phenomenon.
3. To coordinately respond to emergencies caused by earthquakes, for the timely and efficient management of the consequences.
4. To harmonize all actions, implemented to first responders' operational procedures, to the ones dictated by the "Egkelados" Plan.

Actions proposed for the four phases of the disaster management cycle

The "Egkelados 2" plan proposes a series of measures and plans to be implemented prior to, during and after the occurrence of an earthquake, following the four phases of the disaster management cycle.

Actions in the phase of prevention

The phase of prevention is also referred to as "usual preparedness". "Egkelados 2" suggests the implementation of the following measures and actions:

1. Pre-seismic inspection of buildings following the national anti-seismic code issued by the Earthquake Planning and Protection Organization (E.P.P.O.) in 2000 (Earthquake Planning and Protection Organization, 2000).
2. Review, update and harmonisation of stakeholders' plans and procedures with the "Egkelados 2" plan.
3. Economic provisions for the coverage of costs regarding the procurement, maintenance and upgrade of technological equipment and the recruiting of personnel among others.
4. Assurance of the proper operation of information exchange mechanisms for the timely, efficient and accurate exchange of information between first responders.
5. Maintenance and technological upgrade of the equipment and resources deployed when emergencies occur.
6. Establishment of Memorandum of Cooperation with the private sector for the deployment of further resources and means, should the need arise.
7. Organisation of campaigns for the increase of public awareness.
8. Establishment of committees for the documentation of damages and the provision of economic support to those who need it.
9. Identification of public spaces to be used for the concentration of the population after major earthquakes.
10. Identification of spaces for the concentration of debris.
11. Inspection of the quantity and quality of stored material to be used for the sheltering of earthquake victims, e.g., tents, blankets.
12. Organisation of preparatory meetings within the local and regional civil protection coordination bodies.
13. Assurance of proper cooperation and interoperability between stakeholders' operational centres, e.g., between the operational centres of the Police, of the Fire Service and of the EMS.

14. Planning and organisation of training exercises for the operational personnel relevant agencies and organisations.

Actions for the preparedness phase

This phase is also referred to as "increased preparedness". It should be noted here, that, for the case of earthquakes, early warning is not applicable to the same extent as for other hazards, such as floods or wildfires. Therefore, the General Secretariat of Civil Protection consults the Permanent Scientific Committee of the E.P.P.O. for the assessment and reduction of the seismic risk. According to the "Egkelados 2" plan the following actions should be undertaken:

1. Municipalities and prefectures should immediately ensure the appropriate implementation of all preparatory actions, foreseen at the stage of usual preparedness, and, if necessary, to convene the local or regional coordination bodies for further actions.
2. Stakeholders should review and update operational plans and procedures and enhance their capabilities.
3. The aforementioned Scientific Committee of the E.P.P.O. should evaluate the evolution of the seismic sequence in a specific area and provide relevant recommendations.

Actions for the response phase

This is the stage of management of the immediate consequences, which emerge directly after the occurrence of a seismic event. The plan dictates the following actions:

1. Search and rescue of people. These operations are undertaken by the Fire Service.
2. Provision of triage, first aid and transportation of victims to nearby hospitals.
3. Increase of situational awareness, collection and evaluation, by stakeholders, of all information regarding the situation and its evolution.
4. Provision of shelters to victims, whose houses are deemed inappropriate for residence.
5. Debris lifting to ensure that first responders reach the affected area in a timely manner.
6. Quality check of drinking water.
7. Visual inspection of infrastructure for the detection of damage due to the earthquake.
8. Ensure that the operation of infrastructures, such as the power supply network, is not hampered.
9. Engagement of the military if necessary.
10. Activation of volunteer teams.
11. Declaration, if necessary, of a state of emergency for the affected area and submission of request for international assistance.

Actions for the recovery phase

This phase includes actions for the victims' short and mid-term relief, as well as actions for the documentation and assessment of damage aiming at the implementation of reconstruction and rehabilitation processes. The plan indicates the following measures:

1. Economic provision and support for displaced citizens.
2. Delimitation of the worst affected areas and documentation of damage to buildings and infrastructures.
3. Provision of grants to damaged buildings and infrastructures, as well as to other affected sectors e.g., the primary sector of production.
4. Restoration of the transportation network and of other infrastructures.

Provision of "Egkelados 2" for Tsunamis

Tsunamis are secondary phenomena, the majority of which is caused by coastal or submarine earthquakes. Other triggering factors may include submarine landslides or volcanic eruptions. In Greece and the entire Mediterranean Sea, usually, there is limited time between the occurrence of a submarine or coastal earthquake and the arrival of a tsunami wave to the closest shores. During this time, it is possible to issue tsunami early warning messages. The Geodynamic Institute of the National Observatory of Athens (NOA), Greece, is one of the five accredited Tsunami Service Providers, acting in the frame of the Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North-eastern Atlantic, the Mediterranean and Connected Seas (NEAMTWS/IOC/UNESCO). At the same time NOA is the responsible monitoring centre for issuing tsunami early warning messages in Greece.

According to the "Egkelados" plan, when a strong earthquake occurs in the sea or near the coastline, the Hellenic National Tsunami Warning Centre of the N.O.A. assesses the scientific data and sends tsunami warning messages to the National Coordination Center for Operations and Crisis Management of the Fire Service as well as to the E.P.P.O. The former conveys the messages to the operational centres of the Fire Service, the Police, the Military, the Coastguard and the EMS, and, to the Secretary General for Civil Protection. Moreover, the National Coordination Center for Operations and Crisis Management informs and alerts the local and regional governor(s) of the soon to be affected municipalities and prefectures to undertake the appropriate actions and measures. The tsunami messages may contain relevant maps and are adjusted to the Greek language with the aim to facilitate a common understanding between stakeholders. In the messages coloured scales are used for the depiction of the corresponding threat levels.

3.1.2 EARTHQUAKE PROTECTION AND PLANNING ORGANISATION AND THE NEW GREEK EARTHQUAKE RESILIENCE REGULATION

Apart from civil protection actions, other prevention measures include the training of the public in earthquake protection matters, the issue of regulations for the adequate and resilient construction of buildings, the pre-earthquake inspection of public buildings for the assessment of their resilience, the development of a network for the monitoring of seismic activity and of an entity responsible for the issue of early warnings for tsunami waves.

Regarding the inspection of buildings, both prior to and after a seismic event, the responsible entity is the Earthquake Planning and Protection Organisation (E.P.P.O.). In addition, E.P.P.O is responsible for information and awareness campaigns for the citizens. For the pre-earthquake inspection of public buildings E.P.P.O. has issued guidelines for the inspection of structural vulnerability, which is divided in three stages, the rapid visual inspection stage, the secondary inspection and the holistic assessment of the seismic capacity of the building.

The Earthquake Planning and Protection Organization has also coordinated the development of the Hellenic Earthquake Resilience Regulation (Earthquake Planning and Protection Organization, 2000). The first national regulation was issued in 1959. The reason for this was the significant number of high magnitude and destructive earthquakes that affected Greece during the 1950's. Most notable events were the Ionian earthquakes, in 1953, which affected the islands of Kefalonia, Zakynthos and Ithaca and reached the magnitude of 7.2 R, the 7.0 R earthquake of Sofades in western Thessaly in 1954, the 6.2 R earthquake that hit the town of Volos in eastern Thessaly in 1955, and the 7.5 and 7.2 R that hit Amorgos and Rhodes Islands respectively, during 1956 and 1957. A significant update of the regulation was performed in 1985. However, in 1995 the new building code, which is called "the New Greek Earthquake Resilience Regulation (N.E.A.K.)",

was put into force. Since 2001, the current Anti-Seismic Regulation (E.A.K.-2000) has been valid following modifications of the N.E.A.K. in 2003. The modifications were imposed by the destructive 7 September 1999 earthquake measuring magnitude 5.9, that struck the northwestern part of Attica in the metropolitan area of Athens. Afterwards, new additions were made when deemed necessary.

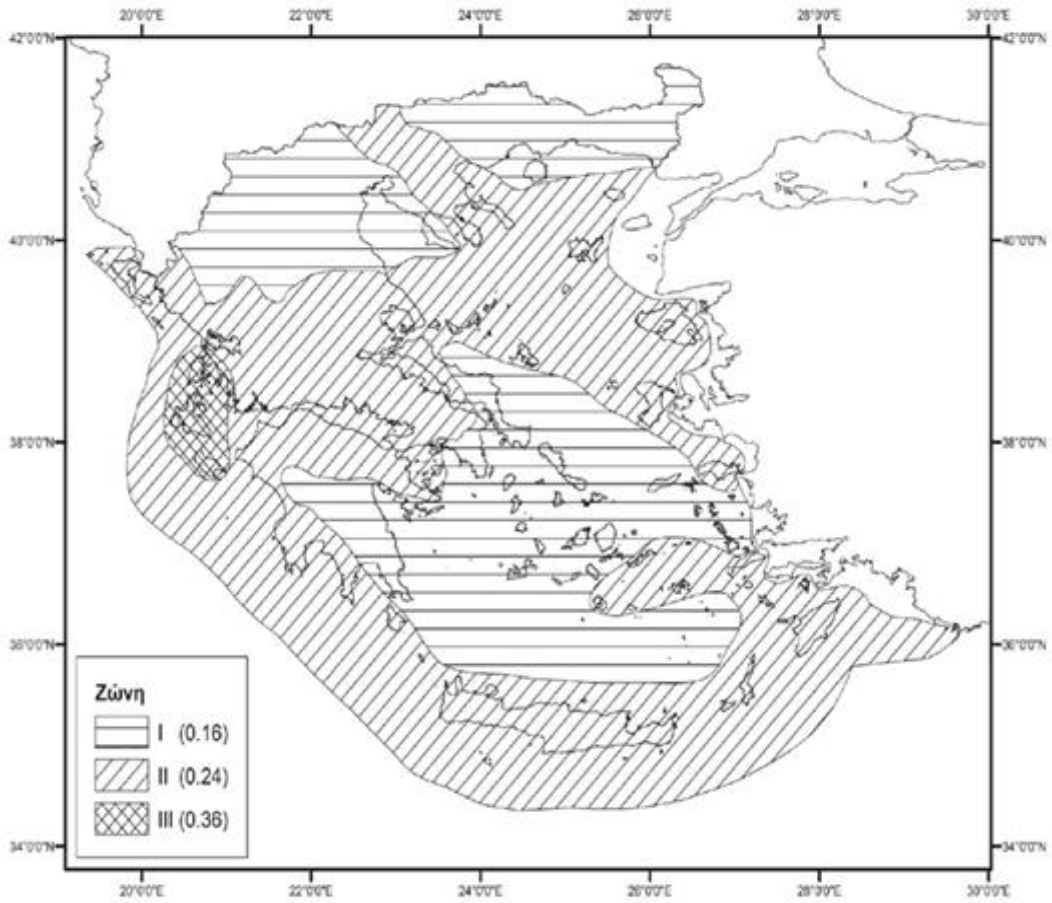

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Figure 4: Map of seismic risk in Greece according to seismic acceleration, Source: E.P.P.O.

The E.A.K.-2000 regulation is in accordance with the Eurocodes 7 (EC 7) and 8 (EC 8). The content of the regulation focuses on the construction of buildings and other structures, capable to withstand the "design earthquakes", which are determined on the basis of the seismic hazard zonation of the country. The aim is to protect human lives by limiting the number of collapsed buildings in cases of earthquakes with high intensities and to reduce economic loss caused by damage to buildings from mid-intensity earthquakes. The E.A.K.-2000 regulation addresses those structures, the damage of which is limited to the structure, its interior and the immediate surroundings. Structures like dams or nuclear plants and above or undersea structures are not included in this regulation.

For the monitoring of seismic activity in Greece the Unified National Seismological Network has been developed and comprises of the Geodynamic Institution of the National Observatory of Athens, the Seismology laboratory of the Department of Geology and Geo-environment of the University of Athens, the Geophysics laboratory of the Aristotle University of Thessaloniki and the Seismology laboratory of the Department of Geology of the University of Patra.

Apart from research centres and civil protection agencies, employers are responsible to integrate and implement protective measures, especially if workplaces could be potentially affected, and interrupt or even cancel ongoing activities and apply evacuation procedures for the safety of the personnel.

3.1.3 GENERAL PLAN "DARDANOS 2" FOR THE EMERGENCY RESPONSE AND MANAGEMENT OF FLOODS

Floods are among the most devastating and frequent disasters occurring in the area of the EU. According to the 2007/60/EC Guideline (The European Parliament an the Council of Europe, 2007), a "flood" is defined as the temperate coverage and deluge, by water, of land, which is usually not covered by water. Moreover, the Guideline defines "flood risk" as the combination of the occurrence of a flood and the consequences it has on lives, public health, infrastructures, the environment and the historical and cultural heritage. In Greece, the majority of floods is caused by intense rainfalls and the rapid melting of snow. Due to geological and geomorphological reasons most of the river catchments in Greece are large in number but relatively small and steep, something that leads to rapid drainage and consequently to flash floods. For the proper management and response to disasters owed to floods, the "Dardanos 2" general plan was issued by the General Secretariat for Civil Protection in 2019 and was updated in 2022 due to administrative and organisational changes implemented in Ministries and other central and decentralized administrations. "Dardanos 2", the updated version of the original plan, was put into force in October 2022 (Hellenic Ministry for Climate Change and Civil Protection, 2022).

Scope

The scope of the plan is to implement preparatory measures and actions, in order to enhance operational readiness of engaged agencies and organisations to respond to flood emergencies and to manage the consequences that arise. These actions are related to the protection of the lives and livelihoods of citizens, the protection of critical infrastructures and of the natural habitat. As a prerequisite is considered the effective interoperability between stakeholders, the facilitation of whom is part of this plan.

Main objectives

The objectives of the plan are not differentiated from the ones in the other three general plans of the G.S.C.P. i.e., "Egkelados 2" for earthquakes, "Iolaos 2" for forest fires and "Voreas 2" for frost. Therefore, the aim of this plan is the determination of responsibilities and specific roles among stakeholders, the design and implementation of preparatory actions for the increase of first responders' operational capacity and readiness, the assurance of proper communication and cooperation among agencies and the integration, harmonisation and update of the overall operational planning of relevant stakeholders according to the plan.

Actions proposed for the four Phases of the Disaster Management Cycle

The "Dardanos 2" plan suggests and dictates a series of measures and actions at all four phases of the disaster management cycle i.e., prevention, preparedness, response and recovery.

Actions for the phase of prevention

For the prevention phase, or phase of usual preparedness as it is referred to, the "Dardanos 2" plan proposes the following actions, the majority of which applies, to a great extent, to mitigation measures for other hazards and risks affecting Greece as well:

1. Review and update of plans and adjustment to the "Dardanos 2" plan.
2. Assurance of economic provisions for the implementation of actions.

3. Effective communication between stakeholders for an efficient information exchange.
4. Technological maintenance and upgrade of equipment and other resources.
5. Establishment of memoranda of cooperation with the private sector for the increase of means for the response to disasters due to floods.
6. Increase of the awareness of population regarding flood risk and protection measures.
7. Suggestion of technical committees for the documentation of damage and the provision of economic support.
8. Organisation of preparatory meetings for the civil protection coordination bodies at the local and regional level.
9. Enhancement of cooperation and communication between stakeholders' operational centres (Fire Service, Police, EMS).
10. Organisation of training exercise for the strengthening of the operational capacity of the personnel.

Actions for the preparedness phase

These actions are foreseen for those areas, which, according to the Hellenic National Meteorological Service and the severe weather warnings issued by the Service, are expected to be affected by extreme weather. It is essential to note, that severe weather warnings and emergency reports are issued by the H.N.M.S. and are addressed primarily to the National Coordination Center for Operations and Crisis Management of the Fire Service, from which they are disseminated to all agencies and stakeholders, in order to initiate procedures and be ready to respond to a potential emergency. Moreover, there is not a nowcasting system established and operated by the H.N.M.S., which would provide, along with the use of meteorological stations on the ground and meteorological radars, a more accurate picture regarding the exact location and time of occurrence, as well as the evolution of the phenomenon. Civil protection agencies and first responders should undertake the following actions:

1. Operational readiness of all personnel and resources for the management of and response to imminent risk.
2. Increase of the citizens' level of awareness and provision of information relevant to self-protection measures.
3. Increase of awareness of citizens occupied in the primary sector of production (peasants, stockbreeders etc.)

Actions for the response phase

The "Dardanos 2" plan dictates the following actions to be implemented by stakeholders for the efficient response to disasters caused by floods:

1. Search and rescue operations for victims are undertaken by the Fire Service.
2. Traffic police is responsible to facilitate the access of emergency vehicles to the site of the emergency and to prohibit the transit of citizens above rivers and streams.
3. Implementation of protection measures for operators of infrastructures and preparation of evacuation processes if this is deemed necessary.
4. Organised evacuation of citizens if it is necessary.
5. Debris lifting in order to facilitate the access of emergency vehicles to the site. To this direction and with the aim to assign responsibilities regarding the maintenance of the road network, the G.S.C.P. has developed 14 maps, using GIS, which correspond to the 14 Prefectures of Greece.
6. Inspection of the quality of drinking water.

7. Visual inspection of critical infrastructures and other structures to detect damage and needed resources for their restoration.
8. Implementation of actions and measures from the police to ensure public order.
9. Immediate restoration of the power network.
10. Restoration and cleaning of wells and of the sewage system from debris in order to facilitate water drainage.
11. Restoration of damage to the water supply network.
12. Decision regarding the proper function and opening of schools.
13. Declaration of a state of emergency for the affected area if this is deemed necessary.

Actions for the recovery phase

The following actions are suggested by the "Dardanos 2" plan of the G.S.C.P.:

1. Provision of assistance and economic support to victims and relocation of displaced population.
2. Provision of grants to industries and affected assets.
3. Documentation and registration of damage to the natural habitat.
   Restoration of the power and water supply networks and of the road network if that is not achieved during the response phase.

3.1.4 GENERAL PLAN "VOREAS 2" FOR THE EMERGENCY RESPONSE AND MANAGEMENT OF SNOWFALLS AND FROST

The "Voreas" plan was issued by the G.S.C.P. in 2020 and addresses the management of emergencies, which are caused by snowfalls and frost. An update was issued in 2022 and, the now-called "Voreas 2" plan, was put into force on 02/12/2022. The plan is activated for the implementation of preparatory actions regarding imminent risk of heavy snowfalls and prolonged periods of frost, and, for the implementation of response actions in order to timely address and manage the consequences, that emerge due to these weather phenomena (Hellenic Ministry for Climate Crisis and Civil Protection, 2022).

In Greece, snowfalls and frost occur usually between late November and early April. The country, due to its topographic and climatic characteristics, presents significant differences, with the areas mostly affected by low temperatures and snowfalls, being those of central and northern Greece and namely those that are of higher altitudes and far from the sea. This is the dominant situation, but occurrences of snow and frost in southern Greece or at lower altitudes cannot, by any means, be excluded. The most regular problem is the interruption of road traffic due to the blockage of roads by high snow coverage or by layers of ice on the road surface. This could lead to adverse consequences for populations residing in stranded areas. Moreover, power outages and problems with the water supply network are not uncommon. Consequences may also be observed to agriculture and to livestock. Thus, two main types of actions are essential, the maintenance of the road network during winter months and the planning of preventive measures for the provision of support to the affected areas. Finally, it should be noted that although avalanches are not an uncommon phenomenon, they usually occur at very high altitudes, where, in most cases, there are no residences or roads.

