Summary Report Italy

REPORT PURSUANT TO ARTICLE 6 (1) (D) OF DECISION 1313/2013/EU

CIVIL PROTECTION
Prime Minister's Office, Department for Civil Protection

Document drawn up by the Department of Civil Protection — Prime Minister's Office and addressed to the European Commission — November 2021

Summary

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Acronyms and abbreviations

ABD	District Bacino Authority
AINEVA	International Coordinating and Documentation Association for snow and avalanches problems

AM	Military Aeronautics
ARP	*Average Return Period*
CDC	Centre of Competence
EC	European Commission
CGR	National Commission for the Provision and Prevention of Great Risks
IGC	Intergovernmental Conferences
CIPE	Interministerial Committee for Economic Planning
Dado	Database of Damage Observed
Di.COMa.C.	Directorate of Command and Control
DIPE	Department for Economic Policy Planning and Coordination
Dir.PCM	Directive of the President of the Council of Ministers
DCDPC	Decree of the Head of the Department of Civil Protection
DPC DPCM	Department of civil protection
INGV	Prime Ministerial Decree
IRMA	National Institute of Geophysics and Volcanology
	Italian Risk Maps
ISPRA	Ispra (the Institute for Environmental Protection and Research)
ISTAT	National Institute of Statistics
MATTM	Ministry of the Environment and the Protection of Natural Resources and the Sea — now replaced by MITE
MEF MIH	Ministry of Economic Affairs and Finance
MIPAAF	*Maximum Inundation Height*
MITE MoU	Ministry of Agricultural, Food, Forestry and Tourism Policy
NEAM	Ministry for the Ecological Transition
NRA	*Memorandum of Understanding*
OCDPC	*North East Atlantic Mediterranean and connected sea*
PCM PGA	*National Risk Assessment*
	Order of the Head of the Department of Civil Protection
	The Prime Minister's Office
	Water Management Plan/*Peak Ground Acceleration*due to an earthquake
PGRA	Flood Risk Management Plans
PNACC	National plan for adaptation to climate change

PSRN	National Rural Development Plan
PZEV	Plans of the Exposed Areas in Valanghe
Siam	National Alert System for earthquake-generated shrimp
SNAC	National Strategy for Adaptation to Climate Change
SNPC	National Civil Protection Service
EU	European Union
UNESCO	*United Nations Educational, Scientific and Cultural Organisation*

Summary

The document is produced in accordance with Article 6. 1 (d) of Decision 1313/2013/EU as last amended by Regulation (EU) 2021/836 of the European Parliament and of the Council of 20 May 2021. Specifically, the European Commission (EC) requests Member States to make available to the Commission a summary of the relevant elements of the risk assessment and the assessment of their risk management capability, focusing on the main risks. In addition, the EC requires Member States to provide information on priority prevention and preparedness measures necessary to address key risks with cross-border consequences and risks related to disasters that cause, or are likely to cause, multi-country cross-border effects, as well as, where appropriate, low probability risks with a high impact.

The summary was drawn up in accordance with the guidelines laid down in the*Reporting Guidelines*published in the Official Journal of the European Union 2019/C 428/07 on 'Guidelines for drawing up disaster risk management reports pursuant to Article 6 (1) (d) of Decision No 1313/2013/EU'.

The Executive Summary is based on the information, updated as necessary, contained in the following documents:

- the**National Risk Assessment**(December 2018), drawn up by the Department of Civil Protection pursuant to Article 6 (a) of Decision No 1313/2013/EU, with the help of centres of expertise, Italian bodies and universities, which provides an analysis of the risk conditions to which the country is subject, with particular reference to the risks (i) seismic, (ii) volcanic, (iii) tidal, (iv) hydrogeological (hydraulic, hydrological, landslide, avalanche), (v) drought ('water crisis') and (vi) forest fires. This document is an essential basis for defining the strategy for disaster risk reduction, including in multi-sectoral and multi-risk contexts.
- The '**Assessment of risk management capacity in Italy**' (August 2018), drawn up pursuant to Decision No 1313/2013/EU, on the basis of the guidelines published in Commission Communication 2015/C 261/03 and delivered to the European Commission on 6 August 2018. The document dealt with management capacity in relation to hydrogeological, hydrogeological, seismic, volcanic and forest fire hazards.
- The document '**Management of Risks from Catastrofi in Italy**' (December 2020), which describes the state of disaster risk management in Italy on the basis of availablescientific and technical knowledge, existing planning and planning tools and existing rules. The document describes the national strategy and the framework of plans and measures for managing and reducing risks from natural disasters in Italy. Account shall be taken of the risks present on the national territory, and in particular risks linked to climate change, including hydrogeological and hydraulic risks, snow and avalanches, water crises and forest fires, and geophysical risks, including seismic, tidal and volcanic risks, as well as anthropogenic risks.

The document is organised in three main parts.

The **first part** (Chapter 1) is dedicated to **risk assessment**. We refer to the above-mentioned *National Risk Assessment* of 2018 (NRA 2018), the most important updates of which are provided, and with regard to some of the risks referred to in the Risk Management Document from Catastrofi in Italy. In drawing up that section, points 1 to 8 of *Reporting Guidelines* 2019/C 428/07

were taken into account.

The **second part** (Chapter 2) addressed the **assessment of risk management capacity**, taking into account the legal and procedural framework defined at national and sub-national level by Legislative Decree No 1/2018 laying down the 'Civil Protection Code' (hereinafter 'the Code'), the regulatory and operational measures that the National Civil Protection Service (SNPC) has produced over the last 3 years for risk mitigation or in response to catastrophic events, also in application of recent revisions of the Code. In this part, based also on the information contained in the Risk Management Capacity Assessment Document and the Risk Management Document from Catastrofi in Italy, a contribution was made in response to the points of question from 9 to 20 of *Reporting Guidelines* 2019/C 428/07, although some of them were merged.

The **third part** (Chapter 3) describes priority **prevention and preparedness measures** to address key risks with cross-border consequences and risks related to disasters that cause, or are likely to cause, multi-country cross-border effects, as well as, where appropriate, low probability risks with a high impact, in response to points 21 and 22 of the *Reporting Guidelines* 2019/C 428/07. In addition, the numerous agreements with Member States bordering Italy are mentioned, referring to generic collaborations in the field of civil protection or to prevention, mitigation and response to specific risks. In response to questions 23 and 24 of *Reporting Guidelines* 2019/C 428/07, low probability risks with a high impact and related priority prevention and preparedness measures are addressed. This refers to some of the risks dealt with in the previous parts which, when taken into account in the intensity of high return periods, in the order of thousands of years, represent for Italy '*High Impact Low Probability Events*' (HILP).

1 Part I Risk assessment

Questions 1, 2, 8 of *Reporting Guidelines* 2019/C 428/07

At the time of writing, the framework for the assessment of civil protection risks in Italy remains the *National Risk Assessment* of 2018 (NRA 2018), to which reference is made for **the risk assessment process** and the corresponding risk reduction activities (question 1 of the Reporting Guidelines 2019/C 428/07), for the **consultation of relevant authorities and stakeholders** (question 2), for the **communication of the results of the risk assessment** (question 8), and for **good practices. In**addition, the DPC prepared the document "Disaster Risk Management in Italy" sent to the Commission, via the Department for Cohesion Policies in December 2020, for the fulfilment of enabling conditions 2.4 "Framework for effective disaster risk management".

A summary of the aspects of risk assessments and impact scenarios for civil protection planning is provided below, complemented by ongoing updating activities.

Identification of key risks at national or sub-national level

Application No 3 of *Reporting Guidelines* 2019/C 428/07)

In Italy, the risks in terms of civil protection are identified by Legislative Decree No 1 of 2 January 2018, 'Civil Protection Code' (hereinafter 'the Code'), and are **seismic**, **volcanic**, **tidal**, **hydraulic**, **hydrogeological**, **adverse weather events**, **water deficit** and **forest fires** (Article 16 (1)). In addition, there are other risks for which civil protection action can be carried out, without prejudice to the competences of the entities normally responsible and the resulting activities. They are the **chemical**, **nuclear**, **radiological**, **technological**, **industrial**, **transport**, **environmental** and **sanitation** risks and **uncontrolled re-entry of space objects and debris** (Article 16 (2)).

Of all the risks covered by the Code, only those relating to Article 16 (1) were dealt with in the 2018 NRA, which will be dealt with later in the first part of the document. Some of the risks relating to Article 16 (2) are dealt with in the third part of the document. The exception is the health and hygiene risk — which is the result of the COVID-19 crisis — which is dealt with in the second part of the document. Regarding the identification of risks that could have significant adverse human, economic, environmental and political/social consequences (including for security), in particular transboundary or HILP, please refer to the third part of the document.

Risk analysis, risk mapping, identification of climate change impacts and monitoring and review of risk assessment

Questions 4, 5, 6 and 7 of *Reporting Guidelines* 2019/C 428/07

The following summaries, for the various risks, are taken from the National Risk Assessment of 2018. Updates and developments that may have taken place since 2019 are also reported.

1.1 Summary of seismic risk

Compared to the risk assessment carried out in 2001, a number of scientific advances were available in 2018 in relation to:

- seismic hazard assessment, using model MPS04;
- definition of new seismic vulnerability models;

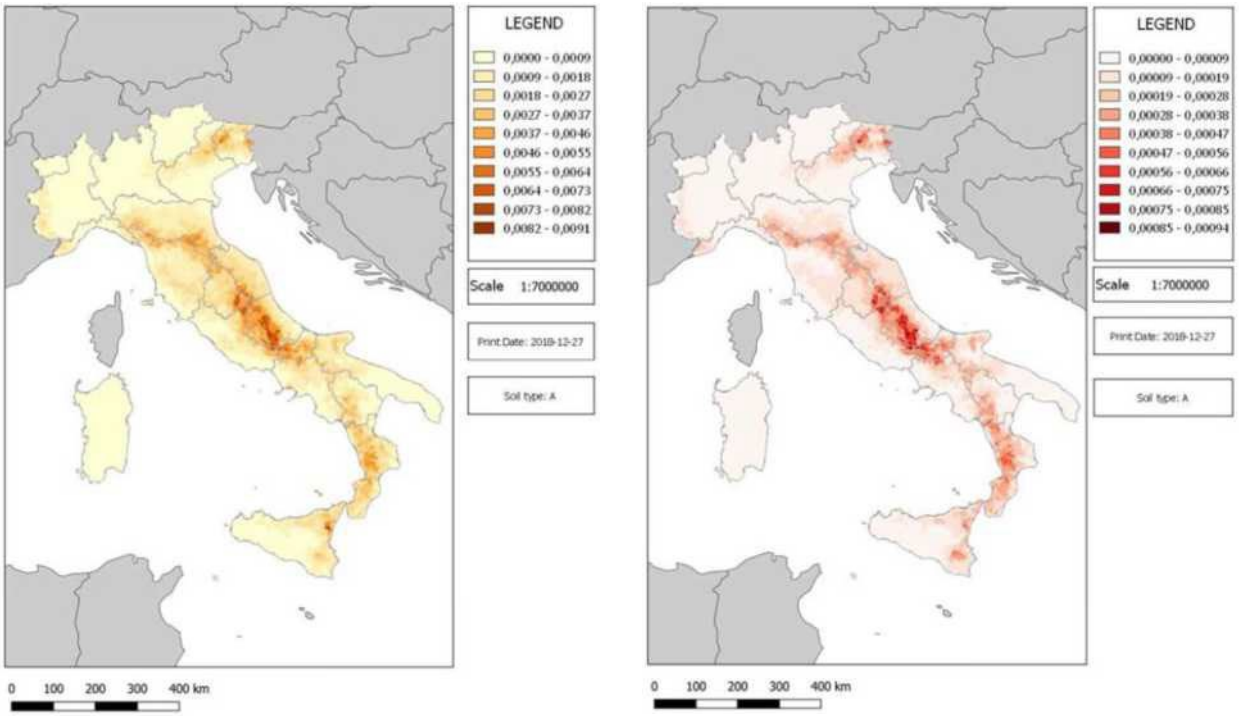
- availability of recent earthquake damage data organised in the observed damage database (dado);
- evolution of competence centres, particularly the ReLUIS Consortium, which allows the involvement of a broad scientific community to produce a harmonised risk model.

On this basis, the new probabilistic seismic risk model at the national scale, issued at the end of 2018, was developed. As in 2001, the focus was on housing stock, both because it is the most important part of the building stock and because the vulnerability/exposure characteristics are well described in ISTAT censuses.

The Code explicitly requires knowledge and products that have reached a level of maturity and consensus recognised by the scientific community. The latter was involved through the organisation of six research groups related to ReLUIS (the universities of Naples, Pavia, Genoa and Padua, and the EUCENTRE Foundation), which have developed similar vulnerability/exposure models. Finally, these models were integrated into a single final model. In order to ensure that the various groups operate in a coherent manner, EUCENTRE has developed an IT platform in the GIS environment called*IRMA (Italian Risk Maps*), which integrates the tools needed to carry out scenarios and seismic risk analysis. Irma makes it possible to use different models of exposure/vulnerability of the building contained in the ISTAT census, while for the hazard it uses model MPS04. The results of the risk assessment were first expressed in terms of damage levels (D1 to D5) and represented in maps. Two examples are given in Figure 1. The total annual average, minimum and maximum values are given in Table 1.

Level of damage	D1	D2	D3	D4	D5
Average	143 100	38 700	17 800	6 100	2 100
Maximum	203 100	65 100	31 400	8 100	3 300
Minimum	84 400	15 600	7 900	2 600	400

Table 1 — Average, maximum and minimum values of the expected number of dwellings damaged for each damage level, per year.



D3 D5

Figure 1 — Maps of average ratios expected in one year of the number of dwellings affected with damage levels 3 and 5 on
total number of dwellings in municipalities.

The results were also expressed in terms of consequences, derived from the above injury levels through appropriate reports, and also represented in maps. The overall average, minimum and maximum annual values, both in terms of direct costs, the number of unusable dwellings and, finally, the number of persons involved, are set out in Tables 2 and 3.

	Direct costs Billion euro	Dwellings that cannot be accommodated in the short	Dwellings that cannot be accommodated in the long
Average	2,13	20938	15635
Maximum	3,27	31847	22024
Minimum	1,27	9962	7404

Table 2 — Average, maximum and minimum values of expected impacts per year, in terms of direct costs and damage to dwellings.

	Dead	Injured	Homeless
Average	505	1744	78602
Maximum	763	2588	131952
Minimum	123	469	40381

Table 3 — Average, maximum and minimum values of expected impacts per year in terms of population involved.

1.1.1 update

The centres of expertise, already involved in the national seismic risk model of 2018, are currently conducting a study to update it. The inclusion of other types of buildings (schools, churches) is foreseen and work is ongoing on the extension to some critical and strategic infrastructure, including to the network (e.g. road and rail transport network).

