MODELING AND ENHANCING THE INNOVATIVE CROSSBORDER EMERGENCY SERVICES

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NATIONAL REPORT ON THE OPERATION OF THE EMERGENCY SERVICES SYSTEM IN THE REPUBLIC OF ITALY

European Regional Development Fund

Summary

The FIRESPILL overall objective is to enhance the capacity of Emergency Service Organizations to increase cross-border effectiveness in tackling natural and man-made disasters, decreasing the exposure of the populations to the impact of hazards and increasing the safety of the Croatian and Italian Adriatic basin by improving emergency prevention and management measures and instruments. In particular, with this report is developed the project line WP3 that aims at improving the level of uniformity of the current structures, procedures and legislation regarding Italian and Croatian Emergency Services Regulatory Systems (ESRS), as well as enhancing its overall efficiency, according to the EU principle of cooperation and subsidiarity (EU civil protection mechanism).

The main of this work outputs are standardized CBC procedures to tackle risks between Italy and Croatia, as well as improved cross border emergency management system.

The work main outputs will be further exploited through its adoption by relevant authorities, by means of which it becomes permanent guideline and set of rules to be consulted when implementing any future measures and actions aiming at homogenizing different legislations, procedures, platforms through stakeholder involvement in both countries. The knowledge, and experience integrated in the outputs, given the concerned territories and the plurality of addressed issues, have a value that is not limited to project duration since they remain at disposal to Stakeholders, Civil Protection and Coast Guard organizations and Citizens even after the end of the project.

This document describes the Italian National Civil Protection System, i.e. a framework relating to current legislation, the components and operational structures of the National Service and the related activities carried out on risk management, both in ordinary and emergency. With reference to the regional civil protection structures, the Italian partners, in addition to describing their organization, reported their experiences for the management of one of the risks examined by the project. In particular, the difficulties encountered due to the regulatory and / or organizational limits of the structure were analyzed, the solutions identified to overcome the difficulties and proposals were provided to overcome these shortcomings.

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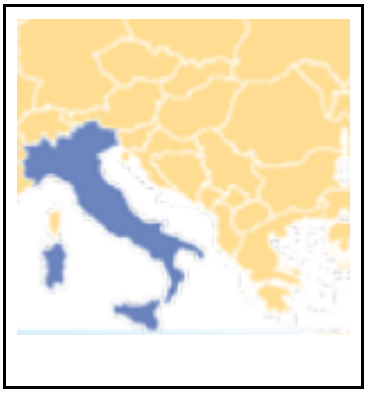
SURVEY OF CURRENT EMERGENCY SERVICES REGULATORY SYSTEMS (ESRS)

Italy



Population: 60,782,668

Area: 302,073 km²

Tiers of administration: 4 (municipalities, provinces, regions, national)

Part of EU Civil Protection Mechanism

Climate change and risk management in Italy

The accelerated climate change we are experiencing is destined to put a strain on the Civil Protection system and the entire country. Adverse meteorological phenomena, such as showers and thunderstorms, hailstorms, strong winds, tornadoes, storm surges, frosts, snowfalls, often connected and responsible for loss of life and considerable material and economic damage, were recorded with increasing frequency over the last few decades. The summer season is increasingly characterized by particularly high temperatures and the scarcity of rainfall, by the occurrence of meteorological phenomena - often intense and localized, as well as by the fires that in the last thirty years have destroyed 12% of the national forest heritage. The consequences for the natural balance are very serious and time for the reorganization of the forest and environmental ecosystem is very long. The alterations of soil natural conditions caused by fires also fosters the phenomena of slopes instability. In Europe and Italy, global warming is causing an increase in the number of days of danger and consequently an extension of the fire season, making our forests increasingly vulnerable. In

addition to forest fires, there are earthquakes, floods, landslides, volcanic eruptions and risks related to human activity that contribute to making our territory fragile.

Prediction and prevention of risks, rescue and overcoming of emergency situations are the civil protection activities identified by law no. 225/92, which establishes the National Service, aimed at protecting people and safeguarding the territory. The National Civil Protection Service is organized as a complex system, in which competences in the activities carried out are entrusted to several bodies and operational structures, as the complexity of the national risk landscape requires the coordinated use of all professional skills and resources available. Over the years, the responsibility for civil protection has progressively passed from the state to regional governments and local autonomies. With the amendment to Title V of the Constitution, civil protection has become a matter of concurrent legislation, so that, except for the determination of the fundamental principles, the legislative power rests with the regional governments. Each Region has organized itself with its own civil protection system.

The National Civil Protection Service

"Civil protection is the set of activities implemented to protect the integrity of life, assets, settlements and the environment from damage or danger resulting from disasters".

Italy is among the most exposed countries to natural risks and related human activities. This requires a system that ensures in each area the resources capable of intervening quickly and in a coordinated manner in case of emergency, but also of operating to prevent and, as far as possible, to foresee any disaster.

For this reason, in Italy, civil protection is not a task assigned to a single body, but a function attributed to an integrated system, made up of public and private, central and territorial structures: The National Service, established in 1992 with Law no. 225 and reformed in 2018 by the Civil Protection Code.

1. Legislation

1.1 Current legislation

The national reference standard is Legislative Decree 1/2018, Code of Civil Protection (Civil Protection Code) which is divided into 7 parts.

- *The first part* describes the objectives, activities and composition of the National Civil Protection Service, which sees citizens, institutions, public and private structures at all levels, engaged and involved in the pursuit of the objectives for the safe-guard and integrity of life, goods, settlements and the environment.
- *The second* part describes in detail the organization of the National Civil Protection Service starting from the typology of civil protection events.
- *The third part* describes risk forecasting and prevention activities, where a strategic role is played by the alert system organized at regional and national level through the functional centers network.
- *The fourth part* deals with emergencies of national importance and the activation of the department of National Civil Protection Service following the declaration of the "state of emergency".
- *The fifth deals with* participation of citizens and volunteers involved in civil protection activities;
- *The sixth* collects organizational and financial measures and instruments aimed at the implementation of civil protection activities
- The *seventh part* contains transitional and final provisions.

1.2 Legislation Evolution

A first organic law appeared in 1925 and it introduced a centralized system: The Minister of Public Works and their operative wing, the Civil Engineering Department as fundamental bodies for relief supported by the health structures. The Prefects and the Mayors of the municipal territories played an important role,

especially in the time occurring to the arrival of the State Authorities. Despite many attempts to achieve organic legislation regarding civil protection and despite severe natural disaster (the flood of Florence, the Belice earthquakes) only after the earthquake of Friuli Venezia Giulia and Irpinia in Italy and thanks to the contribution of Mr. Zamberletti (the extraordinary commissioner for the Irpinia earthquake) Italy started to take seriously the idea of a new asset of Civil protection, which considers not only relief activities but also forecasting , prevention and return to normality.

In Italy, the first law on civil protection interventions is law no. 996 of 1970, which defines for the first time the concept of "civil protection", as the provision of services aimed at guaranteeing rescue and assistance to the populations in case of emergency and, as the center of coordination of interventions of State administrations, Regions, territorial and institutional public bodies, in case of disaster. The notion of natural disaster or catastrophe is also specified for the first time: "the onset of situations involving danger of damage and serious damage to the safety of people and property, which, due to their nature and extent, must be dealt with extraordinary technical interventions ".

Management and coordination of all activities is the responsibility of the Interior Ministry and the Interministerial Committee of Civil Protection is established for better coordination of the activities of the various ministries. The law provides for the declaration of a catastrophe or natural disaster through a decree of the President of the Council of Ministers and the appointment of the Commissioner for emergencies, who is responsible for the role of direction and coordination of the rescue operations on the site of the disaster.

To assist the population from the first emergency to the return to normality, the CAPI-Emergency Assistance Centers are created. For the first time, the activity of civil protection volunteering is also recognized: it is the Ministry of the Interior, through the Fire Brigade, that instructs, trains and equips citizens who voluntarily offer their help.

Law no. 996/70 regulates the rescue to be deployed in the immediacy of the event. The regulation implementing the law will be approved after twelve years. With Law n. 938 of 1982, the Minister for the Coordination of Civil Protection is formalized, supporting the Department of Civil Protection, also established in 1982, as part of the Presidency of the Council of Ministers. It is a lean, supra-ministerial body, able to coordinate all the forces involved in the country's system.

The Department of Civil Protection collects information and data on the forecasting and prevention of emergencies, implements national and territorial civil protection plans, organizes the coordination and management of rescue services, promotes volunteer initiatives and coordinates the emergency planning, for civil defense purposes. Civil protection is now moving along four main lines: forecast, prevention, rescue, return to normal life.

On 24 February 1992, with the approval of Law no. 225, the civil protection architecture is codified with the birth of the National Service. Civil protection therefore becomes a coordinated system of competences shared between administrations of the State, Regions, Provinces, Municipalities ,Local Bodies, Public Bodies, the scientific community, voluntary organizations, rolls and professional boards and any other institutions even private one present on the national territory.

Law n. 225 represents a moment of transition between the centralized and decentralized phase:

It was a reform inspired by the subsidiarity principle which divides the competences between State, Regions, Provinces, Municipalities and other local authorities, public bodies, the scientific community, volunteers, rolls and professional boards and any other institutions even private ones. This law also distinguishes, for the purposes of civil protection activities, three types of events:

- natural events or events related to human activity that can be addressed through actions implemented by the individual bodies and administrations of ordinary competence (local level);
- natural events or events related to human activity that, by their nature and extent, may involve the coordinated intervention of several competent bodies or administrations in an ordinary way (provincial and regional level);
- natural or activity-related disasters which, due to their intensity and extent, must, by means of immediate intervention, cope with extraordinary means and powers to be used during limited and predefined time periods (national and international level).

This law can be considered as the real turning point of the Italian legislation, as for the first time the centralized organization was abandoned; the State continues to have a relevant role but Regions, Provinces and Municipalities, are strongly involved.

It was an important step but it wasn't a stop: we should remember other important reforms, related to natural disasters. Very relevant are the measures linked to the reform of relationship between State and Region – the so-called decentralization- (late'90s to 2001); Law no. 401/2001 which introduced the "great events" and gave civil protection special competence to manage events; law 152/2005, which extended the power of ordering also to events abroad, after the declaration of the state of emergency.
Twenty years after its creation, the National Service of Civil Protection has been reformed. Decree-Law n. 59 on 15 May 2012 converted into Law n. 100 of July 12, 2012 amends and integrates Law no. 225 of 1992, which established the Service. The Civil Protection activities are brought back to the original core competencies defined by Law 225/1992, intended principally to cope with disasters and to increase the effectiveness of interventions in emergency management. It reaffirms the guidance and coordination role of the Department of Civil Protection for the activities of the different components and operational structures of the National Service.

The most important reform, before the code, was law 100/2012. It put the basis for the current system: the classification of disasters, the civil protection activities, the declaration of a state of emergency and the power of an ordinance, the competences and the organization of the National Service.

Since January 2, 2018, the National Service is governed by the Code of Civil Protection (Legislative Decree No. 1 of 2 January 2018), with which all the relevant legislation is reformed. The Code was born with the aim of simplifying and making more linear the provisions of civil protection, enclosing them in a single text easy to read. In order to meet this simplification objective, each article clearly spells out the rules it replaces and, in the two concluding articles (Articles 47 and 48), it also offers coordination of regulatory references and a complete list of all the rules that are repealed through the Code. The reform reaffirms a model of polycentric National Service. For this reason, too, the Code has been written differently from other rules and has been drawn up by a drafting group composed of representatives of the Department of Civil Protection, Regions, Municipalities, Ministries, Civil Protection Volunteering. The first proposal to reorder the legislation on civil protection is therefore the result of the work of a mixed group and this choice has influenced the collective approach of the Code, born from an open discussion on critical issues and strengths of the previous legislation on the subject.

The main novelties introduced by the Code are the following:

Forecasting and prevention.

In terms of forecasting, the Code provides for innovations related to the dynamic study of possible risk scenarios. The foresight activity is preparatory to the activities of the alert system and civil protection planning. With regard to prevention activities, the evolution of the subject over time is taken under consideration, making it clear that the field of prevention is both structural and non-structural, included in an integrated way. Non-structural prevention consists of a series of activities in which the alerting and dissemination of civil protection knowledge on risk scenarios and rules of conduct and civil protection planning stand out. Structural prevention is reintroduced as 'structural prevention of civil protection', underlining the existence of specific civil protection issues when it comes to structural prevention. A specific role, in which the Department of Civil Protection is integrated into the working tables where structural prevention lines are defined. Structural risk mitigation interventions in the emergency area are also regulated. Finally, there is a need for integrated structural and non-structural prevention measures.

Management of national emergencies.

Prior to the Code, national intervention, including the activation of extraordinary instruments, was subject to the declaration of a state of emergency. The preventive activation was left to the independent evaluation of the competent bodies. The state of mobilization, introduced by Legislative Decree No. 1 of 2 January 2018, exceeds this limit and allows the territorial system to mobilize its resources and also to request the assistance of national resources, even before the declaration of the state of emergency. If the event turns into a calamity, the emergency machine is set in motion. Otherwise, a unilateral act by the Head of Department can recognize the costs incurred by those who have previously taken action.

Duration of state of emergency.

The Code redefines the duration of the state of emergency of national importance, bringing it to a maximum of 12 months, which can be extended by a further 12 months.

Civil protection planning.

The Code reaffirms the key role of planning and aims at overcoming a "compiling" conception of the Plan in favor of an evolved vision aimed at making this instrument fully operational.

Risks of civil protection. The Code explains the types of risk that civil protection deals with: seismic, volcanic, tidal, hydraulic, hydrogeological, meteorologically adverse phenomena, water deficits, forest fires. It also specifies the risks on which the National Service can be called upon to cooperate: chemical, nuclear, radiological, technological, industrial, transport, environmental, sanitation, uncontrolled re-entry of satellites and space debris.

Scientific community. The Code clarifies the operational criteria in the Civil Protection System. The scientific community participates in the National Service both through integrated activities and through preparatory experimental activities.

Center of Competence. The Code codifies the function of the Competence Centers; whose specificity is to produce products that can be used in the field of civil protection.

Participation of citizens in civil protection activities. The Code introduces the principle of citizen participation aimed at increasing risk awareness and increasing community resilience. This participation can take place in various areas, from vocational training to civil protection planning and through membership of sector volunteering. The need for a reorganization of civil protection, from Law 225/1992, establishing the National Service, to the new code.

(Legislative Decree no. 1 of 2 January 2018) comes when Law225/1992 has already been modified in an even intensive way following the historical trend and emergencies of the country. Further variations and civil protection integrations, layered over time, also pass through other regulatory bodies and all these factors make reading the law on the subject very difficult. In detail, the main regulations that follow each other from 1992 to 2018 are:

- Legislative Decree No 112 of 1998 – implementing the Bassanini Law – which redetermines the structure of civil protection, on the one hand by transferring important competences to local authorities - including operational ones - and, on the other hand, by introducing a profound restructuring also for the residual state competences. The regulatory framework of reference always remains Law 225/92.Civil protection is considered a subject with mixed competence: regions and local authorities are entrusted with all functions excluding the tasks of "national importance of the Civil Protection System".

- Law No. 401 of 2001 by which the competences of the State in the field of civil protection are restored to the President of the Council, the newly formed Civil Protection Agency is abolished and the Department of Civil Protection is restored, within the framework of the Presidency of the Council. The tasks of the President of the Council correspond to those already identified by Law 225/92 and Legislative Decree 112/98.

- Law No. 152 of 2005, which extends the power of ordinance also for events abroad, after the declaration of a state of emergency.

- Law of 24 March 2012, n. 27, the legislation concerning large events is amended and their management no longer falls within the competence of the Civil Protection.

The new Code (Legislative Decree No. 1 of 2 January 2018), which aims at simplification, does so through the awareness that today's world is complex and that therefore civil protection legislation must also take into account this complexity, governing it. In fact, by regulating activities of forecasting, prevention and mitigation of risks, but also of emergency management and their overcoming, the Code aims at guaranting a linear, effective and timely operation.

It is important to point out that this new code has also been amended and supplemented through Legislative Decree No. 4 of 6 February 2020.

1.3 Any legislation changes foreseen in the near future

The civil protection issue is constantly evolving, in 2020 the whole world faced a new emergency: Covid 19. It is reasonable to believe that following the experiences related to this emergency in the near future new regulations may arise to improve the response of the Civil Protection System regarding the health issue.

2. Civil protection structure

The National Civil Protection Service is organized as an integrated system. Within the system, the skills in the activities of forecasting, prevention, rescue and overcoming of emergency situations are entrusted to several bodies and operational structures as the complexity of the national risk landscape requires the coordinated use of all the professionals and resources available.

The **components** of the National Service are identified in Article 4 of the Civil Protection Code (Legislative Decree No. 1 of 2 January 2018):

- State administrations
- Regions
- Autonomous Provinces
- Local societies

In Article 13 of the aforementioned decree, however, the following are identified as **operational structures** of the National Service:

- The **scientific community,** it contributes to the National Civil Protection Service with a function of technical and scientific support, through monitoring, forecasting and prevention of the different risk hypotheses on the national territory, development projects and technological innovation of monitoring networks and studies and research.
  The activities are regulated through agreements with individual research institutes, in particular with the National Institute of Geophysics and Volcanology (INGV), the National Research Council (CNR) and the Agency for New Technologies, Energy and the Environment. (ENEA).

- The *INGV deals* with seismic and volcanic surveillance throughout the national territory, through technologically advanced monitoring networks distributed over the territory (National Seismic Network), or concentrated around volcanoes.
- Cnr *deals* with developing knowledge, methodologies and technologies for national monitoring, forecasting and surveillance systems, in close collaboration with the Functional Centers of Civil Protection, which constitute the network of operational centers for the national alert system.
- *ENEA deals* mainly with the evaluation and prevention of seismic risk in the national territory, the monitoring of earthquakes, the analysis of the seismic hazard of selected sites and the development of modern anti-seismic technologies for civil, industrial and cultural structures and infrastructures.

– The **National Fire Brigade intervenes** in the protection of human life, in the protection of goods and the environment from damage or danger of damage caused by fires, accidental situations and industrial risks, including those arising from the use of nuclear energy. In case of calamitous events, the Corps can be immediately activated as an operational structure of the National Civil Protection System and ensures immediate and urgent technical interventions according to its competences and in compliance with the levels of coordination provided for by the current Civil Protection legislation. To best deal with disasters, firefighters operate through the regional mobile rescue columns, made up of men and vehicles employed. The National Fire Brigade, in addition to ensuring urgent technical assistance in the territory, provides information on the consequences of the event and determines an initial estimate of the victims, the injured and people in need of assistance. Furthermore, the Fire Brigades provide support with their mobile operational centers available, activate their staff to check and control the viability of the buildings intended to host the operational and coordination centers of the rescue system, provide operational and logistical support for the emergency housing assistance of the populations and intervene to secure structures, infrastructures and cultural heritage. In the event of forest fires, firefighters provide the Regions resources and staff for active fighting interventions and promote the study and testing of measures and regulations to avoid fires or limit their consequences.

- The **Armed Forces** participate in the National Civil Protection Service and contribute to the protection of the national community in case of damage or danger of serious damage to the safety of people and property. In case of emergency or critical events, the Italian Army, navy and air force provide logistical and operational support, qualified personnel, tools and means. The help of the Armed Forces is ensured through the operational units located throughout the national territory, which is divided into areas of responsibility (military regions) and intervention zones (the military commands of the area). The relatio with the National Civil Protection Service is ensured by the Defense Staff at national level and by the Command of the Military Region at regional level.

- The **Police** Forces (State Police, Carabinieri, Finance Police, Coast Guard, Penitentiary Police, Local Police), are involved in civil protection interventions regarding safety and safety of people, each force according to its own logistical, instrumental and personnel possibilities.

- The **organized civil protection volunteering registered in the national list of civil protection volunteering** was born under the pressure of the great emergencies that have affected Italy in the last 60 years: above all, the flood of Florence in 1966 and the earthquakes in Friuli and Irpinia. A large spontaneous mobilization of citizens made it clear that it was not the solidarity of people that was lacking, but an organised public system that knew how to use and enhance it. Since then, civil protection volunteering has combined religious and secular pressures and guarantees the right to be rescued with professionalism. Today, it represents an extraordinary resource in terms of skills and operational capacity that has over 5,000 organizations throughout the country. To support this reality, a detailed regulatory model has been built to provide legal protections, training courses and to improve the ability to intervene. Legislative Decree No. 1 of 2018¸Code of Civil Protection, includes organized civil protection volunteering registered in the national list of civil protection volunteering among the operational structures of the National Service. In particular, to verify and test the organizational models of emergency intervention, the Department and the Regions promote exercises that simulate risk situations in which voluntary organizations are involved. Civil protection volunteering is divided into national and local

organizations throughout the national territory and is represented by the new National Committee, provided for in art. 42 of the Civil Protection Code.

- The **Italian Red Cross (CRI)** founded on June 15, 1864, is the National Society operating in Italy and related to the International Movement of Red Cross and Red Crescent. Auxiliary to the Public Authorities and Operational Structure of the National Civil Protection System, it aims at preventing and alleviate human suffering impartially, regardless of nationality, race, sex, religious and political beliefs.

- The **National Health Service** - NHS is the set of functions and welfare activities that regional health services, the State, national institutions and institutions perform to ensure health protection. Health is in fact a fundamental right of the individual and an interest of the community, respecting the dignity and freedom of the human person (Article 1 of Legislative Decree No 502 of 30 December 1992). The Health Reform (Law No. 833 of 23 December 1978) introduced the term. The National Health Service is not a single administration, but is a public system composed of: Ministry of Health, national bodies and institutions (Higher Health Council, Higher Institute of Health, Higher Institute for Prevention and Safety at Work, Agency for Regional Health Services, Institutes of Hospitalization and Care of a Scientific Nature, Experimental Zoo-prophylactic Institutes, Italian Medicines Agency) and regional health services (which include regions and autonomous provinces, local health companies and hospital companies).

- The **National Alpine and Speleological Rescue** Corps - Cnsas is the central technical body of the Italian Alpine Club - Cai, which works for the protection of human life, deals with the rescue of the injured in the mountain territory, in the caves and in the impervious areas of the national territory and is engaged in the prevention and surveillance of accidents (Law of 21 March 2001, n. 74).