Scope and main Objectives

The scope and objectives of this plan are not greatly differentiated from those of the other G.S.C.P. plans, that are described in this Deliverable. The "Voreas 2" plan aims to implement preparatory civil protection actions focusing on the enhancement of the stakeholders' capacity, response actions to timely manage

potential emergencies and consequences on peoples' lives, livelihoods, infrastructures and assets. The main objectives are to define and clarify the responsibilities of engaged stakeholders at the local, regional and national scale, to coordinate response actions and to harmonise operational processes according to the "Voreas 2" plan.

Actions proposed for the four Phases of the Disaster Management Cycle

The "Voreas 2" plan suggests a series of measures and actions to be implemented at all levels of central and decentralised administration for all phases of disaster management.

Actions for the phase of Prevention

At this stage the main actions concern the maintenance of the road network and the removal of snow with the aim of preventing road blocking. However, there are occasions of long-lasting snowfalls and low temperatures, during which snow removal is impossible, at least in the short term. To prepare for such circumstances, measures have to be implemented, as described herein:

1. Review and update of civil protection emergency plans.
2. Assurance of economic provisions for the maintenance of equipment, the recruitment of personnel and the procurement of new systems and tools.
3. Assurance of efficient communication between stakeholders.
4. Inspection of the equipment and of its proper functionality.
5. Establishment of Memoranda of Cooperation with the private sector for the provision of means and personnel.
6. Increase of the public awareness regarding self-protection and preventive measures, in case of imminent snowfalls and low temperatures.
7. Organisation of meetings between the civil protection coordination bodies of the Municipalities and Prefectures expected to be affected by snowfalls.
8. Organisation of training exercises for the personnel of first responders' organisations regarding response operations.

Actions for the Preparedness Phase

Actions suggested by the "Voreas 2" plan for this phase are valid for the areas that are expected to be affected according to weather forecasts of the Hellenic National Meteorological Service. Severe weather warnings are addressed by the H.N.M.S. to the National Coordination Center for Operations and Crisis Management of the Fire Service, from which they are sent to the operational centres of first responders' organisations. As dictated by the plan:

1. Operational personnel are at a standstill and will operate in order to respond to potential emergencies.
2. The public is aware of the imminent risk and informed by the respective civil protection body of self-protection measures.
3. People working in the primary production sector are aware that low temperatures and/or snowfalls are about to occur in order to implement preventive actions.

It is essential to note that the Secretary General for Civil Protection might dictate extra measures for areas, for which prolonged periods of cold and snowy weather are forecasted, due to the fact thar for extended periods of increased preparedness a different and more extensive planning of actions is necessary.

Actions for the Response Phase

The plan suggests the following actions for the response to emergencies related to snowfalls and frost:

1. Provision of instructions to the public related to snowfalls.
2. Search and rescue operations for stranded citizens.
3. Rescue of drivers, who are stranded in blocked roads.
4. Rescue of citizens, stranded in trains.
5. Provision of medical help to residents of areas, which cannot be reached due to high snow coverage.
6. Immediate, if it is possible, restoration of the power and water supply network.
7. Declaration of a state of emergency for areas affected by severe weather.
8. Decision regarding the temporary interruption of school classes.

Actions for the recovery phase

Finally, regarding the final phase of emergency management, "Voreas 2" indicates the following actions:

1. Restoration of damage to the road network as well as to the power and water supply networks and telephony.
2. Provision of support to residents of stranded areas.
3. Temporary hosting of citizens in hotels and lodges.
4. Documentation and registration of damages to the primary production sector.
5. Demarcation of areas affected by avalanches.

3.1.5 GENERAL PLAN "IOLAOS 2" FOR THE EMERGENCY RESPONSE AND MANAGEMENT OF FOREST FIRES

Forest fires are one of the most common disasters that affect Greece. The country is characterised by a Mediterranean climate type with dry and warm to hot summers, as well as rainy and mild to cold winters. Rain is usual during the autumn, winter and spring months, whereas it is rare during the summer, mainly from May to September. In addition to the climatic regime of the country, forests, comprising of tree species capable of adapting to such conditions, also play a significant role in the occurrence of wildfires. Pine forests accompanied by bushes and other, resilient to dry summer conditions, plants are characteristic of areas with Mediterranean climate and wildfires are a natural mechanism, which promotes the natural rebirth of such forests by decomposing dead organic material lying on the soil. However, recurrent fires lead to the degradation of forests and consequently to floods or even desertification. Wildfires may also have severe impact on human activities including the primary production sector, damage to infrastructures and on tourism.

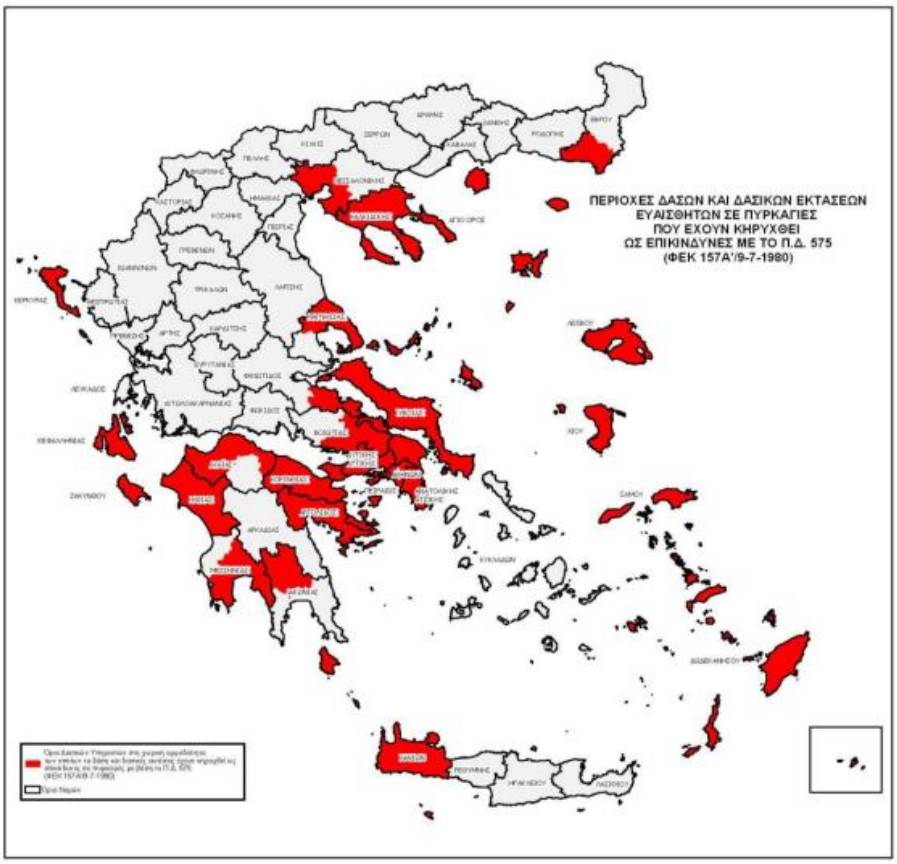

Figure 5: Areas prone to forest fires, Source: G.S.C.P.

As a result, the G.S.C.P. issued, in 2010, the general plan for the management of forest fires with the code name "Iolaos". The plan was updated several times, following changes in the central and decentralized governance and administration, with the 5th version being valid from April 2023. The "Iolaos" plan is activated during the fire season, from the 1st of May until the 31st of October, and the Fire Service is the operational coordinator and the responsible body for the implementation of plans and strategies related to the management of wildfires (Hellenic Ministry for Climate Change and Civil Protection, 2022).

Scope and main Objectives

The scope of the plan is to support the Fire Service to effectively manage and suppress forest fires and efficiently manage consequences on the natural and anthropogenic environment. As a prerequisite, efficient cooperation and interoperability between agencies and stakeholders is required. The main objectives of the plan are the definition of responsibilities between engaged stakeholders, the coordinated response and support to the Fire Service, which is, as already mentioned, the main responsible for the management of wildfires, and the alignment of the plans of agencies with the "Iolaos 2" plan.

Actions proposed for the four Phases of the Disaster Management Cycle

Herein are presented the actions suggested by the "Iolaos 2" plan, that need to be implemented by practitioners and other stakeholders during the four phases of disaster management.

Actions for the phase of prevention

During this stage prevention measures are taken, which increase the capacity, not only of operational services, but also of the population. These measures include:

1. The review and update of the plans of stakeholders and their alignment with the "Iolaos 2" general plan.
2. The organisation of training exercises for the operational personnel.
3. The assurance of financial support for technological upgrades and the recruitment of additional personnel.
4. The assurance of proper communication between stakeholders for the efficient information exchange among them.
5. The establishment of cooperation with the private sector, which can assist with the provision of means and resources.
6. Campaigns aiming at the increase of public awareness and self-protection measures.
7. Organisation of meetings between civil protection bodies at the municipal or regional level.
8. Decision making regarding the implementation of measures related to the curfew with or near natural parks.

Actions for the Preparedness Phase

Actions related to the preparedness phase depend, to a great extent, to the daily fire risk map, which is issued daily by the G.S.C.P. during the fire season and specifically within the 1st of June and the 31st of October. This map depicts Greece segregated according to the boundaries of the Greek Forest Offices. Moreover, according to the level of fire risk, each Forest Office is coloured as follows:

- Green, when the fire risk is low.
- Blue, when the fire risk is medium.
- Yellow, when the fire risk is high.
- Orange, when the fire risk is very high,
- Red, for a state of emergency

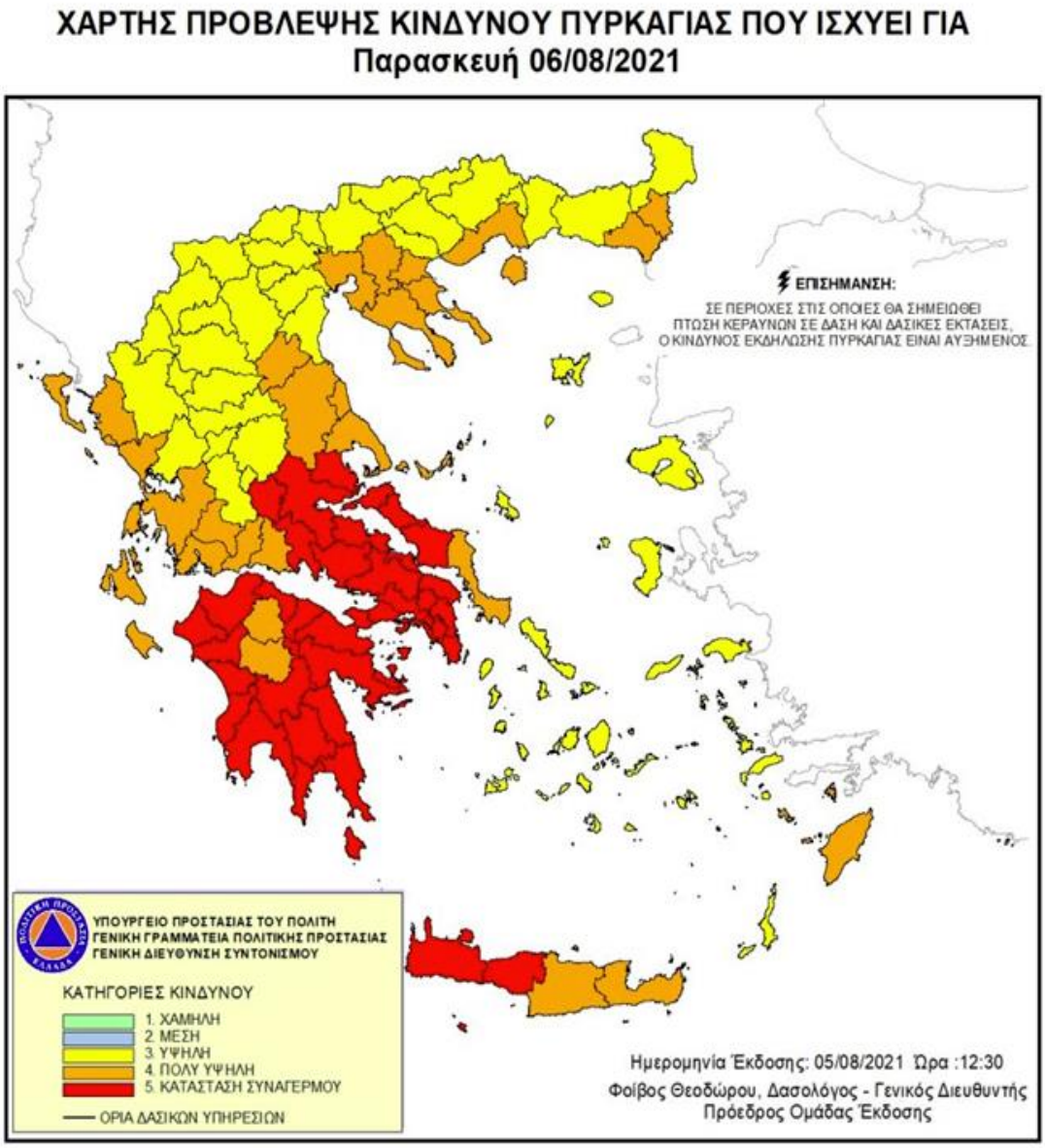

Figure 6: Fire risk map for the 6th of August 2021, during the extreme heatwave and wildfire that burned vast areas in the Euboea Island, Source: G.S.C.P.

The Operational Centre of the G.S.C.P. receives the fire risk map daily and disseminates it to all stakeholders. For areas to which the red colour i.e., state of emergency, is applied, further preparedness actions might be issued. These actions include:

1. Increased forest surveillance by the fire service and other agencies.
2. Implementation of curfew measures within or near forests.
3. Press releases from the respective civil protection agencies regarding the increase of public awareness and the implementation of self-protection measures for citizens residing in areas with very high fire risk.
4. Mitigation of activities taking place near dumping grounds.
5. Mitigation of military activities.

6. Mitigation of activities in the primary production sector, with the aim of avoiding the initiation of fires due to delinquency.

Actions for the response phase

Actions are separated into two (2) main categories i.e., supportive actions for the work of the Fire Services and actions directly linked to the response to wildfires. For the support of the Fire Service the plan suggests the following:

1. Provision of water tanks and machines from local administration bodies to the Fire Service.
2. Implementation of measures by the Traffic Police to facilitate the Fire Service vehicles to approach the site.
3. Preventive power outage.
4. Provision of boats by the Coastguard to facilitate the arrival of forces by sea.
5. Provision of personnel and resources by the Military.
6. Provision of ambulances and other vehicles by the National Center for Emergency Assistance.

Regarding response actions, they are implemented mainly by the Fire Service and include:

1. Search and rescue operations for trapped citizens within or near the site of the wildfire as well as safe evacuation procedures.
2. Evacuation of camps, archaeological sites and monasteries located within or close to the site.
3. Provision of first aid support to victims.
4. Implementation of measures from both the Fire Service and the Police for the preservation of public order.
5. Restoration of the power supply network if it is damaged.

Actions for the Recovery Phase

The “Iolaos 2” plan suggests the following actions for the phase of recovery:

1. State support for the victims of wildfires as well as financial provisions with the aim of covering their needs.
2. Demarcation of the affected area.
3. Provision of grants to owners of affected assets, from agricultural areas to industries.
4. Documentation of burnt forests by the relevant stakeholders e.g., Forest Offices.
5. Restoration of damages to infrastructures e.g., to the power or road network.

3.1.6 GENERAL PLAN “TALOS” FOR THE EMERGENCY RESPONSE AND MANAGEMENT OF VOLCANIC ACTIVITY IN THE ISLAND OF SANTORINI

Greece, lying above the convergence zone between the African and the Eurasian plates, presents, apart from high seismicity, also significant volcanic activity. Island arcs are a characteristic geological structure of convergence zones, especially in cases of the submergence of oceanic crust below continental crust. Moreover, the coexistence of volcanoes in these island arcs is not uncommon. In Greece there are six volcanoes, which constitute the Hellenic Volcanic Arc and they are located at Sousaki of the Regional Unit of Corinthia, at the Methana peninsula, and at the islands of Milos, Santorini (with its approximal submarine volcano of Columbo), Nisyros and Kos. Depending on the definition of the term “active” the two volcanoes in Greece that can be characterized as such are those of the Santorini and Nisyros islands.

Figure 7: Hellenic orogenic arc, with the volcanic arc at its inner side, Source: Virtual Explorer

Volcanic eruptions can potentially have disastrous consequences on lives, livelihoods, infrastructures and, in general, on the natural and anthropogenic environment, although their majority is under continuous monitoring. The volcano of Santorini was last active in 1950, whereas the nearby submarine volcano Columbo has not erupted since 1650. Due to the increased activity observed in Santorini between 2011 and 2013, the Scientific Committee responsible for the Monitoring of the Santorini Volcano was established by the Ministry of Infrastructure, Transport and Networks in 2012. The Committee, through a request from the G.S.C.P. assessed all potential consequences, which will emerge in the case of an eruption, a work that was finalized in 2013. This work is based on two potential eruption scenarios, the most probable and the extreme scenario. The first one describes the phenomena that will take place and the consequences that follow an eruption, similar to the last eruptions, which occurred in 1950, whereas the second one describes a sub-plinian eruption as well as the impact it will have not only on Santorini but also on nearby islands.

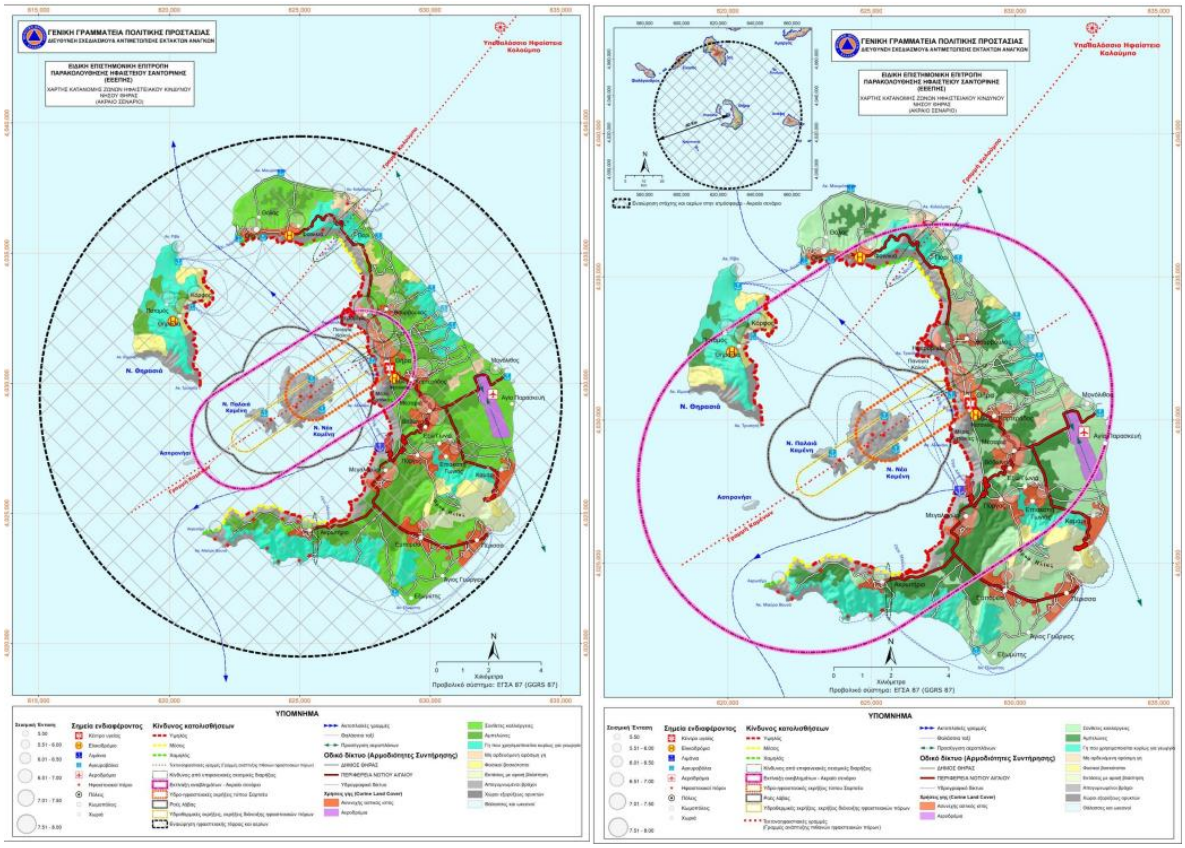

Figure 8: Santorini Island, within the black-dotted circle is depicted the affected area for the most probable (left side) and extreme scenarios (right side), Source: G.S.C.P.