1.2 Summary of volcanic risk

In Italy, there is no risk map for volcanic activity, but volcanic activity is monitored for individual volcanoes and the scientific community has developed different event and impact scenarios for civil protection planning purposes. The most dangerous volcanoes are Vesuvio, Campi Flegrei and Ischia in Campania, and Etna, Stromboli and Vulcano in Sicily. The assessment is due to different considerations relating to the possible extent of future eruptions, the frequency of eruptions and the population at risk. Vesuvio and Campi Flegrei are volcanoes with a higher risk because (i) they are characterised by a strong explosive activity; (II) they are very close to highly populated areas; (III) and their latest eruptions occurred around 500 and 70 years ago, respectively for the Campi Flegrei (1538 AD) and the Vesuvio (1944 AD). For these volcanoes, the risk is expressed on the basis of scenarios, on which contingency planning and mitigation actions are based.

For quiescent volcanoes, such as Vesuvio and Campi Flegrei, the longstanding alert level systems are based on an increase in monitoring parameters, which are considered as possible precursors to imminent volcanic activity. Increasing operational steps for civil protection response are linked to the corresponding scientific alert levels, i.e. based on monitoring parameters. For volcanoes Vesuvio, Campi Flegrei, Etna, Stromboli and Vulcano, four colour alert level systems (green, yellow, orange and red) have been developed, describing for each level: (I) the status of volcano activity, (ii) ongoing or expected phenomena, (iii) possible scenarios. For Flegrei Campi Campi Flegrei, a decision has been taken to move to the yellow alert level since December 2012 and therefore, on the basis of the provisions of the national planning, the operational phase of attention has been declared. The assessment of the alert level is carried out every six months in the framework of specific meetings of the CGR; to date, the yellow alert level and its operational focus has always been confirmed.

For permanently active volcanoes, such as Etna and Stromboli, some scenarios require the activation of civil protection at national level, while other scenarios cover only small parts of the territory surrounding the volcanic building and can be managed at local or regional level. Alert levels for these volcanoes must therefore take into account not only a general increase in parameters towards national scenarios, but also possible minor scenarios that sometimes occur in a short period of time and with very short term precursors. More details on planning can be found in section 2.3.2.

Prediction of eruptions requires at least basic knowledge of volcano behaviour, and monitoring networks. Indeed, while all monitoring signals are useful to understand the general behaviour of a volcano, only some of them are usually decisive in providing a meaningful indication that an eruption is about to happen. In addition, in open-duct volcanoes, precursor monitoring parameters can only change when the eruption is imminent. In such cases,*early warning systems (EWS*) can provide early warning to civil protection authorities and stakeholders, especially in volcanic areas that are excursionist. Depending on the time of evolution of phenomena, the civil protection response may vary. In some cases, an assessment phase is possible and desirable, in others an automatic alert may be required. In recent years, an EWS has been developed for Etna and Stromboli. The relevant operational procedures have been developed together with the Region of Sicily. Further information on alert systems can be found in section 2.10 of the second part of the document.

1.2.1 Update

In the 2018 NRA, Vulcano was considered quiescent, with the last eruption in 1888-1890. Since the end of the last magmatic eruption in 1890, the activity of the 'La Fossa' cone has consisted of fumarolic and weak earthquakes, accompanied by landslides and deformations of the soil. Several reactivation episodes occurred after the eruption of 1888-1890, with fluctuations in fumarol temperature and chemical composition, abnormal seismicity phases, peak CO_2 flow. These episodes did not lead to an eruption, but clearly show signs of potential reactivation of the volcano, with a slow but steady evolution towards a growing chance of eruption. The risk on the island is due to highly explosive volcanism and the number of people living there, especially during the summer. A recent change in the parameters monitored led the DPC, in agreement with Regional Civil Protection and following the opinion of the CGR, to declare the yellow alert level. As a result of this change, civil protection planning at different levels is being updated. In addition to Vulcano, the other volcanoes with yellow alert level are currently, Flegrei Campi, Etna and Stromboli.

L3 Synthesis of the tidal risk

Italy has adopted a probabilistic model of tidal hazard developed as part of the European TSUMAPS-NEAM project (ICG/NEAMTWS)1. Establishing a long-term regional probabilistic assessment of tidal hazard from seismic sources is the basis for launching local and more detailed hazard and risk assessments, and for managing it. The main advantage of the probabilistic approach over scenario-based methods is that it provides quantitative risk analyses that are geographically homogeneous across the national territory potentially affected by the maremots, and allows decision-makers to base their choices on quantitative cost-benefit analyses and comparative studies between different areas.

TSUMAPS-NEAM is a regional, long-term, time-independent probabilistic hazard model based on a Poisson model for the occurrence of the earthquake. For these features, this model lends itself to its use in decision-making processes with long-term effects. In a probabilistic hazard assessment, the main results are the hazard curves and the probability and hazard maps that can be derived. The hazard curve expresses the probability of exceedance compared to a 'level of hazard intensity' for a given period of time, called 'exposure time'. The probability and frequency of an event over time is linked together so that each probability value corresponds to a so-called*Average Return Period* (ARP), which is the average time interval between two consecutive events exceeding the same intensity. The probability of exceedance is always between 0 and 1.

InTSUMAPS-NEAM, the exposure time adopted is 50 years, while the adopted metric for the intensity of the hazard is the maximum height of the tsunami (*Maximum Inundation Height (* MIH)). MIH is assessed at almost evenly distributed points of interest along the coasts, at a distance of ~ 20 km. MIH is an average; the maximum local values of MIH along the flooded coast may be 3-4 times larger than the value of

1 http://www.ioctsunami.org/index.php?option=com_content&view=article&id=10&Itemid=14&lang=en

MIH estimated by the hazard pattern. To represent the uncertainty of the hazard model, called epistemic uncertainty, several curves are shown in a single graph, corresponding to different percentiles of the hazard distribution (Fig. 2). Epistemic uncertainty reflects limited knowledge about past tsunamis and the various physical processes governing these events.

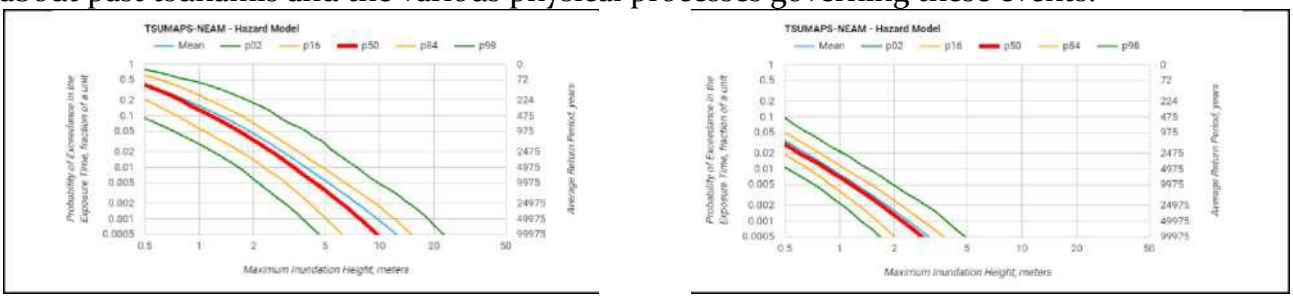


Figure 2 — Examples of hazardous curves from the TSUMAPS-NEAM model for two localities in Calabria, Italy South: Soverato Marina (left) on the Ionian Sea, and Vibo Valentia (right) on the Tyrrhenian Sea. Each graph it provides values for the mean, the 2th, 16th, 50th, 84th and 98th percentiles of the whole set of hazard patterns.

The main results derived from the hazard curves are hazard and probability maps (Fig. 3). The most dangerous is found on the Ionian coast (regions of Sicily, Calabria, Basilicata and Apulia), exposed not only to local seismic sources but also to the sources of the Eastern Mediterranean, especially those along the Arco Ellenico and the Ionian Islands. The relatively high dangerousness of Sardinia is due almost exclusively to the seismic sources in North Africa. Considering a 2.500-year ARP and an average model for the whole Italian region, overall MIH cases above 3 m remain within 1-2 %; the case of MIH under 1 m exceeds 80 %. These results have several limitations. The list of the most binding ones can be found in the 2018 National Risk Assessment.

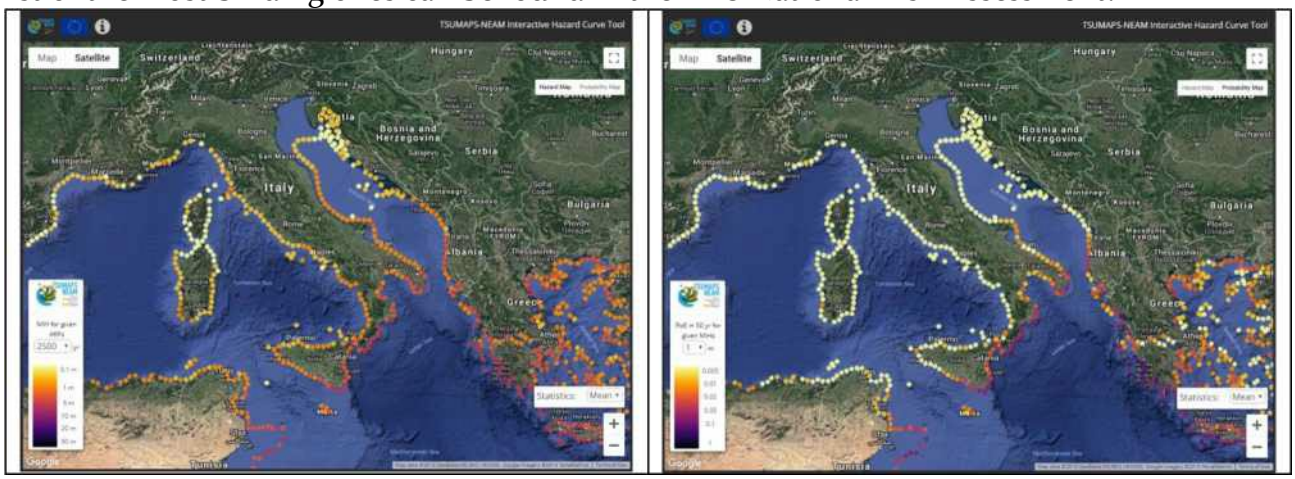


Figure 3 — Maps of danger for ARP = 2500 YR (left) and probability for MIH = 1 m (right) of the Italian coast, extracted from the results of the TSUMAPS-NEAM project.

1.3.1 Update

As regards tidal risk, a feasibility study was launched in 2021 to take stock of data, models, computing capacity and operating chain for the implementation, in the coming years, of a national-level maremote-risk probabilistic model for Italy. The National Institute of Geophysics and Vulcanology (INGV) and the Istituto Superiore per la Protezione e la Ricerca Ambientale (Istituto Superiore per la Protezione e la Ricerca Ambientale — ISPRA) (National Institute of Geophysics and Vulcanology) and the ReLUIS Consortium for the vulnerability, exposure and development of the risk model participate in this study. An indicative time estimate for the issuance of a first prototype model is in the order of 3 years.

1.4 Focus on climate change

Like all countries around the Mediterranean basin, Italy is exposed to climate change effects, with a gradual increase in the frequency and/or intensity of extreme events (rainfall, heat waves, droughts). Climate change risk analyses show that the climate patterns currently available are consistent in estimating a significant increase in temperature until the middle of this century, reaching + 2 °C in the period 2021-2050 (compared to 1981-2010).

The Ministry of the Environment and the Protection of Natural Resources and the Sea (MATTM, now the Ministry of Ecological Transition, MITE) developed and adopted in 2015 the National Strategy for Adaptation to Air Change (SNACC), which outlines the national vision and provides a framework for adaptation. The SNACC encourages more effective cooperation between institutional actors at all national and sub-national levels (state, regions, municipalities) and promotes the identification of territorial and sectoral priorities. The **National Plan for Adaptation to Air Change (PNACC)** is also in the process of being approved. Its aim is to identify the most effective actions in the various climatic areas of the country, in relation to the problems affecting them, and to incorporate adaptation criteria into existing procedures and instruments.

The effects of climate change on the main types of risks related to the water cycle (hydrogeological and hydraulic, snow and avalanches, water crises, forest fires) are dealt with for the entire national territory and according to the different risks, in the relevant national and sub-national plans (for districts and regions). In particular, with reference to an increase in the frequency of weather events characterised by short-term rainfall and high intensity, many regions have in recent years launched in-depth studies on flood hazard and risk assessments, with particular reference to*flash*floods. The results of the studies are progressively taken into account in the context of the Flood Risk Management Plans (FRMPs) and consequently incorporated into local civil protection plans.

1.5 Summary of hydrogeological, hydraulic and adverse weather hazards

As reported in NRA 2018, landslide and flood hazardous areas have been identified throughout the national territory and divided into classes. The perimeter of the areas is carried out by the district basin authorities, which are constantly updated, while ISPRA carries out the patchwork of these areas at nationallevel (http://www.pcn.minambiente.it/viewer/) and determines risk indicators.

The **landslide hazardous** areas (Table 4) are divided into five classes: **very high** hazard (s) (P4); **high** hazardousness (P3); **medium** hazard (P2); **moderate** dangerousness (P1); and **focus areas** (AA). Overall, the areas with landslide and attention hazards cover 59,981 **km²**, or almost 20 % of the entire national territory. The areas with the highest hazard classes (P3, P4) cover almost 1/10 of the national territory.

Dangerousness	Surface area (km2)	national%
P4 — Very high	9.153,06	3,0
P3 — High	16.256,88	5,4
P2 — Media	13.835,76	4,6
P1 — Moderated	13.953,47	4,6
AA — Area of attention	6.782,00	2,2

2 https://www.mydewetra.org/wiki/index.php/QPF_-_Manuale_utente

Total	59.981,17	19,8

Table 4 — Extension of areas with landslide hazards by hazard class (ISPRA 2018).

Flood hazard areas (Table 5) are divided into three classes, according to three hazard scenarios: **high** hazard (s) (P3), with a return time of 20 ≤ TR ≤ 50 years, given by **frequent floods**; (II) **medium** hazard (P2), with a return time of 100 ≤ TR ≤ 200 years, due to **infrequent floods**; and (iii) **low** hazard (P1), with a return time of 300 ≤ TR ≤ 500 years, due **to low flood probability** or extreme event scenarios. Flood hazard areas cover a total area of approximately 32,961 **km²**, or 10.9 % of the national territory. Areas with average P2 hazards cover more than 8 % of the national territory. The district basin authorities are currently finalising the second planning cycle (by December 2021) provided for in the Floods Directive, updating the hazardous areas on the basis of the events that have occurred in recent years and collected on the FloodCat²platform and the results of new modelling, taking into account, where possible, the effects of climate change.