Art. 13 of the Code identifies the subjects that contribute to civil protection activities: professional orders and colleges (with their respective national councils), bodies, institutes, national agencies, companies, companies and other public or private organizations that perform civil protection functions.

Collegial bodies

During the construction process of the National Service, the need gradually emerged to create a connection between forecasting and risk prevention on the one hand and management of emergencies on the other.

For this reason, as early as 1982, a technical-scientific Commission was established to give an authoritative opinion on scientific questions and to orient research towards risk prevention. With Law n. 225 of 1992, the Commission was configured as the link between the National Service and the scientific community. Since 2006, the **National Commission for the Prediction and Prevention of Major Risks** is an independent structure from the Department of Civil Protection, as it is chaired and composed of qualified experts in civil protection matters (Article 20 of Legislative Decree 1/2018).

The body that ensures the unitary management and coordination of emergency activities is the **Operational Committee** (Article 14 of Legislative Decree 1/2018). It is chaired by the Head of Department and it is made up of representatives of Components and Operational Structures of the Civil Protection System. It aims at evaluating news, data and requests from the areas involved in the emergency, it defines intervention strategies and coordinates interventions of all administrations and bodies involved in rescue operations.

2.1 Civil protection volunteering

Volunteering represents one of the most vital components of the Italian civil protection system. An extraordinary resource in terms of skills and operational capacity that has over 4 thousand organizations across the country. Civil protection volunteering consists of men and women who offer their time and energy to protect life and environment. To make their action more effective, civil protection volunteers are associated in organizations through which they share resources, knowledge and experiences. Civil protection volunteer

organizations are different in size, history, approaches and specializations. They are involved in a wide range of activities and they are integrated together with the other components of the civil protection system. The above-mentioned Organizations are registered in specific registers.

2.2.1 What does civil protection volunteering do?

The volunteering of civil protection works daily in the field of risk prevention. In case of disaster, it intervenes to provide rescue and assistance to population.

The contribution of professionalism and different skills is fundamental especially in maxi emergencies. The world of civil protection volunteering has a wide range of specializations and embraces many fields.

To name only a few: rescue and health care, forest fire, telecommunications, protection of cultural heritage, capability of playing different tasks in risk situations. For all these reasons, to become a volunteer of civil protection, it is necessary to contact a recognized organization and follow a training path. The Department of Civil Protection and Regions promote periodic exercises to improve collaboration between volunteering and other system operating structures.

2.2.2 A multifunction

National organizations, local associations, municipal groups. The civil protection volunteering is a world characterized by a multiplicity of associative forms well rooted in the territory. The large national organizations are characterized by the presence of a central coordination structure and a network of sections distributed throughout the national territory. Their main interlocutor is represented by the Department of Civil Protection.

Local associations and municipal groups, small and medium-sized, are an expression of a specific territorial sphere. Municipal groups, in particular, are born with the participation or under the thrust of municipal administration, which regulates them with its own resolution the Constitution, the Organization and Regulation. The main interlocutors of these associative realities are regional civil protection systems.

2.2.3 The support of institutions

Institutions enhance volunteering as an expression of active citizenship, guaranteeing autonomy and promoting development. Volunteer organizations registered in the registers can benefit from subsidies and tax exemptions, access contributions and enter into agreements with public bodies. Specifically, the Department of Civil Protection and Regions promote the organized volunteering of civil protection by supporting projects aimed at improving the operational capacities of volunteers, increasing synergy between volunteering and other components of the system and forming citizens to civil protection culture.

2.2.4 Volunteering in the civil protection system

In Italy civil protection is a function attributed to a complex system, the national service, which operates in compliance with the principle of subsidiarity. This system is coordinated by the Department of Civil Protection, Regions and Local Authorities. The law attributes the role of "operational structure", to volunteering together with the fire brigade, the armed and police forces, the state's forestry body, the scientific community, the Italian Red Cross, the National Health Service and the national body of the Alpine and speleological rescue.

2.2.5 Operational guidelines to ensure the unitary participation of voluntary organizations to civil protection activity (Directive of the President of the Council of Ministers of 9 November 2012)

The directive carries out a path of in-depth study and updating of the provisions of Decree No. 194/2001 of the President of the Republic: the regulation that protects the participation of voluntary organizations to all civil protection activities and regulates it in every aspect.

More than ten years after the regulation and conclusion of the General States of April 2012, operational guidelines aim at consolidating the results already achieved and further supporting the action of civil

protection volunteering within the national service, adapting procedures and tools to changed organizational framework for civil protection, in compliance with the principles of Presidential Decree 194/2001.

Among the innovations we can cite:

1. **The national list**: Organizations intending to participate in the forecasting, prevention and intervention activities in view or in case of calamitous events, and carrying out training activities must be registered in the National List of Civil Protection Volunteer Organizations.
   The national list consists of the sum of:
   - Regional lists / albis / registers called "Territorial lists";
   - "Central List" set up at the Civil Protection Department.

   All organizations registered in the territorial lists and in the central list can be activated and called to operate in national events.

2. **The territorial lists**: to intervene and operate for activities and events of Regional / Local Relevance, the organizations must be registered in the Territorial List of the Volunteering of their own region or province.
   The territorial list is set up separately from the register foreseen by law 266/1991 (Volunteering framework) and the organizations that have the requirements can register for both. In the territorial listings can be signed up:
   - voluntary organizations with a local nature pursuant to law 266/1991;
   - organizations of other nature, but with a predominantly voluntary nature;
   - Local articulations of the organizations referred to in the previous points, with national diffusion;
   - municipal and intermunicipal groups;
   - Territorial coordinations that collect more groups or organizations of the previously indicated typologies.

It is very relevant the need to identify, internally, "rates" that local sections must indicate when registering to the territorial list, specifying volunteers, resources and equipment dedicated to the national organization which they belong, within the respective national mobile column, and those reserved for operations on the territory, for local needs. The methods requested for registration in the territorial lists are governed by regional legislation determing the technical-operational suitability requirements. However, these requirements must meet the four general criteria identified by the directive.

3. **The central list**: This section of the national list includes organizations that ,for operational and dissemination characteristics, are of particular importance thanks to a direct connection with the Department of Civil Protection in the case of national important events.
   They can request registration in the central list:
   - national structures for coordinating organizations pursuant to Law No.266 / 1991 in different regions;
   - national structures of coordination of other organizations with a predominantly voluntary component;
   - Organizations without regional articulation, but able to carry out specific functions deemed by the Department of Civil Protection of particular relevance and National interest;
   - National structures for coordinating municipal and inter municipal groups.

   The directive specifies the structural requirements and the characteristics of technical-operational capacity of national importance that organizations must possess to request registration in the central list. Among these is expressly indicated the national operational relevance, which must be considered with reference to specific parameters, not necessarily connected to the activities aimed at emergency interventions. Registration in the central list of a widespread organization in more regions may also involve the recognition of local sections and operational territorial joints for national importance activities.
   The Department of Civil Protection and the Regions together with the organizations, define, according to their respective competences, agreements and operational protocols to ensure

possible contextual operations, in case of national emergencies, sections or local joints within the national mobile column of each organization.

4. **Computerized management of the national list**: to allow real-time updating of the National List of Organizations and its Public Consultation the Department and Regions will set up computerized management methods.

5. **Regulatory benefits for civil protection volunteers**: in order to apply the benefits provided for in articles 9 (reimbursement to employers' volunteers) and 10 (reimbursement of live expenses incurred in operational activities from voluntary organizations) of Presidential Decree 194 / 2001 it is necessary to formally "activate" the intervention of voluntary organizations. The activation of organizations must contain some basic elements such as: reference event, effective end of the activities / ceased emergency, accreditation method of volunteers, certificates and any authorization to apply for the regulatory benefits through forms Officer available on Department and Regions websites.

6. **Educational and training activities**: in order ti apply to bill benefits, training and training activities must be authorized by the department, even if organized on a local scale. Organizations registered in the central list present their request directly to the department. The territorial / local sections of organizations registered in the central list present their request for authorization to the department through national structures (also informing the civil protection structures of their own region). The organizations recorded in the territorial lists must apply exclusively through their region.

7. **Activities and interventions in case of emergencies / other events**: for type "C", ie national character, or for activities and international relevant interventions the activation of organizations and authorization to apply for Benefits is arranged by the Department of Civil Protection (with

charges against it). For events of type "A" and "B", the activation of organizations and authorization to apply for benefits is organized by the civil protection structures of the regions (with charges carried out). According to Presidential Decree 194/2001, authorization to apply for regulatory benefits is competence of the state or region, not of municipalities or other territorial institutions. According to law 225/1992, however, municipalities have title to activate organizations (but not to have regulatory benefits). To clarify this point, the directive specifies that the request for the regulatory benefits must be paid to a preventive region to the competent region, to allow the quantification of charges.

3. Activity of the National Service

Rescue of people in emergency is the activity that identifies the main function of civil protection, although over the years the competences of the System have extended to the development of knowledge of risks and actions to avoid or minimize the damage caused by disasters.

Law no. 225 of 1992 - establishing the National Service - defines civil protection activities: forecasting and prevention of risks, aid to the affected populations, contrasting and overcoming the emergency, and risk mitigation.

- **Forecast**: its objective is to identify risk scenarios and, when possible, to foretell, monitor supervise events and expected risk levels in real time;
- **Prevention**: aims at avoiding, or minimizing damage in the event of a disaster. Warning, emergency planning, training, dissemination of knowledge of civil protection, information to the population and application of technical regulations are tools for prevention;
- **Relief:** consists of first aid interventions for populations struck by disasters.
- **Overcoming the emergency**: set of initiatives necessary to remove obstacles for the resumption of normal living and working conditions of communities affected by the disaster.

3.1 In ordinary

The components and operational structures of the National Service are employed, according to competence and responsibility, in forecasting activities and planning of risk prevention and mitigation actions.

Central to this process is the involvement of the technical-scientific community, through the **Network of Functional Centers** - which carry out daily, at central and regional level, forecasting, monitoring, surveillance and alerting activities - and of **Competence Centers**, structures that carry out research and provide technical-scientific services for civil protection purposes. Municipalities, Provinces and Prefectures are also dedicated to updating **emergency plans**, essential for prevention, on the basis of regional and national guidelines. Even the individual citizen, as a member of the National Service, has a leading role in risk prevention activities. The objective of the ordinary activities of disseminating knowledge of civil protection and raising awareness of the population is precisely to train a more aware and prepared citizen.

3.1.1 Network of functional centers

The network of functional centers consists of the central functional center, at the Department of Civil Protection, and the decentralized functional centers in the regions and autonomous provinces. Each functional center carries out real-time forecasting, monitoring and surveillance of meteorological phenomena with the consequent assessment of the expected effects on people and things in a given territory, contributing, together with the Civil Protection Department and the Regions, to the management of the national alert.

The activity of the network of functional centers. Each functional center has the task of collecting and sharing with the entire network of Centers a series of data and information from different technological platforms and a dense network of sensors located throughout the country. In particular:

- Data collected by the meteorological-hydro-pluviometric networks, the national meteorological radar network and the various satellite platforms available for earth observation;

- Territorial hydrological, geological, geomorphological data and those deriving from the landslide monitoring system;
- Meteorological, hydrological, hydrogeological and hydraulic modeling.

Based on these data and modeling, the functional centers develop the probabilistic expected scenarios, also through the use of forecasting models of the effects on the territory. Based on these assessments, the functional centers issue bulletins and notices which report both the evolution of the phenomena and the levels of criticality expected in the area.

The Central Functional Center. The central functional center is located at the operational headquarters of the Civil Protection Department, and it is through it that the Department, together with the Regions, guarantees the coordination of the national alert system. Furthermore, consistently with the principle of subsidiarity, in cases where the decentralized functional centers are not active or are temporarily inoperative, the central functional center carries out all the operational tasks assigned to them.

3.1.2 Competence Centers

The Competence Centers provide services, information, data, processing and technical-scientific contributions in specific areas. They can coincide with the functional centers or be external, but participate in the network of functional centers through the stipulation of agreements that identify the areas of activity of each structure. The centers of expertise that collaborate with the network of functional centers include state administrations, agencies, research institutes, universities and basin authorities.

The subjects that can be identified as Centers of Competence are:

a) **Operational structures and public entities** appointed to carry out activities, services, studies and research in disciplinary areas of specific or exclusive competence, including territorial, attributed by laws, legislative and regulatory provisions, for the pursuit of institutional purposes;

b) **Subjects participated by members of the National Civil Protection Service**, established with the aim of promoting technological development and higher education. They carry out their activity primarily

for the National Civil Protection Service and they are both subject to supervision of the Department of Civil Protection;

c) **Universities, university departments, research centers** that have exclusive technical scientific knowledge or proprietary rights in the use of intellectual rights, intellectual property and scientific research;

d) **Universities, University Departments, Research Centers**, on which the National Commission for the Forecasting and Prevention of Major Risks expresses its opinion of technical-scientific merit, based on a comparative assessment following specific needs formulated by the Department of Civil Protection for the various types of risk that the subjects referred to in the letters cannot face a), b) and c).

3.1.3 Civil protection planning

A civil protection plan is the set of operational intervention procedures to deal with any expected calamity in a given territory.

The civil protection plan incorporates the forecasting and prevention program, and it is the tool that allows the authorities to prepare and coordinate rescue interventions to protect the population and property in an area at risk. It aims at ensuring by all means the maintenance of the "civil" standard of living put in crisis by a situation that involves severe physical and psychological discomfort.

The plan is divided into three basic parts:

- General part: it collects all the information on the characteristics and structure of the territory;
- Outlines of the planning: it establish the objectives to be achieved to give an adequate civil protection response to any emergency situation, and the skills of the various operators;

- Intervention model: assigns decision-making responsibilities to the various levels of command and control, uses resources rationally, defines a communication system that allows a constant exchange of information.

A civil protection plan is a document that:

- assigns responsibility to organizations and individuals to carry out specific actions, planned in time and place, in an emergency that exceeds the responsiveness or competence of a single organization;
- describes how actions and relationships between organizations are coordinated;
- describes how to protect people and property in emergency and disaster situations;
- identifies the personnel, equipment, skills, funds and other resources available to be used during response operations;
- identifies the initiatives to be implemented to improve the living conditions of any evacuated from their homes.

It is a continuously updated document, which must take into account the evolution of the territorial structure and changes in the expected scenarios. The exercises also contribute to updating the plan because they validate its contents and evaluate the operational and management skills of the staff. The training helps the personnel who will be employed in an emergency to familiarize with the responsibilities and tasks to be performed in case of emergency.

A plan must be flexible enough to be used in all emergencies, including unforeseen ones, and simple enough to become operational quickly.

3.2 In emergency

The management of emergencies, as required by article 2 of legislative decree n. 1 of 2 January 2018 "Civil Protection Code", consists of a set of measures and interventions aimed at ensuring rescue and assistance to

people and animals affected by disasters, reduction of the impact of the event and information activities to the population.

Emergency civil protection events related to natural disasters or human activity are divided into events that:

A. can be faced with interventions in the ordinary way by the individual bodies and competent administrations;

B. by nature, or extent, involve the coordinated intervention of several entities or administrations and must be faced with extraordinary means and powers;

C. in terms of intensity and extent have national importance and must be faced with extraordinary means and powers.

When an event hits a territory, the Mayor - the only civil protection authority within the National Service - has the task of ensuring first aid to the population, coordinating the local operational structures on the basis of the municipal emergency plan (type event "A"). If the means and resources available to the Municipality are not sufficient to deal with the emergency, the Province, the Prefecture (Territorial Office of the Government) and the Region intervene, activating the resources available in the territories under their jurisdiction (type event "B").

In the most serious situations, at the request of the regional government, the national level takes over, with the declaration of a state of emergency (type event "C"): the coordination of interventions is assumed directly by the President of the Council of Ministers, who operates through the Department of Civil Protection. It is in these cases that the National Service is engaged in all its components and operational structures.

4. Command and control chain

The regional model defines the roles and responsibilities of the various actors involved, with the related exchange of information and communications, and identifies the structures suitable for operational coordination.

At the various territorial and functional levels, the coordination follows the principles of the "Augustus Method", which consists of simple and flexible emergency management and allows representatives of each "operational function" to interact with each other at the so-called "decision tables" and in the Operating Rooms at various levels (COC, COM, CCS, COR, DI.COMA.C.), thus starting collaborative decision-making processes in real time.

- **Municipal level**. The first response of the civil protection system must be guaranteed by the local structure through the activation of Municipal Territorial Presidium (PT). This structure is responsible for the supervision of the territory, in order to guarantee inspection and monitoring of any current critical issues, in particular on those areas most exposed to the risk.

  It must be activated by the Municipal Civil Protection Manager in order to carry out an initial evaluation of the current event. If the intervention is not manageable by this structure, the COC (Municipal Operations Center) must be activated directly.

  The COC (Municipal Operations Center) is chaired by the Mayor, the highest civil protection authority at municipal level, or by one of its delegates, where the different components operating in the social context are represented.
- **Provincial level**. At this level they are activated the CCS (Rescue Coordination Center), at the Prefectures of the Provinces. Convened and chaired by the Prefect, or his delegate, by the Deputy Prefect, it is composed of the highest managers of all the operational components and structures present in the provincial territory, both civil and military, police forces, fire fighters, voluntary organizations and essential services related to civil protection, according to the institutional competences established by law. These authorities, while continuing to carry out their respective ordinary functions, act in the emergency under the coordination of the Prefect. The CCS therefore has the important task of identifying the strategies and operations of intervention to overcome the emergency and to connect with the local authorities of the affected areas. Depending on the severity of the emergency, the Prefect constitutes and coordinates the Mixed Operational Centers (COM) which are the direct outpost of the CCS in the affected area.

  The Mixed Operations Centers (COM) are the first emergency line in the event of a calamitous event. Each COM is the responsibility of a manager (usually an official of the Prefecture or the Department

of Civil Protection, or a Mayor of one of the municipalities concerned), appointed by the Prefect or the Head of the Department of Civil Protection. Representatives of municipalities and operational structures (Urban Fire Brigades, Fire Brigades, Volunteering, Municipal Police Forces) participate to this center. The tasks of the COM are to promote the coordination of the emergency services organized by the Prefect with the interventions of the Mayors belonging to the COM itself. Generally, the territorial composition of these emergency bodies is linked to various factors such as: population density, land size, geographical, orographic, hydrographic configuration. In view of these aspects, a COM may be composed of one or more municipalities. The location of the COM is usually barycentric compared to the relevant municipalities and is located in anti-seismic structures, not vulnerable to any type of risk.

- **Regional level**. At this level, on the other hand, we find the COR (Regional Operations Center), whose superior authority is the President of the Region. A strong point of the regional civil protection system, emergency management is based on the integration, coordination, sharing of knowledge and intervention procedures at the various institutional levels.
- **National level**. Finally, at this level, DI.COMA.C. (Command and Control Directorate), a mobile central structure activated only following major events and representing the decision-making level located throughout the territory that provides local coordination support directly in the area affected by the event. It has tasks and functions carried out by the various representatives of the institutions, both at central and local level, and of the world of volunteering which operates under the coordination of the National Department of Civil Protection.

The information, therefore, if previously known, allows all the components and operational structures, which intervene in the management of the emergency, to mobilize and deploy in a few hours (the first hours) men and vehicles in the areas affected by an event.

5. The Union Civil Protection Mechanism

The Civil Protection Mechanism - established in 2001 and reformed several times - coordinates the European response to natural and man-made disasters. Its objectives also include the promotion of cooperation between national civil protection authorities and the strengthening of citizens' awareness and preparedness regarding risks.

The Mechanism consists of a voluntary pool of resources pre-committed by the Member States to be deployed immediately inside or outside the Union and to guarantee rapid, effective and coordinated assistance to the affected populations in the event of an emergency. The operational heart of the Mechanism is the Emergency Response Coordination Center: active 7 days a week, 24 hours a day, it coordinates the European response to disasters.

At the European level, civil protection is based in the Directorate General for Humanitarian Aid and Civil Protection of the European Commission and has the membership of 34 countries: in addition to the 28 member countries of the European Union, Iceland, Norway, the former Yugoslav Republic of Macedonia, Montenegro, Serbia and Turkey.

6. Regional Civil Protection Systems

Over the years, the responsibility for civil protection has progressively passed from the state to regional governments and local autonomies. With the modification of Title V of the Constitution, civil protection has become a matter of concurrent legislation, so that, except for the determination of the fundamental principles, the legislative power belongs to the regional governments. Each region has organized itself with its own civil protection coordination system.

6.1 Abruzzo Region

6.1.1 CPS LAW REFER

The regional law of reference in the field of Civil Protection for Abruzzo Region is Law No. 46 of 2019, "Establishment of the Regional Civil Protection Agency and further provisions on Civil Protection" repealing Regional Law no. 72 of 1993 "Discipline of Regional Civil Protection activities". It is divided in 2 Chapters according the following structures and contents:

Chapter 1. "Regional Civil Protection Agency" artt. 1 - 18 L.R. 46/2019

This chapter defines the framework of the regional civil protection system.

Articles 1 to 3 define the establishment of the Agency, the function and the organization. Article 4 defines the role of the director. Article 5 defines the role of the statutory auditor who supervises in accordance with the laws. Articles 6 to 18 define the organization of the Agency in terms of staff, structure and related tasks included financial resources and assets.

Chapter 2. "Final and financial provisions" Artt. 19 – 23

This chapter defines the transitional provisions, the abrogation, the referral rules and the financial charges of the structure.

Regional Civil Protection is divided into three services:

1. Civil Protection Activity Planning;

2. Civil Protection Risk Prevention;

3. Civil Protection Emergency.

Activity Planning

Activity Planning Service is managed by an experienced manager whose office is involved in Coordination and Study of Civil Protection. Moreover, there is a network office made by Volunteers charged of Communication.

Skills

The Service deals with everything related to the General Affairs of the Directorate: promotion, selection, keeping the register of voluntary associations, control of requirements in collaboration with the Emergency Service, inscriptions to the Territorial List of CP, communication of study results from the activity of civil protection, organization and training, assignment of tasks in emergency situations of civil protection, taking control of the local emergency situation and coordination with the Regional Executive Organ through the Functional Center of Abruzzo.