The Committee was later replaced by the Permanent Scientific Committee responsible for the Monitoring of the Hellenic Volcanic Arc of the Earthquake Planning and Protection Organisation of Greece (E.P.P.O.). The latter is responsible for monitoring all volcanoes of the country.

Scope and main Objectives

The G.S.C.P. issued and put into force in 2020, the "Talos" general plan for the response to a potential eruption of the Santorini Island. The plan suggests actions of increased preparedness, in cases that the Permanent Scientific Committee of E.P.P.O. raises the level of alert, as well as response actions for the management of emergencies (Hellenic Ministry for Climate Crisis and Civil Protection, 2020). These actions focus on the operational readiness of the personnel and resources of stakeholders and the effective management of consequences, which may arise from an increased volcanic activity and affect citizens and infrastructures. The goal of the plan is, through the proposed actions, to achieve coordination among all stakeholders, delineation of responsibilities and roles, effective harmonisation of operational plans and their successful implementation, both at the preparedness and the response phases. In addition, due to the fact that volcanic eruptions are accompanied by concurrent phenomena e.g., earthquakes, and potentially lead to the occurrence of cascading effects e.g., tsunamis and landslides, the effective management of the situation entails the implementation of measures and actions foreseen in the "Egkelados 2" and "Dardanos 2" plans for earthquakes and floods respectively. Furthermore, regarding landslides, the local police are responsible to inform the relevant agencies of the Southern Aegean Region for the implementation of specific actions such as citizens' evacuation.

Actions proposed for the four Phases of the Disaster Management Cycle

Hereby are described the suggested actions for the four disaster management phases. It should be noted that these actions are similar in the various plans issued by the G.S.C.P., and are diversified only in specific aspects, which are closely related to the respective hazard.

Actions for the phase of prevention

Actions regarding this phase of disaster management are not much differentiated than those in G.S.C.P. plans related to other hazards. Again, it is suggested that financial resources are provided for the implementation of various actions, such as the maintenance of equipment, cooperation with the private sector for the provision of personnel and resources is established, population awareness regarding self-protection is raised and open spaces for the deposition of volcanic ash and debris are identified among others.

Actions for the Preparedness Phase

Since 2012, the Permanent Scientific Committee responsible for the Monitoring of the Hellenic Volcanic Arc is responsible for the monitoring of the activity of the Santorini volcano. Taking into consideration the instrumental observations of the various scientific tools used for the monitoring of the volcano, the level of alert is defined by the Committee following the guidelines of the International Association of Volcanology and Chemistry of the Earth's Interior (I.A.V.C.E.I.). This is a 4-level colour scale:

1. Green level: The volcano is in its typical condition without any significant activity.
2. Yellow level: The volcano presents an above-normal activity, and the volcano is under close surveillance.
3. Orange level: An eruption is quite probable but the timeframe for this to occur is yet unknown.
4. Red level: An eruption is imminent or is already happening.

According to the alert level the corresponding measures and actions are suggested by the "Talos" plan. In the case of a change in the alert level the respective Municipalities and the Region of South Aegean need to be on standby and to activate preparedness measures. Moreover, should the need arise, the local and regional civil protection bodies are convened, whereas first responders' organisations review their actions and proceed to the recruitment of personnel and resources.

Actions for the response phase

The "Talos" plan suggests a series of measures to be taken by the competent agencies during the response to an emergency caused by an eruption of the Santorini volcano. These measures include, inter alia, search and rescue operations, information sharing between agencies regarding the evolution of the situation, information for the population regarding self-protection, inspection of damage to infrastructures, activation of the military if the need arises, activation of volunteering organisations, coordinated evacuation of the population and declaration of a state of emergency if this is applicable.

Actions for the Recovery Phase

The "Talos" plan proposes actions for the Recovery phase as well. These include measures for the delimitation of the damaged area along with the provision of financial support to the victims and especially those, whose homes are damaged or destroyed, the provision of grants to damaged farms, assets and infrastructures, the restoration of water and power supply networks and of the road network.

3.1.7 NATIONAL PLAN FOR GEOLOGICAL RISKS

As geological are characterised those risks, that emerge from natural processes and include phenomena such as earthquakes and volcanic eruptions. In addition, there are secondary risks, e.g., erosion and landslides, whereas, as a risk can be considered the impact that natural elements or anthropogenic activities have on the environment. As such can be considered radioactive natural materials, minerals and ores as well as technological accidents, which can cause negative effects to the soil and subsoil, as well as to surface and groundwaters.

The Hellenic Survey of Geology and Mineral Exploration is involved in the management of geological risks through its Department of Natural and Technological Risk Management. The objective of this department is the identification, recording, research and study of geohazards, in cooperation with the General Secretariat of Civil Protection, the Ministry of Environment and Energy and other competent authorities (Department of Natural Hazards Prevention & Management).

A memorandum of understanding has been signed between the General Secretariat of Civil Protection and the Hellenic Survey of Geology and Mineral Exploration which is activated after the occurrence of major events of landslides, earthquakes or other natural disasters of geologic origin. The Team of the Immediate Response (TIR) goes to the affected areas to assess the risk and dynamics of the phenomenon and to provide advisory instructions to the competent bodies for the immediate treatment of the phenomena.

3.1.8 NATIONAL STRATEGY FOR THE ADAPTATION OF GREECE TO CLIMATE CHANGE

The reduction of greenhouse gas emissions, with the aim to mitigate the impact of the consequences of climate change and to restrain global warming below the threshold of 2 ˚C, is a priority for all countries.

The National Strategy for the adaptation of Greece to climate change (Hellenic Ministry of the Environment and Energy, 2016) was developed by the Hellenic Ministry of the Environment and Energy in collaboration with the Biomedical Research Foundation of the Academy of Athens and the Bank of Greece in 2016. The scope of the Strategy is to manage the consequences of climate change at a national level and the capitalisation on the experience of the Bank of Greece and of the Climate Change Impact Study Committee, which, already since 2009, has been involved in the systematic assessment and study of the environmental, social and financial impact of climate change on the country.

The strategy lays out guidelines and means for the achievement of an efficient management plan, that is compliant with the United Nations Framework Convention on Climate Change, with European guidelines for the adaptation to climate change and international experience. The National Strategy is a first step towards the planning and implementation of actions, which will facilitate the economic and social adaptation of Greece to the imminent threats and consequences posed by climate change.

The most significant target is, through the Strategy, to enhance the resilience of Greece. A timeframe of five years has been defined for the implementation of the initial set of actions, which include the improvement of short- and long-term decision making, the fostering of a sustainable and expansionary plan at a local and regional level, the implementation of actions for all financial sectors, the development of a mechanism for the monitoring, evaluation and update of the developed adaptation plans and the enhancement of social resilience through citizen awareness campaigns.

3.1.9 GENERAL PLAN "IRAKLEITOS" FOR THE MANAGEMENT OF HIGH IMPACT TECHNOLOGICAL ACCIDENTS

The General Secretariat for Civil Protection has issued plans for the management, not only of natural but also of man-made hazards. In 2009 the first version of the "Irakleitos" plan for the management of technological accidents was issued, whereas, due to administrative changes, the plan was reviewed and updated to reach its final third version, which is valid from 2020 (Hellenic Ministry for Climate Crisis and Civil Protection, 2020). In this plan actions for the management of high-impact technological accidents outside of the territory of an upper-tier or within the territory of a lower-tier establishment are included. By the terms "upper and lower tier establishments" are characterised those sites containing significant quantities of dangerous substances and the differentiation lies upon the quantities of these substances within the establishment. These substances as well as the requirements for an establishment to be characterised as upper or lower tier are described in the Directive 2012/18/EU of the European Parliament and of the Council (The European Parliament an the Council of Europe, 2012). Moreover, it should be noted that technological risks and quantitative risk assessment of complex systems are undertaken by the System Reliability and Industrial Safety Laboratory of the Institute of Nuclear and Radiological Sciences and Technology, Energy and Safety of the National Centre for Scientific Research "Demokritos" (INRASTES, Institute of Nuclear % Radiological Sciences & Technology, Energy & Safety). The System Reliability and Industrial Safety Laboratory is coordinating the Greek Technology Platform on Industrial Safety, together with the University of Crete and the National Technical University of Athens.

The "Irakleitos" plan is also activated in cases of accidents during the loading and unloading of dangerous substances to and from tanker trucks and in cases of a malicious act with the exclusion of lethal chemical agents.

Scope, main Objectives and Actions

The scope of the plan is the organised and coordinated response of all engaged stakeholders to high-impact accidents at all levels i.e., the local, regional and national level. Efficient interoperability between agencies and support to the Fire Service, which is the actor in the management of such emergencies. Moreover, the aim of the plan is to delineate the responsibilities of each agency and to provide guidance to affected Municipalities and Regions.

Actions are initiated right after the announcement of a technological accident by the operator of the establishment to the Fire Service, which informs the regional fire department. From the regional department all local stakeholders are alerted. It must be noted that the site operator is responsible for granting access to response teams and to implement the internal plan for the management of emergencies. In addition, the Fire Service and the operator of the site take over the zonalisation of the area with the aim of protecting both first responders and citizens. Depending on the substance and the consequences it can have on the population, as well as on its spread and propagation, an event can be characterised as a simple incident or a major emergency. The Fire Service may also request the assistance of sampling specialists to assess the aerial / ground water spread of the substance.

Furthermore, actions for the support of the Fire Service are proposed. The affected and neighbouring municipalities as well as the region must assist with the provision of trucks and machines, whereas in cases of leakage of dangerous substances to the road network the competent agency, responsible for the maintenance of the affected roads, must implement specific actions. On the other hand, police and coastguard authorities are expected to facilitate the inflow of response teams, the power network distributor might disrupt the power supply, if necessary, the National Center for Emergency Assistance is expected to

dispatch ambulances and the Hellenic National Meteorological Service must provide information regarding potential weather changes, which would lead to cascading effects.

The "Irakleitos" plan dictates analytical actions for the management of incidents, which are not considered as major ones, for the management of technological emergencies within or in the proximity of airports, the management of emergencies in ports, where the supply of ships with liquefied natural gas is foreseen, the management of incidents in non-operational establishments.

3.1.10 GENERAL PLAN FOR THE MANAGEMENT OF EMERGENCIES CAUSED BY ACCIDENTS DURING THE ROAD OR RAILWAY TRANSPORT OF DANGEROUS GOODS, FOLLOWING THE ADR/RID EUROPEAN AGREEMENTS

The General Secretariat for Civil Protection issued in 2016 guidelines related to the responsibilities of stakeholders for the management of and response to emergencies caused by accidents during the transportation of dangerous goods by road or railway. In 2020 and following administrative changes, the Secretariat developed the general plan for the management of such emergencies (Hellenic Ministry for Climate Crisis and Civil Protection, 2020), which is aligned with the EU Agreements ADR/RID (The European Parliament an the Council of Europe, 2008). It should be noted that "ADR" is the acronym for "Agreement Concerning the International Carriage of Dangerous Goods by Road" and "RID" stands for "Agreement Concerning the International Carriage of Dangerous Goods by Rail". The plan is activated in cases of leakage and/or explosion during the transport of dangerous goods as well as in cases of incidents, thar are consequent of terrorist acts.

As dangerous can be regarded those goods, that can affect the health of people, who handle or are in close contact with it, can have serious impact on livelihoods and the environment and can pose threats not only to the safety of the transport but also to the means of transportation (road or rail vehicle). According to the plan, liquefied petroleum gas, natural gas, oil, acetylene, hydrogen, oxygen, ammonia, chlorine, hydrochloric acid and sodium hydroxide are considered dangerous goods. The most usual situations that lead to accidents involving the transport of the aforementioned goods are collisions between vehicles, collision of a vehicle with stable objects, inversion of vehicles, collision of vehicles with trains, human negligence and technical failure. The plan also lays out the risks which come as a consequence of such incidents. These risks are related to thermal radiation due to explosion and fire, high pressure because of blasts and ejection of materials and fragments of destroyed equipment, leakage of dangerous chemical, radiological and biological agents. Such risks might also have cascading effects and can also lead to environmental pollution. Incidents can be classified to those without any victims (deaths and injuries) and damage to the environment, those without victims but with imminent threat for the environment, those without victims but with impact on the environment, those with victims but without environmental impact and, finally, those with both victims and environmental consequences. Incidents inside tunnels or in the proximity of high-interest facilities e.g., schools and hospitals are considered separate case studies.

Scope, main Objectives and Actions

As with all general plans of the G.S.C.P. the scope is the coordinated and well-organised response of all relevant stakeholders and the support of the Fire Service, which has the main responsibility of managing such incidents. To this direction, the plan defines the roles and responsibilities and proposes a series of actions to be taken for the efficient management of the situation. These actions are related, not only to the response to these incidents, but also to the phases of prevention and preparedness. Measures and actions are divided in two categories:

- Those related to the road transport of dangerous goods (ADR) and
- Those related to the rail transport of dangerous goods (RID)

For the first category the plan emphasises on the conduct of regular sample checks to ensure the adherence and compliance to prerequisites, related to the transport of such substances, the training and certification of transporter drivers, the prohibition of transportation in case necessary conditions are not met, the appropriate tagging of vehicles containing and transporting dangerous goods, the obligation of companies and industries to consult specialists for the transportation of dangerous substances and to keep updated records and registrations of transports and on the adequate maintenance of the road network by the competent agencies. Moreover, preventive actions should be implemented in occasions of severe weather and in cases, in which a combination of different vehicles is necessary to reach the final destination e.g., in cases, where a shift from road transport to transport by sea is needed.

For the second category measures and proposed actions are not significantly differentiated. In this case train drivers should be well trained and certified, the railroad should be well maintained, and trains should be tagged as appropriate. Most actions applied to road transportation are also valid for rail transportation as well.

3.1.11 GENERAL PLAN FOR THE MANAGEMENT OF ACCIDENTS DURING THE TRANSPORT AND DISTRIBUTION OF NATURAL GAS

The General Plan for the management of accidents during the distribution and transportation of natural gas was issued by the General Secretariat for Civil Protection and was put into force on the 21st of December 2022 (Hellenic Ministry for Climate Crisis and Civil Protection, 2022). The Plan is activated for the cases of leakage, explosion and fire during the transportation and distribution of natural gas through pipelines. It is also implemented for the management of incidents occurring to pipelines containing compressed natural gas, thus including incidents in compression, decompression and gasification stations. For the case of incidents taking place during the transportation of gas by tank trucks or at gas stations, the ADR/RID general plan is implemented. Moreover, the plan is activated even in cases of malicious and terrorist acts.

On the other hand, the plan is not implemented in cases of accidents at the LNG terminal station in Revithousa, Greece, since this station is used for the storage and regasification of LNG, in cases of accidents within establishments of LNG replenishment of ships and, finally, in cases of accidents in establishments of, combined with gas, power regeneration, as in these occasions the “Irakleitos” Plan is activated.

Scope and main Objectives

The scope of this plan does not differentiate from that of the other Plans of the G.S.C.P. Through it, support actions to the Fire Service, that oversees response operations, as well as the efficient management of the impact of incidents are foreseen. The plan identifies the roles and responsibilities of all stakeholders at all levels, from the local to the national, and foresees coordinated operational actions for the recovery and relief of affected areas.

3.1.12 PLAN FOR THE MANAGEMENT OF HUMAN LOSS

The first version of the plan for the management of human losses due to disasters was issued in 2011. Since then and taking into consideration administrative changes as well as lessons learnt from similar past incidents, the plan was revised several times. The current and fourth version was put into force on the 30th of December 2022. The purpose of the Plan is the management of multi-casualty incidents as a result of the

occurrence of natural and man-made disasters. It is implemented after the conclusion of triage and pre-hospitalisation procedures (Hellenic Ministry for Climate Crisis and Civil Protection, 2022).

For the activation of the Plan a series of actions needs to be undertaken. The responsible preliminary investigation authority along with the competent forensic authority propose to the Chief of the Agency (the Hellenic Police, or the Hellenic Fire Service, or the Hellenic Coastguard) the activation of the Plan. From the Chief the proposal is transferred to the Engaged Stakeholders Unit of the National Coordination Center for Operations and Crisis Management including the date and time, the exact geographic position, the accurate number of deceased victims and description of the incident, as well as an estimation of whether the number of deceased people is expected to rise. The Engaged Stakeholders Unit informs the Secretary General of Civil Protection and after the confirmation for the implementation of the Plan the Unit conveys the decision to all relevant related agencies and stakeholders.

It should be noted that the main investigation authority in Greece is that of the Hellenic Police. The Hellenic Coastguard is responsible for investigation in the sea area of its responsibility, whereas the investigation authority of the Fire Service is responsible for preliminary investigation actions in case of arson. The Hellenic Civil Aviation Authority conducts investigation regarding airplane accidents. Moreover, since 2014, the Disaster Victim Identification Team of the Hellenic police is operationally ready to respond if requested by the Chief of Police.

Main Scope

Through the implementation of this Plan the coordinated response actions between all relevant stakeholders is foreseen. Multi-casualty incidents are the consequences of natural disasters, technological accidents (including CBRNe accidents), malicious and terrorist acts and of other disasters e.g., plane crushes, railway and road accidents. It is expected that during these situations there will be dire demands for the fast identification of victims, for the reporting to Embassies in case of foreign victims, for implementation of measures by the competent and affected infrastructures and for the information of national and international media. Additionally, in case of CBRNe incidents, actions suggested by the General Plan "Pandora" of the G.S.C.P., are implemented.

Prerequisites for the implementation of the Plan are the completion of triage processes, the assurance of safety in the area of the disaster, the reporting of the Emergency Medical System to the preliminary investigation authority regarding the number of deceased victims and, in case of CBRNe events, the completion of actions dictated by the "Pandora" plan.

3.1.13 GENERAL PLAN "PANDORA" FOR THE MANAGEMENT OF CBRN THREATS AND INCIDENTS

The "Pandora" plan is a classified document, issued by the G.S.C.P., the scope of which is the timely and coordinated response of engaged stakeholders to CBRN emergencies, at the tactical, operational and strategic levels. The Plan outlines the roles and responsibilities of first responders' and civil protection agencies, the coordinated operations for the management of CBRN incidents and interoperability between organisations.