Dangerousness	Surface area (km²)	national%
P3 — high, 20 ≤ TR ≤ 50 years	12.405,23	4,1
P2 — average, 100 ≤ TR ≤ 200 years	25.397,62	8,4
P1 — low, 300 ≤ TR ≤ 500 years	32.960,92	10,9

Table 5 — Extension of flood hazardous areas by hazard class.

There are 7.275 municipalities with P3 and P4 landslides and/or P2 floods. Of these, 1.602 (20.1 %) have only P3 and P4 landslide hazardous areas, 1.739 (21.8 %) have only P2 flood hazardous areas, **and** 3.934 (49.3 %) have both P3 and P4 landslide hazardous areas and P2 flood hazard areas.
Nine regions — Valle D'Aosta, Liguria, Emilia-Romagna, Tuscany, Umbria, Marche, Molise, Basilicata and Calabria — have **100 %** of municipalities affected by areas with P3 and P4 landslide hazards and/or P2 hydraulic hazards. In addition, the Province of Trento, Abruzzo, Lazio, Piedmont, Campania and Sicily have a share of more than 90 % of the municipalities concerned.
As regards risk indicators, the categories of exposed items considered are (i) the **population**, (ii) **buildings**, (iii) **enterprises** and (iv) **cultural goods**.
In areas with **high or very high landslide** hazards (P3 + P4), almost **1,3 million people** (2.2 % of the total population) live, **80.000 businesses** (1.7 % of total businesses) and almost 12.000 **cultural goods** (5.7 % of cultural goods) are involved (see Table 6).

In areas with **medium flood** hazards (P2), more than **6,1 million people** live (10.4 % of the Italian population), almost **600.000 businesses** (12.4 % of production activities) and more than 31.000 **cultural assets** (15.3 % of cultural assets) are involved (see Table 7).

Dangerousness	Population	Buildings	Enterprises	Cultural goods
P4 — Very high	507.894	227.329	31.824	4.741
P3 — High	774.076	323.394	51.124	6.971
P2 — Media	1.685.167	548.500	123.772	10.845
P1 — Moderated	2.246.439	599.813	168.070	13.267
AA — Area of attention	475.887	184.986	28.929	2.023
Total	5.689.463	1.884.022	403.719	37.847

Table 6 — Elements exposed in landslide hazardous areas (ISPRA processing from ISTAT 2011 and VIR 2018 data).

Dangerousness	Population	Buildings	Enterprises	1
P3 — high, 20 ≤ TR ≤ 50 years	2.062.475	487.895	197.565	13.865

P2 — average, 100 ≤ T_R ≤ 200	6.183.364	1.351.578	596.254	31.137
P1 — low, 300 ≤ T_R ≤ 500 years	9.341.533	2.051.126	884.581	39.426

Table 7 — Elements exposed in flood hazardous areas (ISPRA processing from ISTAT 2011 and VIR 2018 data).

Looking ahead, the effect of **climate change** could lead to a significant deterioration of the risk conditions. Changing the rainfall regime, with a likely increase in the frequency of weather events characterised by short-term rainfall and high intensity, could have an impact on the occurrence of loose and alluvial phenomena, in particular surface landslides, sludge or debris, and sudden floods, characterised by high kinematism and lack of predictability, which are among the most dangerous natural phenomena that are most difficult to mitigate by prevention and preparedness.

1.6 Summary of the risk of avalanches

In Italy, the regions and autonomous provinces can be divided into three main categories, on the basis of the seriousness of the snowball phenomena that have occurred and are expected in the regions:

- Regions where the possibility of the occurrence of avalanches is **absent** or **limited to limited areas**. Sicily, Sardinia and Apulia;
- Regions where the possibility of avalanches occurring is **significant but limited to specific territorial contexts**. Liguria, Emilia-Romagna, Marche and Lazio, and to a lesser extent Tuscany, Umbria, Campania, Molise, Basilicata and Calabria;
- Regions in which the possibility of avalanches occurring is significant in large parts of the territory, with possible problems for built-up areas, infrastructure and ski areas. Currently Valle d'Aosta, Piedmont, Lombardy, Veneto, Friuli-Venezia Giulia, Abruzzo and the Autonomous Provinces of Trento and Bolzano.

Risk assessments are carried out in terms of "**degree of exposure**" to avalanches. The assessments are carried out on a different scale, from the local to the sub-regional scale, mainly on the basis of zoning shown in appropriate maps where the **areas of danger from** avalanga**, contained in the PZEV plans**, are delimited. In turn, they represent areas with different levels of exposure to avalanches, in three classes: **high**, **moderate** or **low**. Zoning shall also be carried out using numerical models for simulation of the dynamics of avalanches. Only a few Alpine regions have drawn up and adopted the PZEVs which, at present, assess only the **danger posed** by snowball, not taking into account the elements exposed and their vulnerability, nor the response capacity of the civil protection system and mitigation works, and cannot therefore be regarded as real snowball risk zones.

In order to assess the impact of the risk of avalanches on the population, it is recalled that in the 2019-2020 season, there were **31 accidents involving 52 people**, with **13** deaths, **11** injured and **28** illesis (Table 8). The reduced number of casualties in 2019-2020, the lowest since 2009-2010, is partly due to the*lockdown*imposed by the COVID-19 emergency, which started in March 2020, which reduced mountain excursions.

Winter season	Stranded	Injured	Dead	Illesi
2009-2010	217	48	45	123
2010-2011	109	32	16	61
2011-2012	80	24	9	47
2012-2013	168	33	28	107
2013-2014	120	41	23	56

2014-2015	150	36	31	83
2015-2016	90	16 M	15	59
2016-2017	156	29	49	78
2017-2018	156	39	21 M	96
2018-2019	73	22	15	36
2019-2020	52	11 M	13	328
Total	1371	331	265	774

Table 8 — Consequences on the population of avalanches in Italy since 2009-2020. Source: AINEVA.

Climate change in the Alpine and Apennine areas, having direct effects on air temperature and geographical distribution, the typology, intensity and time of the year during which snowfall occurs, affects the risk of snow and avalanches. An important factor to consider is the increase in snow cover instability, which is affected by sudden and increasingly frequent increases in temperatures, which in turn affect the metamorphism of snow crystals, causing the instability of the snow cover. In the context of climate change, it is crucial for the long-term projection of the risk from snow and avalanches to predict the effects of changes in the geographical location, abundance and frequency of precipitative phenomena, as well as the climatic and meteorological conditions — in particular temperature — that affect the presence of snow on the ground, and the consequent danger from snow and avalanches. As far as the state of knowledge is concerned, this forecast remains difficult and uncertain.

Summary of the risk from water deficit

Italy is one of the European countries most at **risk of drought and water crises**. This is due to a number of reasons, including (i) the geographical location in the centre of the Mediterranean, (ii) therainfall regime characterised by weather inflows concentrated mainly in the autumn and winter seasons and mostly dry summers, and (iii) a temperature trend that favours evapotranspiration processes, in particular in summer. Analysis of the data shows that the national territory has been repeatedly affected by drought periods, most frequently in the last two decades (Table 9).

Year (s)	Territories affected by drought
1921	Liguria, Po Basin, Sardinia, Sicily
1938	Centre-North Italy, Sardinia
1943-1945	Catchment area of the Po
1954	Sardinia, Calabria, Sicily
1959	Liguria, Po and Adige Bacini, Veneto, Tuscany, Sardinia, Puglia
1962	Tyrrhenian coastline, Sardinia, Sicily
1976	Catchment area of the Po
1980-1981	North-west
1988-1990	National territory
1994-1995	Catchment area of the Po
2001-2002	Umbria, Sardinia, Puglia, Basilicata, Sicily
2003	Po Basin, Friuli — Venezia Giulia
2006	Catchment area of the Po
2007	Centre-Nord Italy
2012	Po Basin, Centro Italia
2017	Piedmont, Emilia-Romagna, Marche, Umbria, Lazio
2018	Sicily

Table 9 — List of territories affected by drought events in Italy from 1920 to 2020. Source: Red and Benedini (2020),

DPC, chronological sources.

The **preannouncement** and **assessment** of **water crises** is based on systematic and constant monitoring of weather variables, mainly rainfall and temperatures, and those related to water availability in surface and groundwater bodies, as well as the picture of abstraction, consumption and network losses. The temporal and spatial trends in rainfall and temperatures are compared with the historical reference averages, typically with the most recent 30 climatic years for which data are available, to detect **negative rainfall anomalies**, which could lead to water reduction conditions, and **positive thermometric anomalies,** which could lead to higher consumption in the various sectors of use (drinking water, irrigation, industry, energy) and greater evapotranspiration, leading to a reduction in the volume of available water resources. These studies focus on short/medium time intervals and need to be complemented by studies to identify the frequency of drought phenomena on larger time frames and the assessment of drought impacts.

As regards the climate scenarios expected for Italy, the different models agree in estimating a temperature increase of up to 2 °C in the period 2021-2050 (compared to 1981-2010). In recent years, the **effects of climate change**, in particular the reduction and marked variability of weather inflows, as well as the marked rise in temperatures, have been particularly visible, leading to a reduction in available water resources and a deterioration in the quality of resources closely linked to quantitative aspects. The main current and long-term challenges are therefore the increase in demand for water resources, the conditions leading to reduced resource availability and the negative effects of drought.

1.8 forest fire risk summary

The initiation and spread of forest fires are favoured by climatic and vegetative conditions, but their main causes are anthropogenic; the Carabinieri weapon reports show that almost 90 % of forest fires have **anthropogenic causes** (accidental, negligent or malicious), around **10 %** are due to **unknown causes**, while **natural** causes account for only**1 %** of events. The Italian data therefore confirm that forest fires are a **risk of a largely anthropogenic nature**, which has its effects on the territory also on the basis of natural conditions; in this context, the response capacity of the forest, regional and state fire-fighting system plays an important role in limiting the effects that fires cause. From 2000 until 2020, more than **130.000** forest fires were surveyed, which burned approximately 7,800 **km²** of **wooded area**. The area doubles when considering also fires in non-wooded areas, with an annual average of approximately **720 km²**. The regions most affected by forest fires, in terms of total burnt area, are Sicily, Sardinia, Campania, Calabria, Lazio and Puglia; in 2020, these accounted for almost 90 % of the total national burnt area.

In Italy, there are more regional forest fire risk maps, which take into account the characteristics and parameters of the regional context under investigation. Regional **forest fire plans** are drawn up on the basis of these maps. Quantitative data on the number and extent of forest fires are also useful parameters for classifying municipalities by forest fire risk level (ISPRA, 2020), which are in turn used to draw up the 'Regional Forest Fire Prevention, Prevention and Active Prevention Plan' provided for by Law No 353 of 21 November 2000.

At national level, in order to assess and quantify the consequences of forest fire risk, with the aim of improving forecasting and response capacity, the DPC has produced a national synoptic forest fire risk mapping. The mapping shows the probability of forest fire, defined as **Probability of Fire Propagation**, the value of which depends on the normalised ratio between the total burnt

area and the total area occupied by a particular vegetation cover, which varies significantly throughout the year.

The effects of ongoing and expected **climate change** in general can increase — even significantly — the risk conditions from forest fires. In Italy, climate projections agree that there will be an increase in heat waves and droughts characterised by no or insufficient rainfall and resulting water shortages, even prolonged. Taken together, these climatic events contribute to an increase in the number of days during which vegetation is in a condition conducive to the initiation and spread of forest fires, with an increase in the duration of the 'fire season'.

2 part II Risk management capability assessment

In this second part of the document, questions 9 to 20 of *Reporting Guidelines 2019/C 428/07 were taken into account*; some points have been merged.

2.1 Regulatory, procedural and institutional framework

Application No 9 of *Reporting Guidelines* 2019/C 428/07

The legal and procedural framework is defined at national and sub-national level by the Code, which provides for SNPC as a system for predicting, preventing (structural and non-structural) and mitigating risks, managing emergencies and overcoming them (Article 2). On the basis of the provisions of the Code, processes for reviewing and drawing up/updating implementing provisions and guidelines are in place. Therefore, not all the management aspects identified in the Code have so far been fully implemented.

In view of the fact that in Italy significantly different assessment and management processes have been defined for each of the major risks to which the country is subject, please find below a brief summary of the risks which were dealt with in the 'Assessment of Risk Management Capacity in Italy' of August 2018.

According to Article 18 of the Code, civil protection planning at the different territorial levels is based on the identification of scenarios and is aimed at:

a) the definition of the operational strategies and the intervention model containing the organisation of structures for carrying out, in a coordinated form, civil protection activities and operational response for the management of disasters planned or in place;
b) to ensure the provision of information to the National Service's alert bodies;
c) the definition of communication flows between the operational components and structures of the National Service;
d) the definition of mechanisms and procedures for reviewing and updating planning, organising exercises and providing information to the public, to be ensured even during an event.

In addition, it is also foreseen that the participation of citizens, individuals or associates, in the process of developing civil protection planning will be ensured.

2.2 Roles and responsibilities of competent authorities and stakeholders

Questions 10 and 11 of *Reporting Guidelines* 2019/C 428/07

Article 3 of the Code governs the roles and responsibilities of the various branches of the SNPC. The national service includes the civil protection authorities which, in accordance with the

principle of subsidiarity, differentiation and adequacy, guarantee the unity of the system by exercising, in relation to their respective areas of government, the political leadership in the field of civil protection, and which are the Prime Minister, the Presidents of the Regions and Autonomous Provinces of Trento and Bolzano, the mayors and the mayors of Metropolitans. In accordance with their respective legal systems and within the framework of the Code, they shall work with reference to the areas of government of the respective authorities referred to above:

1) the Department of Civil Protection, which shall be used by the President of the Council of Ministers in order to guide and coordinate the National Service and to ensure unity of national representation to the European Union and international civil protection bodies, without prejudice to the powers of the Ministry of Foreign Affairs and International Cooperation, as well as the Prefectures — Territorial Government Offices;
2) the Regions with shared legislative powers in the field of civil protection and the Autonomous Provinces of Trento and Bolzano having exclusive legislative powers in the areas provided for by the Special Statute and its implementing rules;
3) municipalities, including in aggregate form, metropolitan cities and provinces as large entities referred to in Law No 56 of 7 April 2014, in accordance with the organisational arrangements laid down therein.

The SNPC consists of components (Article 4 of the Code), operating structures and competing entities (Article 13 of the Code). The Code identifies different types of risk (Article 16 of the Code), for which support from the Scientific Community (Article 19 of the Code) is provided through the Competence Centres (Article 21 of the Code) and the technical and scientific advice of the Grand Risks Commission (Article 20 of the Code). The SNPC is represented in the Civil Protection Operational Committee, which, in addition to ensuring uniform direction and coordination of emergency activities, is convened to share operational strategies in the context of national civil protection planning (Article 14 of the Code).