Risk Prevention

Risk Prevention Service has one manager and it consists of three Offices:

- Seismic Risk;
- Avalanches, Forest Fires and Anthropogenic Risks;
- Hydrogeological and Hydraulic Risk.

Skills

The Service deals with prevention activities related to the risks of Civil Protection referred to Decision of Regional Government No. 425/2018. It concerns the definition of laws and regulations for forecasting and prevention activities, the definition of operational procedures through specific protocols, the elaboration of

multi-annual programs of prediction and prevention risk; support and collaboration with the Functional Center for the definition of guidelines for civil protection planning at municipal level.

Emergency

Emergency Service has one manager with one Office ready to intervene in rescue, forest fires, management of the Mobile Column organization and Situation Room, moreover to estimate Environmental and Anthropogenic Hydrographic and Oceanographic Risks.

6.1.2 CPS OPERATIONAL INSTRUMENTS AND STRUCTURES

Centro Funzionale - Functional Center

Functional Center of the Abruzzo Region is a highly specialized structure for the lead and management of the national alert system regarding meteorological, hydrogeological and hydraulic risks. It is specialized in monitoring and leading all instruments data concerning meteorological and hydrological stations in a regional domain.

SOR – Sala Operativa Regionale - Regional Operations Room

It is a technical center for news gathering, command, coordination, communication and control to serve the purposes of civil protection activities.

CMR Colonna Mobile Regionale - Regional Mobile Column

The CMR consists of means, equipment and teams operating in emergency, in order to ensure adequate response both to critical situations at local level, and to those affecting the entire regional territory. It can also operate outside the regional and national territory with the authorization of the president of the region or delegated councilor.

It consists of equipment and human resources of the Voluntary Organizations/ Municipal Groups and Coordination listed in the Regional List and of endowments of the Regional Civil Protection, in use at the same Section or entrusted to the Municipalities.

CAPI Centri Assistenza di Pronto Intervento - Emergency Assistance Centers

The agency has at its disposal centers in which materials and facilities for civil protection interventions are kept and stored efficiently.

Struttura di Missione Emergenze di Protezione Civile - Emergency Protection Mission Structure

It is a temporary structure available to the delegated commissioner for the management of activities related to the declaration of emergency status.

The annual activity program of the Agency contains objectives, priorities and projects to be carried out in accordance with the annual budget of the Region regarding human resources, financial resources, and instrumental resources, and it is submitted by the Director to the Regional Government. The annual program is published in the official bulletin of the Abruzzo Region. Agency promotes and organizes training, information and awareness campaigns, civic education programs, on the main problems of disasters, with particular reference to the populations affected by regional risks, explaining the behaviors needed to reduce risk effects. Interventions aimed at reducing seismic and hydrogeological risk, forest fires, environmental health risk, emergency communication, emergency management and assistance to the population are the subjects of training.

Relations and agreements

Regional Civil Protection collaborates with regional groups of scientific research for data analysis and databank sharing in real time and offered by: INGV - National Institute for environment, territory and volcanoes research; GSSI – Gran Sasso Science Institute, an international PhD school and a center for advanced studies in physics, mathematics, computer science and social sciences. CNR – National Research Council, Seismic prevention, post-earthquake and seismic risk, applied research on the seismic vulnerability

of buildings, methods for detecting damage and vulnerability, methodologies for defining the practicability of buildings in post-seismic emergency, organization and coordination of damage censuses, procedures for the technical management of the post-seismic emergency, procedures for the management of restoration activity.

Regional technical services

Territory - Environment Department (DPC) - L'Aquila Headquarters. Agriculture Department (DPD) - Pescara Headquarters.

Civil Protection Volunteer Associations

Volunteers are a precious resource for the Civil Protection System, during their authorized employment, they are granted: maintenance of the job, economic and social security treatment, insurance coverage and reimbursement of expenses incurred in the activity of civil protection. There is a contract fixing values for Volunteering and a Territorial List of Voluntary Civil Protection Organizations. Volunteer Organizations which intend to collaborate with the Civil Protection and carry out a service in full integration with the regional institutional forces must have the requirements provided by regional law, including: to be constituted by a public agreement, to have at least 20 members, have no-profit and include civil protection activity in its statutory purposes.

Fire Brigade

In the Abruzzo Region there is the National Directorate of Firefighters in L'Aquila department, with a Public Rescue and Civil Defense unit.

Army

The role of the Armed Forces was considered complementary to that played by the Civil Protection and by the other Departments institutionally in charge of the various sectors of intervention. The participation of

the Armed Forces, i.e. in the rescue operations of the Abruzzo population hit by the earthquake in 2009, from the beginning of the emergency, took place with the use of the Army and Carabinieri units located in the region.

Forestry Commission

The Abruzzo Region recognizes in the woods and pastures indispensable resources for the community. The Region recognizes the fundamental role of forests in the conservation of natural resources, as well as, their essential function in stabilizing the climate due to their carbon fixing capacity, as defined in the Kyoto Protocol.

The State Forestry Corps collaborates with the Abruzzo Region according to the procedures defined by a specific agreement between the public administrations. The Convention specifies fields of application, tasks and duties that the Region confers on the State Forestry Corps.

Police

Police, Finance Police, Municipal Police and Coast Guard collaborate with the Civil Protection in case of emergency by promptly arriving on site. These bodies act to protect, control and serve the citizen, avoiding inconvenience and imposing the rules for the wellness of the entire community.

Italian Red Cross

Italian Red Cross Abruzzo Regional Committee is in L'Aquila. The system of the Italian Red Cross is inspired by the principles of subsidiarity, democracy and the electivity of associative offices. The Regional Organization is divided into Regional Committees which coordinate and control, through specific powers, the activities of the Committees operating in the region, respecting the autonomy of each Committee.

Health Service

In the region there are 4 local health units for a total network of 17 hospitals.

C.N.S.A.S.

Alpine and Speleological Rescue (CNSAS). Abruzzo Region has introduced new provisions on mountain and speleological rescue for the recognition and strengthening of the Alpine and Speleological Rescue in Abruzzo.

6.1.3 CPS REGULATORY FRAMEWORK

MUNICIPAL PLANNING

- **"Guidelines for the drafting of Municipal and Intermunicipal Emergency Plans." - Regional Council Resolution n. 521 on July 23, 2021 (Linee guida) Guide lines.**

  These plans constitute, at regional level, the main reference for the drafting of municipal civil protection plans with the aim of ensuring a homogeneous and unified planning, directing municipalities in the drafting of a complete and useful document to ensure the operation of the system in case of emergency.

- **"Rules for the reduction of seismic risk and methods of surveillance and control of works and constructions in seismic areas."- Law N. 28 August 11, 2011**.

  With this law, the Civil Protection Section has provided municipalities with the indications on civil protection planning in relation to seismic risk.

OPERATING PROCEDURES

- **"Alert Procedures of the Regional System of Civil Protection for Meteorological, Hydrogeological and Hydraulic Risk" - Regional Council Resolution n. 521 of July 23, 2018, Regional Council Resolution n. 19 of January 13, 2015, "Multi-risk regional alert system" Regional Council Resolution n. 172 of March 4, 2015.**

Guidelines for municipal and inter-municipal emergency plans which describe the alert system in the field of civil protection and define the event scenarios and the intervention model at municipal level for hydrogeological, hydraulic, forest fire risk, etc. Based on the operational indications of the Head of Civil Protection of February 10, 2016, these procedures identify the alert zones, the rain thresholds and water thresholds, the alert and criticality table and establish the bi-univocal correspondence between criticality levels and alert levels. They also report the description of the regional monitoring network, the operational phases for alert levels and the schemes of: Regional Criticality Bulletin, Regional Criticality Notice, Alert Message and Update Bulletin.

- **"Rules for the prediction and prevention of avalanche risks" Law N.47 of June 18, 1992.**

  This law establishes the procedures for assessing the dangers and risks of avalanches in the area of the Abruzzo Region and explain the rules for the protection of public and private safety. It

  establishes a regional technical committee for the study of snow and avalanches – CO.RE.NE.VA as well as avalanche hazard location maps, risk categories and interventions which need to be implemented by the municipal administrations (limitations, inaccessibility, prohibitions, security and prevention works).

- **"Discipline of withholding barriers and water reservoirs of regional competence" Law N.18 of June 27, 2013.**

  This law manages the construction, operation and supervision of the restraint barriers of watercourses and their reservoirs in the region. It classifies the risk of dams and provision on administrative function. It establishes all the regulations for the construction, maintenance, testing and above all the rules for supervision including the management project. The SOR takes care of contacting and alarming the municipalities after notification of the event by the authorities managing the dam.

VOLUNTEER

- **"Territorial list of voluntary organizations" – Regional Regulation no. 178 of March 4, 2013 and n. 392 of May 9, 2014**.

  This regulation provides arrangements for registration, registration refusal and deletion of voluntary organizations from the regional list of civil protection volunteering, arrangements for the employment and intervention of volunteering in civil protection activities and provision of contributions and reimbursements.

6.2 Puglia Region

6.2.1 CPS LAW REFER

The regional law of reference in the field of Civil Protection for Puglia Region is Law No. 53 of 2019, "Regional system of civil protection" which repeals the Regional Law no. 7 of 2014 "The regional system of civil protection". It is divided into 3 Titles according the following structure and contents:

1. "General rules"

I. Chapter "General principle" (artt.1-2)

It defines principles, subject and objective guiding the law, and its scope by the description of the type of civil protection events and the field of institutional intervention.

2. "Regional system of civil protection"

I. Chapter "Regional system of civil protection activities. Functions and duties of institutional actors" (artt.3-12)

This chapter defines the framework of regional civil protection system.

At the beginning it lists the activities of Region, then it describes its components and its functions and duties such as, for instance, the coordination of public and private organisms and organizations involved in civil protection activities.

After that it talks about Municipalities functions and duties, such as data collection and management, drafting and application of civil protection plan, people information about local risks and the activation of first emergency actions in case of emergency.

In order to describe civil protection system, after Region and Municipalities it explains the other two subjects of regional civil protection system: regional standing committee of civil protection and regional operational committee of emergency (COREM), for each one there is the description of aims, composition, activities, procedure of appointing and voting arrangements.

In this chapter are also described the details about the Declaration of state of crisis and of emergency on regional territory: the contents of declaration, who has the power to declare the state of crisis or of emergency (President of regional Government), the conditions for the declaration, the tasks of President of regional Government and the means and structures to overcome the emergency.

Finally, are detailed the instruments useful for emergency management at regional level. The articles 10, 11 and 12 talks about responsible for approval and contents of Forecast and prevention of risks regional program, Prevention and management of emergency planning and Regional plan of wildfires.

II. Chapter "Civil protection operational network"

1. "Operational instruments and structures" (artt.13-15)

In this section the law lists the regional operational structures and describes regional duties about training and information on civil protection topics.

There are two types of operational structures: regional ones and the ones that support region for civil protection activities by agreement. The first type includes Peripheral functional center, Regional

operational center composed by Regional Integrated operational room and Permanent unified operations room.

2. “Civil protection volunteers” (artt.16-17)

This section is all about civil protection volunteer, its organization and use, and the training, contribution and insurance measures.

3. “Transitional and final provisions” (artt.18-19).

6.2.2 CPS OPERATIONAL INSTRUMENTS AND STRUCTURES

The Regional bodies that ensured the exercise of civil protection functions at regional level are:

a. **Regional Permanent Committee of Civil Protection**

The aim of the committee is supporting the Region in the exercise of the functions of planning, organization and implementation of civil protection activities, and to carry out permanent advisory activities for the preparation and implementation of regional programmes.
It is composed of the subjects at the top of the main organs and institutional structures constituting the regional system of civil protection, is appointed by decree of the President of the Regional Council and meets at least once every three months.

b. **Regional Operational Committee of Emergency (COREM)**

The aim of COREM is the technical-operational coordination of the activities necessary to deal with disasters of regional and national importance, is activated by the Head of the Section and is composed by the President of the Regional Committee of Civil Protection, the Head of the Civil Protection Section

of the Apulia Region and representatives of the main institutional bodies and structures constituting the regional civil protection system.

Regional operational instruments and structures.

- **(CFD) - Decentralized Functional Center**

According to “Procedures for early warning of civil protection regional system in case of Meteorological, Hydrogeological and Hydraulic Risk”- D.G.R. n. 1571 of 2017, it is divided into 3 functional sections and it deals with: forecasting of the weather events , their intensity and the impact on the territory; monitoring and real-time surveillance of weather events parameters; data analysis for hydrogeological and hydraulic alerts and emergency management; organization, processing and management of data detected by the monitoring stations with specific references to climate, hydrologic and hydraulic aspects; development of models for hydrological events, as support for the design of hydraulic structures and protection from the risks of extreme events, management of informations exchange and drafting/transmission of forecasting and early warning messages.

- **Regional Operational Center (COR):**

SOIR Sala Operativa Integrata Regionale (SOIR) - Regional Integrated Operational Room

It has the following tasks: coordination of civil protection measures in case of disasters; information exchange with the components of Civil Protection System (National Civil Protection Department, local administration, etc.); information exchange with the Peripheral Functional Center and the territory during weather events; management of regional mobile column; activation and coordination of civil protection voluntary organizations.

SOUP – Sala Operativa Unificata Permanente - Permanent unified operations room

The SOUP (Permanent Unified Operating Room), in compliance with the provisions of the "Regional Plan of Prediction, Prevention and Active Fight against forest fires" approved with D.G.R. n. 1930 of 2017 and extended to the year 2021 D.G.R. n. 388 of 2021, coordinate activities in the territories for the active fight against forest fires, operating H24 during the period of maximum danger to forest fires. From the SOUP must

pass all the useful information to the activities of sighting, activation and coordination of the AIB operating forces present on the regional territory, as well as information of other entities eventually involved, and it is from this that they are emitted and sent the "Report of the Day".

CMR Colonna Mobile Regionale - Regional Mobile Column

The CMR consists of means, equipment and teams operating in emergency, in order to ensure adequate response both to critical situations at local level, and to those affecting the entire regional territory.

It consists of the equipment and human resources of the Voluntary Organizations/ Municipal Groups and Coordination listed in the Regional List and the endowments of the Regional Civil Protection, in use at the same Section or entrusted to the Municipalities.

- **Volunteer Civil Protection**

Volunteer is a fundamental component of the regional system, and is a public system of resources, activities and means that synergistically collaborate in an organized manner to address and manage emergencies, working for the safety of persons in the event of disasters or disasters. The activation of the affiliated teams is carried out and coordinated only and exclusively by SOIR and their intervention is provided exclusively to support other operational forces in the field (VV.F. and A.R.I.F.).

Region for the performance of civil protection activities can also make use of the following structures operating in the regional territory:

- National Department of Fire Brigades;
- Corps of Port Captaincies (Italian Coast Guard);
- Regional Agency for Irrigation and Forestry (ARIF);
- Regional Agency for Prevention and Environment (ARPA);
- Regional Strategic Agency for Sustainable Development of the Territory (ASSET);
- River basin authorities of Southern Apennines;
- Italian Red Cross;
- Land Reclamation Consortia;

- Regional Health Service;
- Armed Forces;
- Police Forces;
- National Mountaineering Rescue team and Regional Speleological Corps (CNSAS-CAI);
- Manager of the Apulia Airport Network;
- Manager of essential public services.

6.2.3 CPS REGULATORY FRAMEWORK

FOREST FIRES AND INTERFACE AREAS

- **“Forest fire prevention and interface rules" - Regional Law No. 38 of 12th December 2016**

This law aims at preventing and counteracting the triggering and propagation of forest fires and interface areas, in order to safeguard public and private safety and agricultural and forestry ecosystems and to promote the reduction of carbon dioxide emissions into the atmosphere. In addition, it defines the prohibitions to be complied with, the obligations to which managers and owners of immovable property or potentially dangerous activities are bound for the purpose of triggering forest fires or interface areas, the functions of Region and Municipalities, forest fire planning and planning instruments and penalties for offenders.

- **"Regional Plan of Prediction, Prevention and Active Fight against forest fires" with validity 2018-2020 - Regional Council Resolution n. 1930 of 21th November 2017, extended to the year 2021 with Regional Council Resolution n. 388 of 15th March 2021**

This plan has been prepared by the Regional Section of Civil Protection with the possible support of other bodies and subjects of the scientific and institutional world. It is the regional planning tool for the organisation and implementation of actions to counteract and contain forest fires or interface fires, with the aim of mitigating the risk of forest fires on the regional territory.

MUNICIPAL PLANNING

- **"Guidelines for the drafting of Municipal Civil Protection Plans." - Regional Council Resolution n. 1414 del 30th July 2019**

These plans constitute, at regional level, the main reference for the drafting of municipal civil protection plans. They update the Guidelines approved with D.G.R. n. 255 of 07 March 2005 with the aim of ensuring a homogeneous and unified planning, directing municipalities in the drafting of a complete document and useful to ensure the operation of the system in case of emergency.

They replace the Guidelines edited in 2005 for the parts concerning the general framework, organizational structure and dynamic structure of the plan, while they update them on the drafting of the event and risk scenarios and on the intervention model limited to weather risks-hydrogeological and hydraulic, tidal and forest fires and interface areas.

- **Seismic risk planning - Note prot. N. AOO_026_687 of 22th January 2016**

With the above-mentioned note, the Civil Protection Section has provided to municipalities the first indications regarding civil protection planning in relation to seismic risk. With subsequent note AOO_026_6724 of 24th June 2016, it also provided information on the update of the same with reference to the findings of the Seismic Micro-zonation Studies (MS) of Level I and analysis of the Limit Condition for Emergency (CLE).

OPERATING PROCEDURE

- **“Procedure of Warning of the Regional System of Civil Protection for Meteorological, Hydrogeological and Hydraulic Risk” - Regional Council Resolution n. 1571 of 03th October 2017**

Based on the operational indications of the Head of Civil Protection of 10th February 2016, these procedures identify the alert zones, the rain thresholds, the water thresholds, the alert and criticality table and establish the biunivocal correspondence between criticality levels and alert levels. They also report the description of the regional monitoring network, the operational phases for alert levels and the schemes of: Regional Criticality Bulletin, Regional Criticality Notice, Alert Message and Update Bulletin.

- **"Document for the management of the hydraulic risk of the Fortore river downstream of the Occhito dam and establishment of the Command and Control Unit (U.C.C.)" - Regional Council Resolution n. 1439 of 13th September 2016**

Procedures are defined for the operational management of the preventive laminating plan of the Occhito dam aimed at flood control, the thresholds of hydraulic criticality of the riverbed downstream of the dam, the hydraulic risk alert phases downstream of the dam as well as the activation conditions and the composition of the U.C.C. and, in particular, the Technical-Scientific Department.

VOLUNTEER

- **"Provisions on the Civil Protection Volunteers of the Apulia Region" – Regional Regulation no. 1 of 11th February 2016**

This regulation provides for arrangements for registration, refusal of registration and deletion of voluntary organisations from the regional list of civil protection volunteering, the arrangements for the employment and intervention of volunteering in civil protection activities and the provision of contributions and reimbursements.

6.3 Marche Region

6.3.1 CPS LAW REFER

The regional law of reference in the field of Civil Protection for Marche Region is Law No. 32/2001, which indicates regional bodies to ensure the exercise of civil protection functions at regional level:

- Regional Civil Protection Service;
- Regional Operative Rooms;
- Regional Operations Committee;

The Regional Civil Protection Service is organized with a Director and 7 subjected structures that provide support in the various strategic sectors of the service, which have been established by the regional resolution 467/2019.

With the Regional Law n.32/2001 and the following resolution n. 557/2008, it was established the Regional Operations Committee (COR).

The COR is officially constituted by Decree of the President of the Marche Region and it foresees the participation of different representatives, with decision-making powers, of the regional structures, of the Bodies and Institutions that have responsibilities and tasks of emergency intervention. Depending on the evolution of the situation, also representatives of other components of the CP System can be called to participate in the activities of the COR.

The members of the COR are alerted and/or summoned when there are situations likely to be classified as current or potential emergencies.

To ensure greater readiness and effectiveness in responding in an emergency, the Marche Region has signed various agreements with the main actors of the COR. Among the most significant we can remember the active agreements with the Fire Brigade (VV.F.).

6.3.2 CPS OPERATIONAL INSTRUMENTS AND STRUCTURES

1. Technical Organization Management

Among its duties there are:
Supervision of the Regional activities and coordination with the National Department and the CP Special Commission;

- Agreements definitions with the Prefectures and Universities;

- Drafting of regulatory documents for the definition of the operating procedures for the intervention of the components of the System and of the Regional Emergency States;
- Special IT projects dedicated to the local Municipalities of the Region;
- Responsible of the Regional participation in the National volcanic risk planning of Vesuvius and Campi Flegrei.

2. Administrative Coordination Management

Accounting management even with the European projects. Administrative support to the other structures of the Service, Human Resources management and Emergency purchasing manager.

3. Emergency Plans and Technical-Scientific Management

It provides technical-administrative support for the activities of the Regional Operations Room, the Emergency Assistance Center (CAPI) and the Regional Operational Committee (COR) in order to allow the implementation of technical checks and urgent interventions.

This structure is entrusted with the tasks of:
- Technical support to the other structures of the Service;
- Preparation of Provincial Planning in collaboration with Prefectures;
- Support in the preparation of municipal planning;
- Management of the Plans IT portal;
- Seismic Micro-zonation, Limit Emergency Conditions (CLE);
- Reconnaissance and Verification of the damage for the declaration of States of Emergency;

- Support for the implementation and management of water crisis interventions;
- Formation.

4. Multi-Risk Functional Center

The MRFC is part of the National System of Functional Centers and contributes to the management of the alert system for hydrogeological and hydraulic risk (Article 17 of D.Lgs. 1/2018). Inside we find the meteorological, hydro, hydrogeo, snow and avalanche sectors, TLC, - INGV seismic. Network Management Integrated Regional Transmission and Video Surveillance System (SIRTEV), Regional Hydro-pluviometric Monitoring Network (MIR network) and IT support within the service. Its duties also include providing the Regional Meteorological Service and the functions of the Hydrographic Service.