3.1.14 CYBERSECURITY STRATEGY

National cybersecurity is a competence and responsibility of the Hellenic Ministry of Digital Governance and specifically of the General Directorate of Cyber Security (Ministry of Digital Governance, n.d.). One of the main responsibilities of the Directorate is the preparation and implementation of the National Cybersecurity

Strategy to further strengthen the level of security of telecommunications and IT systems. Moreover, the Directorate boosts cooperation with the European Organisation for Network and Information Security, for a well-coordinated and uniform implementation and integration of EU policies into national ones. Furthermore, it promotes training for critical infrastructure operators.

As mentioned, the Directorate has developed the National Cybersecurity Strategy, which builds upon the Law No. 4577/2018 "Transposition into Greek legislation of the Directive EU 2016/1148 of the European Parliament and of the Council on measures for a high common level of security of network and information systems throughout the Union and other provisions" (Ministry of Digital Governance, 2020). However, the 2022/2555/EU Directive has been put into force since December 2022 and is expected to be transposed into national legislation by the end of October 2024.

The current strategy has a five-year timeframe (2020-2025) and takes into consideration various factors e.g., the development of cutting-edge systems, such as AI and 5G networks, and the consequences of the COVID-19 pandemic. The increasing dependency of society on digitised services is another crucial factor, as cyber-attacks are now more impactful. The development of the National Cybersecurity Strategy was the critical step for a fully upgraded and compliant to international agreements and frameworks approach.

3.2 EMERGENCY MANAGEMENT PLANS OF THE HELLENIC POLICE

Apart from the general plans for the management of the impact and consequences of disasters and crises that the G.S.C.P. has issued, the Hellenic Police has also developed its own strategies for the management of emergencies. Most of these plans are classified and therefore are only briefly summarized for the purposes of Task 2.1 of the Pantheon project.

3.2.1 INCIDENT AND CRISIS MANAGEMENT SYSTEM, "POLYDEFKIS"

The "Polydefkis" incident and crisis management system is a general plan of the Hellenic Police, the scope of which is to ensure and maintain a consistent security environment through the prevention as well as the effective management of incidents. The principles and directions of the plan are the identification, analysis and assessment of threats and risks, the planning and implementation of proper preventive actions, the planning of operations of police forces for an effective crisis management and the rational management of available resources.

3.2.2 OPERATIONAL PLAN "NIKIAS" FOR THE MANAGEMENT OF CRISES AND HOSTAGES

"Nikias" is a Plan under the responsibility and competence of the Hellenic Police, the purpose of which is to develop an effective system for the response and management, by the Hellenic Police Negotiator Team, of incidents that require negotiations. It is also applicable, inter alia, for the management of crimes against public order e.g., terrorists' raids.

3.2.3 PLAN FOR THE MANAGEMENT OF CBRN THREATS, "THISEAS"

The scope of the "Thiseas" Plan is to determine the role of the Hellenic Police in terms of the main operational responsibility i.e., anti-terrorist prevention and response, as well as the supporting role in case of incidents e.g., hoaxes and technological accidents among others. Moreover, the Plan outlines operational processes of the police for the management of the consequences in the event of CBRN threats from terrorist and other criminal acts.

3.2.4 OPERATIONAL PLAN "ATHENA" FOR THE SECURITY AND POLICING OF ARCHAEOLOGICAL SITES AND DESTINATIONS OF TOURIST INTEREST IN THE WIDER AREA OF THE ACROPOLIS

"Athena" is a plan under the responsibility of the Hellenic Police, which aims to codify a system for taking measures and implementing actions regarding the effective management of potential risks and existing criminality in the wider area of the Acropolis Holy Rock.

3.2.5 PREVENTION AND PREPAREDNESS PLAN "ARIADNI" REGARDING CRIMINAL ACTIVITIES AGAINST THE ATTICO METRO INFRASTRUCTURES

"Ariadni" is the plan of the Hellenic Police, with the implementation of which, prevention of and response to illicit activities against individuals and installations within the network of Attiko Metro, either subterranean or overground, are undertaken.

4. 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 Regional Units and 66 Municipalities. The Regional Units of the Attica Region are the following:

- Central Sector of Athens
- Southern Sector of Athens
- Northern Sector of Athens
- Western Sector of Athens
- Piraeus
- Attica islands
- Western Attica
- Eastern Attica

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.

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 (Hellenic Government, 2020). These action plans are forwarded for approval by the G.S.C.P. and are communicated to stakeholders in order to harmonise their operational plans. 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.

4.1 SPECIFIC ACTION PLAN OF THE ATTICA REGION FOR THE MANAGEMENT OF FOREST FIRES

Under the framework of the "Xenokratis" Ministerial Decision, the 4th version of the "Iolaos" general plan was conveyed to the Region of Attica and its competent civil protection directorate in 2019. The Independent Directorate of Civil Protection composed the specific action plan for the management of disasters due to forest fires.

The Region of Attica is significantly susceptible to forest fires. Forest fires may have a natural cause, in Attica however, most wildfires are caused due to human activities. The "Xenokratis" Decision sets as a primary goal the mapping and identification of vulnerable areas, thus the Independent Directorate, which is responsible for the development of this specific action plan needs to consider the fact that the whole Attica Region is among the most susceptible areas to wildfires according to its vegetation and climatic characteristics, the action plans of the regional fire brigade for the response to wildfires and the map for the forecasting of forest fires, which is issued daily by the GSCP during the fire season.

The specific action plan encompasses measures aiming to secure forests against wildfires, to ensure collaboration between agencies and first responders for the coordinated management of fires and the planning for reforestation and flood prevention actions (Independent Directorate for Civil Protection of the Attica Region, 2020).

4.2 SPECIFIC ACTION PLAN OF THE ATTICA REGION FOR THE MANAGEMENT OF EARTHQUAKES

Earthquakes can have devastating impacts on lives, livelihoods, critical infrastructures and the environment. In the past Attica was mostly affected by earthquakes, the epicentres of which were relatively far. This situation resulted in limited damage in the metropolitan area of Athens. This changed with the catastrophic event of 1999. According to the Global Earthquake Model, Attica is among the most vulnerable areas in the world regarding earthquake damage. Moreover, according to the national anti-seismic regulation of the EPPO (Earthquake Planning and Protection Organization, 2000), Attica, especially the central and northern parts, present increased seismicity. The Eastern Corinthian Gulf, Atalanti and Oropos, are areas in the proximity of Attica, which are tectonically active and can potentially lead to the occurrence of earthquakes affecting the metropolitan area of Athens.

The compilation of a specific action plan was deemed necessary after the 1999 seismic event for several reasons, that are mainly related to the uncontrollable urbanisation of Athens. Aiming to concentrate and provide residence for a very large number of citizens, a series of arbitrary interventions took place, which led to the construction of inappropriate buildings. In addition, residences can be found next to dangerous installation e.g., gas stations, which can lead to cascading events, such as the occurrence of structure fires. Furthermore, due to the urbanisation of the area there is a very limited number of open spaces for the evacuation and the sheltering of people. All the above may lead to disasters with a very large number of victims; management of such situations requires, apart from the anti-seismic regulation of the EPPO, a concrete civil protection plan, specifically designed for the needs of the Region.

In 2020, the Independent Directorate of Civil Protection of Attica developed the specific action plan for the management of earthquakes and their consequences, following the provisions of “Xenokratis” and of the “Egkelados 2” general plan of the GSCP. The scope of the plan is the efficient organisation of the operational personnel and the deployment of means and resources for the timely and effective management of earthquakes and their impacts. Through the plan the roles and responsibilities of the region and its units are defined, preparatory measures and actions are planned and coordinated response tactics are suggested (Independent Directorate for Civil Protection of the Attica Region, 2020). Moreover, according to “Xenokratis” the Region is obliged to map vulnerable areas in order to prioritise response operations.

4.3 SPECIFIC ACTION PLAN OF THE ATTICA REGION FOR THE MANAGEMENT OF FLOODS

The specific action plan of the Region of Attica for the management of floods has been put into force in 2020, following the provisions of the 2007/60/EC Directive (The European Parliament an the Council of Europe, 2007) and of the “Xenokratis” Ministerial Decision (Hellenic Government, 2020). According to the Directive the responsible authority for the assessment and management of flood risk is the Special Water Secretariat. The Special Water Secretariat has segmented Greece in 14 water divisions, each of which has to implement actions and measures provided by the Directive. These measures include preliminary assessment of the flood hazard in the various river basins, the identification of areas prone to flooding and the design of flood hazard and flood risk maps. In the former, consequences of floods depending on the number of affected residences, the economic activities taking place in the affected area, the number of establishments and installations that could lead to environmental pollution and the protected areas, whereas, in the latter, floods with possibility of reoccurrence every 1,000, 100 and 50 years are considered. Flood hazard and flood risk maps have been

finalized for all 14 water divisions. Additionally, the plans for the management of floods have been finalized since 2018 and concern the mitigation of exposure to floods, the reduction of the possibility of a flood event, the enhancement of resilience and the improvement of relief and recovery mechanisms.

Attica is a Region vulnerable to floods. The area presents characteristics from three different water divisions i.e., the water division of Attica, which covers most of the Region, the water division of eastern Peloponnese and the water division of eastern Central Greece. Apart from the hydrological and geomorphological characteristics of Attica, the main aspect that renders the Region vulnerable to floods is the ever-increasing urbanisation of the metropolitan area of Athens, which continues to expand, burying rivers, reducing soil coverage and retention, thus increasing the velocity and impetuousness of flood waters. Therefore, a plan for the management of floods has been developed including, among others, the development of flood early warning system, the update of emergency plans, citizen awareness campaigns and the enhancement of stakeholders' capacity in order to properly respond to flood emergencies (Independent Directorate for Civil Protection of the Attica Region, 2020) .

4.4 SPECIFIC ACTION PLAN OF THE ATTICA REGION FOR THE MANAGEMENT OF FROST AND SNOWFALLS

The action plan of the Region of Attica for the management of the impact of snowfalls and frost was composed in 2021 following the issue of the national plan of the G.S.C.P. "Voreas". Due to administrative changes which led to a revision of the "Voreas" plan, the second version of the regional plan was updated and put into force in early 2023 (Independent Directorate for Civil Protection of the Attica Region , 2023). The scope is, similarly to all national and regional plans, the coordinated stakeholders' response, the delineation of roles and responsibilities and the organisation of preparatory civil protection measures and actions.

According to the "Xenokratis" Ministerial Decision, snowfalls and prolonged periods of frost can have serious consequences on the citizens' well-being, on the primary sector of production and on infrastructures. The main problems caused by these phenomena concern the blocking of roads, which could lead to cascading emergencies e.g., inaccessibility of people residing in secluded areas or inability to restore damages to critical infrastructures such as the power network.

The highly urban character of the metropolitan area of Athens, as well as expansion trends observed in the suburbs and peri-urban areas of the Attica Region are highly considered in all regional civil protection plans. The Special Action Plan for the management of frost and snowfalls identifies, as vulnerable areas, those that have faced serious problems in the past due to the occurrence of winter storms. In the Attica Region, these vulnerable areas are in proximity of mountainous areas. As vulnerable are mainly characterised suburbs of the northern sector of Athens and settlements of higher altitudes in the Eastern and Western Attica Regional Units.

4.5 PLAN FOR THE ADAPTATION OF THE ATTICA REGION TO CLIMATE CHANGE

The plan for the adaptation of the Region of Attica to climate change was assigned, after public competition, to the ADENS A.E. research corporation in 2019 (Advanced Environmental Studies "ADENS A.E.", 2020). The aim was the development of a plan, that takes into consideration the national strategy for the adaptation of Greece to climate change and the specialisation of the adaptation strategies according to the needs of each Region (Law 4414/2016).

The plan assesses and evaluates the potential impact that climate change will have on the Region as well as climatic hazards, which will occur during the 21st century. More specifically the objectives of the plan are climatic risk assessment, interaction principles between the climate and socioeconomic factors, evaluation of the potential consequences from climate change and prioritization of actions for their mitigation. An analysis of the vulnerability of the region and quantification of imminent climatic risk will lead to the planning and implementation of proper measures and actions.

5. DISASTER RISK REDUCTION STRATEGIES IN FRANCE

Two thirds of the 36,000 French municipalities are exposed to at least one natural hazard. More specifically, according to the EC, in the last 20 years, wildfires, followed by floods, are the most frequently occurring natural disasters. Moreover, avalanches and severe storms are not uncommon in the country. On the other hand, in France there are over 500,000 industrial installations and establishments, the damage of which could result in disastrous events. These installations vary from dams to nuclear plants. In the same period, from 2001 till 2022, 1,964 natural disasters occurred, causing 30,824 deaths, and leading to a financial cost of 49 billion €. It is also worth mentioning that one out of four French people and one out of three jobs are now potentially exposed to flooding, which, as mentioned above is a major national hazard in terms of the number of concerned municipalities and the financial cost of flood induced disasters (Republique Francaise, 2014).

The concept of natural risk covers the impact that specific natural phenomena and hazards pose to populations, structures, and equipment. No matter if they are more or less violent, these natural events are always likely to be impactful at a human, economic or environmental level.

The prevention of natural risks relies on the adaption to these phenomena with the aim to reduce, as far as possible, their foreseeable consequences and potential damage. It complements the civil protection policy (which makes it possible to manage the crisis when it occurs) and the damage compensation policy. However, France is prone to man-made disasters as it is home to a very large number of Seveso sites, with many of them being upper tier, whereas the country has seen a significant number of terrorist attacks. Specific plans are dedicated to the management of man-made disasters and technological accidents.

5.1 THE STRUCTURE OF CIVIL PROTECTION IN FRANCE

In France, various Ministries are engaged in disaster management. The Ministry of Environment is competent for risk reduction, prevention and management, 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. Beyond these four key ministries, the Ministries of Agriculture, Health, Foreign Affairs and Education contribute to their fields of competence to Disaster Risk Reduction.

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

On the other hand, the French Ministry of Interior includes, among other agencies and administrations, the General Directorate of Civil Security and Crisis Management. The mission of the Directorate is to protect lives, properties and the environment, to inform and alert the population of imminent threats and the overall promotion of civil protection. It includes land and aerial resources, ready to be deployed when the need arises. Moreover, it relies on 250,000 firefighters, 78% of whom are volunteers and 22% are civil or military professionals, who are the main stakeholders for the management of the various crises and disasters affecting the country (Ministere de l'Interieur et des Outre-Mer, n.d.).

The main purpose of the Directorate is the monitoring and preparation for potential hazards, that are expected to affect the country. Moreover, through its operational centre, it coordinates an inter-Ministerial planning by implementing an inter-Ministerial crisis cell. There are 12 security zones, following the administrative division of the country, the prefect of which is responsible for the coordination of operational processes and for the mobilisation of personnel and resources (EC DG ECHO, n.d.). Inter-Ministerial headquarters and an operational centre are in place for disasters, which exceed operational capabilities of one security zone. Apart from the response to disasters, the Directorate of Civil Security raises campaigns for the increase of social awareness, in the fields of natural and man-made hazards and disasters, while also develops programmes and material with the aim to further educate, train and increase the competence and capacity of stakeholders.

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 (SDGN Secretariat general de la defense et de la securite nationale, n.d.). On the other hand, at the regional level, the organisation and planning for defence and civil protection is carried out by the prefects. As a representative of the State, the organisation directs the implementation of actions locally, on state policies, receives and supervises requests for authorization and chairs the departmental commission for major natural hazards. Risk management is the responsibility of the mayor and the prefect of the department, but also the local authorities play an increased role in disaster management, particularly through their competence for the management of aquatic environments and flood prevention (Gestion des milieux aquatiques et prevention des inondations, GEMAPI) (Ministere de la Transition ecologique et de la Cohesion des territoires, n.d.).

The French High Committee for National Resilience (Haut Comite Francais pour la Resilience Nationale, HCFRN) is another crucial actor in the safety and security domain in France. HCFRN was established under the Law 1901 and its main role is to prepare the public and private sectors for incidents, which can disrupt normal operations and functionalities (HAUT COMITÉ FRANÇAIS POUR LA RÉSILIENCE NATIONALE, n.d.). Within the Committee are engaged, among others, critical infrastructure operators, first responders and public authorities with the aim to exchange ideas, experience and expertise in order to increase overall resilience. Practically, it coordinates the network of crisis prevention professionals and provides the appropriate place for the exchange of knowledge and information. Moreover, the Committee participates in national and European projects and has created a large network of contacts engaging in the emergency management domain.

5.2 PLANS FOR THE PREVENTION OF NATURAL AND TECHNOLOGICAL HAZARDS

In France, 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)
- DICRIM (Document d'Information Communal sur les Risques Majeurs), which is an information document on major risks affecting France.

5.2.1 NATURAL RISK PREVENTION PLAN (PPRN)

The Natural Risk Prevention Plan (PPRN) is developed under the authority of the prefect by associating local authorities in a consultation process. It aims to control vulnerability by issuing vulnerability reduction

measures rather than preventing the hazard and subsequent damage from occurring. The purpose of the PPRN is to delineate areas at direct or indirect risk and to regulate land use in those areas. This regulation ranges from the prohibition of building to the possibility of building under certain regulations. The PPRN should also enable prevention decisions, which are mostly adapted to the future and current occupation of exposed spaces, so as not to increase the vulnerability of assets and activities.

The development of a PPRN has six main steps:

1. A request for the development of the plan
2. The actual development, that includes:
    a. Determination of the hazards
    b. Determination of objects (assets, infrastructures, open spaces etc.) at stake
    c. Definition of regulatory zoning by overlapping
    d. Development of regulations
3. Public consultation
4. Possible modifications
5. Request for approval
6. Annexation of the PPRN in present and future urban planning documents.

Table 6 presents the most significant hazards, which can potentially affect France and the associated regions of Guadeloupe, Martinique, French Guiana, Mayotte and Reunion, as well as, the principles, identified by the Natural Risk Prevention Plan, for the efficient management of disasters occurring as a result of these hazards.

Table 6: Most significant hazards and the principles to manage disasters.

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	

Figure 9: Hazards affecting France and overseas countries, Source: Le Moniteur

Finally, the PPRN document consists of:

- A note explaining the reasons for the request of the PPRN, the known and anticipated natural phenomena and hazards, the prerequisites, and the reasons behind the consideration of specific assets as stakes and the regulatory measures,
- Maps indicating the geology, geomorphology and hydrology of the area and information on natural phenomena and hazards, in combination with the vulnerability of the area,
- Regulations specifying prevention, protection, and safeguarding measures.

5.2.2 THE TECHNOLOGICAL RISK PREVENTION PLAN (PPRT)

The Technological Risk Prevention Plan (PPRT) was developed in the context of Law no. 2033-699 and provides plans for land-use taking into consideration the technological risk. The plan applies to upper tier facilities as defined by the European Seveso Directive. According to the Head of Energy and Chemical Industries Office of the General Directorate for Risk Prevention, Helene Heron (Heron, 2020), at least 600 installations are considered upper tier, whereas 390 have adopted and implement a PPRT plan.

A PPRT plan is developed following three basic steps:

1. The technical study, in which the hazards and the stakes are assessed. There are seven levels of hazards according to the severity and the probability of occurrence. Regarding the stakes, these include local residents and private properties, critical infrastructures and public spaces in the proximity of an upper tier industrial site.