The Prime Minister uses the DPC to carry out a number of tasks, including the preparation and coordination of the implementation of the national plans for specific risk scenarios of national relevance and the national rescue programmes (described below). The DPC ensures the coordination and management of integrated structural prevention action plans, limited to publicly owned structures and infrastructure, and not of a structural nature for civil protection purposes, which are generally aimed at reducing risks (Article 22 of the Code).

However, it should be pointed out that planning at all levels also requires the coordination and collaboration of operational structures (Article 13 of the Code). The distribution of roles and functions is assigned in accordance with the principle of subsidiarity, defined in relation to civil protection emergencies on the basis of the definition of the event referred to in Article 7 of the Code:

a) emergencies linked to natural disasters, which can be dealt with by means of workable measures, by the individual competent authorities and bodies acting on a regular basis;
b) emergencies related to catastrophic events which, by their nature or extent, involve coordinated action by several bodies or administrations, and must be dealt with by means and powers of an extraordinary nature or powers;
c) major national emergencies linked to catastrophic events which, because of their intensity or extent, must be dealt with immediately by means of extraordinary means and powers.

2.2.1 Seismic risk

As regards engineering aspects related to seismic risk, vulnerability and exposure, two CDCs of the DPC (EUCENTRE Foundation and Consortium ReLUIS) have, among other tasks, the provision of technical and scientific advice for seismic risk assessment and reduction, and support for activities related to seismic prevention programmes and the drafting of technical standards. Other CoCs, such as the Institute of Environmental Geology and Geo-Engineering of the National Research Council, contribute to the assessment of specific aspects, such as those relating to the amplification of soil motion and cosismic effects, as well as their implications for planning.

2.2.2 Volcanic risk

In the activities of managing volcanic risk, responsibilities, roles and functions are defined by Dir. PCM of 14 February 2014 "Vesuvio — Rossa Zone", by Dir. PCM of 16 November 2015 "Vesuvio — Zone Gialla", by the Prime Ministerial Decree of 24 June 2016 "Campi Flegrei — Rossa and Gialla Areas" and by Decree of the Head of the Civil Protection Department of 2 February 2015 issuing the "Indications to the components and operating structures of the National Service for the updating of emergency planning for the evacuation of the population of the Red Area of the Vesuvian area". For volcanic risk, monitoring of physical and chemical parameters, surveillance and deepening of knowledge, the role of the scientific community, experts and CoCs is laid down in the Code.
In addition, Legislative Decree No 381/1999 identifies INGV as the structure of the SNPC, entrusting it, inter alia, with the functions of seismic and volcanic surveillance in Italy.

2.2.3 Risk from landslides and floods

The legislation in force **assigns to the district basin** authorities, under the coordination of the MITE, the task of carrying out risk assessment for the purposes of spatial planning and planning and planning structural risk mitigation measures, as well as defining constraints and safeguards for areas with varying hazards and risks. The Regions, in coordination with the DPC, are entrusted with the management of the national hydrogeological and hydraulic risk alert system, under which the risk assessment is carried out with a view precisely to alerting in 'real time', as defined in Ministerial Decree No 27/02/2004.

As regards hydraulic risk in particular, the Floods Directive 2007/60/EC addresses the issue of flood assessment and management as a whole, providing for the adoption of FRMPs which 'cover all aspects of risk management and, in particular, prevention, protection and preparedness, including flood forecasts and allergic systems, and take into account the characteristics of the catchment area or sub-basin concerned'. In view of this, Legislative Decree No 49/2010, the Decree transposing the Floods Directive, identified as the competent authorities for the assessment and management of hydraulic risk, in addition to the DPC, MITE, ISPRA, district basin authorities, regions and autonomous provinces. That provision thus expressly defined the division of administrative powers (Article 3).

2.2.4 National Commission for the Examination and Prevention of Great Risks

The National Commission for the Precasting and Prevention of Great Risks (CGR) is the technical and scientific advisory body of the DPC, whose function is to providescientific and technical advice on questions put by the Head of Department for Civil Protection and to make proposals to improve the capacity to assess, predict and prevent the various risks. The CGR, established by Law No 225 of 1992 and confirmed in the Code (Article 20), consists of a Bureau and four areas

relating to seismic and tidal risks; (II) volcanic risk; (III) hydraulic, hydrogeological, adverse weather, water deficit and forest fire hazards; and (iv) human and technological risks (chemical, nuclear, radiological, technological, industrial, transport, environmental, sanitation and uncontrolled re-entry of space objects and debris)3.

2-3 procedures and measures at national, subnational and local level

Application No 12 of *Reporting Guidelines* 2019/C 428/07

Management of emergencies

The management of national emergencies is the responsibility of the DPC, whose headquarters are h24, the Central Functional Centre — Meteo Sector, Idro and the National Coordination Centre known as **SYSTEM**, which includes, in addition to the Situation Room Italy, the Unificato Aereo Operativo Centre and the Operational Centre for Maritime Emergencies. The system is responsible for monitoring the national territory in order to identify and monitor emergency situations, and for alerting and activating the various components and operational structures of the SNPC that contribute to the management of emergencies. The Central Functional Centre — Vulcanico and Sismico Sectors is also active at h12.

In the event of an event, planned or ongoing, **the Crisis Unit may be activated in** support of the Emergency Operations Director.

The entire system of procedures, i.e. the emergency response mechanism, is defined by specific directives:

- Prime Ministerial Decree of 3 December 2008 'Organisation and operation of the system at the Italian DPC Situation Room';
- Prime Ministerial Decree of 3 December 2008 "Operational guidelines for emergency management".

In the context of civil protection emergency planning, the **intervention model, which defines** the roles and responsibilities of the various actors involved, the flow of communications and the places of operational coordination, structured by Support Functions, is essential, in which all the bodies and administrations, in various capacities, are responsible for each type of activity. **The regional intervention model** identifies the criteria and procedures for intervention of the regional civil protection system in the event of an emergency, with reference to the principle of subsidiarity and with particular regard to the aspects of relief, assistance to the population and restoration of continuity of administrative action.

The **National Organisational Structure**, divided into support functions, is independent of the location of the event for which it is activated and is intended to

3Prime Ministerial Decree of 16 September 2020.

coordinate and manage the actions of the national level in emergency situations.

The **organisational model** for the response is linked to the predictability or otherwise of the phenomena. If an alert system is in place, the next step is to determine the levels of risk, defined on the basis of hazard scenarios or ongoing events, to the relevant operational phases, which define the actions to be taken by the administrations involved. This condition shall ensure, as far as possible, a modular activation of the system.

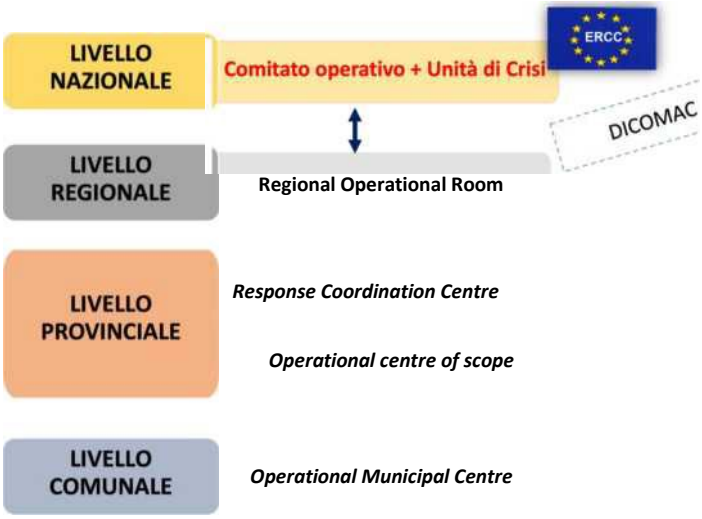


Figure 4. Outline of the different levels of territorial and local coordination.

In the event **of emergencies of a national nature** (Fig. 4), at central level, the coordination and uniform direction of emergency activities are ensured by the **Operational Committee for Civil Protection** (Article 14 of the Code and Prime Ministerial Decree of 27 May 2019), made up of representatives of all the operational structures, bodies and institutions directly involved in the management of the emergency, and which links the actions of the administrations and bodies involved in relief and assistance to the population as pillars of the first emergency.

If deemed necessary, a **Headquarters and Control Directorate (Di.COMa.C.)**, or a national coordination structure for emergency management, may be set up on the spot to ensure liaison with the local operational centres.

Operational and coordination centres operate on the ground at the various levels of responsibility (municipal or inter-municipal, provincial, regional and national), depending on the intensity and extent of the emergency event, in order to ensure coordination of rescue activities, in relation to the response capacity of the area concerned. In 2015, the DPC issued specific 'Operational Indications for the identification of Operational Coordination Centres and Emergency Areas', defining criteria of a structural, logistical nature and adequate functionality in relation to exposure to the risks present in the area.

For the management of emergencies and return to normal for national events, the Code provides for various legal and **administrative instruments** which guarantee a wide operational capacity, in particular:

- Statement of the state of deployment of the SNPC;
- Resolution of the state of emergency of national significance;
- Civil protection orders;
- Orders to facilitate return to the ordinary in the event of national emergencies (post-

emergency).

Finally, in the context **of the National Emergency** Plans (referring to specific risk scenarios of national importance) and the **National Rescue Programmes** (containing the intervention model for organising the operational response in the event of or in view of national disasters), structures and infrastructures are identified that are useful for emergency management and reference for the preparation of descending plans.

Civil protection planning

Civil protection planning is a system activity, to which all relevant actors, institutionally and territorially, must participate, thus ensuring vertical cooperation between national, subnational and local authorities. In this regard, the recent Prime Ministerial Decree of 30 April 2021 laying down*guidelines for the preparation of civil protection plans at the various territorial levels*aims to standardise the civil protection planning method, both in terms of the content of the civil protection plan at the various territorial levels, in organisational terms and in the methods for approving, updating and evaluating plans, as well as with regard to public participation, information and communication to the public.

The responsibilities for risk planning are assigned in a relevant manner under the Code and, for some risks, under sectoral regulations, as described below.

2.3.1 Seismic risk

Annex 2 of the Prime Ministerial Decree of 14 January 2014, containing the 'National seismic risk relief programme', sets out the civil protection organisation and the information on the territory to be drawn up by the Regions and Autonomous Provinces in agreement with the Prefecture-UTG and the local authorities, subject to the agreement of the DPC. Almost all regions are continuing the planning process aimed at identifying the strategic elements set out in the above-mentioned Annex.

2.3.2 Volcanic risk

The first civil protection planning activity for the Flegrei Campi was carried out in 1984 following the bradismic crisis; subsequently, in 1995, the Vesuvio Area Plan was drawn up and both were updated in 2001. Over the years, after a long process of studies and analyses, the new red and yellow areas for Vesuvio and Flegrei Campi have been identified on the basis of the available scenarios. In particular, the red area is the area at risk of invasion of pyroclastic flows, for which preventive evacuation is envisaged as the only safety precaution for the population; the Gialla area is the area outside the red area which, in the event of an eruption, is exposed to the significant spillage of volcanic ash for which provision is made for temporary removal measures for the population living in buildings made vulnerable or difficult to access by the accumulation of ash (Fig. 5). On the basis of dangerous and vulnerable studies carried out by the scientific community, as well as civil protection assessments, the Red and Gialla areas have been demarcated by the DPC, together with the Campania Region and the municipalities concerned. The overall strategy for transferring the population from red areas to twinned regions and autonomous provinces has also been identified.

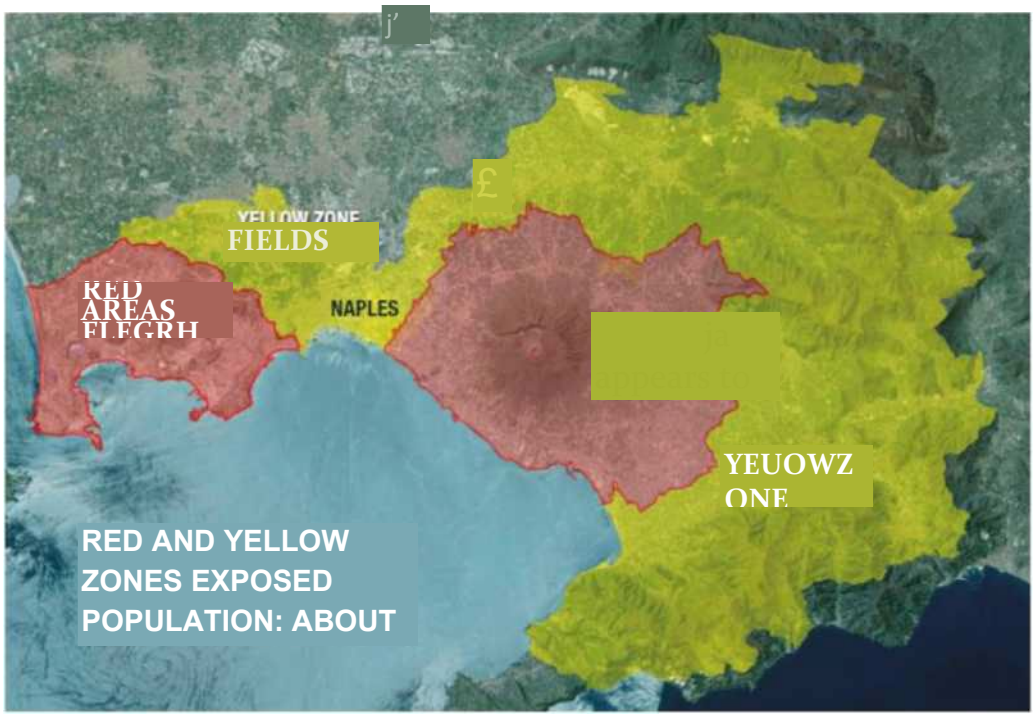


Figure 5 — Red area and Gialla area for Vesuvio and Flegrei Campi.

In detail, the main legal references are as follows.