5. Operative Rooms and Special Planning Management

The Regional Operative Room (SOUP) guarantees timely information flows between all the components of the National Civil Protection Service (State, Regions and Municipalities) and between all the components of the System. The SOUP operates continuously and without interruption, opening 24 hours a day, 7 days a week, 365 days a year. It coordinates the Regional Operational Center (COR). It manages the five Provincial Integrated Operating Rooms (SOI) in coordination with the Prefectures. It manages the special planning, the field hospital, the Marche helipad network (REM), the organization of the forest fire prevention campaign (AIB). It coordinates the Regional Health Emergency Operating Group for SPC

6. Logistics Management

The main activity consists in the acquisition, handling, custody, maintenance in efficiency, installation and disassembly of all materials and means for emergency interventions. It also provides logistic support to CP System components, Regional Mobile Column activation, PPE acquisition and maintenance, support to the Regional Health System during health emergencies and to the Volunteering management.

7. Volunteering Management

The main activity consists in the management of PC Volunteer Organizations (Municipal Groups and Associations). Furthermore, it provides the maintenance and updating of the regional register of volunteers and equipment and the management of various activities, including activation of the volunteers (Models A), refunds to employers and voluntary organizations, contributions to the SB, conventions to ensure the operational capacity of the SB, formation of the SB and relations with the National PC Department in the field of volunteering.

6.3.3 CPS REGULATORY FRAMEWORK

The Marche Region has agreements with the components of the civil protection system:

Delibera Giunta Regione Marche Numero	Date	Oggetto	Title	Components of the civil protection system
DGR 387	06/04/2021	Direttiva concernente "Indirizzi operativi volti ad assicurare l'unitaria partecipazione delle organizzazioni di volontariato alle attività di protezione civile". Indicazioni per la gestione del volontariato di protezione civile nella Regione Marche"	"Operational guidelines to unify the participation of voluntary organizations in civil protection activities". (L.R. 32/01)	**Volunteering**
DGR 204	01/03/2021	Approvazione schema di convenzione con l'Azienda Ospedaliero – Universitaria Ospedali riuniti Umberto I - G. M. Lancisi - G. Salesi relativo al Polo operativo sito ad Ancona presso Ospedale regionale di Torrette.	Agreement between the Marche Region- Civil Protection and the "Umberto I - G. M. Lancisi - G. Salesi Hospital - University Hospital" for the operational located in Ancona at the Torrette regional hospital.	**National Health Service**
DGR 754	03/09/2020	Convenzione tra il ministero delle politiche agricole alimentari e forestali e la regione marche per l'impiego delle unità carabinieri forestale nell'ambito delle materie di competenza regionale	Agreement between the Marche Region- Civil Protection and the Ministry of Agriculture, Food and Forestry	**Armed Forces**
DGR 1121	03/08/2020	Approvazione schema di protocollo d'intesa ai sensi dell'art. 4 del D.lgs 2 gennaio 2018 n. 1 per attività di protezione civile tra la Regione Marche e ENEL Italia S.r.l.	Agreement between the Marche Region- Civil Protection and ENEL Italia S.r.l. concerning civil protection activities. (D.lgs. 2 January 2018 n. 1, art. 4)	**Essential services**
DGR 442	14/04/2020	L.R. 32/01 (art. 3 - comma 3) Approvazione dello schema di Convenzione triennale da stipularsi tra la Regione Marche e il Ministero dell´Interno - Dipartimento dei Vigili del Fuoco del Soccorso Pubblico e della Difesa Civile	Three-year agreement between the Marche Region- Civil Protection and the Ministry of the Interior - Fire Department, Public Rescue and Civil Defense Department (L.R. 32/01, art. 3) The Agreement concerns the forest fire fighting and includes: -the presence of firefighters in the regional civil protection Operations Center, -extra human Resources and materials dedicated to the regional territory	**Regional Fire Department of the Ministry of the Interior, the Fire Department, Public Rescue and Civil Defense Department**

			-and other forms of collaboration (such us trainings, drills, and so on).	
DGR 441	14/04/2020	Approvazione accordo di collaborazione per lo studio, l'analisi, la sperimentazione di tecnologia e sistemi di misura all'avanguardia, l'interscambio dati, anche Real time, volte al miglioramento della comprensione dei fenomeni/processi meteo-marini costieri, tra il Servizio Protezione Civile - Centro Funzionale Multi-rischi della Regione Marche e Istituto per le Risorse Biologiche e le Biotecnologie Marine (IRBIM) del Consiglio Nazionale delle Ricerche (CNR)	Agreement between the Marche Region- Civil Protection and the Institute for Biological Resources and Marine Biotechnologies (IRBIM) of the National Research Council (CNR).for the study, analysis, experimentation of cutting-edge technology and measurement systems, data exchange, including real time, aimed at improving the understanding of coastal meteorological-marine phenomena / processes.	**Scientific community**
DGR 212	24/02/2020	Approvazione accordo di collaborazione per lo studio delle relazioni esistenti tra piogge, umidità del suolo e fenomeni franosi volto alla definizione delle condizioni idrologiche responsabili dell'innesco di frane indotte da pioggia nel territorio della Regione Marche tra il Servizio Protezione Civile - Centro Funzionale Multi-rischi della Regione Marche e l'Istituto di Ricerca per la Protezione Idrogeologica (IRPI) del Consiglio Nazionale delle Ricerche (CNR)	Agreement between the Marche Region- Civil Protection and the Research Institute for Hydrogeological Protection (IRPI) of the National Research Council (CNR) for the study of the relationships between rainfall, soil moisture and landslides aimed at defining the hydrological conditions responsible for triggering rain-induced landslides.	**Scientific community**
DGR 211	24/02/2020	Convenzione tra la Regione Marche Servizio Protezione Civile - Centro Funzionale Marche e la Regione Umbria - Servizio organizzazione e Sviluppo del Sistema di Protezione Civile - Centro Funzionale Umbria, per attività di collaborazione tecnico - scientifica in ambito di protezione civile	Agreement between the Marche Region- Civil Protection and the Umbria Region - Organization and Development Service of the Civil Protection System - Umbria Functional Center, for technical-scientific collaboration.	**Scientific community**
DGR 166	18/02/2020	Approvazione schema di Convenzione ai sensi dell'art. 4, comma 2, del D.lgs. 2 gennaio 2018, n. 1, per attività di protezione civile tra la Regione Marche e Ferrovie dello Stato Italiane S.p.A.	Agreement between the Marche Region- Civil Protection and and Ferrovie dello Stato Italiane S.p.A. for civil protection activities. (D.lgs. 2 January 2018 n. 1, art. 4)	
DGR 1487	25/11/2019	Articolo 15 L. 241/1990 - Approvazione schema di convenzione tra la Scuola di Scienze e Tecnologie dell'Università degli Studi di Camerino (UNICAM) e la Regione Marche per attività di	Agreement between the Marche Region- Civil Protection and the School of Science and Technology of the University of Camerino (UNICAM) (D.lgs. 2 January 2018 n. 1)	**Scientific community**

		Protezione Civile di cui al D.Lgs. n. 1/2018 e L.R. 32/2001		
DGR 1356	07/11/2019	Approvazione dello schema di Accordo da stipularsi tra l´Università Politecnica delle Marche, la Regione Marche ed il Dipartimento della Protezione Civile della Presidenza del Consiglio dei Ministri per l´attuazione di attività formative, di studio e ricerca connesse alle tematiche di Protezione Civile	Agreement between the Marche Region-Civil Protection, the Polytechnic University of Marche and the National Department of Civil Protection for the implementation of training, study and research activities related to Civil Protection issues. (D.lgs. 2 January 2018 n. 1, art. 4)	**Scientific community**
DGR 1210	07/10/2019	Approvazione degli "Indirizzi per la predisposizione del Piano Provinciale di Protezione Civile"	Approval of the "Guidelines for the preparation of the Provincial Civil Protection Plan".	**Public institutions-Local authorities**
DGR 1008	29/08/2019	L.R. 32/2001 - Protocollo di intesa tra la Regione Marche e l'Istituto Zooprofilattico sperimentale dell'Umbria e delle Marche per l'implementazione del sistema regionale integrato di protezione civile. Approvazione schema	Agreement between the Marche Region-Civil Protection and the Experimental Zoo-prophylactic Institute of Umbria and Marche for the implementation of the integrated regional civil protection system. (L.R. 32/2001)	**Scientific community**
DGR 765	24/06/2019	Approvazione degli Indirizzi per la predisposizione del Piano di Emergenza Comunale di Protezione Civile - D.lgs. n. 1/2018 art. 11, comma 1) lettera b) e art. 18	Guidelines for the Municipal Civil Protection Emergency Plan (D.lgs. 2 January 2018 n. 1, art. 11 e 18)	**Public Institutions-Local Authorities-Municipalities**
DGR 712	18/06/2019	Approvazione dei seguenti schemi di Protocollo di Intesa: tra la Regione Marche, la Regione Campania ed il Comune di Poggiomarino (NA) per rendere operativi i gemellaggi di cui al DPCM "Disposizioni per l'aggiornamento della pianificazione di emergenza per il rischio vulcanico del Vesuvio" e tra la Regione Marche, la Regione Campania ed il Comune di Bacoli (NA) per rendere operativi i gemellaggi di cui al DPCM "Disposizioni per l'aggiornamento della pianificazione di emergenza per il rischio vulcanico dei Campi Flegrei"	Agreement between the Marche Region- Civil Protection, the Campania Region, the Municipality of Poggiomarino (NA),the Municipality of Bacoli (NA) and the Civil Protection National Department : "Guidelines for the emergency plan in case of Vesuvius volcanic risk and the Phlegraean Fields operational".	**Public Institutions-Local Authorities-Municipalities**
DGR 1540	19/11/2018	Convenzione tra la Regione Marche Servizio Protezione Civile - Centro Funzionale Multi-rischi Marche - e Corpo Nazionale Soccorso Alpino e Speleologico (C.N.S.A.S.) Servizio Regionale Marche in materia di pericolosità e rischio neve e valanghe	Agreement between the Marche Region- Civil Protection and the National Alpine and Speleological Rescue Corps (C.N.S.A.S.) - Marche Department concerning snow and avalanche risk.	**National Alpine and Speleological Rescue**

DGR 1051	30/07/2018	Protocollo di intesa tra la Direzione Marittima di Ancona e la Regione Marche - Servizio Protezione Civile	Agreement between the Marche Region- Civil Protection and the Ancona Maritime Department.	**Armed Forces**
DGR 912	02/07/2018	Approvazione dello schema di protocollo di Intesa tra il Servizio regionale di protezione civile e Rotary International - distretto 2090 Abruzzo, Marche, Molise e Umbria	Agreement between the Marche Region- Civil Protection and Rotary International - district 2090 Abruzzo, Marche, Molise and Umbria.	**Territorial professional Associations**
DGR 791	12/06/2018	Approvazione del nuovo schema di Protocollo di Intesa tra la Regione e le Prefetture delle Marche - Organizzazione delle attività di protezione civile a livello provinciale sia in tempi di quiete che per la gestione delle emergenze - Revoca della DGR n. 1530 del 18/12/2017	Agreement between the Marche Region- Civil Protection and the Prefectures of the Marche – concerning civil protection activities.	**Public Institutions- Prefectures**
DGR 384	26/03/2018	Approvazione schema convenzione tra la Regione Marche e Anci Marche, Ombudsman della Regione Marche, Save The Children Italia Onlus finalizzata alla promozione di attività di protezione civile rivolte alla tutela dei minori nella Regione Marche	Agreement between the Marche Region- Civil Protection and Anci Marche, Ombudsman of the Marche Region, Save The Children Italia Onlus aimed at promoting civil concerning activities aimed at the protection of minors in the Marche Region.	**Public Institutions**
DGR 1633	28/12/2017	Approvazione Schema di convenzione tra la Regione Marche - Servizio Protezione Civile e gli Ordini e Collegi professionali territoriali per le attività di censimento del danno in conseguenza degli eventi sismici occorsi a decorrere dal 24 agosto 2016	Agreement between the Marche Region- Civil Protection and the Territorial professional Associations and Colleges for the activities of census damage as a result of the seismic events that occurred starting from 24 August 2016	**Territorial professional Associations and Colleges**

6.4 Emilia-Romagna Region

6.4.1 CPS LAW REFER

The Regional Civil Protection System was created in 1995 with the adoption of the Regional Law n.45 and renewed/amended in 2005 through the enactment of Regional Law n.1 in order to guarantee the safety of citizens, the protection of the environment, of the cultural and artistic heritage and of civil and productive settlements from damage or the danger of damage resulting from calamitous events. At the same time, the "Emilia-Romagna Region Civil Protection Agency" was set up.

The Regional Civil Protection Agency has technical, operational, administrative, and accounting autonomy, in compliance with the directives of the Regional Council.

It aims to unitary manage the Civil Protection activities and permanently supervise those events affecting the regional territory and simplify the procedures in response to events.

Its principal activities concern: regional coordination of emergency interventions; the adoption of contingent and urgent measures, upon the occurrence or imminence of a dangerous situation, countering or mitigating the possible consequences; the preparation and coordination of urgent interventions plans for the safety of the territory and risk reduction; the preparation of the regional plan for the management of the emergency and the regional programs for forecasting and prevention; the address of pre-alarm and alarm warning notices; the coordination and use of the regional mobile column; activities related to the organization, employment training of volunteers, planning of forest fire prevention activities.

I. Title "General rules"

I. Chapter "General principle" (artt.1-3)

General issues are identified with reference to the regulation and reorganization of civil protection functions, with territorial safety as a priority objective.

It identifies the Region, the Provinces, the Municipalities, the Mountain Communities, the Unions of Municipalities and the other forms of association referred to in Regional Law No. 11 of 26 April 2001 as the bodies responsible for carrying out civil protection activities.

It defines types of disaster and areas of institutional intervention.

It defines the field of activity of civil protection with particular reference to the emergency planning and management phases, i.e. the definition of a cognitive framework of the risk.

II. Title "Regional system of civil protection"

I. Chapter "Functions and tasks of institutional actors" (artt.4-13)

With reference to Emilia-Romagna Region responsibilities in the field of civil protection, it defines the way the region promotes and encourages:

a) the setting up of unified provincial Civil Protection Centers to optimize the functional and operational connection between the regional, provincial and municipal Civil Protection Authorities and the volunteers, defining homogeneous minimum standards;

b) the organization and management at municipal or inter-municipal level of structures suitable for hosting operational centers for the coordination of emergency interventions;

c) Functions and tasks of municipalities and mountain communities (with particular reference to the activation of urgent interventions that are the responsibility of the municipality concerned);

d) Regulates the procedures for declaring a state of crisis and emergency in the region and Interventions for overcoming the state of crisis and emergency, as well as the Regional Program for Risk Forecasting and Prevention.

II. Chapter "Functions and tasks of institutional actors" (artt.14-19)

It regulates:

a) the operational support structures;

b) training and information activities in the field of civil protection.

III. Title "Regional system of civil protection"

I. Chapter "Tasks and organizational set-up of the regional civil protection agency and financial regulations" (artt.20-23)

It defines:

a) Legal nature and tasks of the Regional Agency;

b) Bodies of the Regional Agency;

c) Staff of the Regional Agency;

d) Regional Operational Committee for Emergencies (COREM) Regional Commission for Forecasting and Preventing Major Risks Regional Operations Centre (COR).

II. Chapter "Financial arrangements" (art.24)

Moreover, the following summary of the regulatory framework for the Emilia-Romagna Region starts from the experience of the seismic events of May 2012, following which extraordinary procedures were adopted, which are now intended to be brought into the ordinary, due to the demonstrated effectiveness.

The Civil Protection in Emilia-Romagna took its steps in 1986, with the establishment of a special regional service, six years before the launch of the primary national law for the sector, n. 225/92 "Establishment of the National Civil Protection Service". The Emilia-Romagna model of Civil Protection is based primarily on the connection with the National Department of Civil Protection, the integration and synergy between the Region, the Prefectures - Territorial Offices of the Government, the Provinces, the Municipalities, the Volunteer, Fire Brigade, the Carabinieri Forestry Corps, the Port Authorities, the Land Reclamation Authorities, the Italian Red Cross, the Scientific Community and numerous other public and private bodies and institutions. The collaboration between all the components and the constant connection with the national civil protection system allows managing many crises and emergencies.

To promote coordinated management of emergencies, Emilia-Romagna was the first Region in Italy to sign a Memorandum of Understanding among the main components of the regional Civil Protection system containing the guidelines for emergency planning and a model of coordinated intervention, to ensure more effective and timely interventions in the event of floods, earthquakes, hydrogeological events, fires or chemical-industrial risks. This made it possible to ensure the ready availability of equipment and personnel to be used in the emergency phases and support of the regional and local Civil Protection structures.

The regional law n. 1/2005 gives full recognition and provides economic contributions for its development and regulates the exercise of functions relating to its coordination and employment by the Region. Great importance was given to strengthening the regional Mobile Civil Protection Column, activated in the event of

a macro-calamity such as the 2012 earthquake, equipped with functional modules and specialized and professional teams for urgent assistance to the populations, the restoration of infrastructures, second-level health care.

To support decisions, the Regional Civil Protection Agency has equipped itself with a complex integrated information system with the aim of supporting emergency planning, the preparation of forecasting and prevention programs and scenarios in the course of a calamitous event for the '' adoption of urgent response measures.

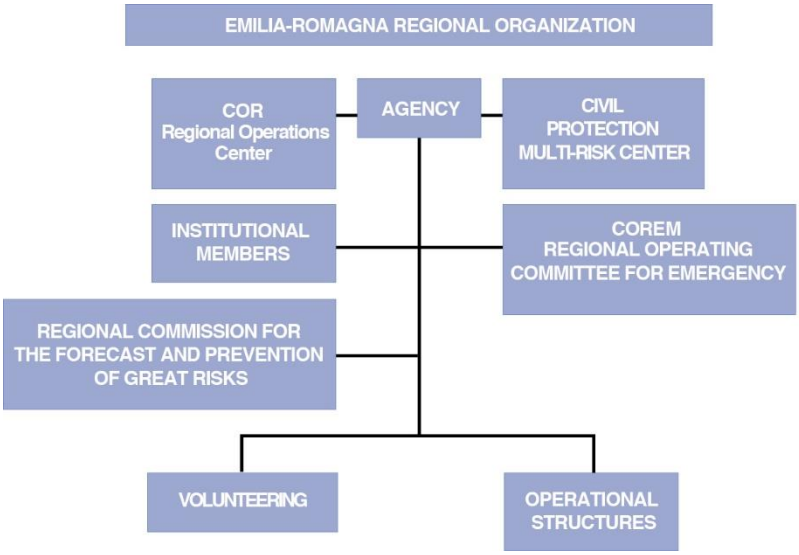
With regard to alerting, in collaboration with ARPA and other technical structures, procedures and decision-making processes relating to the various levels of criticality have been codified.

The integrated regional monitoring system (SIRE.M.) for Civil Protection purposes was designed as a tool to follow the evolution of a meteorological event and evaluate its consequences on the anthropic system in order to activate the consequent states of alert and to deal with the management of a possible flood hydrogeological risk emergency in an integrated and coordinated way.

For the training of operators, the Region promotes and coordinates interventions and courses for preparation, updating, and training in a perspective of permanent activity. Three levels are reserved for volunteers in particular (introductory courses - specialist courses - courses aimed at developing roles of responsibility and coordination).

6.4.2 CPS OPERATIONAL INSTRUMENTS AND STRUCTURES

It is a set of Bodies and Institutions, both professional and voluntary, which interact and cooperate on the basis of clear rules, predefined responsibilities, and standard intervention procedures in crisis and emergencies. The collaboration between all forces makes it possible to effectively manage the crisis and emergencies that might occur in Emilia-Romagna and to intervene in Italy or abroad for major calamitous events.



Regional Operational Committee of Emergency (COR)

Among the bodies in support of the regional civil protection agency, the Regional Operational Center (COR) is the permanent presidency of the agency, which plays the role of a technical operational link between the municipal and provincial operational centers and the national Department of Civil Protection. The COR is responsible for the functions and tasks of the Operations Room and Multi-Risk Center. In particular, the Civil Protection Multi-Risk Center is responsible for risk analysis activities, the evaluation of data regarding danger and damage, and the issuance of forecast scenarios valid for the purposes of emergency planning and emergency intervention.

Regional Operational Committee for Emergency (COREM)

The COREM (Regional Operational Committee for Emergency) ensures the technical-operational coordination of emergency type b) and c) events of regional and national importance. The Regional Commission for the Prediction and Prevention of Major Risks carries out advisory, propositional and technical-scientific support functions in the field of forecasting and prevention of the main types of risk present in the regional territory,

in particular scenarios and assessments of danger and/or risk, to support decisions taken by the institutional level.

Regional operational instruments and structures.

- **The Prefect**

The Prefect is responsible for coordinating activities in his area of competence, including the activities of the Firefighters and the Armed Forces.

- **Di.Coma.C**

With the establishment of the Di.Coma.C in Bologna, the coordination of the components and operational structures of the National Service of Civil Protection, in support of the activities of the Head of Department, moves directly to the region most affected by the seismic events, also in anticipation of the handover that will take place in the phase following the state of emergency.

The structures of the Emilia-Romagna Region are immediately integrated in Di.Coma.C to ensure the unified management of the emergency by the Department and the Region in the provinces of Bologna, Modena, Ferrara and Reggio Emilia. In order to optimize the organizational model of emergency management in the territory, Di.Coma.C also guarantees support to the activities of the coordination centers set up at provincial level which, in turn, support the operational centers set up by the mayors in their territories. By emergency management, we mean the activities aimed at rescue, assistance to the population and the implementation of provisional interventions strictly related to the first needs, which are identified in more detail in Ordinance no. 3 of the Head of Department.

The structure has been divided into 12 support functions, each coordinated by a contact person and a vicar, who belong to the Civil Protection Department or represent the regional structure. The functions activated are: Technical assessment, Survey of agility, Health, Volunteering, Logistics, Assistance to the population, Information and communication, IT support, Telecommunications support, Personnel management and Dpc vehicles, spending authorizations and administrative support, to which is added the coordination secretariat.

The coordination of Di.Coma.C is entrusted to the Director of the Emergency Management Office of the Civil Protection Department.