2. The development of the plan, with consultation with first responders, infrastructure operators and security managers and with the local residents. For the development of the plan the intersections between the map of hazards and stakes, conducted in the technical study are greatly considered. The following figures present the first and second step for the structure of the plan, as described in the sub-regional workshop on land use planning and industrial safety for south-Eastern Europe, held in October 2020.

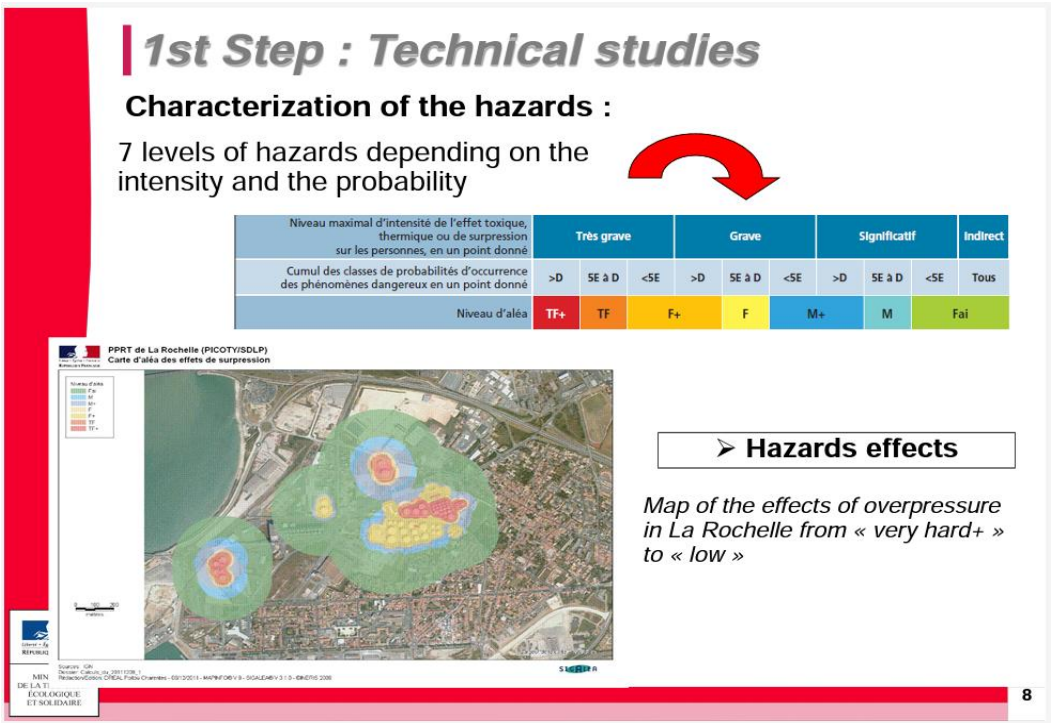

Figure 10: Mapping of hazards, Source: Sub-regional workshop on Land-Use Planning and Industrial Safety for South-Eastern Europe

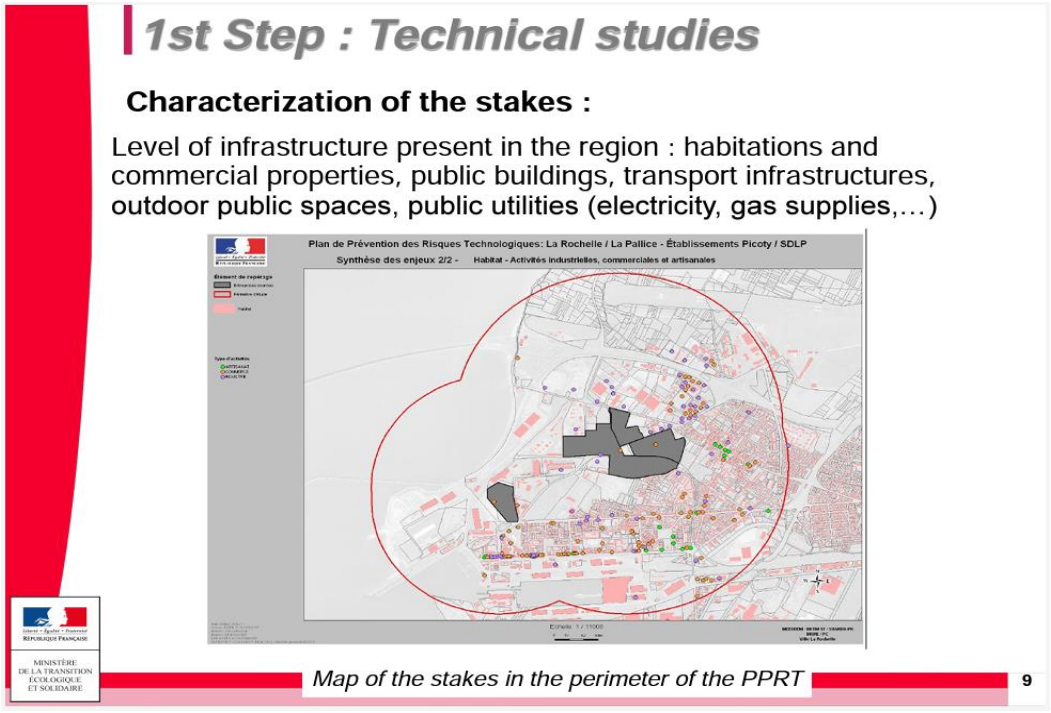

Figure 11: Mapping of stakes, Source: Sub-regional workshop on Land-Use Planning and Industrial Safety for south-Eastern Europe

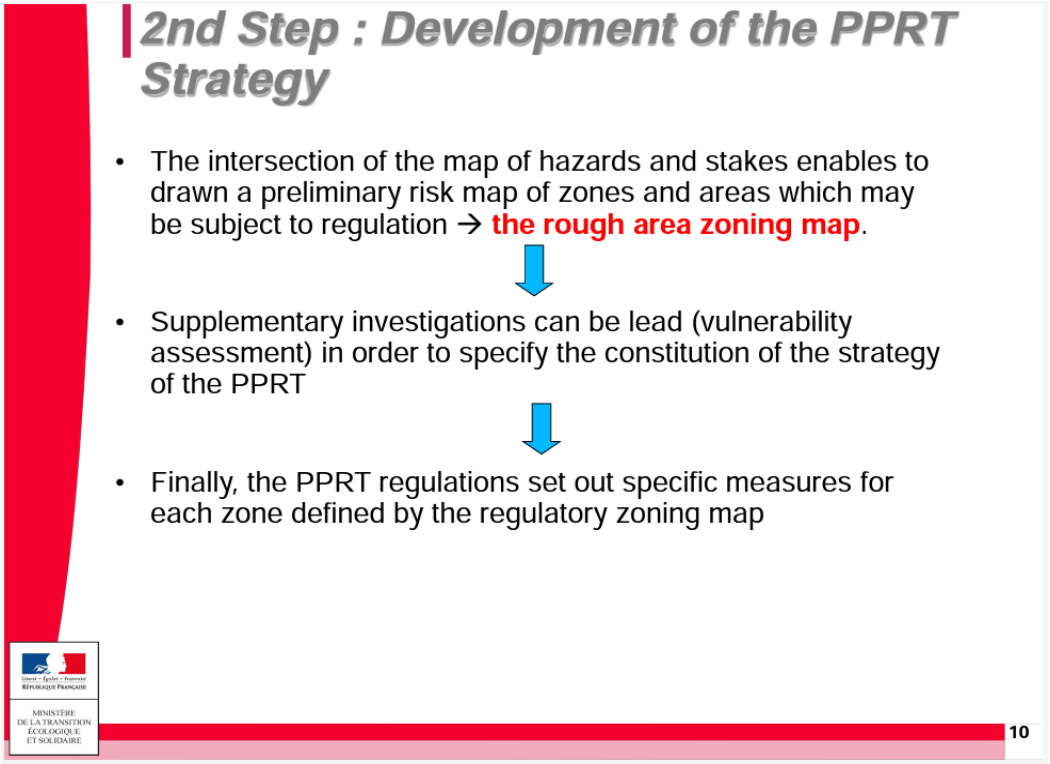

Figure 12: Analysis of the methodology for the development of the PPRT, Source: Sub-regional workshop on Land-Use Planning and Industrial Safety for south-Eastern Europe

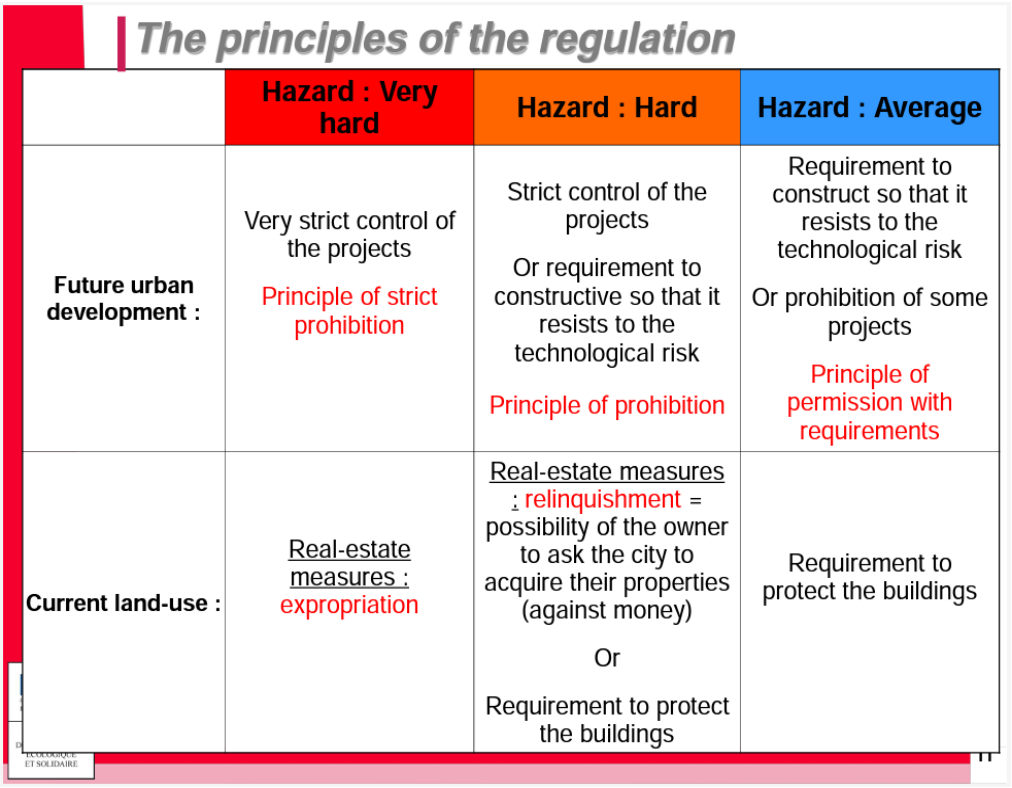

Figure 13: Results from the assessment of hazards and stakes, Source: Sub-regional workshop on Land-Use Planning and Industrial Safety for south-Eastern Europe

3. The finalisation and approval of the plan. Prior to the approval of the plan a public inquiry is necessary. The PPRT of a specific territory and its rules and regulations have to be taken into account in all future urban plans.

5.2.3 FOREST FIRE PREVENTION PLAN (PPRIF)

In July 2015, the plan for forest fires prevention and land use was put into force, through the Articles L.562-1 to L.562-9 and R.562-1 to R.562-12 of the Environmental Code (Republique Francaise, 2015). The Plan primarily targets territories exposed to significant levels of risk and strong land pressure. There are currently nearly 200 PPRIFs. They meet the objectives of decreasing exposure and vulnerability of people and property by:

- Delimiting risk exposure zones, within which construction or development is prohibited, while allowing reasoned and secure development in other areas, where the intensity of the hazard allows it,
- Defining prevention, protection, and safeguarding measures as well as measures relating to the development, use or operation of structures, works or cultivated or planted areas existing on the date of approval of the plan.

The purpose of the Plan is to ensure forest fire prevention and specify the requirements to achieve it, thus responding to the expectations of the decentralised services confronted in recent years with the forest fire hazard and difficulties. The plan lays out strategies, that aim to enhance and increase vigilance, especially during summer months, considering, inter alia, the pressure certain exposed areas sustain by urbanisation,

the development of wastelands in certain agricultural sectors and the expected effects of climate change on forests. Specific events, such as the 2003 catastrophic wildfires, and prolonged periods of drought and increased temperatures, which result from climate change, have highlighted the need for a change in wildfire management. The need for novel approaches regarding the knowledge of hazards, risk culture, crisis management, land use planning and citizen vulnerability reduction was apparent. To this end, the forest fire risk prevention plan (PPRIF) is the basic prevention mechanism, since it allows control over the urbanisation of areas exposed to risk and provides prevention, vulnerability reduction and safeguard measures. However, the PPRIF is fully effective when the risk of wildfire is considered in the development and in different modes of territorial management. For that reason, other tools are also used i.e., local urban plans, communal maps, territorial coherence schemes, the article R111-2 of the urban planning code and the policies conducted by other ministries The State services remain mobilized on prevention through these tools. The following figure presents the vulnerability of French Regions to the risk of wildfires considering the number of incidents occurring between 2007 and 2018.

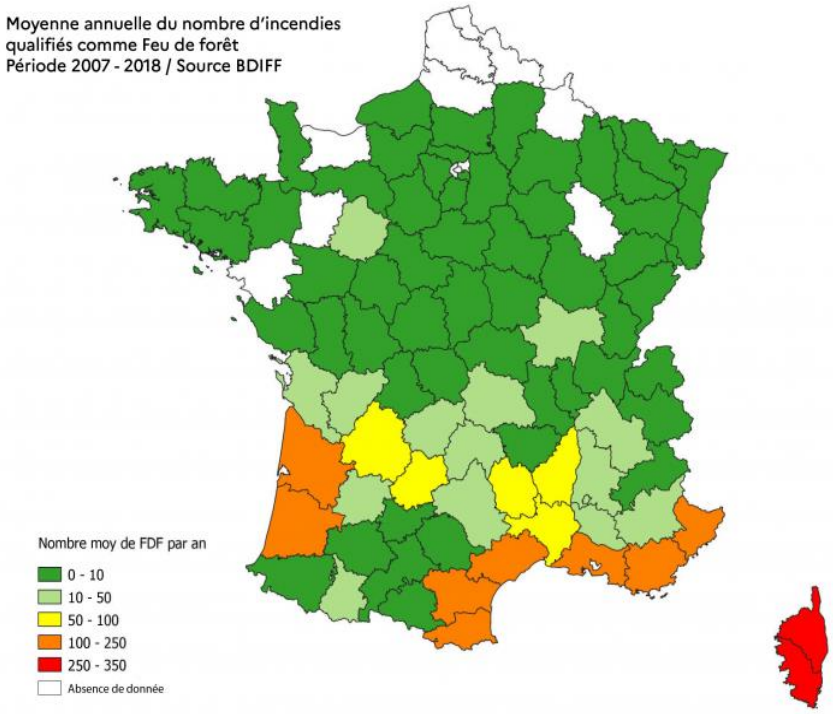

Figure 14: Forest fire vulnerability map according to the number of wildfires per Region, Source: Ministry of Ecological Transition and Territorial Cohesion

There are various tools enabling and increasing the efficient implementation of the Plan:

1. The Forest Fire Database (BDIFF), hosted by the National Institute of Geographic and Forest Information (IGN) (Base de Donnees sur les Incendies de Forets en France, n.d.). Since 1992, all information at national level on forest fires and, in particular, ignition causes, are collected.
2. The Promethee Database, specific to forest fires in the French Mediterranean area.
3. Citizen Information: The Act of 22 July 1987 established the right of citizens to information on the major risks, to which they are subject, in all or part of the territory, as well as on the safeguard measures affecting them. This part of the law has been included in Article L 125.2 of the Environmental Code. It applies to the prevention of forest fire risk.

Prevention in the territories:

- **The defence of the forest against fire** (DFCI, led by the Ministry of Agriculture), which is based on a global policy for the development and maintenance of rural and forest areas. It makes use of tools for programming, management, and maintenance of massifs, resulting from the forest code, in particular the forest protection plans against fire (Plan de Prevention des Forets Contre l'Incendie, PPFCI) often established at the departmental level and the massif plans, which are the declination by massif of the PPFCI.
- **Prevention**, particularly through the control of urbanisation. Land use control is a major component of forest fire risk prevention policies. Urban planning documents such as territorial coherence schemes (ScoT) and local urban plans (PLU) are considered.
- **The awareness-to-knowledge**, within the Article L121-2 of the urban planning code, is an obligation located upstream in the planning process. Through it, the State services recall the legislative and regulatory provisions and easements in force.

5.2.4 FLOOD PREVENTION PLAN

Flood risk management is part of the European Directive 2007/60/EC (The European Parliament an the Council of Europe, 2007). The Directive was transposed into the French Law in 2010 and 2011. It is codified in Articles L.566-1 to L.566-12 and R.566-1 to R.566-18 of the Environmental Code.

The National Flood Risk Management Strategy (Strategie Nationale de Gestion des Risques d'Inondation, SNGRI)

The National Flood Risk Management Strategy was conceived and developed since the European flood Directive was put into force and integrated within the French legislation with the Law of July 2010 related to environmental protection. In addition, due to climate change, floods occur more frequently and have greater impact on societies and economies. Over the last 30 years, flood costs in France exceed the number of 800 million Euros annually. Concurrently, the vulnerability of the population and of infrastructures is increasing (Republique Francaise, 2014).

The new flood risk management policy provides the mobilisation of personnel, the deployment of resources, and financial aid. Moreover, it enables the engagement of local actors in the management of floods. The State encourages the optimisation of existing approaches e.g., the flood prevention programmes (Programmes d' Actions de Prevention des Inondations, PAPI) which implement the provisions of the European Directive. The basic objectives of the strategy are three (3):

- To increase the safety of exposed populations,
- To stabilise, in the short term, and reduce, in the medium to long term, the economic damage related to floods and
- To reduce recovery times for a timely rehabilitation of the affected societies and to build back better.

The following figure presents areas prone to flooding, also including overseas regions.