- For **Vesuvio**, Dir. PCM of 14 February 2014 lays down provisions for updating national civil protection planning for volcanic risk in Vesuvio. It defines the new red area and the general intervention strategy, which provides for the displacement of the population from other regions and autonomous provinces. Furthermore, Dir. PCM of 16 November 2015 was adopted for the definition of the Gialla area, which is subject to the spillover of pyroclastic material.
- For **Flegrei Campi**, the Prime Ministerial Decree of 24 June 2016 contains 'Provisions for updating the contingency planning for volcanic risk in Flegrei Campi'. The document delimits the red area and the Gialla area, defines the twinning between the Flegrei municipalities and the regions and autonomous provinces and identifies the overall intervention strategy. The 'Indications relating to the updating of emergency planning for the precautionary evacuation of the population of the Red Area of the Vesuvian area', which also apply to the Flegrei Campi area, were developed by the DPC in a document dated 2 February 2015.
- For **Etna** and **Stromboli**, alert procedures were developed and the alert **levels were updated in 2021,** as mentioned in Part I of this document. In 2015, the latest version of the national emergency planning for the Isle of Stromboli was approved, setting out the main activities to be carried out to deal with a tidal event triggered by a landslide of significant portions of the Fire Sciara, which nevertheless requires the activation of the national level of civil protection. In addition, in 2021, the 'Procedures related to the automatic activation of Early-Warning experimental systems for *parosistic* and tidal explosions generated by volcanic activities in Stromboli' were formalised.
- For **Vulcano**, the **alert levels and the National** Civil Protection Plan for volcanic risk were updated in 2021. In addition, the decision to move to the **yellow** alert level has recently been taken for the Isle of **Vulcano**.

2.3.3 Tidal risk

Dir. PCM of 17 February 2 017 set up the National Allocation System for earthquake-generated

shrimp (Siam), consisting of INGV, ISPRA and DPC, which work in synergy, each for their own competences, to alert the municipal authorities along the Italian coast as soon as possible. The DCDPC of 2 October 2 018 gave guidance to the components and operating structures of the SNPC for updating civil protection planning at the various territorial and institutional levels, in view of the tidal risk present on the coasts of the area in question.

2.3.4 Hydrogeological and hydraulic risk

Planning takes place at river basin district level, including measures addressing risk management and risk reduction from a prevention and preparedness perspective.

Drainage plans for hydrogeological development, drawn up by the District Basin Authorities (ABD), are the first main national measure to prevent hydrogeological and hydraulic risks at the river basin district scale.

Flood risk management plans, drawn up in implementation of Directive 2007/60/EC, consist of two parts. The first, drawn up by the district basin authorities, concerns the river basin planning activity provided for by Legislative Decree No 152/06. The second, drawn up by the Regions and Autonomous Provinces for each district in coordination with each other and with the DPC, concerns the system of forecasting, monitoring and surveillance and national alerting to the weather, hydrogeological and hydraulic risks referred to in the Ministerial Decree of 27 February 2004.

On the basis of the planning referred to above, the bodies concerned draw up civil protection plans at the various geographical and organisational scales and comply with their urban planning requirements.

At national level, plans for the planning of hydrogeological risk reduction measures are drawn up, such as:

The national plan for hydrogeological risk mitigation, restoration and protection of environmental resources, approved by the Prime Ministerial Decree of 20 February 2019,**is**a complex national measure to prevent hydrogeological and hydraulic risks.

2019 plan for immediate shipbuilding, approved by Decision No 35 of the CIPE of 24 July 2019, is a national measure for the prevention of hydrogeological and hydraulic risks, investing in immediate shipbuilding operations relating to landslides, floods and coastal erosion phenomena identified by the MATTM on the basis of urgent and permanent criteria.

Operational plan for hydrogeological instability for 2019, approved by Prime Ministerial Decree of 2 December 2019, is a national measure to prevent hydrogeological and hydraulic risk, investing, with resources from the Development and Cohesion Fund 2014-2020, in measures to reduce hydrogeological risk and coastal erosion.

These national plans are drawn up on the basis of district planning and knowledge of the necessary measures set out **in the National Register of Measures for Soil Protection**, managed by ISPRA. The Directory is a national preventive measure which aims to establish and maintain a uniform framework of the works and economic resources involved in soil protection and the mitigation of hydrogeological and hydraulic risks.

The main non-structural preventive measure is the **national, state and regional alert system,** implemented through the network of functional centres, which is central to the DPC and the regional authorities in the Regions and Autonomous Provinces.

2.3.5 Risk from water deficit

Planning takes place at national, river basin district and individual regional level, and includes measures addressing the complex and multifaceted issue of water deficit risk mitigation, both from the prevention and preparedness point of view.

National action plan in the water sector aims to plan and implement, at national level, actions to mitigate drought damage and to upgrade and adapt water infrastructure for different areas of use (drinking water, irrigation, etc.).

Permanent observatories on water uses are operational structures for forecasting and monitoring water resources, their uses and consumption, within each river basin district. Observatories are the main measure of *governance* of water resources and water deficit crises, based on cooperation between the various actors and stakeholders, with a focus on territorial specificities and needs. Observatories act as a steering booth for forecasting and managing water crisis and drought events, and are an important water emergency preparedness measure.

Water Management Plan, drawn up by the ABD, is a preventive, cognitive, regulatory and technical/operational measure by which the necessary actions are planned and planned to ensure that the environmental objectives and objectives set out in Articles 1 and 4 of Directive 2000/60/EC are met.

National Rural Development Plan and Regional Rural Development Plans are prevention measures — and Community programming instruments — in the agricultural sector, at national and regional level respectively. Co-financed by the European Agricultural Fund for Rural Development (EAFRD), the NRP 2014-2020 is a set of preventive measures through which MIPAAF supports and develops the potential of rural areas in Italy.

2.3.6 Risk from snow and avalanches

On 12 August 2019, the Dir. PCM on alerting and local civil protection planning in the field of avalanches was issued. The purpose of the measure is to provide support to the Regions and Autonomous Provinces, affected by the risk associated with avalanches, for the preparation of regional guidelines for civil protection planning at local level in anthropogenic areas and the drafting of alert messages.

2.3.7 Risk of forest fires

Under the Framework Law on forest fires No 353 of 2000, the Regions are responsible for organising the activities themselves. In support of these activities, guidelines were issued by Ministerial Decree of 20 December 2001 on regional plans for planning activities to anticipate, prevent and actively combat forest fires. Therefore, each region in its own planning defines actors, procedures and resources to be allocated. At national level, through the DPC, it is responsible for managing the State's aerial firefighting fleet and issuing general guidelines on forest firefighting. CDPC No 1551 of 10 April 2018 also established an **interinstitutional technical table**, made up of representatives of the Regions and Autonomous Provinces and representatives of the relevant operational structures, to monitor the forest fire-fighting sector and propose operational solutions. Finally, Decree-Law No 120 of 8 September 2021 laying down provisions to combat forest fires and other urgent civil protection measures, converted, with amendments, into Law No 155 of 8 November 2021, provides for extensive implementation of measures relating to prevention, prevention and active combating of forest fires, in order to supplement and strengthen the existing regulatory and operational arrangements, while respecting the

responsibilities and autonomy of the Regions and Autonomous Provinces and in accordance with the principles underlying the 2000 Framework Law.

2.3.8 Risk of marine pollution

Article 11 (4) of Law No 979 of 31 December 1982 defines the powers of the DPC in the field of pollution of the sea by oil or other harmful substances in the event of a national emergency. With regard to this issue, the DPC drew up the 'National Emergency Response Plan to protect against pollution of oil and other harmful substances caused by marine accidents', published in Official Gazette No 271 of 19 November 2010, which applies to all possible marine or coastal pollution, irrespective of the sources and situations giving rise to them, when the national state of emergency has been decided, and lays down the operational procedures for action by the DPC and the central and peripheral components and structures of the National Civil Protection Service, coordinated by the Department itself. Work is ongoing to update the 2010 plan, aimed at defining and deepening the aspects of *governance* and the model of action, also in the light of the changed regulatory framework.

2.3.9 Health and hygiene risk

Article 16 (2) of the Code states that, without prejudice to the powers of the entities normally identified under current sectoral legislation and the resulting activities, SNPC may also act in relation to various types of risk, including health and hygiene risks.

Following the **declaration by the State of Emergency** (Decision of the Council of Ministers of 31 January 2020) concerning the health risk and the occurrence of diseases arising from transmissible viral agents, coordination of activities was entrusted to the Head of the DPC, who immediately convened the Operational Committee (see point 2.3) in a permanent session and activated the operational components and structures of the SNPC. In parallel, the Crisi Unit was also activated to facilitate the connection of the internal operational organisation and the connection with the area affected by the health emergency.

The DPC (under OCDPC No 630 of 3 February 2020) established the **Technical Scientific Committee**, whose task is to give opinions on the adoption of the most appropriate preventive measures necessary to tackle the spread of diseases arising from transmissible viral agents. The coordination activity was based on health indications defined by the Ministry of Health, with the technical and scientific support of the National Institute of Health in the field of public health.

In managing the COVID-19 emergency, the Operational Committee implemented the provisions **of the intervention model for the management of the national emergency** (see point 2.3) at the various territorial levels — national, regional, provincial and municipal — ensuring links with the Regions and Autonomous Provinces, Prefectures and Municipalities. Continuity of the communication flow and the optimisation of available resources have been ensured in this handbook.

The DPC also considered it necessary to issue the following documents in order to provide the necessary guidance to the components and operating structures of the SNPC:

1) Civil protection operational measures for the management of the COVID-19 epidemiological emergency. The document refers to the establishment of operational centres, the associated flow of communications and the instructions on the procedures to be put in place in relation to the emergency situation in place, at all territorial levels.
2) Operational measures for the components and operating structures of the SNPC for the

management of other emergencies in connection with the COVID-19 epidemiological emergency. The document refers to the definition of the activities to be implemented by the system if, in conjunction with the COVID-19 epidemiological emergency event, any catastrophic event occurs that may lead to the need to manage a civil protection emergency.

At its meeting of 25 January 2021, the State-Regions Conference endorsed the agreement on the **National Strategic Operational Plan for Preparedness and Response to an** Influenza PanFlu (**PanFlu 2021-2023**). Italy has therefore adopted an updated plan drawn up on the basis of the recommendations of the World Health Organisation, which replaces the previous pandemic influenza plans. The 2021-2023 influenza pandemic plan identifies key actions for the next three years for different operational dimensions. In addition, it defines the roles and responsibilities of the National Health Service in preparing for and responding to an influenza pandemic, in the context of the response of all the bodies and institutions of the national government, within the framework of the State of National Emergency, which such an event would entail, in accordance with Article 24 of the Code. The overall objective of the influenza pandemic plan is to strengthen preparedness to respond to a future influenza pandemic at national and local level.

2.4 cross-border, interregional and international procedures and measures

Application No 13 of *Reporting Guidelines* 2019/C 428/07

Please refer to Chapter **3** of this document.

2-5 climate change adaptation measures

Application No 14 of *Reporting Guidelines* 2019/C 428/07

With regard to the main types of risk linked to climate change, as identified in Part I of the risk assessment, namely hydrogeological and hydraulic risks, from snow and avalanches, water deficit and forest fires, the **National Plan for Adaptation to Air Change** (PNACC) referred to above, which is currently in the process of being approved, provides a tool to support national, regional and local institutions in identifying and selecting the most effective actions in the various climatic areas of the country, in relation to the problems affecting them and for integrating adaptation criteria into existing procedures and instruments. In addition, the Conference of Regions and Autonomous Provinces, in order to establish a common framework for the implementation of the strategy and the national plan at the various territorial levels, adopted**the 'Guidelines for regional climate change adaptation strategies**'.

- The likely increase in the frequency of extreme precipitation events characterised by high intensity and short duration, has a strong impact on **hydrogeological and hydraulic risk**, the mitigation of which is a priority and requires the strengthening of prevention and preparedness measures, from the river basin scale or its aggregations to the municipal scale. One of the main measures is the alert system for the activation of the SNPC. This includes Dir. PCM of 23 October 2020 on Civil Protection Allocation and Public Alert System IT-alert, which aims to ensure a coordinated framework of terminology and definitions throughout the national territory and integration between the civil protection systems of the various territories. In addition, we would point out that Article 2 of the Code includes a dynamic term in the definition of forecasting activities to take account of developments in long-term climatic conditions (activities 'aimed at identifying and investigating possible risk scenarios,

including *dynamic* studies' and their subsequent evolution).

- The **PNACC** for hydrogeological and hydraulic risks provides for a complex and articulated system divided into 5 main macro-sectors. The macro-sectors identified concern the improvement of knowledge and technology transfer, the improvement of territorial monitoring, the development of foresight and alert systems, the improvement of emergency management, the preparation and information of the population and structural defence measures. Each of these macro-sectors, which are considered equally strategic, is then divided into different classes of measures.

- In Italy, the **risk from snow and avalanga** varies across the territory depending on morphological and climatic factors, and is strongly linked to the tourist presence in mountain areas and the presence of buildings and infrastructure. Climate change in the Alpine and Apennine areas, with direct effects on air temperature and geographical distribution, typology and intensity of rainfall, has an impact on the risk of snow and avalanches. An important factor is also the increase in the instability of snow cover, which is affected by sudden and increasingly frequent increases in temperature. The key to addressing this risk is the ability to provide homogeneous guidance at national level to ensure planning actions on a sub-national basis. The operational guidelines for the functional and organisational management of the national alert system and for national civil protection planning are contained in the Prime Ministerial Decree of 12 August 2019 and are jointly a risk prevention and emergency preparedness measure. In addition, map documentation tools exist on the territory at regional and sub-regional level, the 'Charters for the Probable Localisation of Valanghe' and the 'Carte dei Siti valanghivi', which make it possible to know the geographical demarcation and the hazard characterisation of avalanches, together with the information on the risk adopted at regional level and contained in the plans for the avalanche Exposure Areas.

- Analysis of the data shows that the Italian territory has been repeatedly affected by drought periods, more frequently in the last 20 years, and similarly climate projections agree that the frequency of heat waves and droughts is expected to increase, resulting in prolonged water deficits. This increases the **risk of water deficit** and the **risk of forest fires.**

- With regard to the **risk of a water deficit**, the adoption of 'proactive' prevention strategies based on the announcement of water crises within the broadest possible period of time makes it possible for the authorities responsible to implement measures to combat water as soon as possible, and thus minimise the impact. The measures are mainly implemented at the level of the river basin district and individual regional territories. The national unit guidelines integrated with the entire hydraulic risk management sector, through sectoral plans, make it possible to avoid misalignments in intervention policies for the management of water demand and water availability. The evaluation activities are carried out by a number of institutional bodies in the context of the already **mentioned district observatories on water uses**, a measure **of the Water Management Plans** (WMP), with the aim of ensuring the *governance* of the water resource in implementation of **Directive 2000/60/EC** and coordinating the implementation of the actions necessary for the proactive management of extreme drought events. With regard to this risk, the PNACC identifies a complex integrated system of measures aimed at (i) strengthening the regulatory and planning framework; (II) improve water management capacities; (III) promoting the conservation and efficient use of water resources; and (iv) protecting ecological integrity and improving the resilience of aquatic ecosystems.