In order to ensure the unitary management of the interventions on all the territories affected by the seismic events for which a state of emergency has been declared, a Committee has been set up within the Di.Coma.C, whose members are, in addition to the Director of the Regional Agency for Civil Protection of the Emilia-Romagna region, also the General Director of Civil Protection, Local Police and Security of the Lombardy region, and the Regional Director of the Civil Protection Project Unit of the Veneto region.

- Region for the performance of civil protection activities can also make use of the following structures operating in the regional territory

Operational Structures:

- ✓ Regional Civil Protection Agency and related technical structures;
- ✓ Fire brigade;
- ✓ State Forestry Corps;
- ✓ Harbor Offices;
- ✓ Municipal Police;
- ✓ Regional Health, 118;
- ✓ ARPA, AIPO;
- ✓ Drainage Consortia;
- ✓ Voluntary work, CRI;
- ✓ Alpine;
- ✓ Scientific Community;
- ✓ Service Companies.

- Emergency Assistance Centers

In 2005, with the Regional Reform Law n.1 ruling on "Civil Protection and Volunteering", the Regional Civil Protection Agency was established with an Operations Center and a Multi-Risk Center and supported at the

regional level by two logistic centers: the CERPIC (Center for Hydraulic Emergency and First Assistance) in Tresigallo (FE) and the CREMM (Regional Center for Emergency for vehicles and materials) in Bologna.

CERPIC: First Aid Hydraulic Centre - TRESIGALLO (FE)
It manages and maintains equipment for hydraulic emergencies.
Submersible electric pumps, Motor pumps, Water purifiers, Light towers, Generators, Tents, Emergency Kits Hydraulics, Snow Emergency Kits, Cisterns.

CREMM: Regional Centre Materials and Equipment - BOLOGNA (BO)
It manages and maintains maintenance of equipment for assistance to the population: (assistance of about 250 people divided into modules that individually activated)

- Strategic areas and structures

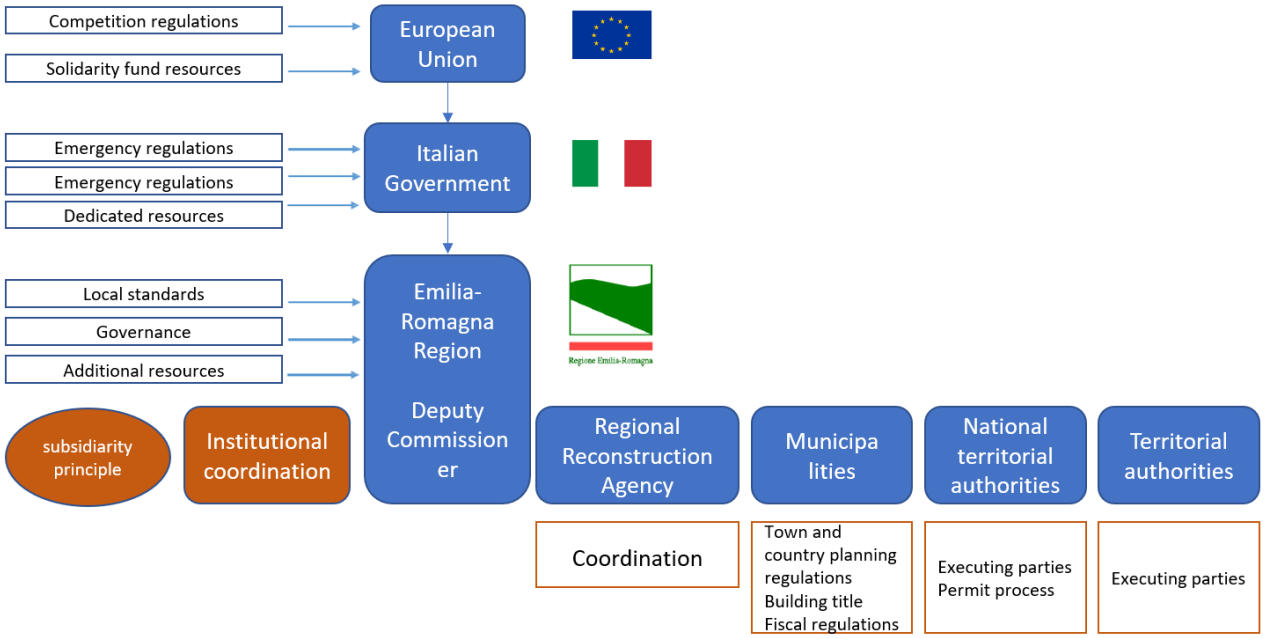
Provincial Unified Centers, (C.U.P.) is the coordination center at provincial level, permanent seat of the technical structures involved in civil protection activities.
Province Chief Municipality Voluntary Coordination.

Mixed Operational Center (C.O.M.) is the coordination center of the operational civil protection structures - seat of technical activities - to which the municipalities belonging to a homogeneous territorial area belong.

Municipal Operational Centre (C.O.C.) is the municipal coordination center coordination center headed by the mayor, who coordinates the first aid with the support of the operational structures and local resources.

- **The Regional Agency for the 2012 Earthquake Reconstruction**

Establishment of the Regional Agency for The 2012 Earthquake Reconstruction, pursuant to Regional law no. 6 of 2004. The Agency is headed by a Director appointed by the Council. In case of vacancy. The role of Director is exercised by the Director General of the relevant Directorate General, unless otherwise appointed by the Council.



In more detail, the Agency's structures summarized below:

- Implementation and management of the Program and of the Public Works and Cultural Heritage Plans and related activities;
- Activities related to the management of the procedures temporary structures acquired by the commissioner and granted to municipalities for municipalities for housing in favor of private persons or for public functions (schools, town halls, etc.);
- Support, tutoring and training to municipalities for the management of contracts related to reconstruction;
- Activities related to the tender procedures for the acquisition of goods and/or services for the Commissioner in connection with the competent structures;
- Activities connected to the stipulation of conventions to ensure services in support of the activities carried out for the Commissioner in liaison with the competent structures;
- Management of litigation in liaison with the Attorney General's Office;

- Management of contributions to municipalities defined by specific commissioner's orders;
- Support for activities aimed at restoring normal living conditions of life of the populations affected by the earthquake and accompanying the recovery and development of the socio-economic economic and social system of the affected area through targeted plans and programs in conjunction with the Nucleus of Evaluation and Evaluation and Verification of Public Investments Emilia-Romagna Region and ERVET Spa (Now ARTER Spa);
- Administrative and accounting duties and activities related to financial and accounting management of the resources credited for the 2012 earthquake to the special account in the name of the registered in the name of the President of the Emilia-Romagna Region, in his Emilia-Romagna Region, in his capacity as Commissioner, opened at the state treasury state treasury;
- Obligations related to the management of the separate account for the use of the resources credited to the same and cultural heritage and related activities; implementation and management of the related activities;
- Activities related to the management of the procedures temporary structures acquired by the commissioner and granted to municipalities for municipalities for housing in favor of private persons or for public functions (schools, town halls, etc.);
- Support, tutoring and training to municipalities for the management of contracts related to reconstruction;
- Activities related to the tender procedures for the acquisition of goods and/or services for the Commissioner in connection with the competent structures;
- Activities connected to the stipulation of conventions to ensure services in support of the activities carried out for the Commissioner in liaison with the competent structures;
- Management of litigation in liaison with the Attorney General's Office;
- Management of contributions to municipalities defined by specific commissioner's orders;

- Support for activities aimed at restoring normal living conditions of life of the populations affected by the earthquake and to and accompanying the recovery and development of the socio-economic economic and social system of the affected area through targeted plans and programs in conjunction with the Nucleus of Evaluation and Evaluation and Verification of Public Investments Emilia-Romagna Region and ERVET Spa;
- Fulfilments and administrative-accounting activities related to the financial and accounting management of the resources credited for the 2012 earthquake on the special account in the name of the President of the Emilia-Romagna Region, in his capacity as Commissioner, opened at the state treasury;
- Fulfillments related to the management of the separate account for the use of the resources credited to the same special account:
    - to cope with the flooding events that occurred between 17 and 19 January 2014 and the whirlwind of 3 May 2013;
    - to deal with the seismic events of May 2012.
- **The Crisis Unit - National Coordination UCCN – MiBAC (Presently MiC)**

Regional operational instruments and structures: updating after the Emilia-Romagna earthquake 2012

In view of the resolution of the Council of Ministers of 22 May 2012 declaring a state of emergency, in view of Legislative Decree 42/2004 "Code for Cultural Heritage and Landscape", in view of the circular of the General Secretariat of the Ministry for Cultural Heritage and Activities no. 9/2012 "Security of cultural heritage and natural disasters. Crisis Unit", the Crisis Unit - National Coordination UCCN - MiBAC is established.

Specifically, the tasks provided are:

- coordinating the activities on the territory of the personnel of the Ministry of Culture;
- liaising with the territorial structures in charge of emergency interventions (prefectures, civil protection, fire brigades, police forces, volunteers);

- identify and manage teams to survey damage to cultural heritage;
- identifying the places where cultural heritage requires to be moved to make it safe;
- guaranteeing supervision and support functions during all phases, including those of surveying, securing and reconstruction for cultural heritage interventions.

In this framework, the Commissioner for Reconstruction, in the person of the President of the Region, is exclusively responsible for the management of the funds. Definitely, MiBAC funds are managed by the Secretary General for Cultural Heritage.

6.4.3 CPS REGULATORY FRAMEWORK

- **“Regulations on civil protection and voluntary work. Establishment of the regional civil protection agency” - Regional Law No 1 of 7 February 2005**

  The Emilia-Romagna Region with the present law provides, in the exercise of its powers according to article 117 of the Constitution, for the regulation and reorganization of the functions in the field of civil protection and assumes territorial safety as the priority aim of its action. New regulations on Civil Protection and Volunteering. Establishment of the Regional Civil Protection Agency

- **“Regulations on civil protection and voluntary work. Establishment of the regional civil protection” - Regional Law No. 11 of 26 April 2001**

  Regulation of forms of association and other provisions on local authorities

- **"Reform of the regional and local administrative system. European Union and international relations. Innovation and simplification. Relations with the University"** - **Regional Law No. 6/2004**

Regional Law 6/2004 "Reform of the regional and local administrative system. European Union and international relations. Innovation and simplification. Relations with the University", which in Chapter I of Title IV, Articles 42 and 43, provides for the possibility of setting up agencies, for the pursuit of institutional aims and policies of the Authority and for the organization and management of particular activities and services, entrusting this task to the Regional Council, in compliance with the principle of delegation, without prejudice to the need for the legislative instrument for conferring autonomous legal personality.

This law establishes the Agency for the 2012 Earthquake Reconstruction.

- **Conversion into law, with amendments, of Decree-Law No 59 of 15 May 2012, containing urgent provisions for the reorganization of civil protection - Law No. 100 of 12 July 2012**

To strengthen the regional civil protection system, following the earthquake of May 2012, Law n.100 of 12 July 2012 was promulgated; thus, the Emilia-Romagna Region co-financed the creation of a network of civil protection centers to coordinate human resources and equipment to integrate knowledge, skills, organizational procedures and greater effectiveness in emergency interventions. These are Provincial Unified Centers, immediate assistance structures for displaced persons, supra-municipal and municipal operational centers.

Main changes introduced:

type "c" events: the timescales for the use of the extraordinary means and powers necessary to deal with the emergency are specified. The "c" events are therefore those that, due to their intensity and extension, must be faced with immediate intervention using extraordinary means and powers to be employed for limited and predefined periods of time.

Civil protection activities: in addition to the activities of 'risk forecasting and prevention', 'rescue of the population' and 'overcoming the emergency', the activities aimed at 'combating the emergency' and 'risk mitigation' are better specified as further necessary and unmissable activities. It is then specified that the competent administrations provide for civil protection activities within the human, instrumental and financial resources available under current legislation.

Rescue assistance: the purpose of the rescue assistance is to ensure that the populations affected by the events receive all forms of first aid. assistance to the populations affected by the events and this is achieved, according to the new definition of law no. 100/2012, with 'integrated and coordinated' interventions. integrated and coordinated' interventions.

Ordinances: ordinances are issued by the Head of the Civil Protection Department, with the prior agreement of the Regions concerned.

Novelty introduced: with the ordinance it is possible to order the interventions, also structural, for the reduction of the residual risk and to start the first measures for the restoration of structures and infrastructures and for the compensation of damages.

Institutional components

- National Government
- Regional government
- Provinces
- Municipalities

General framework

DECREE-LAW No 74 of 6 June 2012

(Art.1 Parag.1) The provisions of this decree are intended to regulate interventions for reconstruction, assistance to the population and economic recovery in the territories of the municipalities of the provinces of Bologna, Modena, Ferrara, Mantova, Reggio Emilia and Bologna, Modena, Ferrara, Mantova, Reggio Emilia and Rovigo on 20 and 29 May 2012. (12G0096)

(Art.1 Parag. 2-4) For the purposes of this decree, the Presidents of the Regions Emilia-Romagna, Lombardy and Veneto Regions act as Commissioners delegates, who coordinate the activities for the reconstruction of the territories affected by the by the earthquake of 20 and 29 May 2012 in the regions under their jurisdiction from the entry into force of the present decree and for the entire duration of the state of emergency.

(Art.1 Parag. 5) The Presidents of the Regions can rely on the assistance of mayors of the municipalities and presidents of the provinces affected by the earthquake, adopting appropriate procedures in order to coordinate the interventions.

(Art. 2 Parag. 1) The same decree establishes the Fund for the reconstruction of the affected areas.

(Art. 2 Parag. 6) The Presidents of the Regions referred to in Article 1, paragraph 2, shall be provided with special accounts opened with the State Treasury to which the resources coming from the fund mentioned in paragraph 1 are assigned and intended for the mentioned in paragraph 1, destined to the financing of the interventions provided by the present decree.

(Art. 3 Parag. 1) In order to meet the needs of the populations affected by the earthquake of 20 and 29 May 2012 in the territories referred to in Article 1, the Presidents of the Regions referred to in paragraph 2 of the same article, in agreement with each other, shall establish, by means of their own measures adopted in line with the criteria established by the decree of the President of the Council of Ministers referred to in Article 2, paragraph 2, on the basis of the damage actually occurred, priorities, methods and percentages within which contributions may be granted.

7. Activities relating of the risks of Firespill's project

7.1 Seismic risk

Italy, due to its particular geographical position, located in the convergence area between the African and Eurasian plate, is notoriously one of the countries with the greatest seismic risk in the Mediterranean. The highest seismicity is concentrated in the central-southern part of the Peninsula, along the Apennine ridge of central Italy which includes Marche, Umbria, Lazio and Abruzzo, in Calabria, Sicily and in some northern areas, including Friuli, part of the Veneto and western Liguria. Sardinia is not a high seismic risk area.

The Civil Protection Department carries out activities to assess, prevent and mitigate the seismic risk in Italy, also making use of the Competence Centers and operational structures.

7.1.1 Forecast

Current knowledge does not allow us to predict the exact time and place where the next earthquake will occur. Currently the only possible forecast is the statistical one, which is based on the knowledge of the frequency of the seismicity that affected Italy. The areas of our country subject to high seismicity are known, in terms of frequency and intensity of earthquakes, or where a strong earthquake is more likely to occur, but it is not possible to establish exactly when this will happen. Probabilistic forecasting allows us to identify the most dangerous regions and to distinguish them based on the probability of strong earthquakes and the frequency with which they can be expected. It is possible to study more precisely the time interval in which in a given region an earthquake can be expected with a higher probability, but it is necessary to know how much energy is stored in the seismogenic structure capable of triggering an earthquake in that area and how the energy will be released. While studying seismogenic structures in depth, it is not yet possible to predict the exact moment in which the next seismic event will take place. The study of seismic precursors has made enormous progress and the possibility is not excluded that in the future it will be possible to fix the initial instant of the earthquake. The study on the precursors of an earthquake concentrated on:

- **geophysical precursors**: irregularities in the velocities and characteristics of P and S seismic waves, changes in the magnetic and electrical characteristics of rocks and the atmosphere;
- **seismological precursors**: before a strong earthquake it is possible to detect a series of micro-tremors, perceptible only through instruments, or a change in the distribution of seismicity;
- **geodetic precursors**: variations in altitude, position, inclination of parts of the soil surface and in the speed of the calculated movements;
- **geochemical precursors**: modification of the concentration in groundwater and ground gases of some radioactive chemical elements, including radon gas;
- **hydrological precursors**: variation of the groundwater level in the subsoil, measured in the wells.

Seismologists have understood the phenomenon and hypothesized a valid genetic model of the earthquake but nevertheless the prediction of seismic events based on precursors has so far given contradictory results. None of the aforementioned precursors occur regularly before any major seismic event. To date, the only valid method to reduce the consequences of an earthquake is limiting the risk factors by intervening on the quality of buildings.

Emergency planning and damage scenarios

Specific emergency plans are required to organize the Civil Protection structures to deal with and manage an emergency. Contingency plans identify targets from reach out to plan an adequate civil protection response when the event occurs. The emergency plan defines the methods of intervention. In order to size the resources to be put in place in the event of an emergency, it is necessary to know the damage scenarios that are defined on the territorial data of exposure and vulnerability and on the basis of past reference events whose occurrence is considered more probable depending on the chosen time interval. The Department of Civil Protection deals with the assessment of these seismic scenarios, which are not limited to estimating the extent of the shaking, but are oriented towards assessing the losses immediately. Knowing the "damage scenario" allows you to reach a territorial picture of the area involved by the event by providing data of significant importance regarding the location and extension of the most affected area, the functionality of transport networks, communication routes and of distribution lines, the expected losses in terms of human lives, injured people, homeless people, collapsed and damaged buildings and the corresponding damage in economic terms, with repercussions on Civil Protection activities also in emergency planning and management activities . With regard to planning, the data make it possible to identify and represent the reference event for sizing human resources, the materials to be used and their allocation to be foreseen in the plan. To do this, the Department of Civil Protection gives its support to the Regions during the planning and guidance process towards the minor local authorities, Provinces, Municipalities, Mountain Communities, providing data on information regarding their impact on the territory for one or more reference events in correspondence with which different levels of activation of the Civil Protection plans are associated. With regard to emergency management, the information immediately describes the real event and its impact on the territory, in support of the activities to overcome the emergency. The tools adopted by the Department

of Civil Protection to assess the damage scenarios are Sige (Sistema Informativo per la Gestione dell'Emergenza), Quarter (Quadro territorial) and Scecom (Scenari di danno comunali).

These devices are adopted by the Civil Protection Department to remedy the emergency and to support the Regions and local authorities. The methods for assessing the danger and vulnerability are based on the need to synthetically provide an answer that the protection operators civil can be adopted both locally and nationally and are the same for all instruments. However, assessing the uncertainty of the estimate and quantifying the confidence level of the loss predictions is not an easy task. The Service has carried out a series of studies that have led to "second generation" products to assess the damage scenario such as Faces (Fault Controlled Earthquake Scenario) and Espas (Earthquake Scenario Probabilistic Assessment).

International Commission on Earthquake Prediction for Civil Protection

The International Commission on Earthquake Prediction for Civil Protection was established on the basis of article 6 of the ordinance of the President of the Council of Ministers n. 3757 of 21 April 2009.
The Commissioners are geo-scientists from China, France, Germany, Greece, Italy, Japan, Russia, the United Kingdom and the United States, with extensive experience in probabilistic prediction and deterministic earthquake prediction. The Commission is chaired by prof. Thomas H. Jordan, Director of the Southern California Earthquake Center and Professor of Earth Sciences at the University of Southern California, Los Angeles, USA.

The Commission was appointed by Guido Bertolaso, Head of the Civil Protection Department until November 2010, with the task of:

1. develop a report on the current state of knowledge on deterministic prediction and short-term probabilistic prediction of tectonic earthquakes;

2. indicate guidelines for the use of possible precursors of strong earthquakes to address civil protection actions, including the use of probabilistic seismic hazard analysis pending a strong earthquake.

The Commission began its activities on May 12, 2009, and on October 2, 2009 it delivered an executive summary of the results achieved with respect to the issues of the assignment. On May 30, 2011, the Commission delivered to the Department a final, extended report on the same issues.

7.1.2 Prevention

The study of prevention is managed by the Seismic Risk Service of the Department which deals with the elaboration of the criteria and techniques to be applied for the assessment and reduction of seismic risk, expands the technical-scientific skills for the prediction of the impact of the earthquake on territory and is committed to optimizing interventions in emergency conditions and post-earthquake reconstruction. The Risk Service also provides technical support and assistance to other central and peripheral administrations of the State with which it collaborates closely, monitors the territory to determine the characteristics and effects of earthquakes, organizes and manages awareness-raising initiatives on prevention and particular on the seismic risk. The scientific and operational contribution of the centers of competence for seismic risk such as the INGV (Istituto Nazionale di Geofisica e Vulcanologia) for the seismological aspects, the ReLUIS (Rete dei Laboratori Universitari di Ingegneria Sismica) and the Eucentre (Centro Europeo per la formazione e la ricerca in ingegneria sismica) for the engineering aspects are fundamental for the performance of these tasks. To appropriately mitigate the seismic risk, a constant effort is required to improve knowledge on the causes of the phenomenon, an in-depth study of the behavior of structures subjected to seismic actions and optimization of emergency interventions. The seismic risk is closely linked to the presence of man and due to the unpredictability of the occurrence of an earthquake, to limit its effects on the man-made environment it is necessary to intervene by adopting appropriate seismic risk prevention and reduction policies such as:

- improve knowledge of the phenomenon by monitoring the territory and adequately assessing the danger to which citizens, housing assets and infrastructural systems are exposed;
- implement policies to reduce the vulnerability of older buildings, relevant buildings (eg schools, monumental assets) and strategic buildings (eg hospitals, structures used for emergency management), optimizing the resources used for the recovery and the requalification of the building stock;

- update the seismic classification and legislation;
- broaden knowledge on the consistency and quality of assets exposed to risk;
- develop seismic micro-zonation studies for the correct use of ordinary planning tools, to obtain over time a reorganization of the territory that takes into account the seismic risk and to improve the efficiency of emergency management following an earthquake;
- intervene on the population by constantly informing and raising awareness among citizens.