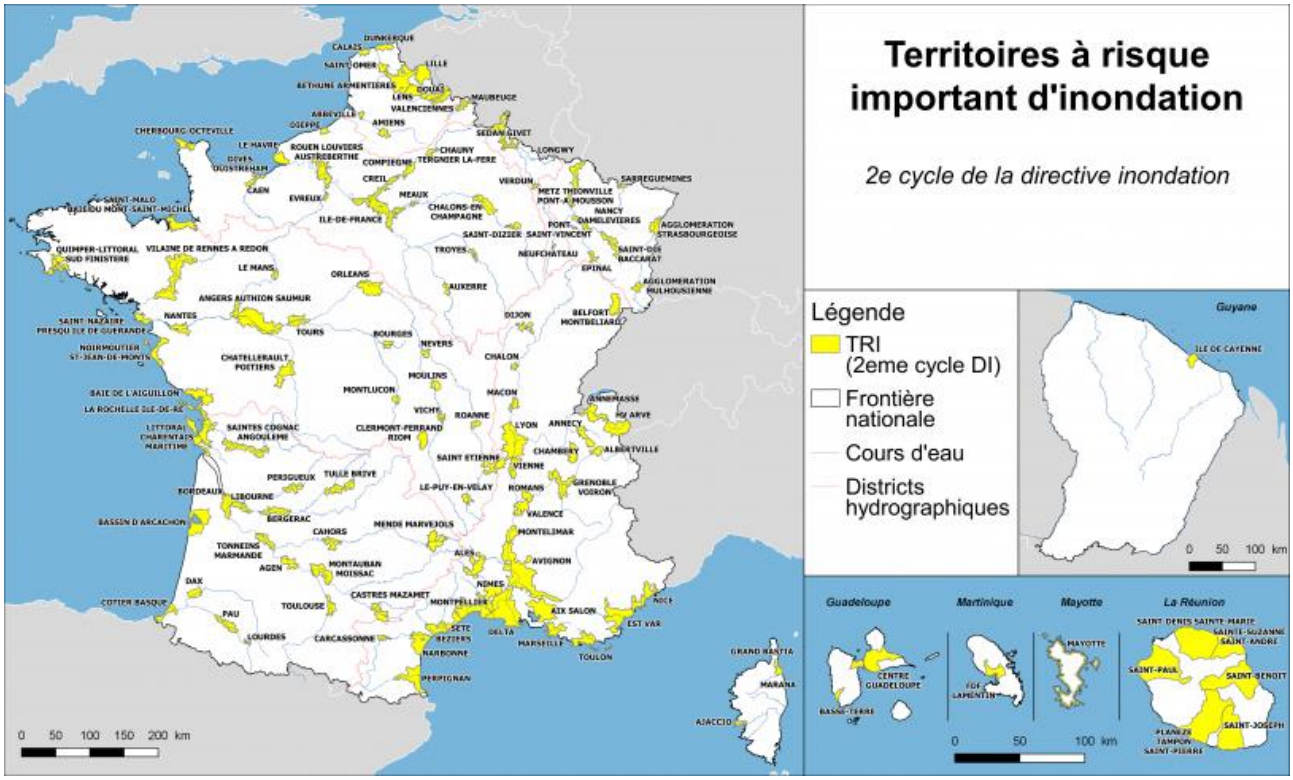

Figure 15: Flood-prone areas in France, Source: Ministère de la Transition ecologique et de la Cohesion des territoires

The PPRI: prevention and urbanisation

The control of urbanisation is an important lever for flood prevention at the initial stage. Among others, natural risk prevention plans (PPRN) have the value of public utility easement and are annexed to urban plans (PLU). They are ordered and drawn up by the State in association with the municipalities and in consultation with the population.

The main objectives of a PPRN, commonly referred to as a PPRI for floods, are:

- the control of development in flood zones, on the basis of a reference flood, in order not to increase the population and exposed properties, to reduce vulnerability for the existing, not to aggravate the risks or to cause new ones.
- preservation of flood expansion fields and non-urbanized areas
- the PPRI maps areas exposed to risks and regulate them according to hazard and land coverage.

Flood Prevention Action Programmes (PAPI)

The Flood Prevention Action Programs (PAPI) is a contract between the State and local authorities. Its purpose is to promote a global and balanced management of flood risk, thought at the scale of a risk "basin". The objective of the PAPI is to develop a risk prevention approach according to the seven pillars of prevention i.e., knowledge, surveillance, preventive information, urbanisation control, preparation for crisis management, crisis management, feedback, and in consultation between the various actors of the territory and the population (Ministère de l'environnement, de l'énergie et de la mer, 2017).

The Vigicrues Network

Vigicrues is the reference information service that enables and facilitates the exchange of information regarding the condition of the main watercourses, that are monitored by the State in France, and provides

warnings to the population in case of high flood risk. It is managed by the Vigicrues network, comprising of service agents of the Ministry of Ecological Transition, the Schapi (Central Service of Hydrometeorology and Support to Flood Forecasting), at the national level, and the Flood Forecasting Services in the region (VIGICRUES, n.d.).

5.2.5 PLANS AT THE INTER-REGIONAL, REGIONAL AND LOCAL LEVEL

At the sub-national level there are three basic plans in France, which mainly address the pre-catastrophic phases of disaster management: the communal safeguarding plan (PCS), the intercommunal safeguarding plan (PICS) and the municipal information document on major disasters (DICRIM). A brief description of the plans and the roles of the Prefect and the Mayor is provided herein.

Prefect of the Department

As a representative of the State, the prefect directs the local implementation of state policies. The prefect monitors the inter-ministerial Defence and Civil Protection service (Service Interministeriel de Protection Civile, SIDPC) and directorates at local level. The Prefect chairs the departmental commission for major natural hazards.

Risk management is the responsibility of the mayor and the prefect of the department, but the local authorities also play an increased role, particularly through the new competence for the management of aquatic environments and flood prevention (GEMAPI). The General Council of the Department defines the policies, financial investment and the operation of the various specialised departmental services.

Mayor of the Community

As responsible for the maintenance of safety in the municipality, the mayor must ensure that adequate information regarding hazards and risks is provided and organises crisis relief actions through the following tools:

- Municipal information file on major risks (DICRIM)
- Communal safeguarding plan (PCS)
- Risk prevention plan (PPR)
- Local urban plan (PLU)

Communal Safeguarding Plan (PCS)

The municipal safeguarding plan (Plan Communal de Sauvegarde, PCS) is a tool produced at the municipal level, under the responsibility of the mayor, to plan the actions of the municipal risk management actors (elected officials, municipal agents, volunteers) in the occurrence of major natural, technological or health emergencies. Its objective is to provide information for the protection of the population (Direction de la Défense et de la Sécurité Civiles, 2004).

It is mandatory for each municipality, that:

- has an approved plan for the prevention of foreseeable natural or mining risks,
- is characterised as a territory with significant flood risk, as provided by the Article L. 566-5 of the Environmental Code,
- is officially recognised, as prone to volcanic risk,
- is located in the territories governed by Article 73 of the Constitution or the territories of Saint-Martin and Saint-Barthélemy and exposed to cyclonic risk,
- lies within a high-seismicity zone,

- includes forests classified under Article L. 132-1 of the Forest Code or deemed particularly exposed.

The development of a PCS is strongly recommended also for all other municipalities.

The Intercommunal Safeguarding Plan (PICS)

The inter-communal safeguarding plan (Plan Intercommunal de Sauvegarde, PICS) is a document that acts as a link between local risk prevention policies and crisis management policies. It contributes to solidarity between member municipalities of the same community in the face of risks, by promoting expertise, support and coordination for the benefit of these municipalities in terms of planning or during crises. It is mandatory for public institutions for inter-municipal cooperation with their own taxation as long as at least one of the member municipalities is subject to the obligation to draw up a municipal safeguarding plan (Legifrance, n.d.).

The PICS includes:

- a list of the analysis of the risks identified and the identification of the issues at stake in each member municipality,
- the provision of inter-municipal resources
- the pooling of municipal resources
- the continuity of intermunicipal competences e.g., drinking water, roads, transport

Document d'Information Communal sur les Risques Majeurs (DICRIM)

DICRIM is a document, foreseen in the Article R. 125-11 of the Environmental Code, developed by the mayor, which encompasses safety measures and actions that need to be taken for the management of major natural and technological risks within the area of a Municipality (French Government). In addition, the document lays out the administrative responsibilities and competencies of the mayors. Moreover, it contains data and information, at the local, departmental and national level, for the increase of the citizens' level of awareness regarding major hazards. Specifically, there are four (4) main types of information:

- Documentation and description of the characteristics and mechanisms of natural and technological hazards affecting the Municipality, as well as, the consequences these hazards might have to citizens, assets, the environment,
- Measures and actions for the mitigation of and protection against disasters with specific examples,
- Individual protection measures
- A display plan for the aforementioned instructions.

The scope of DICRIM is to make citizens responsible for their own safety, thus enhancing and reinforcing the efficiency of the measures implemented by the Authorities. The document starts with a statement from the mayor, who briefly describes the hazards affecting the area. It also includes maps and visual material from previous disasters, with the aim of reminding citizens of past situations. Finally, best practices and lessons learnt are also part of the DICRIM of each Municipality. The DICRIM is inserted into the PCS.

5.2.6 OTHER DRR STRATEGIES IN FRANCE

Although, as already mentioned, the basic natural hazards affecting the country are floods and wildfires, the State has developed strategies and plans for the mitigation of other risks as well, mainly the seismic risk and the risk of tsunamis, which are briefly described herein.

Strategy for the risk of earthquakes

While the occurrence of severe earthquakes is relatively rare in the French territory, the extent of their potential socio-economic consequences, which can be aggravated by natural or technological cascading effects, call for the implementation of prevention measures, adapted to the different territories, in order to reduce the impact of such events (GEORISQUES, n.d.).

The French policy to reduce seismic risk is mainly based on the following axes:

- Inform populations living in earthquake prone areas
- Define and enforce building and planning rules, according to Eurocode 8 (European Committee for Standardization "CEN", 2004), to reduce vulnerability and exposure to risk
- Improve knowledge of hazard, vulnerability, and seismic risk
- Prepare the crisis management strategy

Published in October 2013, the Framework of Actions for the Prevention of Seismic Risk aims to guide and coordinate seismic risk prevention policies on the national territory (low to medium seismicity zones). Initially developed for a period of 5 years (2014-2018), its implementation is ongoing. This national framework is broken down into territorialised action programmes at the regional level, in a manner adapted and proportionate to the risk levels of the different territories.

Coastal risk and tsunami prevention in France

The State is required to put in place, alongside local authorities, preventive measures, in addition to the compensation system, for property affected by natural disasters. This is done through:

1. The supervision and perspective of development, which allow risk to be considered in the development of territories: the coastal law, coastal risk prevention plans, sea development plans, master plans for water development and management, territorial coherence schemes.
2. Actions to protect the coastline, protection works generally owned by communities or individuals, and the State. It also sets out the obligations that apply to the construction, management, and maintenance of these works to ensure their safety.
3. The development of monitoring and warning systems, along with Météo France and the Hydrographic and Oceanographic Service of the Navy (Service hydrographique et océanographique de la Marine, SHOM) to have a “wave-submersion” vigilance. This modeling and forecasting system has been operational since 2011 and is subject to constant optimization.

The International Action of France against Terrorism

France is crucially affected by the threat of terrorism, since a significant number of terrorist raids and attacks has spread disaster throughout the country. The deadliest attack occurred in Paris, in 2015, in a mass shooting, which cost the lives of more than 130 people (Seibt, 2015), whereas another significant event includes the Nice attack, in 2016, with 86 victims (Nice: Eight guilty over the deadly Bastille Day lorry attack, 2022).

France has taken significant action to counterattack terrorism, with international initiatives, extended networking and coordination. These actions aim at reducing the capacities of terrorists’ groups, reducing the outreach of terrorist propaganda, economical and human resources, delimiting radicalisation both internally, within the country, and internationally, protecting and defending the interests and benefits of the country.

To achieve the above goals, France has raised the level of the threat of terrorism at the European level, while also seeking to provide solutions to foreign conflicts, through specific political actions, areas that have been recently liberated. Moreover, the government has implemented actions to enhance international cooperation, with the aim to reduce financial sources, which provide support to terrorist groups, whereas it takes determined and dedicated military action (Ministere de l'Europe et des Affaires Etrangeres).

5.3 PREPAREDNESS AND RESPONSE TO DISASTERS

For the adequate preparedness for disasters and emergencies first responders i.e., firefighters, search and rescue specialists and civil protection agencies, are required to undertake daily training and exercise capabilities and interoperability among stakeholders at the local, regional and inter-regional level. Exercises related to safety are also applied to infrastructures, the operation of which is protected by specific safety and security plans. Such establishments must annually organise and execute training and preparedness exercises.

In addition, the Directorate also organises or takes part in exercises organised at the EU level. The Union Civil Protection Mechanism Knowledge Network, through the various training programmes it provides, enables exercises and exchange of practices, knowledge, expertise and experience among first responders throughout the Union. Moreover, the Directorate provides its modules for exercises organised by the Common Emergency Communication and Information System (CECIS) such as the EU Domino 2022 full scale exercise, which was organised in 2022.

Apart from first responders' exercise, crucial, for the preparedness of the population for an imminent threat or disaster, is the role of early warnings and alerts. The Directorate is in cooperation with the French meteorological authorities for meteorological or climatological hazards, whereas for geological hazards e.g., earthquakes and tsunamis, the Directorate collaborates with the Copernicus Emergency Management Service and other competent agencies and services.

For the early warning of the population France heavily relies on a network of siren warnings. The SAIP (Population Alert and Information System) system, a programme set up by the French Ministry of Interior, is used to alert citizens for imminent threats, whereas also providing information about the risk and measures and actions needed to be implemented by the public. Overall, the SAIP system consists of a set of various tools, which assists, not only in early warning the population, but also in disseminating messages by the authorities.

Response operations for the management of a crisis are initiated by the mayor of the affected Municipality. The mayor is responsible to inform the citizens, mobilize emergency services and maintain an undisturbed flow of information for a clear picture of the situation, something crucial for both stakeholders and the general public. When a disaster affects a wider area, the departmental prefect becomes the head of the response operations, whereas when the capacities of the department are exceeded, the responsibility lies on the prefect of the defence and security zone. In the following table the disaster risk reduction plan of France is described, in terms of the public actor' competencies.

Table 7: French Public Sector DRR plan.

WHAT	WHO	HOW
Knowledge of the hazard	Ministry of the Environment Ministry of Agriculture (forestry)	Funding of scientific studies and technical and data acquisition.

Monitoring, Forecasting and warning	Ministry of the Environment Ministry of Agriculture Ministry of the Interior Ministry of Education	Specific human organization and equipment Territories in means and tools for surveillance and the forecasting of hydro-meteorological phenomena, marine-weather, hydrogeological, movements terrain, volcanism...
Information	Ministry of the Environment Ministry of the Interior Mayor	The Prefet establishes the DDRM. The mayor establishes the DICRIM. The Ministry of the Environment ensures national dissemination of information via the Internet. The Ministry of the Environment informs in real time citizens of the relative data monitoring, vigilance, and forecasting.
Education	Ministry of National Education Ministry of the Environment Ministry of National Education	Enrolment in programs. Network of coordinators with rectors National Risk Day. Training of risk management professionals, building, development, etc.
Taking risk into account in the Urban development	Ministry of the Environment Ministry of Housing Mayor	Implementation of risk management flood plans (PGRI). Establishment of prevention plans Risk (PPR). Compliance with national prevention regulations seismic risk (seismic zoning, seismic construction), monitoring compliance with the rules. Consideration of risks in documents urban planning and legality control
Mitigation	Ministry of the Environment Ministry of Housing Communities	Training of professionals (architects, engineers, craftsmen). Financing of seismic reinforcement work of vulnerable buildings in the West Indies. Funding for vulnerability reduction work floods. Realization of hydraulic works (retention basin, dynamic slowdown systems, etc.) Realization of vulnerability diagnosis and work vulnerability reduction (cofferdam installation, Relocation of assets and activities outside the risk areas
Crisis preparedness	Ministry of the Interior Mayor	The civil protection services or the mayor prepare the crisis.

Crisis management	Ministry of the Interior (Prefect) Mayor Departmental Fire Department and Rescue (SDIS)	Mobilization of resources (civil servants, services) public, communal reserve of civil security
Return on experience	Ministry of the Environment Ministry of Housing Ministry of the Interior	Disaster Analysis Missions (REX). Capitalization of all data allowing improve knowledge of risks, improve management and prevention plans, to revise the planning documents, etc.
Indemnification	Natural Disaster Commission (Ministry of the Economy, Ministry Department of Environment, Department of the Interior, Caisse centrale reinsurance)	Once the natural disaster order has been issued, the insurance companies set up a special procedure Compensation

5.3.1 THE ORSEC PLAN

The Organisation for the Response of civil Protection (Organisation de la Response de Securite Civile, ORSEC) develops the general plan for the management of major disasters, whether natural or technological e.g., large industrial accidents. The plan was developed in 1952 and is activated in incidents, the management of which overwhelms the capabilities of the local or regional authority. There are three (3) different levels in terms of geographical coverage i.e., the departmental, the zonal and the maritime level. ORSEC also identifies the competent actors for the response to crises and emergencies, which are the French emergency medical service (Service d'aide medicale urgente, SAMU), the French police, the gendarmerie, the interdepartmental fire and rescue service (Service Departmental d'Incindie et de Secours, SDIS), the communes, network operators, the Departmental Council and other companies and associations (DG ECHO, n.d.).

The ORSEC plan provides:

- General provisions applicable in all circumstances
- Specifics provisions to certain specific risks or related to the operation of specific installations (in particular special intervention plans) (Organisation de la reponse de securite civile (ORSEC), n.d.).

Since 2000, plans, regarding population displacement, electrical continuity, management of CBRN emergencies and specifically response to nuclear and radiological accidents and management of flu pandemics, have been developed.

According to the "Analysis of law in the EU pertaining to cross-border disaster relief" of the French Red Cross, in August 2004, ORSEC becomes "*the only organization responsible for managing all emergency situations, involving the entire society, under a single authority (the prefect) and which is empowered to use an operational mechanism for mobilizing many resources, according to the risks identified and subject to ongoing adaptation*" (French Red Cross, 2010).

Each public or private person listed in the ORSEC Plan:

- Is able to permanently carry out the missions assigned by the prefect of department, the prefect of defence and security zone or by the maritime prefect,
- Prepares its own event management organisation and provides a brief description to the representative of the State,
- Appoints among its members a corresponding official of the representative of the State,
- Specifies the internal provisions allowing at any time to receive or transmit an alert,
- Specifies the means and information at its disposal that may be useful in the context of the mission of general protection of populations under the responsibility of the representative of the State and the particular missions assigned to him by the latter.

When several public or private persons carry out the same mission, they may set up a common event management organisation and designate a corresponding joint official of the State representative.

The ORSEC plan includes:

1. an inventory and analysis of the risks and potential effects to the citizens' safety, properties and the environment,
2. an operational mechanism responding to this analysis, and which organises the response of the authorities to the event,
3. the procedures for preparing and training of public and private bodies for their missions in civil protection.

Figure 16: Schematic representation of the ORSEC plan, Source: Prefet de la Haute-Savoie

6 DRR INITIATIVES AND POLICIES IMPLEMENTED IN THE REGION OF ILE DE FRANCE

Île de France is one of the most densely populated regions of the country, with Paris, the Capital of France located within the region. It consists of the departments of Val-d'Oise, Seine-et-Marne, Seine-Saint-Denis,

Ville-de-Paris, Hauts-de-Seine, Val-de-Marne, Essonne and Yvelines. The region covers an area of 12,009.77 square kilometres and its population reaches the number of 12,027,565 residents. The river Seine and its tributaries i.e., the Marne, Oise and Aisne rivers drain the hydrographic network of the whole area, while pose a serious threat for floods, as the relief of the Region is gentle and altitude differences are low (The Editors of Encyclopaedia Britannica).