- For the **risk of forest fires**, other factors indirectly linked to climate change, such as changes in land use and cover, land abandonment and expansion of urban areas, contribute to this risk. The key to tackling this is the ability to provide homogeneous guidelines at national level

that guarantee or facilitate regional planning interventions. To this end, Decree-Law **No 120 of 8 September 2021**, converted into law on 3 November 2021, provides for the adoption of a National Plan, reassessed every three years, to strengthen coordination, technological updating and increase operational capacity in anticipation, prevention and active combating of forest fires.

2.6 critical infrastructure protection measures

Application No 15 of *Reporting Guidelines* 2019/C 428/07

In the Italian regulatory framework, the issue of 'critical infrastructure' is covered by Civil Protection Order No 3274/2003, Article 2 (3) of which states that '[t]*he obligation is to carry out checks on buildings of strategic interest and infrastructure works whose functioning during seismic events is of fundamental importance for the purposes of civil protection, and of buildings and infrastructure works which may be relevant in relation to the consequences of any collapse*'.

The resulting DCDPC of 21 October 2003 defines two lists of buildings and infrastructure works of State competence, of strategic interest, whose functionality during earthquakes is of fundamental importance for civil protection purposes, or which may be relevant in relation to the consequences of a possible collapse.

The listed buildings are wholly or partly dedicated to hosting command, supervision and control functions, operating rooms, transmission facilities and installations, databases, logistical support facilities for operational staff (accommodation and provisioning), facilities for logistical activities in support of civil protection operations (storage, handling, transport), facilities for assistance and information to the population, hospital facilities and facilities. The infrastructure works listed are:

- Motorways, state roads and related works of art;
- Airport stations, heliports, ports and maritime stations included in emergency plans, as well as installations classified as large stations;
- Facilities connected with the operation of inter-regional water pipelines, the production, transport and distribution of electricity to medium voltage installations, the production, transport and distribution of combustible materials (such as oil pipelines, gas pipelines, etc.), the operation of national communication services (radio, fixed and mobile telephony, television);
- Works of art relating to the system of great road and rail traffic, the collapse of which may have serious consequences in terms of loss of life or prolonged disruptions of traffic;
- Large dams.

Subsequently, Article 2 of Directive 2008/114/EC on the identification and designation of European critical infrastructures and the assessment of the need to improve their protection provides the following definitions: '*For the purposes of this Directive, the following definitions shall apply: (a) 'critical infrastructure' means an element, system or part thereof located in Member States which is essential for the maintenance of vital societal functions, health, safety, security and economic and social well-being of citizens and the disruption or destruction of which would have a significant impact in a Member State due to the inability to maintain those functions; (b) 'European Critical Infrastructure' or 'ECI' means critical infrastructure located in Member States the disruption or destruction of which would have a significant impact on at least two Member States. The significance of the impact shall be assessed in terms of cross-cutting criteria. This includes*

effects arising from cross-sector dependencies in relation to other types of infrastructure.'

The definitions are similar to those set out in Legislative Decree No 61/2011 transposing the European Directive into national law. In this context, critical infrastructure is also part of the risk assessment. In particular, under the Code, the DPC ensures the coordination and management of integrated structural and non-structural prevention action plans for civil protection purposes relating to publicly owned structures and infrastructure, with a view to overall improvement of emergency management and risk reduction, with the involvement of the components and operational structures of the SNPC.

The DPC, with regard to Critical Infrastructure Operators, maintains an operational link with the main national-level energy distribution, telecommunications, road and rail infrastructure operators at the various stages of the risk management cycle, in accordance with Article 2 of the Code.

In addition to the actions for which it is responsible for managing the emergency, the relationship between the DPC and the managers takes the form of close cooperation aimed at understanding the civil protection system, developing training at territorial level on civil protection issues and ensuring knowledge of the models of intervention. The inclusion of managers in the civil protection system gives them greater knowledge of risk prevention and forecasting tools and enables them to participate in planning activities, including through the conclusion of specific agreements and memoranda of understanding.

With regard to the main risks, please note the following.

2.6.1 Seismic risk

In drawing up probabilistic assessments of seismic risk at the national level, only residential buildings are taken into account, while infrastructure is also taken into account when calculating specific event and impact scenarios. The simplest way to take them into account is to take them into account when calculating the exposures, which is the model for calculating the damage scenario used by the DPC in the first hour after an earthquake. More elaborate impact scenarios, developed through a platform developed by the EUCENTRE Foundation for the DPC, may take into account observed ground shielding, for example measured by the DPC's National Accelerometric Network (RAN), and also carry out analyses on the possible level of damage to some infrastructure, such as bridges and viaducts, also with a view to an initial assessment in principle of the reachability of the affected area by rescue vehicles. Schools and transport infrastructure such as roads and motorways, ports and airports and large dams are also present on the platform. Railways, hospitals and other strategic buildings are being implemented. For all, the correct determination of seismic vulnerability, i.e. the fragility curves to be assigned to individual constructions, is crucial. Finally, some critical infrastructures (schools, hospitals, bridges and dams) are also monitored by the Sismico Observatory of the structures of the DPC.

2.6.2 Volcanic risk

Studies have been carried out on the vulnerability to the fallout of volcanic ash and the seismic events of the building and the infrastructure of Vesuvio and Campi Flegrei. Specifically, the results and reference scenarios for civil protection planning have been shared with infrastructure managers, including information on the impacts of expected phenmenologies on infrastructure, for the purpose of mitigation and planning of interventions.

2.6.3 Risk from landslides and floods

Exposure in landslide and flood hazardous areas shall be taken into account in the risk assessment in order to identify the risk class. The main complaints are built for residential use, hospitals, schools, barracks, etc. In relation to large dams, the Directive of 8 July 2014 laying down*operational guidelines for civil protection activities in the catchment areas in which large dams are present*has been issued, which defines the alarm system and provides for an emergency plan to be drawn up for each large dam.

2.7 Sources of funding

Application No 16 of *Reporting Guidelines* 2019/C 428/07

In Italy, responsibility for disaster risk management and reduction is shared between different institutional actors: State administrations, regions and autonomous provinces, local authorities; each of them invests its own resources for the operation and maintenance of prevention, preparedness and response, also depending on the type of risk.

As regards central government, the annual "**Budget Law**"allocates resources for primary expenditure on environmental protection and the use and management of natural resources. Just under half of these resources are allocated to the '**protection and remediation of soil, subsoil and surface water**' sector. Initial budgetary appropriations may increase as a result of changes during the financial year. As regards environmental expenditure, there are also management plans for environmental and risk mitigation purposes, concerning transfers to other persons outside the central government of the State. This is the case for certain transfers intended for the ordinary financing of local authorities or some investment grants to businesses or for the financing of regional development programmes.

More generally, state budget laws and other primary legal sources provide the legal basis for allocating funding for prevention, preparedness and response. This funding is managed and distributed on a regional basis by means of territorial indicators (population, extent, danger, risk), and the relevant interventions are set out in agreements between the State and the Regions. The agreements may provide, in a flexible manner, for the programming and adjustment of the measures themselves and their economic resources, on the basis of assessments and opinions expressed both by the local authorities (municipalities, district authorities, regions, other local authorities concerned) and by the national authorities. The 'agreements' and 'agreements' are the **main mechanisms** used and are set up through the Standing Conference for relations between the State, the Regions and the Autonomous Provinces of Trento and Bolzano, better known as the '**State-Regions Conference**', which, together with the 'Joint**Conference**', is the main forum for discussion and coordination between the prerogatives of the State and those of the autonomous bodies.

As regards civil protection activities, risk prevention and forecasting activities, guaranteed by the DPC, are carried out with the resources of the '**National Civil Protection Fund for forecasting and prevention activities**' (Article 43 of the Code). For operations resulting from catastrophic events, for which a state of emergency of national importance is decided by the Council of Ministers (Article 24 of the Code), the resources of the '**National Emergency Fund**' (Article 44 of the Code) are used, the use of which must be shown in a document attached to the financial account of the Prime Minister's Office at the end of each year. The resources intended to overcome the specific emergency situation are then transferred, as a general rule, to the special accounts in the name of the 'Delegated Commissioner' for the emergency. These special accounts (Article 27 of the Code) may be authorised for the payment of any additional financial resources

made available by the regions and local authorities concerned, as well as any financial resources from the **European Union Solidarity Fund**.

In the case of 'Declaration of the state of deployment of the National Civil Protection Service for intervention abroad' and 'Deliberation of the state of emergency for intervention abroad' (Article 29 of the Code), the financial resources to be allocated are identified within the limits of the appropriations of the above-mentioned National Emergency Fund and of the resources allocated to the operations referred to in Article 10 of Law No 125 of 11 August 2014.

2.8 Infrastructure, resources and equipment

Application No 17 of *Reporting Guidelines* 2019/C 428/07

The operational components and structures of the SNPC ensure, both during an emergency and as part of the regular preparation and planning phase, that disaster risk mitigation or response activities are carried out as a whole, not only providing equipment or means but also training and refresher training for staff assigned to use them. To this end, the procurement of resources and equipment is carried out as part of the normal activities of updating, maintaining and upgrading their operational capacities, by the various components and structures of the SNPC. Following major catastrophic events involving intensive use of the available facilities, unit programmes, coordinated by the DPC, are launched to restore the overall response capacity of SNPC. By way of example, reference is made to the two extraordinary programmes launched after the earthquake of 2016/2017 in Centro Italia and governed by Article 5 of OCDPC 438/2016 and Article 41 (4) of Decree-Law No 50/2017. These programmes are developed through a representation of needs, an integrated assessment and subsequent implementation by the different actors responsible for the different activities, their means and equipment.

The implementation of preparedness measures, such as civil protection plans drawn up at the various territorial levels, covers risks that may lead to shortcomings in the logistics and organisation of the management of the disaster. The system is organised in such a way as to be able to reshape the intervention in accordance with the needs (mobile regional columns, etc.) and the problems that may arise; it also has flexibility to issue measures (ordinances) to solve specific problems in alternative ways to those envisaged in the planning.

The logistical management of available equipment and assets shall take place in the framework of the coordination procedures governing operational response to emergency situations. To this end, within the various components and operating structures of the SNPC, specific actors are identified, who are given a specific training activity, with particular attention being paid to actions requiring coordinated use of several different structures.

2.9 Losses due to disasters and related procedures

Application No 18 of *Reporting Guidelines* 2019/C 428/07

Given the complexity of both the SNPC and the national risk landscape, strong coordination between professionalism and available resources is required. Disaster damage data are collected from the municipal level. Each Region or Autonomous Province has set up or is organising its own coherent data collection system at national level.

In the event of an event of national importance, for which a state of emergency is declared, the Regions and Autonomous Provinces shall coordinate the identification of public and private needs for compensation for damage and draw up appropriate action plans, sent to the DPC for assessment and approval.

In the case of **seismic risk**, outside emergencies, the costs of human damage and loss are also estimated through simulated national event scenarios and risk models. On the other hand, post-seismic damage to structures for public, residential, commercial/industrial use and cultural goods is subject to an appropriate assessment procedure, carried out by specially trained technical experts and on the basis of specific legislative provisions, which provide for the communication of the outcome to interested parties via the local authorities. For information on damage to construction in past earthquakes, a database within a GIS platform has been set up by the DPC for scientific purposes[4].

In the case of **hydraulic risk**, the DPC and ISPRA have developed a shared methodology for collecting and systematising historical data on past floods, to be carried out using the FloodCat platform. In general, scientific projects for ex-ante damage assessment are being developed for the various risks.

The **Protected Plan** is a plan managed by the DPC for the part relating to measure 1 (Fulty emergency plan) to combat hydrogeological risk caused by natural disasters, which made available over EUR 3 million over the three-year period 2019-2021 (EUR 2,6 billion provided for in the 2019 Budget Law and EUR 524 million provided for in the tax decree). These resources were entirely allocated to the Regions and Autonomous Provinces of Trento and Bolzano affected by the weather events in October and November 2018 (the so-called 'VAIA Tempesta') and for which a state of emergency was ordered, as well as to the regions affected by events with an emergency state in force on 31 December 2018 and those whose emergency states had ceased for no more than 6 months from that date, for a total of 17 regions and 2 autonomous provinces. The DPC, as the authority responsible for connecting the various regional structures and the other state administrations involved, continuously monitors the progress of the approved plans and their financial flows. In order to ensure that the monitoring system is fed correctly, the legislation in force places the task of collecting data on each measure on the DPC. To this end, on a regular basis, the DPC receives information on the basis of timeframes that are pre-defined by the DPC, from those entrusted with implementation (Delegated Commissioners).

Data on losses due to natural disasters, collected through the SNPC, are then shared with the **global Sendai Framework Monitor platform**.

2.10 Equipment and procedures for early warning systems

Application No 19 of *Reporting Guidelines* 2019/C 428/07

The state and regional civil protection alert system provided for in Article 2 of the Code consists of all procedures and activities which, on the basis of probabilistic forecasts, monitoring physical parameters and monitoring phenomena of civil protection interest, is intended to activate the SNPC at the various territorial levels. Following this activation, the competent authorities shall implement relevant prevention activities as well as emergency management activities. The Prime Ministerial Decree of 23 October 2020 on 'Civil protection adaptation and public alert system IT-alert' aims to ensure a coordinated framework of terminology and definitions throughout the national territory and integration between the civil protection systems of the various territories. Please find below a brief summary of the individual risks for which a pre-announcement can be made and for which specific directives and decrees have been issued.

4 Da.D.O., Database of Damage Observed; http://egeos.eucentre.it/danno_osservato/web/danno_osservato

2.10.1 Seismic risk

Although experiments on*early seismic warning*are ongoing in Italy, for example for its use in relation to the rail network, there is no national seismic alarm system for civil protection because it is difficult to apply due to the seismicity of the country and its geographical configuration. In any event, in accordance with Article 4 (5) of Decision No 1313/2013 (*'early warning' means the Timely and effective provision of information that measures to be taken to be taken to avoid or reduce risks and the adverse impacts of a disaster, and to facilitate prevention for an effective response*), the DPC is structured to have a rapid response system, in other words allergies for the activation of the SNPC, as soon as a significant earthquake has occurred. Indeed, through the monitoring of the territory (National Accelerometry Network and the Department's Sismic Observatory of Structures and the National Sismometry Network of the INGV), the surveillance activities and the associated procedures, it is possible to know, within a few minutes of the event, some essential information on the earthquake and then, within 20 minutes, to have the final parameterisation of the earthquake. On the basis of these data, the ground shielding and the movements of the buildings recorded, the expected impact scenario, in terms of population affected and damage to buildings, is calculated and an initial estimate is made of the consequences and, therefore, of the amount of assistance to be sent immediately to the epicentre area. This rapid response system has been borrowed in the implementation of Aristotle, the ERCC alert system under development (DG-ECHO).