National plan for the prevention of seismic risk

Due to the formation of the Apennine chain, Abruzzo is one of the Italian regions most exposed to seismic risk. The city of L'Aquila, in particular, has historically been hit by destructive earthquakes several times and in different eras: we remember the earthquakes of 1315, 1349, 1461, 1703, 1762 and the recent earthquake of 2009. After the earthquake, a provision was issued to give greater impetus to seismic prevention. With article 11 of the decree-law no. 39 of 28 April 2009, a loan was set up for interventions for the prevention of the seismic risk which affected all of Italy and allocated funds for a value of 965 million euros over 7 years. The implementation of art. 11 is entrusted to the Department of Civil Protection and regulated by ordinances of the Head of the Civil Protection Department. The Ministry of Economy and Finance authorized an expenditure of 44 million euros for the year 2010, 145.1 million euros for 2011, 195.6 million euros for each of the years 2012, 2013 and 2014, € 145.1 million for 2015 and € 44 million for 2016. The total amount invested represents only a minimal percentage, even less than 1%, of the real needs necessary for the complete seismic adaptation of all the buildings in our area. With the opcm n. 3843 of 19 January 2010, a commission of experts on seismic risk was set up who explained the objectives and general criteria of an effective preventive action to be implemented with the funds made available by Article 11. These objectives mainly concern the mitigation of seismic risk through actions and interventions only marginally developed in past years, such as: seismic micro-zonation studies for the choice of suitable places to build and interventions on private buildings, through direct economic contributions for strengthening or improvement seismic of the

structures. The use of funds from art. 11 is regulated by orders from the President of the Council of Ministers in compliance with the objectives and criteria defined by the Commission of Experts.

Seismic classification

To reduce the effects of the earthquake, state action has focused on the classification of the territory, based on the intensity and frequency of past earthquakes, and on the application of special construction regulations in areas classified as seismic.

The Italian anti-seismic legislation, aligned with the most modern international regulations, prescribes technical standards on the basis of which a building must withstand the weakest earthquakes without serious damage and without collapsing the strongest earthquakes, first of all safeguarding human lives.

Until 2003 the national territory was classified into three seismic categories of different severity. In 2003 the criteria for the new seismic classification of the national territory were issued, based on the most recent studies and elaborations relating to the seismic hazard of the territory, i.e. on the analysis of the probability that the territory will be affected in a certain time interval (generally 50 years) from an event that exceeds a certain threshold of intensity or magnitude. To this end, the Ordinance of the President of the Council of Ministers no. 3274 of 20 March 2003, in the Official Gazette no. 105 of 8 May 2003.
The provision dictates the general principles on the basis of which the Regions, to which the State has delegated the adoption of the seismic classification of the territory (Legislative Decree no. 112 of 1998 and Decree of the President of the Republic no. 380 of 2001 - "Consolidated Law of the Building Regulations "), have compiled the list of municipalities with the relative attribution to one of the four areas, with decreasing danger, in which the national territory has been reclassified.

Zone 1 - It is the most dangerous area. The likelihood of a major earthquake is high

Zone 2 - In this area strong earthquakes are possible

Zone 3 - In this zone, strong earthquakes are less likely than in zone 1 and 2

Zone 4 - It is the least dangerous area: the probability of an earthquake is very low

In fact, the "unclassified" territory disappears, and zone 4 is introduced, in which the Regions have the right to prescribe the obligation of anti-seismic design. Furthermore, each zone is assigned a value of the seismic action useful for the design, expressed in terms of maximum acceleration on rock (zone 1 = 0.35 g, zone 2 = 0.25 g. Zone 3 = 0.15 g, zone 4 = 0.05 g).

The implementation of the ordinance n.3274 of 2003 has made it possible to significantly reduce the distance between consolidated scientific knowledge and its translation into regulatory instruments and has led to the design and construction of new buildings, safer and open to the use of innovative technologies. The innovations introduced with the ordinance have been fully implemented and further refined, thanks also to the studies carried out by the centers of competence (Ingv, Reluis, Eucentre). An update of the national reference hazard study (Working Group, 2004), provided for by OPCM 3274/03, was adopted with the Order of the President of the Council of Ministers no. 3519 of 28 April 2006.

The new hazard study, attached to the OPCM no. 3519, provided the Regions with an updated tool for the classification of their territory, introducing acceleration intervals (ag), with a probability of exceeding 10% in 50 years, to be attributed to the 4 seismic zones.
In compliance with the guidelines and criteria established at national level, some Regions have classified the territory in the four proposed zones, other Regions have classified their territory differently, for example by adopting only three zones (zone 1, 2 and 3) and introducing, in some cases, subzones to better adapt the standards to the seismic characteristics.
For the details and meaning of the zoning of each Region, please refer to the regional regulatory provisions. Whatever the regional choice, each zone or sub-zone is assigned a basic hazard value, expressed in terms of maximum acceleration on rigid ground (ag). However, this basic hazard value has no influence on the design. The current Technical Regulations for Constructions (Ministerial Decree of 14 January 2008), in fact, have changed the role that the seismic classification had for design purposes: for each area - and therefore the municipal area - a peak acceleration value was previously provided and hence the elastic response spectrum to be used for the calculation of seismic actions.

From 1 July 2009 with the entry into force of the Technical Regulations for Construction of 2008, for each construction we must refer to an "own" reference acceleration identified on the basis of the geographical coordinates of the project area and according to life nominal of the work. A basic hazard value, therefore, defined for each point of the national territory, on a square grid of 5 km on each side, regardless of the municipal administrative boundaries.

The seismic classification (seismic area to which the municipality belongs) remains useful only for planning management and for the control of the territory by the responsible bodies (Region, Civil engineering, etc.).

Anti-seismic regulations

Seismic prevention can be achieved through the use of two tools: the seismic classification and the anti-seismic legislation. The anti-seismic legislation refers to the criteria for constructing a building in order to reduce its tendency to suffer damage following an earthquake. Currently, reference is made to the Technical Standards for Construction (NTC 2018). The 2018 NTCs identify the minimum indices of seismic vulnerability that must be achieved in the event of the improvement of historic buildings and the adaptation of existing school buildings. The NTC 2018 also contain the general technical construction criteria for the design, execution and testing of buildings and for their consolidation, general criteria for the verification of the safety of buildings, investigations on soils and rocks and indications on the techniques for the design, execution and testing of land support works and foundation works; general criteria and technical specifications for the design, execution and testing of special works and the protection of buildings from fires. The 2018 NTCs also identify the minimum indices of seismic vulnerability that must be achieved in case of improvement of historic buildings and adaptation of existing school buildings. Minimal impact they must be achieved in the event of an "improvement" reserved for historic buildings (minimum vulnerability index: 0.6) or "adaptation" of existing school buildings (minimum vulnerability index: 0.6). The adaptation may also include local improvement and repair. As regards the management of the results of the seismic vulnerability checks, the Civil Protection provided clarifications on the matter with the circular of 4 November 2010, n. DPC / SISM / 0083283. Unlike the intervention, the verification is mandatory: the need for seismic adaptation of buildings and works will be taken into consideration when drafting the three-year and annual plans and for the preparation of the extraordinary plan for earthquake safety.

National Accelerometric Network

The National Accelerometric Network (Ran) is a monitoring network whose task is to record the response of the Italian territory to the earthquake, in terms of ground accelerations. The data generated by the system allow to describe in detail the seismic shaking in the epicenter area and to estimate the expected effects on buildings and infrastructures, they are suitable for seismology and seismic engineering studies and participate in defining the seismic action to be used in structural calculations for reconstruction. The RAN is distributed throughout the country, with particular attention to areas of high seismicity and is managed by qualified personnel from the Seismic Risk Service - Technical - Scientific Activities Office for the prediction and prevention of risks of the Civil Protection Department.

To date, the National Accelerometric Network is made up of 580 digital stations, both permanent and temporary, which include an accelerometer, a digitizer, a modem / router with an antenna to transmit digitized data via GPRS and a GPS receiver to link the time to information universal UTC and to evaluate the latitude and longitude of the location.

The data flows into the central server of the National Accelerometric Network within the Department of Civil Protection which deals with their processing automatically to obtain an estimate of the descriptive parameters of the earthquake.

Seismic Observatory of Structures

The Seismic Observatory of Structures (OSS) was conceived and is directed by the technicians of the Department's Seismic Risk Service. The structures of the permanent OSS network and the temporary emergency network are identified by the Ministry of Infrastructure and Transport, the Regions, local authorities and other public bodies The efficiency of the network (about 97%) is guaranteed through an appropriate maintenance service, a high efficiency rate of the network is maintained (about 97%). The Civil Protection Department monitors the oscillations caused by the earthquake thanks to the national network of the Seismic Observatory of the structures. The OSS allows you to estimate the damage caused by an earthquake to the monitored structures, which can be extended to structures with similar characteristics located in the affected region, thus providing useful data for civil protection activities immediately after a

seismic event. The Seismic Observatory of Structures allows check strategic structures for the management of a seismic emergency and estimate damage, as well as make information available to the technical-scientific community to understand the response of buildings to a seismic event. These data also represent useful baggage for updating the technical standards regarding construction in seismic areas. If one of the OSS structures is affected by a major earthquake, the monitoring system detects the displacement of the ground and the structure and immediately afterwards transmits the recorded data to the central OSS server in Rome. The server is able to automatically process the recordings merged from all the structures affected by processing a summary report that includes the maximum recorded values as well as some descriptive parameters useful in evaluating the incoming earthquake, the vibrations of the structure and the state of damage. This report is also automatically published on the public site of the OSS. Immediately after a strong earthquake, a temporary network consisting of at least 4 simplified monitoring systems immediately integrated into the OSS is installed in the epicentral area. The monitored structures are above all the structures intended for the organization of actions for emergency management, such as the headquarters of the Mixed Operations Centers and Di.Coma.C. The OSS monitoring system consists of sensors distributed on all floors of the building as well as on the ground, for an average of 20 acceleration measurements that allow you to analyze the vibrations of the structure for a consequent estimate of the damage. The sensors are connected by cable to a seismic control unit, connected via ADSL with the OSS server in Rome. The OSS consists of 131 OSS systems of this type and 29 other simplified permanent systems, similar to those of the temporary network installed in an emergency. This configuration provides only independent sensors connected to each other in a Wi-Fi network, for about 7 measurements, on the ground and on the top floor of the building. It is a cheaper system but it is less accurate. To better understand the earthquake observed experimentally with OSS systems, firstly, the available technical documentation is collected, then in situ investigations are carried out on the monitored structure. Thanks to this information, a mathematical model is developed that allows to simulate its behavior under earthquakes of increasing intensity and to estimate the damage. It is possible to consult all the documentation found, the description of the monitoring system, the surveys, the models and all the data produced by the systems since 1999 on the ISS-Fact-finding and monitoring site within the OSS (after registration).

Seismic micro-zonation

Buildings and infrastructures do not always respond in the same way following a seismic event. It is not infrequently possible to observe extensive damage even in places far from the epicenter. The earthquake that struck L'Aquila on 6 April 2009, for example, showed that in some municipalities far from the epicenter (eg S. Pio delle Camere, 30 km from the epicenter), there was considerable damage to the structures. Factors that influence the response of the structures to seismic stresses are both the quality of the buildings and the different local seismic hazard, conditioned by the different way in which the earthquake propagates and by the instability of the soil. Seismic micro-zonation (MS) studies allow to identify stable areas, stable areas that could be subject to local amplification and unstable areas, (e.g. landslides, surface ruptures due to faults and dynamic soil liquefaction) with objective to improve the skills on the alterations that the seismic shaking can undergo on the surface in order to provide useful information for the government of the territory, for the design, for the planning, for the emergency and for the post-earthquake reconstruction. With regard to spatial planning, the seismic micronation studies in relation to the various scales and levels of intervention, are directed to the areas for which the regulatory framework provides for use for building purposes, their potential transformation for these purposes, or use for civil protection purposes. Seismic micro-zonation allows you to guide the choice of areas for new settlements, define reliable interventions in a given area, plan investigations and levels of detail, establish guidelines and rules for intervention in urbanized areas, define intervention priorities. MS studies are useful in the construction of new works or interventions on existing buildings as they highlight the possibility that some shaking phenomena linked to the lithostratigraphic and morphological characteristics of the area may be subject to amplification as well as to phenomena of instability and permanent deformation triggered by the earthquake. Based on the level of in-depth analysis to be achieved, Seismic Micro-zonation assumes different costs.

- level 1: consists of a collection of pre-existing data, processed to distinguish the territory into qualitatively homogeneous micro-zones. Preparatory to real seismic micro-zonation studies;
- level 2: defines a real map of zoning thanks to the introduction of the associated element associated with the homogeneous areas, using further and targeted surveys (where necessary);

- level 3: indicates a seismic micro-zonation map with in-depth information on particular themes or areas.

To establish the level of in-depth study to be adopted in the study of MS, it is necessary to evaluate its actual usefulness in order to compare it with the costs to be faced. To intervene on risk mitigation, it is appropriate to improve knowledge on the seismic phenomenon thanks to MS studies, assess vulnerability and exposure and optimize the resources available to carry out targeted interventions. The techniques of execution and application of seismic micro-zonation on the Italian territory are regulated by the "Guidelines and Criteria for Seismic Micro-zonation".

7.1.3 Damage scenarios

The first essential information to intervene immediately following an earthquake are the size, extent and location of the damage. In this regard, it is necessary to use assessment tools built on the basis of simulations of damage scenarios that allow employees to plan and manage emergency response in real time, even before inspections. These tools are associated with rapid damage assessment activities in order to consolidate the preliminary analyzes and projections identified thanks to the first instrumental data collected by the seismic monitoring network. In the event of seismic events exceeding the damage threshold, a rapid macro seismic survey is carried out with the aim of directing and coordinating relief and resources in the emergency phase. The survey consists in observing the level of damage and how it is distributed in the various affected locations by assigning to each of them a value of macro seismic intensity expressed in degrees on the Mercalli Cancani Sieberg (MCS) scale. In the moments following an earthquake, it is extremely important to identify its size, its impact on the territory and on the population as soon as possible in order to be able to size the aid and organize it appropriately. The Civil Protection Department has taken advantage of the negative experience gained during the 1980 Irpinia earthquake and in this sense has set up a territorial information system (GIS) capable of generating in semi-real time a scenario for simulating the consequences of seismic event. If the earthquake is of significant magnitude, the National Institute of Geophysics and Volcanology transmits the focal parameters (magnitude and coordinates) of the event to the Department. Immediately after, an

automatic procedure is activated for the generation of a report which is made available to the Civil Protection within just 10 minutes of the event.

The report contains data, maps and other information about the municipalities within a radius of 100 km around the epicenter. In particular, data are provided on:

- description of the territory (anthropogenic, physical and administrative aspects; characteristics of buildings and infrastructures; seismic monitoring networks);
- danger (seismogenic zones, historical earthquakes, isosist and elevated planes, attenuation of the ground motion);
- vulnerability (building stock, schools, hospitals, road and rail networks);
- exposure (characteristics and distribution of the resident population in each census section);
- preliminary assessment of damages and losses (damaged and unusable houses, estimate of dead and injured, estimate of economic damage).

Limit Condition for Emergency (CLE)

Following an earthquake of significant intensity and simultaneously with the occurrence of physical and functional damages that almost completely interrupt the urban functions present (including the residence), the Limit Condition for Emergency (CLE) is defined as the condition for which the settlement urban still retains, as a whole, the operation of most of the strategic functions for the emergency, their accessibility and connection with the territorial context. CLE is performed at the municipal level, but it is also possible to carry it out at the inter-municipal level. The CLE analysis was introduced starting from OPCM no. 4007/2012 which regulates the use of the funds provided for by art. 11 of the DL n. 39/2009 for the year 2011 and is performed in parallel with the seismic micro-zonation studies according to the national standards adopted by the Department of Civil Protection (CLE standard).

Standard of representation and computer storage of the CLE analysis

The information is assembled through specific survey forms, approved by the Technical Commission for MS studies and issued with the decree of 27 April 2012 of the Head of the Civil Protection Department. The document describing the standards in detail consists of two parts: the first part contains the description of the representation system of the "Charter of elements for the analysis of CLE" while the second part describes the filing system. The legend used for the "Map of elements for CLE analysis" and the layout of the title block are defined in the representation system. Within the Charter are shown the elements that identify, within the urban settlement, the emergency management system (strategic buildings, emergency areas, accessibility infrastructures and connection, interfering structural aggregates and related structural units). To facilitate the work of entering alphanumeric data, SofCLE has been prepared, a software freely distributed which reproduces all the survey cards.

7.1.4 Usability surveys

To effectively manage a post-earthquake emergency, the expeditious activities of assessing the damage and usability on public and private buildings and buildings of cultural interest play a fundamental role. In fact, these activities have the objective of safeguarding public safety, guaranteeing, if possible, the timely return of the population to their homes and carrying out the first urgent measures to make buildings safe to reduce the inconvenience of those affected and any further possible damage.

In these contexts, on the one hand, the Fire Brigade are called upon to work who, within the scope of their competences and attributions, among their activities, carry out expeditious surveys to verify and facilitate the practicability of the roads, check the usability of the buildings and perimeter the areas to be subjected to preventive interdiction. On the other hand, at the same time, technicians of the National Civil Protection Service act who, equipped with adequate professional skills and suitably trained, have the task of carrying out a timely, albeit expeditious, analysis of the buildings, carrying out inspections with the help of technical evaluation sheets (Aedes and GL-Aedes data sheets). For this purpose, with the Decree of the President of the Council of Ministers of 8 July 2014, the National Technical Unit was established which goes in the direction of rationalizing, according to a predefined scheme in peacetime, the mobilization of expert technicians for post-seismic emergency usability checks.

The technicians to be enrolled in the National Technical Nucleus, coming from the Public Administration, voluntary organizations and professional Orders and Colleges, are addressed the operational indications of October 29, 2020, aimed at integrating their previous skills and professional experiences with knowledge that allows them use in post-seismic emergencies.

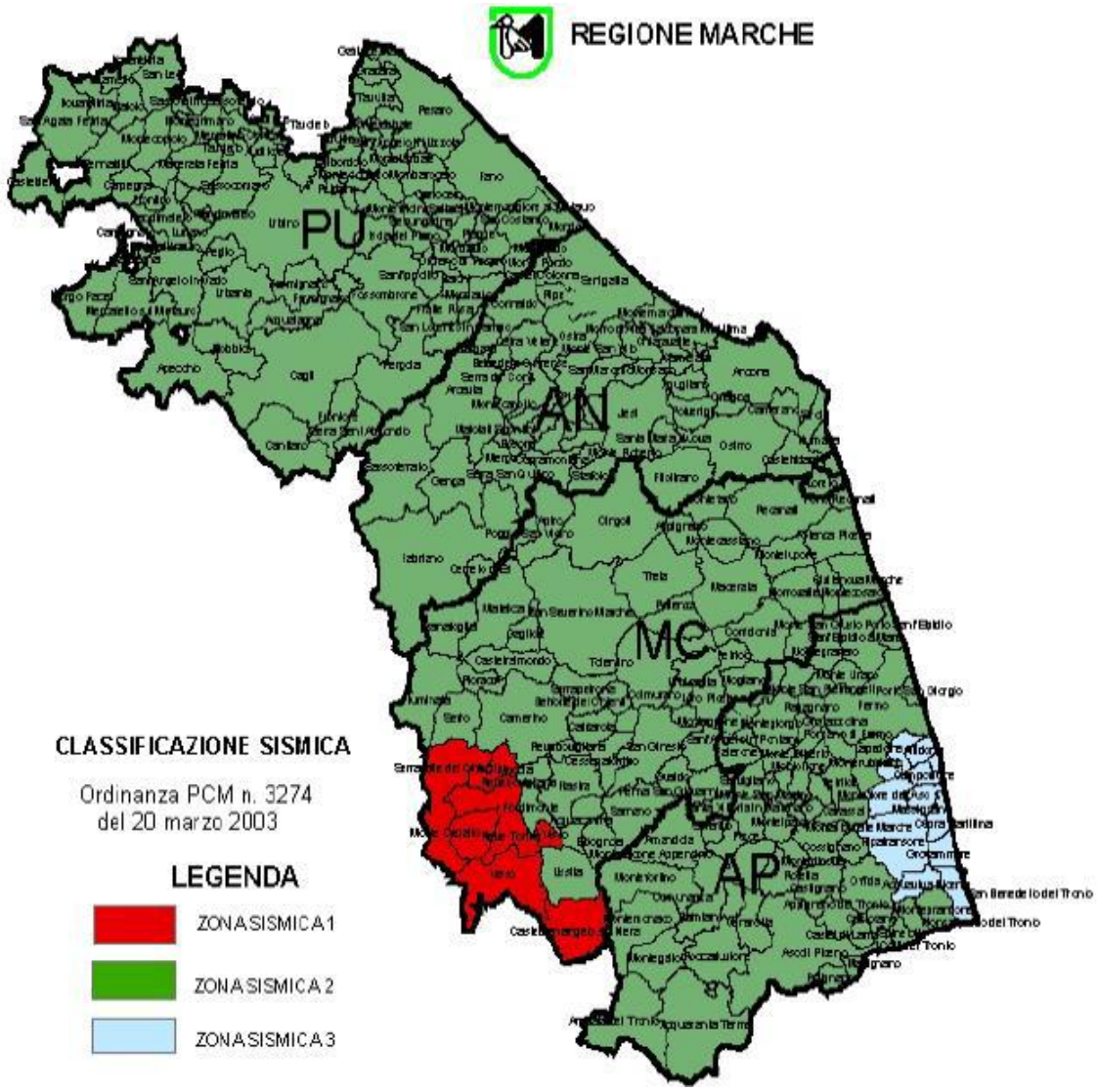
These expeditious post-seismic emergency activities require a considerable degree of standardization of procedures and constant quality control in the management and organization of surveys and inspections. With the aim of defining coordinated and integrated ways of organizing and implementing these activities, on February 12, 2021, the Department issued the Operational Guidelines for the connection and coordination of the activities of a quick post-earthquake technical inspection.

7.1.5 Best Practice

The contribution of the Marche Region in the management of seismic risk.

After the issue of OPCM no. 3274/2003, also the Marche Region, with the DGR n. 1046 of 29/07/2003 "General guidelines for the first application of the Ordinance of the President of the Council of Ministers no. 3274 of 20 March 2003. Identification and formation of the list of seismic zones in the Marche Region ", adapts the design to the new standards and proceeds with a seismic reclassification of the municipalities of its territory.