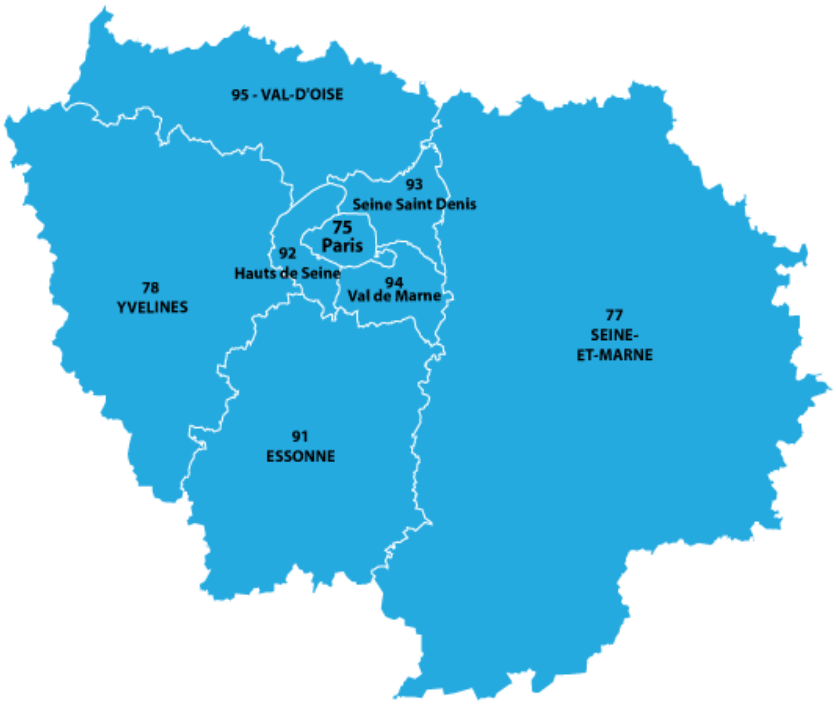

Figure 17: Ile de France Region and its Departments, Source: Really French

Disaster risk reduction takes into consideration the heavily urban character of the Region, as the number of exposed citizens and assets, infrastructures and properties is very large, as well as the fact that the centre of the economic activity of the whole country lies within and around the metropolitan area of Paris.

The region is not greatly exposed to natural hazards. Regarding geological hazards, Île de France lies far from tectonically active zones, in which most 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. According to a study conducted by the Institute for Development and Urban Planning for the Ile de France Region (Institut d'Aménagement et d'Urbanisme de la Région d'Ile de France, IAURIF) 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 (Institut d'Management et d'urbanisme de la region d'Ile-de-France, 2005). According to the Organisation for Economic Cooperation and Development (OECD) (OECD, 2018), a flood, that could be compared to the 1910 historic floods, would affect almost 5 million citizens and cause damage of 30 billion Euros.

Another major threat is related to runoff flooding. The urbanisation of the Region results in large coverage of soil by concrete, thus limiting its water retention capacity and increasing the velocity of runoff flood waters. This type of flooding appears in the event of short but very intense storms occurring usually during

summer months. Floods can also occur due to the rise of groundwater as a result of prolonged periods of rainfall, but it does not pose a serious threat.

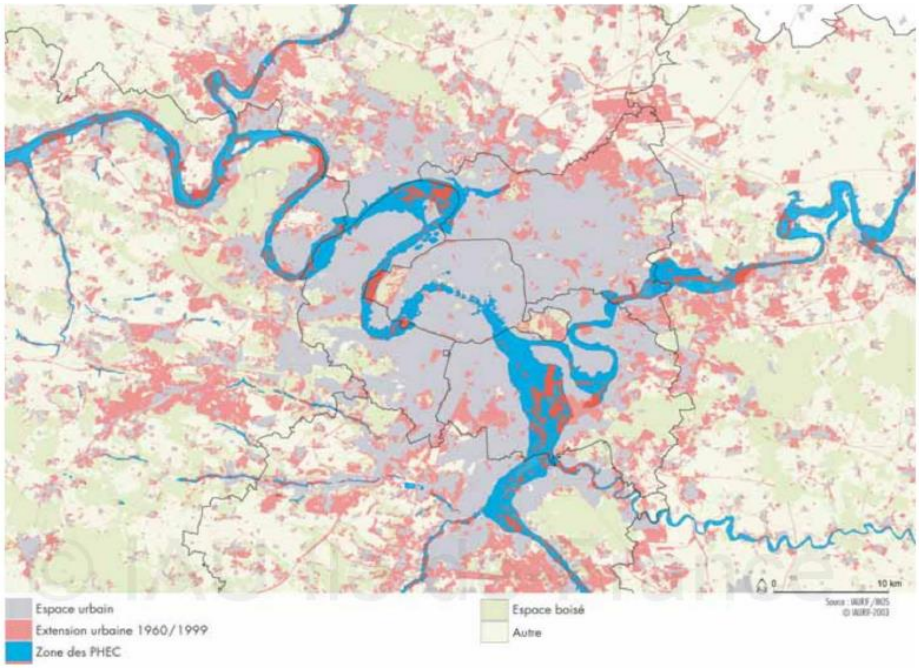

Figure 18: Map showing Paris and its expansion during 1960-1999 (grey and red colours respectively) and areas affected by a 100-year return period flood from the Seine River and its tributaries (blue colour), Source: L'Institut Paris Region

Apart from floods, the Departments of Île de France are affected by land movements, especially soil subsidence, landslides and undermining, which are the outcomes of the soft soil composition and of the topography. Swellings and/or shrinkages are observed in many municipalities and seriously damage properties and infrastructures.

Natural hazards are not the only cause of threat for the region of Ile de France. Although the region is at the stage of serious de-industrialisation it remains the leading industrial area throughout France. A large number of Seveso sites is located around the metropolitan area of Paris with some of them lying within the Capital. Additionally, in France, serious technological accidents have occurred in the past. The Institut National de l' Environment Industriel et des Risques "INERIS" has provided an inventory of industrial accidents occurring worldwide in the 20th century. A significant number has occurred in France and varies from industrial accidents, e.g., the AZF chemical factory explosion in Toulouse, to dam failures e.g., Malpasset and mine explosions (Courriere mine) (INERIS, n.d.). There are 1312 Seveso sites in France with 102 of them located within the Region of Ile de France. 35 of these sites are upper tier, whereas in the Region 1,465 installations, classified for the protection of the environment (ICPE), exist.

6.1 CIVIL PROTECTION IN PARIS

Civil protection in Paris is organised by the department for prevention and protection (Direction de la Prevention et de la Protection, DPP). One of its major roles is, among others, to inform citizens about major risks and is in communication and cooperation with officials and first responders. The municipal civil security reserve of Paris (La reserve communale de securite civile de la Ville, RCSC) also participates in informing the

population. Usually, the City of Paris ensures a permanent watch in order to anticipate and prevent any event that could affect the population and the territory of Paris. This monitoring work is based on the exchange of information between the city and its civil security partners. The vigilance of all city departments is ensured by the operational monitoring centre (La centre de veille operationelle de la Ville de Paris, CVO) with information messages sent daily to all municipal services. The CVO is located at the headquarters of the DPP and operates all day and all year long. Among its missions is to regulate and monitor all DPP activities, to centralise the on-call duties of the directorates of the city, to alert authorities for any incidents, to receive and disseminate information from various sources to the officials and to keep a close communication with the Paris defence and security zone (French Ministry of Interior, 2015).

6.1.1 LEGAL FRAMEWORK

Law No. 87-565 of July 22, 1987, concerning the organisation of civil security and the prevention of major risks, ensures the citizens' right to be well informed regarding the major risks, to which they are subjected, and relevant prevention measures. Information is a crucial prerequisite as each citizen becomes responsible for his/her own safety, by adopting responsible behavior in the face of risks.

Law No. 2004-811 of August 13, 2004, sets the framework for the design of PCS plans. These plans become mandatory for municipalities, which are subject to risk prevention plans (PPRs), whereas specific intervention plans (plan particulier d'intervention, PPI) must be developed.

Paris is mainly susceptible to floods and the PPRI risk prevention plan was approved on July 15, 2003 and revised on April 19, 2007. In addition, a draft intervention plan (PPI) concerning the Institut Pasteur is being developed and will be subject to a consultation procedure before being approved by the prefectural authority (French Ministry of Interior, 2015).

The Ministerial Decree No. 2005-1156 of September 13, 2005, related to the municipal safeguard plan, outlines the DICRIM document, specifies the risk and vulnerability map of the area, ensures early warning for the population and initiates the procedures for implementing the RCSC. The PCS plan can be supplemented with various useful information for crisis management i.e., provisions for business continuity as well as recovery procedures for the restoration of normality. The plan must be revised every five years.

According to article L-2212-2 of the general code of local authorities (Code general des collectives territoriales, CGCT), the mayor is required to adopt policies aimed at reducing risks, thus resulting in preventive and precautionary actions for people and their properties. The mayor of Paris must take care of the organisation of all necessary preventive measures. For the city of Paris, this mission belongs to the prefectural police (French Ministry of Interior, 2015).

6.1.2 THE "PROTECTION CIVILE PARIS SEINE" ASSOCIATION

In addition, civil protection in Paris is greatly enhanced by the Protection Civile Paris Seine (PCPS), which comprises the departmental association for the departments of Paris, Seine-Saint-Denis and Val-de-Mame. The association was constituted by the 1901 Law and is affiliated to the National Civil Protection Federation (Federation Nationale de Protection Civile, FNCP) as a public utility (Protection Civile Paris Seine, n.d.).

The association has a voluntary basis and consists of more than 1600 volunteers, who are assigned to all the 34 suburbs of the Paris metropolitan area. There are 40 branches spread all over the city and neighbouring areas, which are used as recruitment sites for volunteers. Apart from the personnel, the association has a rich pool of resources, which includes a large number of ground and water vehicles. In detail the association

has in its possession 69 light vehicles, five logistics and 41 first aid vehicles as well as 10 first response botas. In addition, the association has one command post vehicle and a control room. The logistics of the PCPS include tents, stretchers, generators and other operational equipment, whereas the association operates a dedicated radio network.

The PCPS volunteers' main activities include participation in first aid training processes, response and relief operations as well as participation in solidarity actions. Volunteers have to undertake first aid courses in order to receive the title of a "Certified First Responder" at the PSE (Premiers Secours en Equipe, which translates in Team First Aid) levels 1 and 2. A Certified First Responder needs to fulfill a 70-hour training programme and follow a 6-hour training course annually. Each volunteer can be trained to become a team leader, head of post or a team leader of prompt rescue. In addition, the volunteers participate in the annual major events taking place in Paris e.g., the Roland Garos tennis tournament and the Paris Marathon among others, whereas will be mobilized for response and relief operations along with the Paris Fire Brigade and the Service d'Aide Medicale Urgente (SAMU), which is the main emergency medical organisation is France. The PCPS makes its vehicles and personnel available to the Fire Brigade, if needed, as dictated by the 1990 agreement between the organisations. Finally, volunteers participate in solidarity actions such as the provision of support to disaster victims, the provision of emergency accommodation and the collection of relief materials and food for homeless people. Relief operations and social activities exceed the number of 2800 and 1000 per year respectively.

6.1.3 THE SOLIDARITY RESERVE OF PARIS

By deliberation of December 2007, the Council of Paris created a municipal civil security reserve (RCSC) Named "The solidarity reserve of Paris", which is responsible for providing assistance to municipal services in terms of information and preparation of the population in the face of imminent risks, incurred in the municipality, support and assistance to populations in the event of disasters, logistical support and re-establishment of activities. The Paris solidarity reserve is managed by the DPP and consists of retired officials. Today, there are about a hundred agents under the supervision of a coordinator, who are all volunteers and are covered by a one-year contract, which can be renewed (French Ministry of Interior, 2015).

6.2 HAZARDS AFFECTING ÎLE DE FRANCE, 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 (French Ministry of Interior, 2015) has conducted an in-depth analysis of hazards and of existing prevention/response actions, with the most significant ones being presented in the following table.

Table 8: 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 (Plan de prevention du risqué d'inondation, PPRI) following the European Directive 2007/60/EC. • The local urban plan of Paris (Plan Local d'Urbanisme, PLU), which integrates the PPRI. • The flood prevention action program (Programme d'action de prevention des inondations, PAPI) for the Seine and the Marne department aims at reducing the vulnerability of the city of Paris to the risk of flooding. • 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. • The Eau de Paris authority, responsible for supplying drinking water to the city, distributes 480,000 m^3 of water every day. • Water from the Seine and the Marne rivers is stored in drinking water treatment plants and is distributed with consumption restrictions in case of a drought.
Storm	• In case of strong winds, authorities prohibit citizens from accessing parks and groves. • Messages are broadcasted to citizens through messages, the city of Paris website and social media. • After the storm, authorities remove debris and fallen trees, with priority for major avenues.
Extreme temperatures	• Extreme weather forecasts are issued in cases of extreme temperatures. • There is a winter emergency plan in force from November to March, and a heatwave plan in force, from June till August. • Protection guidelines are issued for vulnerable groups e.g., elderly people or people with disabilities. • Citizen awareness is raised through a well-developed communication system
Technological accident	• In case of an accident to an ICPE (Installation Classee pour la Protection de l'Environment), the authorities of the city, along with the urban ecology agency, issues protection measures for the potentially affected population and orders the cessation of the activities of the ICPE.
Transportation accident	• In case of a transportation accident the urban transportation plan of the Ile-de France Region (Plan de deplacements urbains d'Ile de France, PDUIF) is activated. • The Chamber of Commerce and Industry of Paris (Chambre de commerce et d'industrie de Paris, CCIP), along with major transportation companies, launch protection campaigns for the population, regarding transportation risks. • Messages are distributed to the population for information purposes, in case of an accident. • Proper maintenance of canals is ensured for the safety of river traffic.
Transportation of dangerous goods	• Specific regulations are integrated in the PLU and applied to pipeline transport. • Speed and other restrictions are applied to vehicles containing dangerous goods. • The Fire Brigade is responsible for the response to such incidents with its adequately equipped vehicles.

Risk to power and gas network	• Companies managing the power and gas network i.e., ERDF (electricite reseau distribution France), GRT Gaz and GrDF (for the management of gas pipelines) and the Paris district heating company CPCU (compagnie Parisienne de chauffage urbain) have internal operation plans (plan d'operation interne, POI) to manage potential incidents
Nuclear risk	• The Interministerial circular No. DGS/DUS/DSC/2011/64 of July 2011 controls the provision of potassium iodide tablets to the affected population, especially those not covered by an intervention plan (PPI). • The establishment, responsible for the response to health emergencies (L'etablissement de preparation et de response aux urgences sanitaires , ERPUS), suggests that each prefecture, with the assistance of the respective municipalities, is competent for the organisation and the methods of provision of these tablets.
Biological risk	• The city has a business continuity plan (Un plan de continuite d'activite, PCA)

6.3 FLOOD PREVENTION IN ÎLE DE FRANCE

Floods are the main natural hazard affecting the Region of Île de France and the Paris metropolitan area. Significant events, such as the great 1910 flood, the floods of 1924 and 1955, as well as more recent incidents, like the floods of 2013 at the upstream areas of the river, have highlighted the need for a well-structured strategy for the efficient management of flood-related disasters. However, due to the lack of disastrous events in the last decades, investments in protective and precautionary measures have been reduced. On the other hand, vulnerability increases due to the concentration of large volumes of population and the accumulation of industrial and economic activities in the Region.

As already mentioned, Île de France is the second largest economic area in the European Union as many industries and infrastructures are located there. However, the Organisation of Economic Cooperation and Development (OECD) in its report "*Seine Basin, Ile de France: Resilience to Major Floods*" indicates that flood protection levels in the Region do not live up to the standards reached by many other countries. The Organisation highlights the consequences an extreme flood event would have on the Region, in terms of affected population, jobs and entities. In financial terms, the toll could reach 30 billion Euros and lead to a reduction of up to 3% of the GDP (OECD, 2014)

According to the OECD there are three (3) basic areas for improvement regarding flood protection in the Region i.e., governance of flood risk prevention, resilience measures and financial enhancement.

Flood risk is highly fragmented in the Region. In general, in France, the mayors and prefects have the responsibility to manage risks, both at the pre-, syn- and post-catastrophic stages. However, in Ile de France competencies are lie upon different stakeholders at the regional, departmental, municipal and metropolitan levels and the roles and responsibilities are vague. Additionally, there is another fragmentation between stakeholders within the metropolitan area and stakeholders in upstream areas. Therefore, a first step, according to the OECD, for a coherent flood risk governance, is to clearly define and address roles and responsibilities to the various stakeholders of all different levels and areas. Through this definition, which should be both vertical, regarding administrative levels, and horizontal, for the different actors of the public sector, coordination among stakeholders could be achieved. Moreover, OECD highlights the necessity for an alignment between the flood risk strategies and other initiatives, national or EU, such as the 2007/60/EC Directive, the long-term Grand Paris project and other water management policies. Synergies can be

developed through the various initiatives, by taking into serious account the flood risk, with the aim of creating a multi-stakeholder approach.

The second step for a coherent strategy is to increase and enhance resilience measures. It is crucial to increase the level of awareness of the public and cultivate a culture of risk prevention to citizens, industries and decision makers. Communication strategies addressing all societal levels should be developed, accompanied by risk-related information and appropriate material (maps, images etc.). Another important aspect is to increase the resilience of critical infrastructures and ensure business continuity. The incorporation of other sectors, for instance the insurance sector, in the sphere of crisis management stakeholders will significantly enhance flood risk strategies in economic terms.

Finally, the OECD highlights the importance of financial provisions for the development of sustainable strategy. Financial assistance could derive from the State and from local and regional funds. European funds could also be considered with the aim of implementing the provisions of the EU Directive.

6.4 TECHNOLOGICAL RISK PREVENTION IN ÎLE DE FRANCE

As stated above Ile de France is home to 102 Seveso sites, 35 of which are upper tier. PPRT plans are developed by these sites in order to carefully plan urban development around them. The purpose of PPRT plans is to delimit the effects of technological accidents likely to occur in these installations and which could cause serious environmental pollutions and affect public health and safety. Depending on the nature and technological risks pertaining to each facility, perimeter zones are drawn with strict limitations and measures regarding urban development for each specific zone. PPRT plans are partly financed by the State, the operators of the Seveso establishments and local authorities. According to the Regional and interdepartmental directorate for the environment, planning and transport, between 2010 and 2019, 31 PPRTs, corresponding to high-risk facilities, were approved.

7 ASSESSMENT OF EXISTING PLATFORMS AND DECISION SUPPORT SYSTEMS FOR CBDRM

Disasters are expected to increase in terms of both frequency and impact. 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, which are also concentrated in areas prone to various risks. As a result, the need for technological systems and tools, which can facilitate disaster management and enable decision making is major. In addition, due to the increasing complexity of emergencies, it is important to take into consideration the viewpoint of multiple stakeholders, apart from first responders', i.e., researchers' and the community's viewpoint. In this chapter current platforms and decision-making systems are described, which also cover a wider range of the society and the community. These platforms are the results of projects, national and EU ones, and emerge from the synergies among different domains.

7.1 CBDRM PLATFORMS

7.1.1 THE ACTAREA TOOL

Developed by ESPON, the European Territorial Observation Network, the on-line tool ACTAREA (ACTAREA ESPON, n.d.) aims at promoting a common mental perception of an area to stakeholders interested in soft territorial cooperation. The policy briefing, by ESPON in May 2022 (ESPON, 2022), about participatory processes proposed the soft cooperation concept as a building block of territorial cohesion in functional areas. Soft cooperation addresses stakeholders participating in the decision processes over a territory, in which these stakeholders need to feel ownership of the output decisions. Soft cooperation is a complement to "hard" official structures, that make stakeholders to enhance the territorial cohesion, by participating in a win-win process and empowering them to contribute to common objectives.

The tool is a web-based application able to generate two types of maps: mapshots and institutional maps. Mapshots are simplistic geographic maps where a problem to solve can be schematically represented. Institutional maps show all the stakeholders involved in a territory and their area of influence. Together the two types of maps can be very useful for decision makers and disaster manager to act and to plan mitigation measures for disaster risk reduction.