2.10.2 Volcanic risk

The alert system is the measure developed in recent years by the DPC in consultation with the Regions and CoCs, responsible for monitoring and surveillance, to define the **alert level according to** the change in the volcano's activity status. Alert levels express the evolution of volcanic activity and associated phenmenologies under way and/or expected; taking into account the specific territorial conditions at the time, the coordinated intervention of the SNPC is defined according to a codified system of procedures. Currently, as already stated in point 1.3 of this document, alert levels have been defined for volcanoes Etna, Stromboli, Vulcano, Vesuvio and Campi Flegrei.

On the basis of the level of alert declared by the DPC by means of a 'Notice of variation in alert level' and depending on the associated risk assessments, the operational response of the national system and the local civil protection system is reduced through the activation of national operational phases, declared by the DPC for phenomena which, in terms of intensity and impact, require the intervention of the national level, and local operational phases, declared by the Regions by means of regional civil protection notices, for events that are managed locally. In order to deal with phenmenologies characterised by sudden onset and/or rapid evolution (violent explosive activity), alerting systems have been put in place that allow automatic activation of acoustic warning devices and automatic sending of alert messaging to national and local civil protection structures.

As regards rapid alert systems, a sound alert system has been in operation in Stromboli since 2021 for the purpose of reporting the paroxism risk of volcano or tsunami. The system, which has been operational since October 2019, is based on monitoring data including devices such as tiltmeters and ondametric buoys.

2.10.3 Tidal risk

The Siam Alert System (Dir.PCM of 17 February 2017) consists of three key activities:

- seismic monitoring (carried out by INGV), through which earthquakes with epicentre are detected at sea or in the immediate vicinity; assessed their 'tsunamigenic' potential; estimate the arrival times of the first tidal wave along the exposed coasts; communicate the alert to the DPC as soon as possible;
- dissemination of alerting messages by the DPC to the structures and components of the SNPC with the aim of reaching, as soon as possible, also the population potentially affected;
- analysis of data from Mareographic Networks in the Mediterranean, including the National Mareographic Network (NMR) managed by ISPRA, which makes it possible to detect the occurrence of anomalies in sea level at the various measuring stations, confirming or not the arrival of any tidal wave.

A technological platform for simultaneous and centralised communication of alerts is operational.

2.10.4 Hydrogeological and hydraulic risk

The management of the alert system for these risks is ensured by the DPC and the Regions and Autonomous Provinces, as provided for in the Code, and provides for procedures defined at national level by Prime Ministerial Decree No 2004, as subsequently amended and supplemented, and by the operational instructions of Chapter DPC of 10 February 2016 containing 'Methods and criteria for homogenising the messages of the national alert system for meteorological, hydrogeological and hydraulic risk and the response of the civil protection system'. The Regions shall ensure the functioning of the alert system using their own technical facilities called Functional Centres, which carry out daily activities to predict, monitor and monitor weather, hydrogeological and hydraulic events and their effects on the territory. This activity makes it possible to define the risk scenarios, which are communicated through the dissemination of Bollettini or criticality notices. The criticality levels correspond to hydrogeological and hydraulic alerts, which have been encoded at national level using colour codes: the GIALLO, ARANCIONE and ROSSO alert levels are associated with defined problem scenarios and subsequent possible damage scenarios. The Regions and Autonomous Provinces are responsible for defining and issuing these alert levels. They are notified to local authorities for the activation of civil protection plans; the latter provide communication and information to citizens through the available technological and communication tools. Moving from national to inter-regional or local level, the procedures and systems for alerting and monitoring include those specific to the Po river, all dams of national importance, and monitoring and alerting systems dedicated to large Alpine landslides.

Lastly, we would remind you of the alert system for large dikes provided for in the Directive of 8 July 2014, which defines alert criteria for the activation of the civil protection service.

2.10.5 Snow and avalanches risk

PCM Dir. PCM of 12 August 2019 defines the tasks and roles for rapid alert for avalanches. The management of the alert system is ensured by the DPC, the Regions (through the network of Functional Centres), the regional structures and the CoC. Each Region and/or Autonomous Province shall set up and lay down the procedures and procedures for alerting the risk of avalanches for the territory for which it is responsible. Similarly to the other hydrogeological risks, there are 3 levels of criticality and corresponding alerts for avalanches, using GIALLO, ARANCIONE and ROSSO colour codes. As regards snow at low altitude, the national monitoring

service carried out by the Carabinieri Forestali with the collaboration of the DPC, the Regions and Autonomous Provinces and the Meteorological Service of the Military Aeronautica (AM) is carried out by means of NeveMont, with the collaboration of the DPC, the Regions and Autonomous Provinces and the Meteorological Service of the Military Aeronautics (MA), in order to improve public safety on road, motorway and rail traffic. The measure also includes a forecast bulletin of motorway sections potentially affected by snowfall, produced by the DPC.

2.11 Information and risk communication to raise public awareness

Application No 20 of *Reporting Guidelines* 2019/C 428/07

With regard to communicating and informing citizens of the risk, it should be pointed out that the current legal framework places responsibility on the municipalities/mayors for providing effective information to citizens in the field of civil protection. Municipal civil protection plans are a key tool to help the population understand elements such as the distribution and risk characteristics on their territory. However, there are problems that limit the dissemination potential of the plans, which, in many cases, are considered to be a technical tool with little communication propensity.

As regards the central level, the institutional communication channels of the DPC include, in an integrated form: the institutional website, the Contact Centre to ensure direct communication with citizens, various online social media platforms (Facebook, Twitter, Instagram, Youtube channel), the DPC Mining Centre in an online format, which focuses on civil protection issues, the activities of the National Service, the risks and the role of the scientific community.

In addition to these channels, the DPC has chosen a system, inclusive and multilevel communication strategy involving the different actors of the SNPC. At national level, information and communication on risk and good civil protection practices shall be implemented through specific communication campaigns and dissemination of the culture of civil protection, aimed at citizens and young people, using tools that are diverse and tailored to different contexts.

The national campaign 'Io Non Rischio' (INR)5 is a multi-hazard national prevention measure and aims to raise awareness and activate citizens with regard to the risks of earthquake and tidal, flood (hydraulic) and volcanic activity.

The INR campaign, launched in 2011, with the involvement of national and local voluntary organisations, will include events throughout the year, with awareness-raising activities in schools (physical or digital), through the dissemination of information materials and the use of alternative equipment, meetings with specialised staff, in order to increase awareness of the risks and the consequent adoption by individuals and communities of correct behaviour in the event of emergencies due to natural disasters.

The INR activity in 2019 was also implemented for volcanic risk, during the national Exe Campi Flegrei 2019 exercise.

The INR campaign also has an international impact, examples of which are given. With the 2013 European Exercise **TWIST** — *Tidal Wave In Southern Tyrrenian Sea*, the information campaign on the tidal risk was launched. Subsequently, an international INR workshop was held in May 2018 as part of the European project Neiflex — *North Eastern Italy Flood Exercise*, dedicated to flood risk management financed by the EC and coordinated by the DPC, with the involvement of the regions of Friuli-Venezia Giulia and Veneto, and Slovenia, Austria, Montenegro, France,

5 http://iononrischio.protezionecivile.it/

Serbia and Russia as foreign partners. In addition, the first INR campaign in a foreign country (Podgorica, Montenegro) was carried out under the NEIFLEX project.

In April 2019, as part of the *Increasing Preparedness Capacities Across the Mediterranean II* project (IPCAM II), a group of local volunteers was formed in Tunisia and subsequently developed independently and implemented INR campaigns on forest fire risk and flood risk.

The workshop *Population Awareness* of the PPRD South III Mission took place in Morocco in December 2019, during which participants, civil protection officials from the programme countries, followed an INR design process with the aim of raising awareness of good civil protection and risk prevention practices.

As part of the project entitled European Neighbourhood Policy — Civil Protection (ENP- CP), which supports the civil protection activities of Algeria, Morocco and Tunisia and which has the task of assisting Algeria and Morocco in carrying out national seismic risk awareness and education campaigns, experts from both countries took part in the INR Campaign in October 2021. The representatives of the two national civil protection authorities intervened in the direct national streaming 'Io Non Rischio', which was also broadcast with *oversound* in French.

Finally, as regards school risk education and civil protection, it should be noted that in Italy, Law No 92/2019, which re-introduced 'civic education' as one of the subjects of ministerial programmes, provided for basic training in civil protection as one of the skills to be developed and the learning objectives. The law covers all schools of all types and levels.

In support of this activity, in 2020 the Department of Civil Protection published the book 'Civil**Protection in Italy. Institutional reference text for school teachers**' (Dolce et al., 2020). The volume was produced by the Department in agreement with the Ministry of Education. It is a subsidy for the planning of educational activities and addresses a wide range of issues, from historical to scientific, social to regulatory. Teachers, including by means of pictures, photos, tables, links and bibliographic references in schools, are offered the opportunity to enrich the training offer and to look into the various areas of attention of the National Civil Protection Service.

3 part III

3-1priority prevention and preparedness measures to address key risks with cross-border consequences and, where appropriate, low probability risks with a high impact

Questions 21 and 22 of *Reporting Guidelines* 2019/C 428/07

Given the geographical nature of our country, some of the risks defined in Article 16 of the Code could give rise to cross-border impacts, as well as to disasters that cause or may cause multinational cross-border effects. **Instruments for international and transnational cooperation between civil protection actors have been developed over time with a view to promoting cooperation in anticipation, prevention and** response to disasters between neighbouring countries.

Please find below some generic cooperation agreements in the field of civil protection activities, to be understood as prevention and preparedness measures.

Law No 578 of 1994 ratifying and implementing the Convention on Cooperation between the Italian Republic and the **French Republic** in the field of anticipation and prevention of major risks and mutual assistance in the event of natural or man-made disasters, signed in Paris on 16 September 1992, constitutes the contractual basis under which the agreement between the Prime Minister of Italy and the Minister for the Interior, Internal Security and Management of the French Land was signed on 19 March 2 007 to define and organise the implementation of emergency relief in civil protection mountains. The agreement applies, for Italy in the regions of Valle d'Aosta, Liguria and Piedmont, and for France in the departments of Alta Savoie, Savoie, the Alps Alps, the Alps of Upper Provence and the Maritime Alps.

Law No 87 of 1998 ratifies and implements the Convention between the Italian Republic and the **Swiss Confederation** on cooperation in the field of anticipation and prevention of major risks and mutual assistance in the event of natural or man-made disasters, done at Rome on 2 May 1995. Pursuant to this Convention, a Memorandum of Understanding was signed in June 2016 between the Prefecture — UTG of Como and the Department of Institutions of the Canton of Ticino, in Bellinzone (Swiss Confederation), for the adoption of operational procedures for mutual assistance in cross-border areas in the event of civil protection emergencies in the provinces of Como and Canton Ticino.

In view of the territorial proximity and the resulting substantial sharing of certain risks, reference is also made to the Memorandum of Understanding concluded on 30 March 2021 between the Prime Minister's Office of the Italian Republic, Department of Civil Protection, and the State Secretariat for the Territory, Environment and Civil Protection of the **Republic of San Marino**, in the fields of forecasting, preventing, mitigating and combating natural or man-made disasters occurring in the territory of either of the two Parties.

The following are the risks with potential transboundary effects and the related prevention and preparedness measures in place.

3.1.1 Seismic risk: earthquakes in the border area between Friuli-Venezia Giulia and Slovenia

Among the prevention and preparedness measures, the *Memorandum of Understanding* (MoU) between the Prime Minister's Office of the Italian Republic — Department of Civil Protection and

the Ministry of Defence of the Republic of Slovenia — Administration for Civil Protection and Disaster Relief aims to facilitate bilateral cooperation in the field of disaster management, in particular in terms of forecasting, prevention, preparedness and response to natural or man-made disasters that may occur on the territory of one of the two participating States. The MoU was signed on 29 October 2013 and is still in force. There is also a Memorandum of Understanding between Civil Protection at the Ministry of Defence of the Republic of Slovenia and the Civil Protection of the Autonomous Region of Friuli Venezia Giulia of the Italian Republic, signed on 18 January 2006, for cross-border cooperation in the field of forecasting, prevention and assistance.

3.1.2 Tidal risk

Italy has set up Siam (including Dir. PCM 17 February 2017), which carries out its functions taking into account the principles established by the Intergovernmental Coordination Group (ICG) of the UNESCO Intergovernmental Oceanographic Commission (IOC) for the creation of a tsunami alert system for the Mediterranean and North-East Atlantic Ocean (NEAMTWS) region (*Tsunami Early Warning and Mitigation System in the North-Eastern Atlantic, the Mediterranean and connected seas*), in order to foster international cooperation between Member States and the sharing of information and good practices. The Siam monitoring area covers all the shores of the Mediterranean and extends from 100 km west of the Strait of Gibraltar to the Marmara Sea, touching the coasts of 20 countries.

Alerts are sent by INGV to several Mediterranean countries, in particular to agencies and institutions in Cyprus, Egypt, Germany, Israel, Lebanon, Malta and Spain, with the future objective of covering all Mediterranean countries. Messages are also sent to other NEAMTWS alert centres, with which scientific collaboration agreements exist; these include the *Centre d'Alerte aux tsunamis* (CENALT) in France, the*Hellenic National Tsunami Warning Centre*, established at the *National Observatory of Athens, Institute of Geodynamics (* NOA/HL-NTWC) in Greece, and the *Boğaziçi University Kandilli Observatory and Earthquake Research Institute, Regional Earthquake-Tsunami Monitoring Center* (KOERI- RETMC) in Turkey, and the*Instituto Português do Mar e da Atmosfera* (IPMA), Portugal.

3.1.3 Hydraulic, hydrogeological and adverse weather hazards

The **Moncenisio** dam, which is subject to French legislation by virtue of its location, is subject to hydroelectric use by France and Italy, through the main electricity generating companies (EDF and ENEL respectively), pursuant to the 1947 Treaty of Peace between Italy and France, thus resulting in a cross-border dam. By decision of the Piedmont Regional Executive of 26 March 2021, the Diga Emergency Plan was approved to combat the danger associated with the propagation of a full-wave wave caused by the manoeuvres of the drainage organs, or the hypothetical collapse of the barrier. The Inter-Institutional Working Group on the Moncenisio Cross-Border Dam Emergency Plan, in which the DPC participates, has also been set up.

The management of the waters of **the Isonzo Basin**, both quantitatively and qualitatively, is governed by the **Treaty of Osimo of** 10 November 1975 between the Government of the Italian Republic and the Government of the Federal Socialist Republic of Yugoslavia. On the basis of the Treaty, and in order to resolve questions about *'the quantities of water that Italy needs periodically', a* **Joint Standing Committee on Hydroeconomics was set** *up,* which established the average daily flow rate normally needed in Gorizia in the irrigation period, while contextualising this hydronecessity as part of a 'global system' for hydroelectric power production

and for regulating the flow rates of Isonzo. The Joint Committee also monitors the state of implementation of Directive 2007/60/EC in the respective parts of the international basins of Isonzo and Timavo, in which the objectives set by the two parties are coordinated and substantially common and a number of measures identified as priorities for the implementation of the two plans have been agreed.