With the DGR 1046/2003 (subsequently modified by DGR 136/2004) the seismic zones of the Marche Region are thus identified; in light of this classification, 6 municipalities in the Province of Macerata were included in Zone 1 (high danger), 12 municipalities in the Provinces of Ascoli Piceno and Fermo were classified in Zone 3 (medium-low danger) while most of the remainder territory was included in Zone 2 (medium-high danger) (Img. 1).

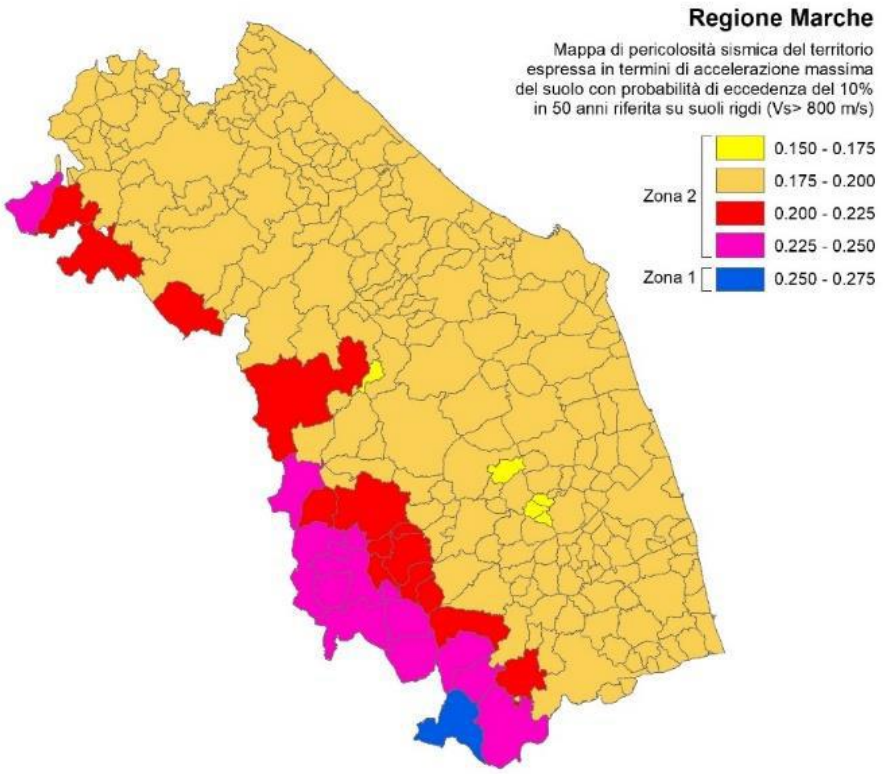


Img. 1: The seismic classification of the Municipalities of the Marche Region according to DGR 1046/2003.

Subsequently, with the OPCM no. 3519 of 29/04/2006, the national seismic hazard map was approved and, in Annex 1, the new criteria were established through which to identify, for each municipality, the 4 seismic zones, by means of the maximum acceleration values of the soil "ag".

These values of "ag" are provided, for all Italian municipalities, in Annex 7 of OPCM no. 3907 of 13/11/2010, which governs the contributions for the prevention of seismic risk provided for by art. 11 of Law 77 of

24/06/2009; using these values it is clear that all the current 225 Municipalities of the Marche Region fall into Zone 2, except the Municipality of Arquata del Tronto, which is located in Zone 1 (Img. 2).



Img. 2: The classification of the Municipalities of the Marche Region based on the ag values contained in OPCM 3907/10.

The whole regional territory is therefore characterized by medium-high values of seismic hazard.

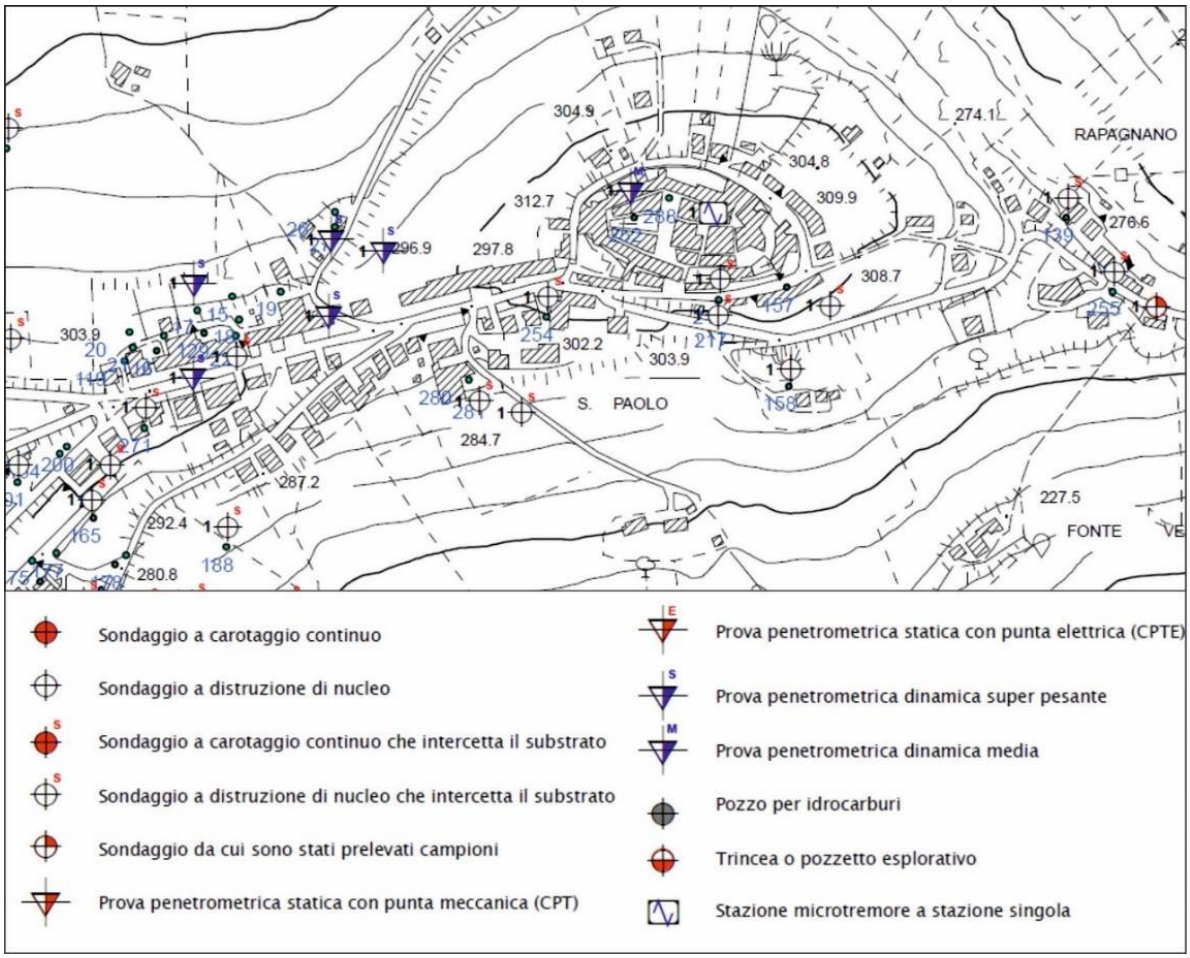
The aims to reduce the seismic risk: Seismic Microzonation and the Limit Condition for Emergency

Seismic Microzonation and the experience of the Marche Region

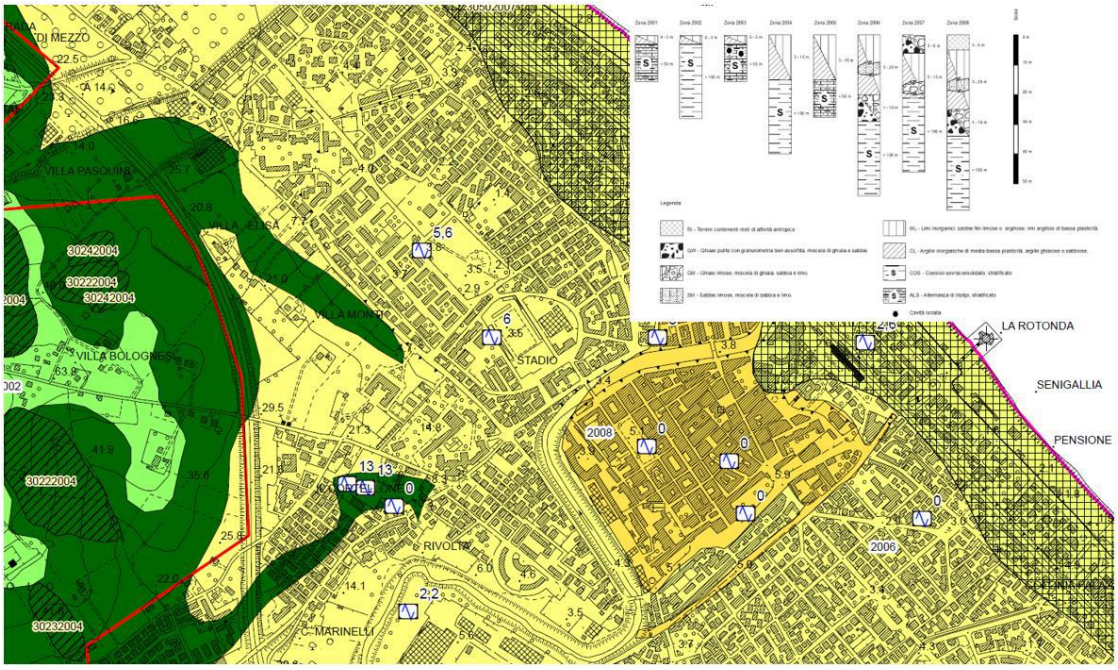
To date, all the municipalities of the Marche have a microzonation of at least level 2.

Furthermore, on 89 municipalities, there are level 3 MS studies (85 of which studied following the Ordinance of the Extraordinary Commissioner for Reconstruction 24/17 following the earthquake that hit central Italy in 2016).

Below are some excerpts of the maps produced by regional seismic microzonation studies.

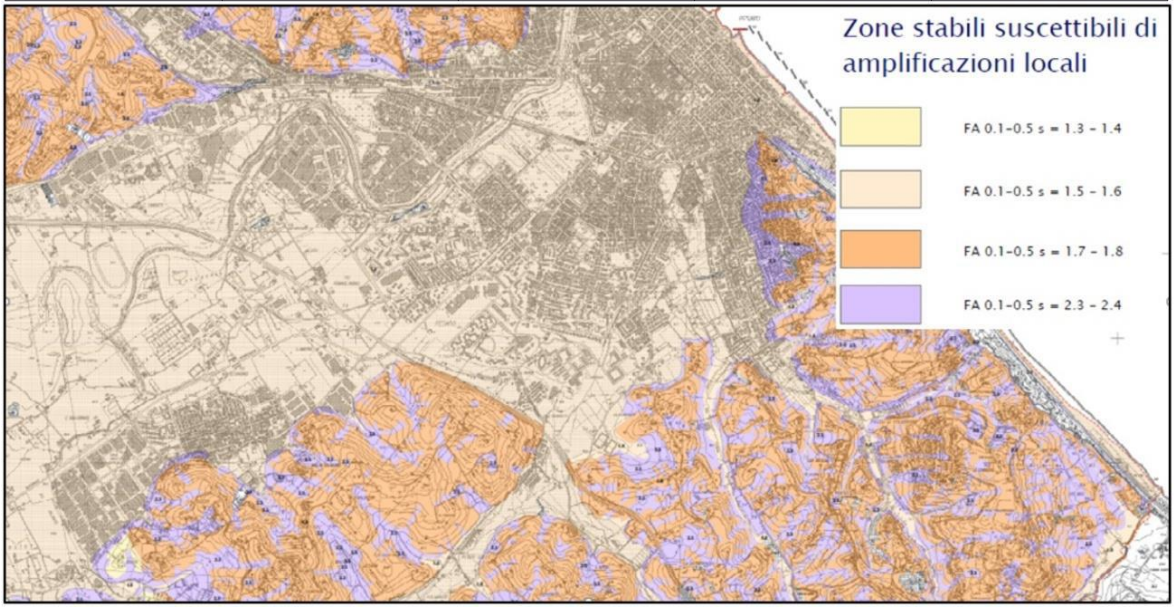


Img. 3: Extract from the Investigation Charter of the Municipality of Rapagnano (FM).



Img. 4: Extract from the MOPS Charter of the municipality of Senigallia (AN).

Zona 2001	Zona 2002	Zona 2003	Zona 2004	Zona 2005
FA = 1.8	FA = 1.4	FA = 2.3	FA = 1.5	FA =1.5

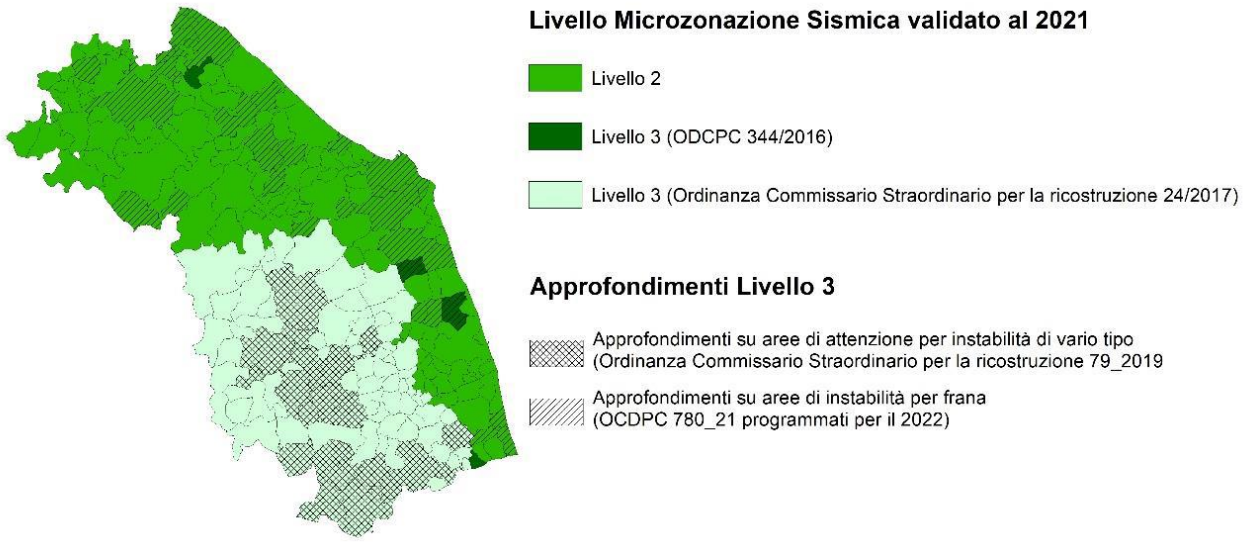


Img. 5: Extract from the Level II Seismic Microzonation Card (FA 0.1 - 0.5 s) of the municipality of Pesaro (PU).

Future prospects of Seismic Microzonation in the Marche Region

With the OPCM no. 780 of May 20, 2021, new funds have been allocated for MS and CLE.

The Marche Region has decided to use these state funds, supplemented by regional co-financing, to carry out Level 3 in-depth studies on some areas of attention due to slope instability (as identified and defined in the level 1 studies and updated by level 2 studies) in 31 municipalities in the Marche region (Img. 6).



Img. 6 The current state and planning for the future of microzonation in the Marche Region.

The process for selecting the first municipalities that will benefit from state funds and regional co-financing was initiated with Decree no. 456 / SPC of 13 December 2021 and the studies will be carried out in 2022.

The choice of Municipalities to be included in the new studies was carried out in collaboration with CNR-IGAG, selecting them from those that have already carried out MS level 2 studies, i.e. the Municipalities for which it was possible to establish, in correspondence with the urbanized areas or development, a true quantitative estimate of the local amplifications of the seismic impulse.

The analysis of the Limit Condition for the Emergency and the experience of the Marche Region

The analysis of the Limit Condition constitutes a first tool aimed at the integration of interventions on the territory for the mitigation of seismic risk on a municipal scale and concerns the verification of emergency management systems, understood as sets of physical elements (buildings strategic areas, emergency areas, connection and accessibility infrastructures).

For the analysis of the CLE of a specific settlement it is essential to identify:

a) the buildings and areas that guarantee the strategic functions for the emergency;

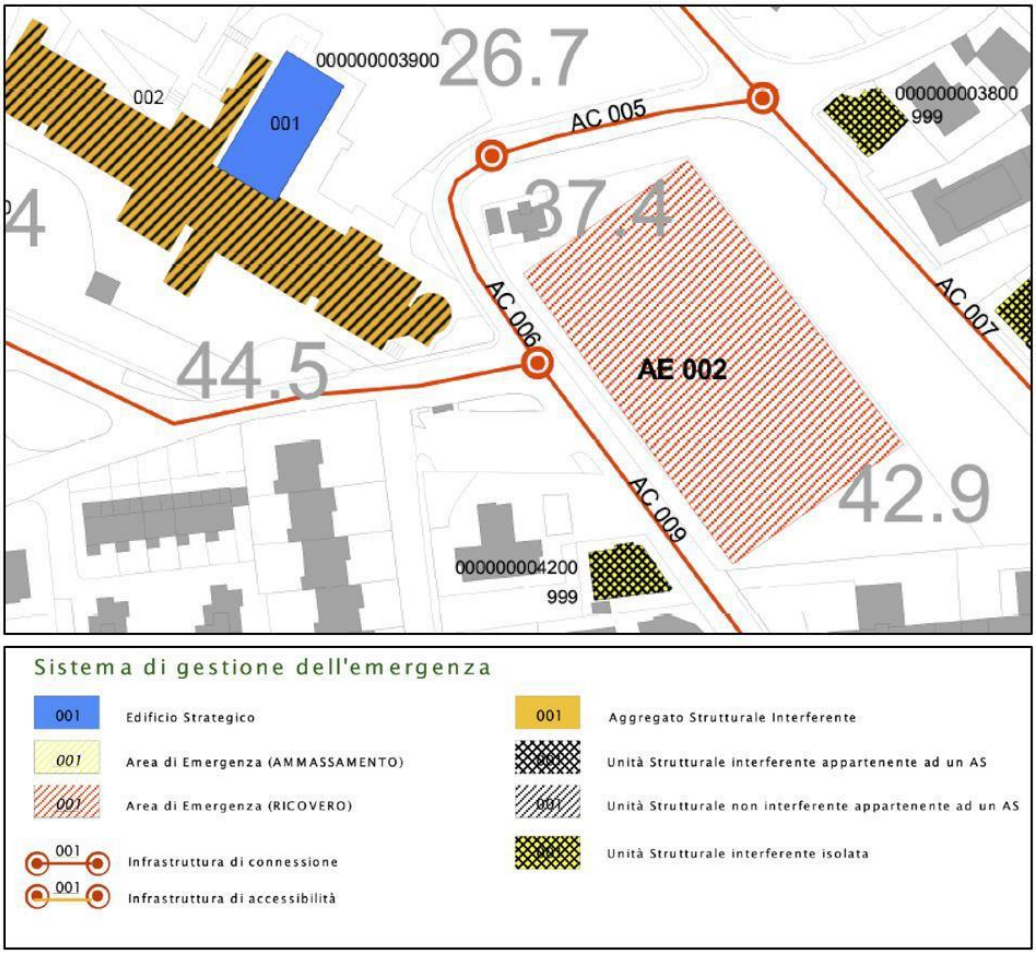
b) the infrastructures of accessibility and connection with the territorial context, of the buildings and areas referred to in point a) and any critical elements;

c) the structural aggregates and individual structural units that may interfere with the accessibility and connection infrastructures with the territorial context.

Operationally, we proceed by identifying, in each context, the elements of the emergency management system, which are detected using five specific detection cards specially prepared, in which to collect the information:

- Strategic Buildings (ES)
- Emergency Areas (AE)
- Accessibility / Connection Infrastructures (AC)
- Interfering Structural Aggregates (AS)
- Interfering Structural Units (US)

The information collected is entered in a database and represented in the GIS environment on the base cartography (Img. 7).

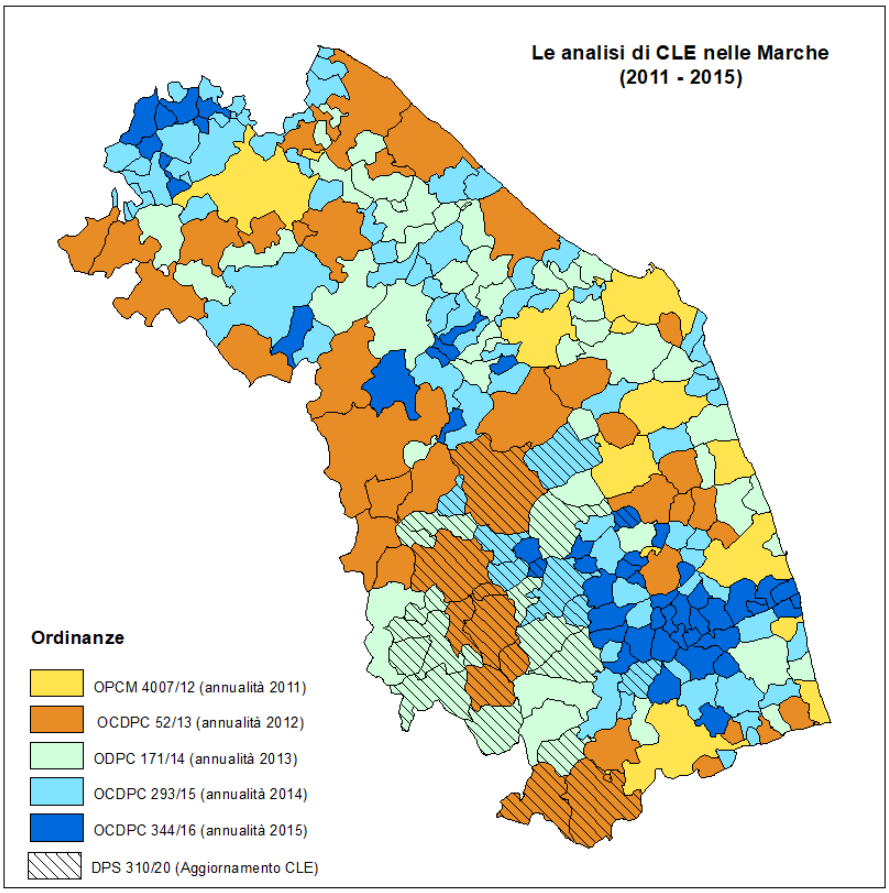


Img. 7: Future prospects of Seismic Microzonation in the Marche Region.