7.1.2 THE PUMA-X UNIVERSAL MULTI-ALERT PLATFORM

The PUMA-X platform is the result of the cooperation between seven stakeholders, engaged in the areas of security, defense and environmental protection (PUMA X, n.d.). 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. Through the use of this platform, it becomes possible for all emergency management factors to concentrate and integrate different systems, serving different needs e.g., forecasting and alerting among others, in one modular solution.

PUMA-X is a PSIM (Physical Security Integration Management) platform i.e., a system integrating security related subsystems. It is modular and scalable, allows the integration of heterogeneous data and provides 3D maps using GIS software, that enables the future development of digital twins for specific assets or areas and assists in the development of an efficient PCS (municipal civil protection plan for French Municipalities).

Moreover, it provides the capability of real-time processing of data, thus enabling decision support, while, on the other hand, it can provide alerts to the population. The PUMA-X is supported by the State of France, the Region of Provence-Alpes-Cote d'Azur and the Metropolis of Aix-Marseille-Provence.

7.1.3 PREDICT PLATFORM

Predict Services is an engineering consultant company which was born after the catastrophic floods that affected Nimes, France in 1988 and is supported by large players in the domains of safety and the environment such as Airbus DS GEO S.A., Meteo-France, and the BRL Group (PREDICT, n.d.). The company provides stakeholders and local authorities with climate risk analysis tools and soon expanded to include also businesses and the general public in France and abroad.

Predict solutions aim to support the design of PCS and PICS 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. In addition, through the developed mobile applications, citizens can be timely informed about meteorological risks as well as about the evolution of an ongoing situation.

7.1.4 THE SAHANA EDEN PLATFORM

Sahana Eden is an open-source software platform that can be used for Community-Based Disaster Risk Management (CBDRM) (Sahana Foundation Open Source Disaster Management Solutions, n.d.). It offers a range of modules and features to support various aspects of disaster management and response. While it is not specifically tailored for CBDRM, it can be customised and configured to meet the specific needs of CBDRM initiatives. It can also be implemented for CBDRM initiatives in various locations globally. Its usage is not limited to a specific region or country. Sahana Eden is available for organizations and communities worldwide to utilize and adapt to their specific needs. Some of the key features and modules of Sahana Eden that can be relevant to CMDRM include:

1. Emergency Coordination: the platform allows for effective coordination of emergency response efforts. It facilitates the management of resources, organizations, and personnel involved in CBDRM activities.
2. Volunteer Management: The platform provides tools for managing and mobilizing volunteers in CBDRM initiatives. It enables organizations to track volunteer skills, availability, and assignments.
3. Incident Reporting: Sahana Eden allows for the collection and management of incident reports from affected communities. This feature can help in gathering information about specific hazards, impacts, and community needs.
4. Mapping and Geospatial Integration: The platform supports mapping and geospatial analysis, which is essential for CBDRM. It enables the visualization of hazards, vulnerability, and resources on maps, facilitating better decision-making and planning.
5. Data Management: Sahana Eden provides capabilities for data collection, storage, and analysis. It can help in managing various types of data relevant to CBDRM, such as demographic information, infrastructure data, and risk assessments.

It is important to note, that Sahana Eden is a flexible platform that requires customisation and configuration to suit specific CBDRM needs. Technical expertise or support may be necessary to implement and adapt the platform effectively for CBDRM initiatives.

7.1.5 THE OPEN FORIS TOOL

Open Foris is a suite of open-source tools developed by the Food and Agriculture Organization of the United Nations (FAO) (Open Foris, n.d.). While Open Foris is primarily focused on forest monitoring and management, some of its tools can be applicable to CBDRM initiatives as well. The tools within Open Foris can assist in data collection, analysis, and management, which are crucial components of CBDRM. One specific tool within Open Foris that is relevant to CBDRM initiatives is Collect Earth. Collect Earth is a tool designed for participatory mapping and data collection using satellite imagery. It allows users to collect data on various environmental and social variables at the local level, including aspects related to disaster risk and vulnerability. In the context of CBDRM, Collect Earth can be used to gather data on hazard-prone areas, vulnerable populations, infrastructure, and other relevant factors. This data can then inform decision-making, risk assessments, and planning processes. While Open Foris is not exclusively developed for CBDRM, it offers tools that can be adapted and utilized in CBDRM initiatives. It's important to consider the specific requirements of CBDRM and assess how Open Foris tools can be integrated and customised to support those objectives.

7.1.6 THE USHAHIDI PLATFORM

Ushahidi is an open-source platform that has been used for various purposes, including community-based disaster risk management (CBDRM) (Khanh Ngo Duc, 2014). Ushahidi, which means “testimony” in Swahili, is a platform that 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. Key features of Ushahidi that make it suitable for CBDRM include:

1. Crowdsourced Reporting: Ushahidi allows community members to submit reports through various channels such as SMS, web forms, social media, or mobile apps. This enables the collection of on-the-ground information from affected areas.
2. Mapping and Visualisation: The platform provides tools to visualize and map the collected data, allowing for a spatial understanding of incidents, vulnerabilities, and resources. Maps can be customized to display different layers of information.
3. Data Filtering and Analysis: Ushahidi includes features to filter and analyse the collected data, facilitating the identification of patterns, trends, and priority areas for CBDRM interventions.
4. Collaboration and Communication: Ushahidi supports collaboration among different stakeholders involved in CBDRM. It provides channels for communication, coordination, and sharing of information within the platform.

Ushahidi has been used in various disaster contexts worldwide, including earthquakes, floods, and conflicts. It has been particularly effective in engaging affected communities and leveraging local knowledge for improved disaster response and recovery efforts. It’s important to note that while Ushahidi can be a valuable tool for CBDRM, its successful implementation depends on factors such as community engagement, connectivity, and appropriate training for users (Sijbren de Jong, 2016).

7.1.7 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. An OSOCC brings together the OCHA (United

Nations Office for the Coordination of Humanitarian Affairs), national disaster management authorities, teams from UNDAC and USAR, as well as other responders so that they all can share and exchange information in the initial phase of response to major natural disasters. The OSOCC is both a methodology and a physical location for the coordination of on-site emergency response. It is supported and promoted by the UN Office for the Coordination of Humanitarian Affairs (OCHA) and is used as a tool to support the governments in countries that are affected by disasters. 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 (OCHA, UN, 2018).

The main objectives of the OSOCC tool are, according to the OSOCC Guidelines (OCHA, UN, 2018):

- To provide a platform that facilitates the rapid on-site cooperation, coordination, and information management between international responders and the government of affected countries
- To establish a physical space and a single point of service provision for incoming response teams.

The OSOCC guidelines suggest that, in order to "*optimise its effectiveness, the OSOCC should be established in the immediate aftermath of a disaster requiring international assistance or when indicated by a change in situation of an existing emergency*", and "*it should be located in close proximity to the disaster site and relevant national government authorities*". This is important since a timely set-up as well as the choice of an appropriate location are both crucial for ensuring optimal rescue and relief efforts.

While an OSOCC is primarily intended to be a short-term response tool to be used in the immediate relief phases of a disaster, it is expected to be operational as long as the respective governments of the affected countries can resume the responsibility of coordinating international resources through their own structures (OCHA, UN, 2018).

The OSOCC model also allows for being integrated into national response planning and preparedness programs in order to coordinate humanitarian assistance and domestic disaster relief responses at local levels. Thereby, the OSOCC for national use should not be seen as a replacement of already existing emergency management structures, but rather as a supplemental capacity that should help in enhancing the systematic coordination between different actors.

A special component of the OSOCC system is the Virtual OSOCC (VOSOCC), a real-time online coordination platform that allows rapid information exchange early in an emergency. It is part of the Global Disaster Alert and Coordination System (GDACS), a cooperative framework supported by OCHA Geneva. „Specific features of the VOSOCC allow first responders to exchange information such as baseline country information (including relevant socio-economic and demographic information), entry points and other logistical aspects, relief team status, assessment information, cluster activities, civil-military coordination arrangements, environmental risks and security" (OCHA, UN, 2018). Additionally, the VOSOCC also supports the coordination of trainings, the sharing of information and the discussion of projects.

The VOSOCC alerts and mobilizes emergency teams and pulls together information from different organisations for a better situational awareness in order to assess the scope and scale of a disaster and the immediate response priorities. In case of earthquakes, it is also used as a planning tool for search and rescue operations.

While the VOSOCC mainly operates on an inter- and intra-national level, there are also many other early warning systems available at national levels. In the case of Austria, for instance, many national agencies as

well as NGOs and other public organisations have in place community based early warning systems or platforms that manage the organisation of donations and aid. These systems and platforms allow community members to report, either by telephone or online, a wide variety of risks, to organise and manage donations, or to channel people's willingness to help in the event of disasters and other emergencies, and to quickly mobilise volunteers in the event of an emergency.

7.1.8 COPERNICUS EMERGENCY MANAGEMENT SERVICES (CEMS)

The Copernicus Emergency Management Service (CEMS) (COPERNICUS, n.d.) is a European initiative that aims to provide timely and accurate geospatial information and services to support emergency management and response activities. It is part of the Copernicus programme, which is the EU Earth observation and monitoring programme. CEMS uses satellite imagery and other geospatial data to monitor and assess various types of emergencies, including natural disasters, such as floods, wildfires, and earthquakes, as well as man-made disasters like industrial accidents and oil spills. The service provides information to help authorities and emergency responders make informed decisions and take appropriate actions in emergency situations.
Some key features and components of Copernicus Emergency Management Service include:

1. Rapid Mapping: This component provides on-demand satellite imagery and derived products for emergency mapping within a few hours after a disaster event. It helps assess the extent of the disaster and supports response planning.
2. Early Warning Systems: CEMS operates early warning systems for specific types of hazards, such as floods and wildfires. These systems use data from various sources, including satellites, weather models, and ground-based sensors, to detect and forecast potential emergencies and provide alerts to authorities.
3. Risk and Recovery Mapping: CEMS generates maps and spatial information for risk assessment and recovery planning. This includes assessing vulnerabilities, identifying critical infrastructure, and evaluating the potential impact of disasters.
4. Training and Support: CEMS offers training and capacity-building activities to enhance the knowledge and skills of emergency management professionals. It also provides technical support and advice to help users make the most of the service.

7.2 COMMUNITY BASED PROJECTS

7.2.1 THE RESALLIENCE PROJECT

ResALLience is an EU Horizon Europe Programme. The complete name of the project is "Landscape resilience knowledge alliance for agriculture and forestry in the Mediterranean basin" and the scope of the project is to provide foresters as well as farmers in Mediterranean countries with innovative landscape resilience solutions. The project focuses on four thematic areas: governance, management practices, technology and finance, and builds on multi-stakeholder initiatives. The outcomes of these initiatives are the LandNet and the LandLabs (ResAllience, n.d.).

The LandNet engages stakeholders, such as public and regional administrations, researchers, private enterprises, farmers and persons dealing with the primary sector of production, with the aim to create and expand cooperation networks, improve information and best practices exchange among all interested parties.

The LandLabs are developed in five Mediterranean regions, which are the focus areas of the project, face common threats e.g., wildfires and droughts, and have common needs, and are practically tools for knowledge transfer and proper adaptation of solutions, that address the aforementioned needs.

7.2.2 THE C2IMPRESS PROJECT

C2IMPRESS is an ongoing Horizon Europe Project, with the aim to increase citizen awareness on multi-hazard risks (C2IMPRESS, n.d.). The project aims to develop a people-centric instead of the traditional hazard-centric approach and envisages developing several innovative and holistic tools. Such tools include resilience frameworks encompassing methodologies and guidelines for the enhancement of resilience of citizens and authorities, dynamic models for the accurate prediction of future extreme phenomena, early warning systems, which use and assess big data for the better monitoring and understanding of multi-hazards, and a multi-actor decision support platform for novel and more efficient Disaster Risk Reduction and Climate Change Adaptations strategies.

7.2.3 THE FIRE-IN PROJECT

FIRE-IN was an EU H2020 project, the aim of which was to bring together different stakeholders engaged in disaster management, focusing on first responders, researchers, technological providers and citizens (FIRE-IN The first European Fire and Rescue Innovation Network, n.d.). The project was clustered in five thematic areas i.e., search and rescue, structure fires, landscape fires, natural hazard mitigation and CBRN-e, while it was organised in three phases:

- The identification of capability gaps, expressed by practitioners, who are the main actors in disaster management. These gaps are formulated as challenges to be solved in the future.
- The desktop research, regarding past and ongoing projects, guidelines, technological innovations, widely adopted guidelines, best practices and standards related to safety and security, which could address the identified challenges and cover the gaps.
- Establishment of interactions and cooperation among stakeholders and the request for ideas regarding solutions, which will potentially address the challenges.

For the third phase the project developed an e-platform, in which registered persons could submit a solution and correlate it with specific challenges. Through this platform, a significant number of people, with different backgrounds, uploaded solutions, thus creating a pool of knowledge and of existing or upcoming solutions and increasing networking and information exchange among practitioners. Although the project is finished the platform is still active, enabling registration and the submission of solutions.

7.2.4 THE MEDEA PROJECT

MEDEA is an ongoing EU H2020 project, the aim of which is to create a network of security practitioners, with the aim to exchange knowledge and experience regarding the management of incidents in the Mediterranean area. The network establishes direct links to policy makers and technological providers related to the safety and security sectors.

The project is clustered into four thematic areas i.e., migration and asylum, border security, crime and terrorism and the disaster management area, and targets the improvement of interoperability and collaboration among stakeholders, the definition of security priorities in the area around the Mediterranean and the Black Sea and the development of a scenario driven technology roadmap in order to address identified needs and gaps.

7.2.5 THE BUILDERS PROJECT

BuildERS was an EU H2020 European Project, which ended in 2022, focusing on the enhancement of the resilience of the society against natural disasters. The project addresses the most vulnerable groups and communities, and its objective is to develop strategies, policies and plans with the aim of producing partnerships and bonds between different social groups and strengthening their capacities against future threats. The targeting of vulnerable groups concerns the highlighting and address of their needs, and this is achieved through a multi-stakeholder approach and interaction with the vulnerable groups and their representatives.

7.2.6 THE TEAMS PROJECT

The TEAMS project (TEAMS, n.d.), launched by the European Union Humanitarian Aid and Civil Protection, develops and evaluates a tool for training Emergency Medical Teams to respond to outbreaks, man-made disasters, and other possible cross-border risks. The TEAMS tool is a standardised, validated, and cost-effective training package focused on operational team training using simulation-based exercises. The type of exercises proposed was table-top exercises, functional simulations and discussion based. The tool was developed to be useful for medical emergencies in low-income countries and resource-poor environments. The involved profiles included authorities, NGOs and rescuers, in addition to medical personnel. In this project, the lack of cooperation between different Emergency Medical Teams was addressed, and the training package was assessed to improve the teamwork.

7.3 EARLY WARNING FOR CITIZENS

Apart from CBDRM platforms, mobile application dedicated to the provision of alerts as well as information and protection guidelines, have been developed and are currently used by citizens of Attica and Ile de France.

“CivilAttica” is a mobile application for the citizens of the Attica Region, which provides the population with information and protection measures in cases of extreme weather or the occurrence of wildfires. Weather forecasts are provided directly from the Hellenic National Meteorological Service, whereas the daily fire risk map, issued by the competent civil protection authorities, is provided throughout the fire season, which, as already mentioned, lasts from the 1st of May until the 31st of October. Apart from the threat of forest fires or extreme weather, the application has expanded its spectrum, encompassing other hazards as well e.g., earthquakes, floods and technological accidents. The application was developed by the Independent Directorate of Civil Protection of the Attica Region (Pappas, 2020).

“Paris a la seconde” is a free mobile application, available for both IOS and Android software. It allows citizens to be kept informed in real time regarding any incident occurring in the city of Paris. Using a “push alert” system, this application allows citizens, who have downloaded it, to receive general information, as well as local information by district regarding various incidents, ranging from traffic conditions around the city to weather forecasts or pollution alerts (Ferriere, n.d.).

8. CONCLUSIONS

In this document an attempt to map and briefly describe existing policies, initiatives and platforms related to crisis management and disaster risk reduction, was undertaken. In order to holistically approach the wide spectrum of DRR in Europe, the methodology followed a top-down approach starting from the top level, which is related to the global and the EU disaster risk reduction framework, and downscaled, at first, to the national level, regarding the two pilot countries of the Pantheon Project, Greece and France, and finally to the Regions of Attica an Ile de France respectively.

As seen through the various strategies, directives and plans, the main focus for disaster risk reduction is mainly on the pre- and syn-catastrophic phases of disaster management. These initiatives target the prevention, preparedness and response phases of the disaster management cycle. This highlights and indicates the firm belief that "*prevention is better than cure*" and in the face of evermore frequent and impactful disasters, which are abetted also by climate change, the need to proactively take and implement measures and actions for the safety of both the individuals and the society is the most important goal of disaster risk reduction. This does not imply that recovery is completely discounted, on the contrary there are specific steps to be made in order to fulfill the objective of "building back better" as the Sendai Framework dictates. However, to achieve this objective, the burden lies heavier on prevention and response. The aforementioned steps target the immediate and short-term recovery. Long-term recovery lies at the sphere of mitigation and prevention, a phase thoroughly examined and addressed by DRR strategies and plans.

Apart from the global and the EU level, both countries, Greece and France, have developed a strong DRR framework with national, regional and inter-regional plans, enhancing interoperability and coordination among all engaged stakeholders. As it is seen, Greece develops strategies based on a more hazard-oriented approach. The country faces mainly natural hazards, with the most significant ones being the geological and hydrometeorological. With its location being at the very edge of tectonic plates and the combination of a variety of climatological conditions, Greece is affected by many different geophysical, meteorological and hydrological phenomena, thus emphasising on the development of detailed and dedicated action plans related, mainly, to prevention, preparedness and response measures and actions. These actions do not only include processes undertaken by first responders, civil protection agencies and other stakeholders, but also provisions and self-protection measures for the public.

On the other hand, France with its large number of SEVESO and other industrial establishments and installations, focuses on the management of technological accidents without, of course, disregarding natural phenomena. In terms of natural phenomena, the country mainly faces hydrometeorological emergencies e.g., floods or wildfires, with the geophysical risk remaining relatively low. This, however, does not apply to overseas regions like Guadeloupe and Martinique, which, as parts of the Lesser Antilles Volcanic Arc and located within the tropical cycle, are affected by occasional earthquakes, volcanic eruptions and tropical cyclones. The various DRR plans of France lay down the responsibilities and competences of mayors (local level) and prefects (regional level) and describe, step by step, procedures needed to be implemented by stakeholders and citizens.

Apart from initiatives that are taken at a governmental and political level, both software developing SMEs and companies, as well as, EU funded projects have focused on a community-centred approach, taking into consideration the timely provision of information and protection guidelines to the population. Community-based platforms have already been and are still being developed, thus making citizens an active factor in disaster management. There is a cultural shift towards the community, which has to act proactively in order

to increase its level of protection against all kinds of hazards. CBDRM platforms and applications pave the way towards this direction.

The results of this Deliverable, in conjunction with the outputs of Deliverables 2.2 "*Multi-Hazards/risk data and assessment report"* and 2.3 "*Community vulnerability and capacity assessments (VCAs) report*" aim to provide a uniform presentation of the existing situation in the EU and the pilot countries, in terms of hazards, natural and man-made, policies and strategies for disaster risk reduction, and susceptibilities and capacities of vulnerable groups and minorities. The outcomes of these three tasks will lay the basis for the further evolution and development of the Pantheon project.

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