As regards the testing of Lake **Maggiore**, an agreement was signed in 1940 between Italy and Switzerland on the basis of which the methods of regulation were agreed, contained in a product specification, and an Italo — Switzerland International Commission was set up to monitor compliance. In recent years, a trial has been launched to increase the limits of Lake levels during the summer season. This trial has been concluded by providing important data on the possibility of a new approach to regulation also in relation to the capacity to adapt to climate change.

As regards the **risk of a water deficit**, please note the agreement on the **Roja river** basin, a transboundary basin covered by Law No 524 of 25 May 1970 under the Convention between Italy and France for the supply of water in the municipality of Mentone. This convention was applied during the last summer season, as there was an abnormal drop in groundwater levels, probably due to the flooding event of 2020. The Roja basin is managed by the Water Use Observatory by the Northern Apennines District Authority, which has been enlarged with the French part. The Observatory has therefore set up a technical steering committee in order to identify the most effective and appropriate ways of managing the crisis, by means of measures and actions to be taken in the short and medium term, selected from those already envisaged by France and Italy, verifying their implementation not only from a technical, but also from a procedural and financial point of view.

3.1.4 Risk of forest fires

Pursuant to the aforementioned Convention between the Italian Republic and the French Republic in the field of forecasting and prevention of major risks and mutual assistance of 1992, an administrative agreement of unlimited duration was signed in 2004 between the DPC and the French Civil Protection Directorate to regulate the order of operations for the operation of aerial water bombarders in the event of mutual assistance for forest fires.

For fire risk, reference is also made to cross-border cooperation with the Republic of Slovenia, as referred to in the MoU and the Memorandum of Understanding referred to above in relation to seismic risk prevention and preparedness measures.

On 22 September 2010, a technical agreement on a programme for forecasting, preventing and mitigating risks to forest fires and floods was signed to reduce Albania's vulnerability to the above-mentioned risks.

On 4 April and 11 November 2011 respectively, the DPC concluded two MoUs aimed at facilitating bilateral cooperation in anticipating, preventing and responding to natural and man-made disasters, with the Emergency and Civil Security Sector of the Ministry of Interior of Montenegro and with the National Directorate for Protection and Rescue of the Republic of Croatia.

Collaborations have also been launched in the context of various projects, such as those funded under the INTERREG programmes; examples of these include:

- ALP FFIRS, the aim of which was to improve fire prevention measures in the Alpine region, also taking into account the effect of climate change on the conditions available, through the creation of a common alert system. In addition to the Italian Alpine regions, partners Austriaci, Francesi, Sloveni, Svizzeri and Tedeschi participated in the project.

- MED-STAR, the general objective of which is to contribute to improving the capacity of the public institutions involved to jointly prevent and manage the growing risk of fire resulting from climate change, in areas of high human presence and of significant natural interest, including through appropriate adaptation actions. The project involves Italian regions such as Liguria, Sardinia and Tuscany, as well as France as the main neighbouring partner.

In addition, projects such as '3 Watch Out', within the INTERREG IPA CBC programme, have been strengthened in which cooperation capacities between the Apulia region and foreign countries such as Albania and Montenegro, which have the sea as a natural border with Italy, have been strengthened.

During the management of fires, when they exceed national response capacity, the Union Civil Protection Mechanism (UCPM) is activated as well as on a residual basis under bilateral agreements concluded with the States concerned.

3.1.5 Nuclear risk

The nuclear risk in Italy is mainly linked to possible accidents in installations located within 200 km of national borders, leading to the implementation of direct and indirect protection measures for the population and other measures, such as the management of Italian citizens located in or returning to the country, and the management of imports of foodstuffs and other contaminated products. The implementation of these measures, on the basis of the predicted evolution of the scenario, is structured within the framework of**the 'National plan for the management of radiological emergencies and nuclear**i' provided for in Article 182 (2) of Legislative Decree No 101/2020 implementing Directive 2013/59/Euratom laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation. The nuclear power plants affected by this scenario, with possible involvement of the national territory, are *Bugey, Cruas, Fessenheim, Phenix, Saint-Alban and Tricastin* in France, *Gundremmingen and Isar* in Germany, *Beznau, Goesgen, Leibstadt and Muehleberg* in Switzerland, and *Krško* in Slovenia. For the prompt notification of an event occurring in a power station, there are bilateral agreements with neighbouring countries. In particular, the Italian Government has signed a bilateral agreement with the Swiss Confederation. In this context, the National Swiss Alert Centre (CENAL) sends alert notifications to the National Inspectorate for Nuclear Safety and Radiation Protection (ISIN). In addition, the Swiss Confederation has made available to ISIN access to its national emergency platform, which collects the information that the various Swiss institutions share in the event of a radiological and nuclear emergency. ISIN has also signed bilateral agreements with the *Slovenian Nuclear Safety Administration* (SNSA) of Slovenia, the French *Autorité the Sécurité Nucléaire* (ASN) and the National Inspectorate for Nuclear Safety (ENSI) of the Swiss Confederation. The agreements aim at prompt notification and rapid exchange of information in the event of accidents involving nuclear installations. The references of the agreements mentioned are as follows:

- Agreement between the Swiss Federal Council of the Swiss Confederation and the Government of the Italian Republic on the rapid exchange of information in the event of nuclear accidents. Concluded on 15 December 1989. Entered into force on 26 February 1990.
- Agreement between ISPRA (now ISIN) and *Slovenian Nuclear Safety Administration* (SNSA) of the Republic of Slovenia for the early exchange of information in the event of a nuclear emergency and cooperation on nuclear safety, signed on 24/5/2010 in Trieste.
- Agreement between ISPRA (now ISIN) and *the French Autorité the Sécurité Nucléaire* (ASN)

for the rapid exchange of information in the event of a nuclear emergency and cooperation on nuclear safety, signed on 27/10/2016 in Rome.

- Agreement between ISIN and the National Nuclear Safety Inspectorate (ENSI) of the Swiss Confederation for Nuclear Safety Cooperation, signed on 2 July 2019 in Arona (NO).

3.1.6 Industrial risk

For industrial risk, the relevant legislation is Legislative Decree No 105 of 26 June 2015 implementing Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances (Seveso III). It applies to industrial establishments using or holding, for their production activities, hazardous chemicals in quantities above certain threshold values, which therefore represent a possible risk to the public and the surrounding environment.

This risk is linked to the possibility of an accident occurring within an establishment which may lead to a danger, immediate or delayed, due to the release of dangerous substances into the environment. The accident may occur due to unforeseen circumstances during the work activity and is characterised by its sudden nature. Industrial establishments covered by the Seveso Directive are divided into lower-tier and upper-tier establishments, depending on the quantity of dangerous substances they use. Legislative Decree No 105/2015 assigns to the Ministry of the Environment and the Protection of Natural Resources and the Sea, now the Ministry of Ecological Transition (MITE), in addition to the functions of assessment and monitoring, guidance and coordination in the field of control of major-accident hazards, also those relating to the exchange of information with the European Commission and the Member States of the European Union, on the basis of information provided by the competent authorities. In particular, for the exchange of information within the European Union, the MITE shall, where another Member State may be affected by the transboundary effects of a major accident occurring in one of the upper-tier establishments, make available to the Member State sufficient information to apply the measures provided for in the External Emergency Planning. Pursuant to the aforementioned Decree, the **External Emergency Plan** is drawn up and coordinated by the Prefect, in agreement with the regions and local authorities concerned. External emergency planning and public information are carried out on the basis of guidelines established by the Department of Civil Protection, in agreement with the Joint Conference.

3.1.7 Risk from transport (crossings)

The main motorway tunnels are the Mount Bianco Trapher and Frejus to France and San Bernardo to Switzerland. The Tenda Col Tunnel to France is also of major importance. Each tunnel has a contingency plan drawn up jointly with the territorial authorities of the two countries. In general, the main binational traholes are managed by mixed-capital companies between the two nations. The administrative authorities supervising the operation of the tunnels are the Intergovernmental Conferences (IGCs) chaired alternately by an Italian or French ambassador for six months and with representatives of the competent ministries of the two countries. IGCs may use safety committees, which support the Commission in technical assessments of tunnel risk. Railway tunnels must comply with the rules resulting from the Technical Specifications for Interoperability of Networks (Directive 2016/797) and emergency plans approved by the competent local authorities are also drawn up for them.

3.1.8 Risk from marine pollution

In the event of pollution of the sea and coasts by oil and other harmful substances, when its size exceeds national response capabilities, the country in which the accident took place may activate

the EU Civil Protection Mechanism. The EC DG-ECHO has set up an H24 system capable of:

- provide assistance in civil protection operations including marine pollution;
- take specific action on marine pollution through the European Maritime Safety Agency (EMSA), whose staff, specialised vessels, equipment and services can be activated through requests from Member States through the*European Response Coordination Centre (* ERCC). The Agency also provides a satellite oil spill monitoring service through CleanSeaNet.

Communications on ongoing emergencies and requests for assistance to the Member States are the responsibility of the DPC, using the CECIS (*Common Emergency Communication and Information System*) *Marine Pollution* system via the Maritime Emergency Operations Centre (COEMM).

If there is a need to obtain specific information on the characteristics and behaviour in the marine environment of chemicals and harmful substances causing pollution, you can also contact the network Marine *Intervention in Chemical Transport Emergencies* (MAR-ICE), set up by EMSA in close cooperation with the *Centre of Documentation, Research and Experimentation on Accident Water Pollution* (CEDRE) and the *European Chemical Industry Council* (CEFIC), or consult internationally developed databases and guidelines available on institutional sites of EMSA and the *Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea* (REMPEC), administered by the United Nations specialised agency*International Maritime Organisation* (IMO).

The Ministry of Ecological Transition (MITE) is the national authority empowered to act on behalf of the State to sign international agreements to cooperate in and combat accidental marine pollution (i.e. RAMOGE), as well as cooperation of both operational and scientific nature from international organisations such as the IMO, REMPEC and EMSA.

3-2 priority prevention and preparedness measures for low probability and high impact risks

Questions 23 and 24 of *Reporting Guidelines* 2019/C 428/07

Many of the risks dealt with so far, when viewed in the intensity of high return periods, in the order of thousands of years, represent real events with a high impact and low probability for Italy: *High Impact Low Probability* (HILP) *events*. For example, **volcanic** and **seismic hazards** are mentioned.

As regards **volcanic risk**, consider the civil protection plan in the event of the Vesuvio eruption. The plan is calibrated to a subplinian eruption: in case of an event, the probability of the eruption having this intensity or lower intensity is 95 %. In this case, the civil protection plan is structured in detail, including the evacuation of the population of certain districts of Naples and their surroundings and their reception in the other regions of Italy. However, there is a 5 % conditional probability of the event being more intense, i.e. a plinian eruption, clearly a HILP. In this case, the Italian civil protection system, which is scalable from local to national and supranational, is activated at the highest national level and also involves the Union Civil Protection Mechanism.

As regards **seismic risk**, the country has a probabilistic model of national seismic hazard (MPS04) which includes shields relating to different periods of return. The most well-known map is the 475-year map, but the map has also been prepared for a return period of around 2500 years. On the basis of this map and considering a so-called type B soil, which corresponds to approximately

80 % of the national territory, one can consider the estimated peak soil acceleration (PGA) for Italian cities with more than 150.000 inhabitants, as shown in Table 10.

There are 25 large cities in Italy with more than 150.000 inhabitants, including four regional capitals (Bologna, Naples, Palermo and Perugia) for which an EMP of more than 0.3 g is expected for a 12-year return period. It should be noted that a PGA of this order of magnitude was registered in the city of Aquila, with a population of around 70.000 inhabitants, during the earthquake of 6 April 2009. **Each of the cases highlighted in Table 10 can be considered as a HILP from the perspective of the national civil protection system**. In order to deal with HILP events, the Prime Minister's Directive of 14 January 2014 laying down the 'National seismic risk relief programme' was issued. Here too, the possibility of activating the Union Civil Protection Mechanism is envisaged.

ISComune	Population	PGA on soil B
	no of residents	*Acceleration of gravity g*
Naples	940.940	0,311
Palermo	640.720	0,337
Bologna	394.463	0,318
Catania	294.298	0,444
Verona	257.838	0,322
Messina	225.546	0,482
Brescia	195.102	0,306
Modena	187.977	0,333
Reggio Calabria	173.456	0,512
Reggio Emilia	169.803	0,304
Perugia	164.057	0,338
Ravenna	157.422	0,332

Table 10 — Italian municipalities with more than 150.000 inhabitants and peak acceleration to the ground (PGA accelerating by
gravity, (g) greater than 0.3 g on soil B over a return period of 2500 years. The values are taken from the model probability of national seismic hazard MPS04 of INGV (http://zonesismiche.mi.ingv.it/).

In addition, as a forward-looking exercise, the Department of Civil Protection, together with its CoCs, is starting to assess complex scenarios from a multi-hazard and multi-hazard perspective. There are still no established prevention and preparedness measures in place for these scenarios. In any event, such an event would strongly involve the European Union and would therefore require the full activation of the Union Civil Protection Mechanism.

A wide-ranging reflection has started on this issue, covering not only technical and operational aspects, but also the involvement of the population and territories potentially affected, in order to promote an increase in their awareness and resilience. By way of example, one of the possible scenarios, which concerns the southern part of the country, in particular eastern Sicily, is summarised below. The scenario envisages, on the one hand, the occurrence of several contemporary events and, on the other hand, the occurrence of cascading effects. In the course of a moderate eruption of the Etna, a severe earthquake of a magnitude of 7.1 is also happening, broadly comparable to that which struck that territory on 11 January 16936. In addition to causing usual seismic geological effects, such as landslides and liquefactions, the seismic event also generates a submarine landslide capable of causing a major tidal, capable of penetrating a large

6 https://emidius.mi.ingv.it/ASMI/event/16930111_1330_000

coastline. From the point of view of impacts, in addition to the damage caused by the earthquake in the city of Catania and throughout eastern Sicily, there are also significant impacts linked to the tidal, in particular on the industrial area in the coastal area between Catania and Siracusa; for example, to a petrochemical plant. On the other hand, the ongoing eruption of the Etna, with the release of gas and ash into the atmosphere, has an impact not only on the territory, but also on the potential *entry points* provided for in the National Sismico Rescue Programme, in particular on Catania and Reggio Calabria airports, and thus on the timely arrival of assistance. The development of civil protection consequences and actions for this scenario is under development.

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