In practice, the preparation of the cards allows the implicit verification of the emergency management system, since it identifies on the one hand the artifacts or areas with management functions (strategic functions) and on the other the accessibility to the system composed of these elements, also identifying the main potential critical factors that can affect performance.

All the municipalities of the Marche have analyzes on the limit condition for the emergency.

Furthermore, with Decree no. 310 / SPC1 of 12 November 2020, the Marche Region has launched an update of the CLE for 29 municipalities most affected by the 2016 earthquake.



Img. 8: Future prospects of Seismic Microzonation in the Marche Region.

This choice arose from the consideration that in the capitals of the aforementioned municipalities the urban fabric has undergone evident transformations as a result of the aforementioned seismic events, with the construction of new residential settlements (see the "SAE" Emergency Housing Solutions and replacement houses) , and very often the relocation of strategic buildings functional to emergency management. All these elements logically went to affect the elaboration of the CLE Analysis and the drafting of the Municipal Civil Protection Emergency Plan.

The strengths of the experience of the Marche Region

Seismic Microzonation studies and the analysis of the Limit Condition for Emergency in the Marche Region have been made possible for over a decade now, thanks to the precious and indispensable collaboration between local authorities, national research institutes, the academic and professional world (both Technical orders, both freelancers).

This "model" adopted of "team play" is described below which, through a series of regulatory acts by the Marche Region, has made it possible to carry out these studies throughout the region.

Regional legislation

The Marche Region, through the Regional Council Resolution (DGR) 967 of 5 July 2011 "First Provisions for carrying out Seismic Microzonation surveys", acknowledges the provisions at national level of Law 77/09 and OPCM 3907/10.

With the DPS2 Decree n. 53/2011, the first Municipalities in which to carry out the Microzonation studies are identified (selected on the basis of population and ag value) and the share of regional co-financing for the studies is established.

In the document, which is the deed of departure for MS in the Region, it also resolves:

- the approval of a protocol between the Marche Region, ANCI Marche and the Order of Geologists to ensure the best execution of the MS studies (protocol that will be integrated in 2012 following the inclusion of the CLE studies, including the Orders of Engineers, Architects and Surveyors)
- the incorporation of MS studies into urban planning tools;
- the establishment of a Regional Technical Commission on Seismic Microzonation, made up of 5 experts with proven experience in the sector to support the studies;
- the decision that it is the Municipalities that directly assign the task to a duly selected implementing entity.

To implement this last point, the Marche Region has provided to regulate the procedures for conferring the assignments, indicating a series of principles aimed at favoring the best and most correct carrying out of studies and the adequate selection of the persons in charge, contained in the disciplinary scheme assignment to be provided to the Municipalities (Decree DPS 163/2011), within which it also provided for:

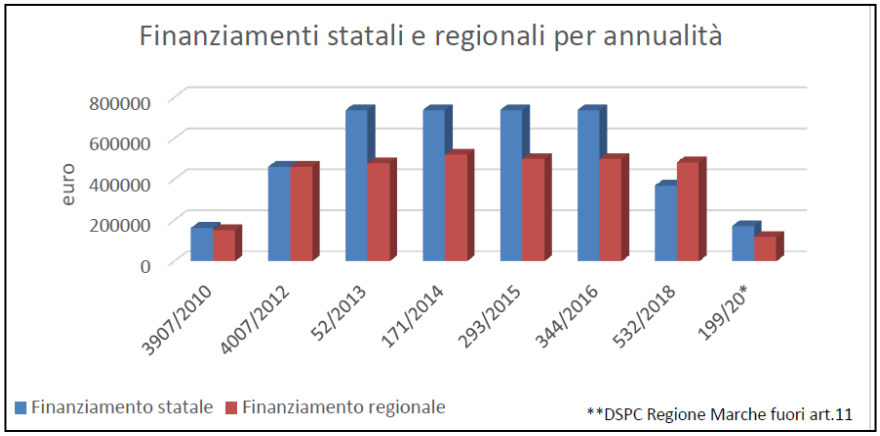
- the obligation to identify the figure of a young collaborator (with less than 5 years of membership in the professional order) who supports the geologist in charge
- the obligation to participate during the performance of the assignment in the technical coordination meetings with the Regional Commission, in order to evaluate the progress of the studies and support the appointees
- starting from 2012, the collaboration with the persons in charge of the parallel studies of CLE.

With the introduction of the CLE analyzes starting from 2012, the DGR 1470 of 13/10/2012 extends the selection criteria of the Municipalities also to the CLE, deciding that every year the Regional Civil Protection identifies the Municipalities on which to carry out the MS and the CLE analysis based on the demographic dimension, the anthropization of the territory and the presence of infrastructures of strategic interest and the possible drafting or adaptation of the PRG.

Following the resolution with DGR 967 of 5 July 2011, in 2012, through the Regional Law of 26 November 2012 No. 35 "Provisions on seismic microzonation", the Region formalizes in its legislation the introduction of Seismic Microzonation studies , defining that the Municipalities must carry out the MS studies, which areas will concern these studies in particular (Art. 1) and that the urban planning tools must be adapted to such studies after their certification of conformity (Art. 2 and 4); currently the law is still awaiting the publication of the implementing rules.

The regional curriculum starts in 2011 and; over the years, through the various acts by the Regional Civil Protection, state funding, provided through art. 11 in the 7 years foreseen, were integrated by the Marche Region with a regional co-financing and transferred to the Municipalities identified from time to time

(according to the procedures provided for in the Ordinances), so that they directly entrusted the professionals selected by them to carry out the MS studies (and CLE analyzes since 2013) (Img. 9).



Img. 9: The composition of the loans disbursed by the Region for the various years.

In 2015, through an agreement between the Experimental Geophysical Observatory of Trieste and the Marche Region, the "Regional abacuses for lithostratigraphic amplifications aimed at drawing up level II seismic microzonation maps" were developed, thus implementing the indications present in the Guidelines and Criteria for MS (DPC-CRPA 2008), which advise individual Regions to develop their own abacuses for the quantitative characterization of the amplification phenomena expected in the "stable susceptible to amplification" areas for which a simplified approach may have significance (objective of level 2 MS studies).

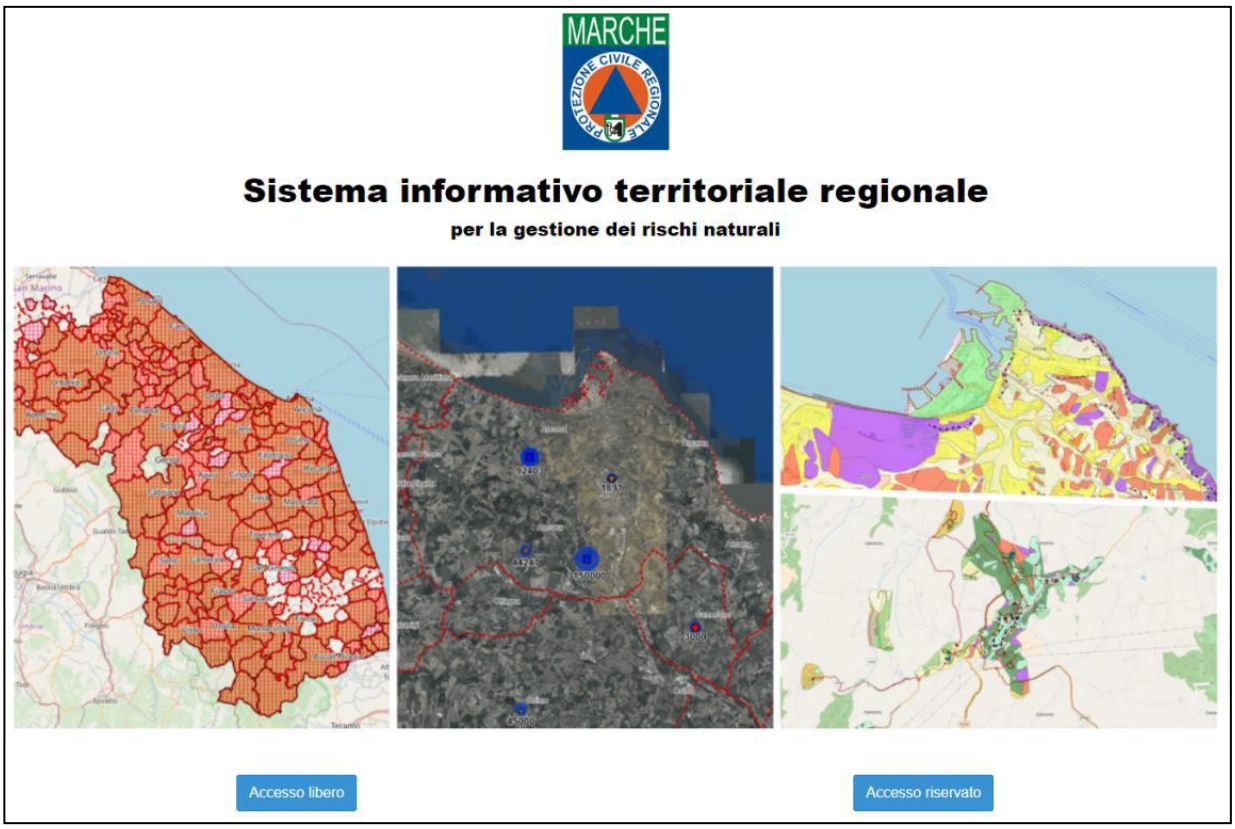
The schedules, after a series of reviews and tests, were made available and used for level 2 studies starting in 2018.

In the same year, pursuant to Regional Law no. 35/2012, an agreement (renewed and still in place) was stipulated between the Marche Region - Civil Protection Service and the C.N.R. - Institute of Environmental Geology and Geoengineering (IGAG) so that it provides support activities to the Region through various actions, such as the supervision of the preparation of the level 2 studies that were about to be carried out and the indications to the Municipalities for a correct application of Article 2 of Regional Law 35/2012, which provides that the Municipalities adapt their urban planning tools to the studies of MS.

The Regional Territorial Information System for the management of natural risks

The Civil Protection Service of the Marche Region has created an online "Regional Territorial Information System for the management of natural risks", in which to archive and make accessible in an open form, all the regional MS and CLE studies validated each year by the National Commission for the MS.

The portal, available at https://qmap-protciv.regione.marche.it/, has a WebGis section in which it is possible to interactively browse the maps produced and a section where it is possible to view and download all the data present, both in documentary and vector format.



Img. 10:The home page of the regional site for the management of natural risks.

In addition to the information relating to the MS studies and the CLE analyzes, the portal has been perfected, implemented and expanded over the years: one section contains links to the Civil Protection Plans of the Municipalities of the Marche, while in another the information has been entered relating to the safety measures carried out in the area with resources made available from time to time following various declarations of a state of emergency.

To date, the portal has become a very important archive and an easy and quick consultation tool by Prefectures, Professional Orders, Provincial and Municipal Administrations as well as individual citizens.

7.2 Forest fires risk

The phenomenon of forest fires in Italy has, for some years now, been critical. We come from a critical summer, especially for the Adriatic regions and the islands, in which over 170,000 hectares of vegetation went up in smoke. The summer emergency also led to a new law, D.L. n. 120 of 8 September 2021 (converted into law no.155 on 8 November 2021), which intervenes in the field of forecasting, prevention and active fight against forest fires, in order to integrate and strengthen the existing regulatory and operational device.

Studies relating to climate change, but also the interpretation of land management, the abandonment of agricultural areas, pastures and the mountains, make us understand that the next few years will be increasingly difficult, with events linked to higher propagation speeds, spotting more and more frequent and expected intensities exceeding the extinction capacity.

The effective responsible characters, therefore, will be destined to carry out more complex interventions, in contrast to pyric phenomena that will affect (as observed in recent years) entire emergency periods, in which the contemporaneity of events risks affecting effectiveness. It is therefore essential to size the service in an elastic way, and to enhance the forecasting capacity in the short, medium and long term. Activities that the law 353/2000 "framework law on forest fires" attributes to the regions as they are identified as the central subject of the system for managing this

risk. The forecasting tools should elaborate informative hazard indices, identify territorial areas and periods of greatest risk for each macro-area, and provide an estimate of the expected damage in order to facilitate the planning of preventive interventions and optimize active control strategies.

7.2.1 Forecast

The forecasting activity consists in identifying the areas and periods at risk of forest fire, as well as the hazard indices elaborated on the basis of climatic and vegetation variables, the application of which is crucial for the planning of prevention and extinguishing interventions.

The forecasting activity, but more generally the warning system, makes use of the forecasts of the dangerous conditions of possible forest fires and the resulting risk scenarios not only in wooded and rural areas, but above all in peri-urban areas. These activities, implemented by the Department and the regions through the network of functional centers, are therefore fundamental in view of the activation of the interventions that take place on the basis of the needs expressed by the individual territories.

The management of the alert system is ensured by the Civil Protection Department through the Central Functional Center and the Forest Fire Risk and Interface Service, which issues a daily bulletin of susceptibility to the initiation of forest fires throughout the national territory, identifying for each province three levels of danger (low - medium - high). Three different situations correspond to the three levels of danger:

- low danger: the event can be faced with ordinary means only and without particular use of forces;
- average danger: the event must be faced with a rapid and efficient response from the active control system;
- high danger: the event can reach such dimensions as to almost certainly require the participation of the state air fleet.

The forecasts are prepared not only on the basis of weather and climatic conditions, but also on the basis of vegetation, physical state and land use, as well as the morphology and organization of the territory. The

bulletin is limited to a provincial-scale forecast, estimating the average value of the susceptibility to triggering over a period of time useful for the next 24 hours and a trend for the next 48.

The bulletin is made available to Regions and Autonomous Provinces, Prefectures, Forestry Carabinieri and Fire Brigade. The decentralized functional centers, in the Regions where the alert system is active, can in turn issue a fire susceptibility bulletin.

National forest fire forecast bulletin

As required by the Directive on the active fight against forest fires of 1 July 2011 signed by the President of the Council of Ministers, the Department of Civil Protection prepares a national forest fire forecast bulletin on a daily basis, taking into account the weather and climate conditions, vegetation, the physical state and use of the land, the morphology and organization of the territory.

The Bulletin reports the probabilistic forecasting scenario of the susceptibility conditions to the initiation and propagation of forest fires, articulated on three levels (low, medium, high), with an estimate of up to 24 hours and a representation of their trend up to at the most appropriate time scale.

This forecasting tool aims to provide the Department Offices with information to support the activities of the State air fleet so as to modulate organizational management in terms of maximum profitability.

The Bulletin is also made available to the competent Administrations on the subject for an exchange of information aimed at promoting a synergistic framework of initiatives and interventions to combat forest fires.

7.2.2 Prevention

Prevention activities aim to counteract the factors and causes that determine the initiation and development of fires. Prevention is divided into activities that vary according to the methods, timing and intensity of the interventions to be carried out. Generally, these interventions are classified into:

- cultural interventions: they act on the distribution and quality of the fuels present in the space in the form of biomass and include:
    a) reduction of combustible biomass with high propagation potential;
    b) collection of woodworking residues;
    c) pruning;
    d) thinning;
    e) re-naturalization of formations;
    f) elimination of highly flammable species.
- infrastructural interventions: they serve to limit difficulties or shortcomings connected with the physical nature of the territory to be defended. They include construction, restoration and maintenance activities for:
    a) service roads;
    b) fire-break avenues;
    c) water supply points;
    d) stands for helicopters.

In cases where cultivation interventions cannot be applied due to the poor accessibility of the sites or due to excessive costs, infrastructural interventions are the only possible interventions. Alongside these preventive interventions, which can be defined as direct, those of indirect prevention must be identified which have an impact on the whole territory. They are divided into:

- short-term interventions that include the set of activities aimed at raising awareness among citizens, in order to avoid behaviors that can trigger fires, such as for example the posting of signs or the distribution of brochures illustrating the behavior to be adopted in the event of fire.

- long-term interventions based on information campaigns, awareness raising in schools, AIB training courses for volunteers, etc.

Among the preventive measures to deal with the risk of forest fires there are:

- Forestry prevention: includes the set of operations that tend to reduce the impact of any passage of fire on the wooded surface or to reduce the possibility of ignition;
- Fire-resistant avenues: these consist of open roads or tracks created to prevent the spread of fires in wooded areas;
- Fire protection strips in wooded areas: these are areas with a lower density of vegetation between the forest and areas with different destinations, the aim of which is to reduce the forest fire risk and, at the same time, allow the extinguishing operations to take place in safe conditions and in a short time;
- Prescribed fire: it is a technique of expert and authorized application of fire to vegetation, on planned surfaces, with the aim of eliminating some particularly flammable parts of the vegetation, such as litter and dry grasses, in order to reduce the impact of the passage of fire in specific areas and facilitate fire-fighting interventions;
- Water supply: the water supply network is composed of large basins and water supply points, both natural such as streams and lakes, and artificial ones, such as artificial reservoirs, hydrants and pipelines, for land vehicles and for helicopters operating in extinguishing;
- Forest road system: it has the purpose of allowing the access of AIB operators and vehicles in the wooded complexes;
- Helicopter stands: serve to increase the operational capacity of the helicopter service, reducing intervention times by locating landing stands in areas where fire is likely to develop. These landing points are useful both for refueling the aircraft and for boarding people, materials and water.

7.2.3 Active fight against forest fires

The fight against forest fires aims to reduce economic damage and mitigate the consequences on the environmental and socio-cultural heritage. It is based on the identification of the main objectives to be defended. Among these, the Park Areas, as established by law 353/2000, are of absolute priority.

Excluding housing structures, such as urban centers, farmhouses etc., which differ from this planning as they are the responsibility of other Bodies, the following elements of evaluation are considered:

- vegetational and environmental value: protected natural areas;
- wooded and / or non-wooded areas adjacent to inhabited centers;
- young reforestation and / or coniferous forests;
- difficult accessibility from the ground to the areas referred to in the previous points;
- extension of the area to which the fire can spread;

The interventions of active fight against forest fires include reconnaissance, surveillance, sighting and extinguishing activities by air and land vehicles.

The regions organize the aforementioned activities through the regional plan, ensuring the coordination of their fire-fighting structures with the state ones through the Permanent Unified Operations Room (S.O.U.P). The S.O.U.P. ensures the connection and coordination between the regional and local levels, manages the intervention of regional air vehicles and the request for air competition from the state vehicles.

The Department of Civil Protection guarantees and coordinates on the national territory, through the Coau - Unified Air Operational Center, the aerial firefighting activities with the State firefighting fleet.

The Coau is continuously active within 24 hours throughout the year. Command and control center for all aircraft made available for competition in civil protection activities, the Coau plans and coordinates flight activities both nationally and internationally. In the forest firefighting activity he is in constant contact with the Regional Operational Centers and Soups of all the Regions. To minimize the time required to arrive at the site of operations, the planning of the ground dislocations of the available air vehicles is essential. The

firefighting planes and helicopters of the state's air fleet are deployed on the territory taking into account the areas at risk and the weather conditions that make forest fires more likely to ignite. Any point in the country can be reached within 60/90 minutes of take-off.

7.2.4 Best Practice

The contribution of the Puglia Region in the management of forest fire risk.

The Puglia forest heritage, based on data produced by the National Inventory of Forests and Forest Carbon Tanks (INFC, 2005), amounts to 179,040 hectares and specifically the regional forest area is divided into:

- 145,889 hectares of "Woods" (81.48%)
- 33,151 hectares of "Other wooded lands" (18.52%).

The provincial distribution of the forest heritage indicates the province of Foggia as the one with the greatest forest resources, followed by Taranto, Bari, Lecce and finally Brindisi.

Province	Superficie territoriale (ha)	Superficie boscata (ha)	Altre terre boscate (ha)
BARI	513.831	26.333	1.902
BRINDISI	183.717	2.719	388
FOGGIA	718.460	91.188	20.024
TARANTO	243.677	21.363	9.671
LECCE	275.940	4.293	1.165
PUGLIA	**1.935.625**	**145.896**	**33.150**

Img. 11: Source C.F.S. - INFC, 2005

Still according to the INFC 2005, with respect to the degree of mixture of the topsoil, in Puglia as in almost the whole national territory, the pure deciduous forest prevails followed by the pure coniferous forest.

Furthermore, it is important to report from the IFNC 2005 survey that the naturalistic constraint is triggered on forest surface falling within national or regional protected areas and Natura 2000 sites and concerns as much as 62% of the regional forest area (of which 44.8% falls in SIC and SPA areas).

In the Puglia Region, the forest fire risk assessment is described in the 2018-2020 AIB Plan, approved with Regional Council Resolution no. 585/2018, the validity of which was extended to the year 2021 pursuant to and for the purposes of the Regional Council Resolution no. 388/2021.

The zoning of the risk, carried out at the municipal level, arises from a methodological procedure that takes into consideration some basic components: woodiness, potential risk, real risk, density of roads, presence of pastures.

The linear combination of indices, appropriately weighted and normalized on a regional basis, leads to the definition of an Overall Risk Index (IR) at the municipal level and, therefore, to a classification of the territory by risk bands.

The components were expressed in indices defined as follows:

1. Woodiness index (IB): based on the previous information on the regional forest heritage, the woodiness index was calculated for all the Apulian municipalities. The index was calculated as the ratio between the forest area and the overall area of the municipality in question. In essence, it is an index that identifies the overall and undifferentiated exposure, in terms of surface area, of each individual municipality to the risk of forest fire;
2. Stain index (IM): based on the most updated UDS (Land Use) of the Puglia Region (2011), the presence index of sclerophyll vegetation was calculated, attributable to the associative plant formation defined as Mediterranean Macchia. For all the Apulian municipalities, the index was calculated as the ratio between the surface with the presence of scrub and the overall area of the municipality in question;

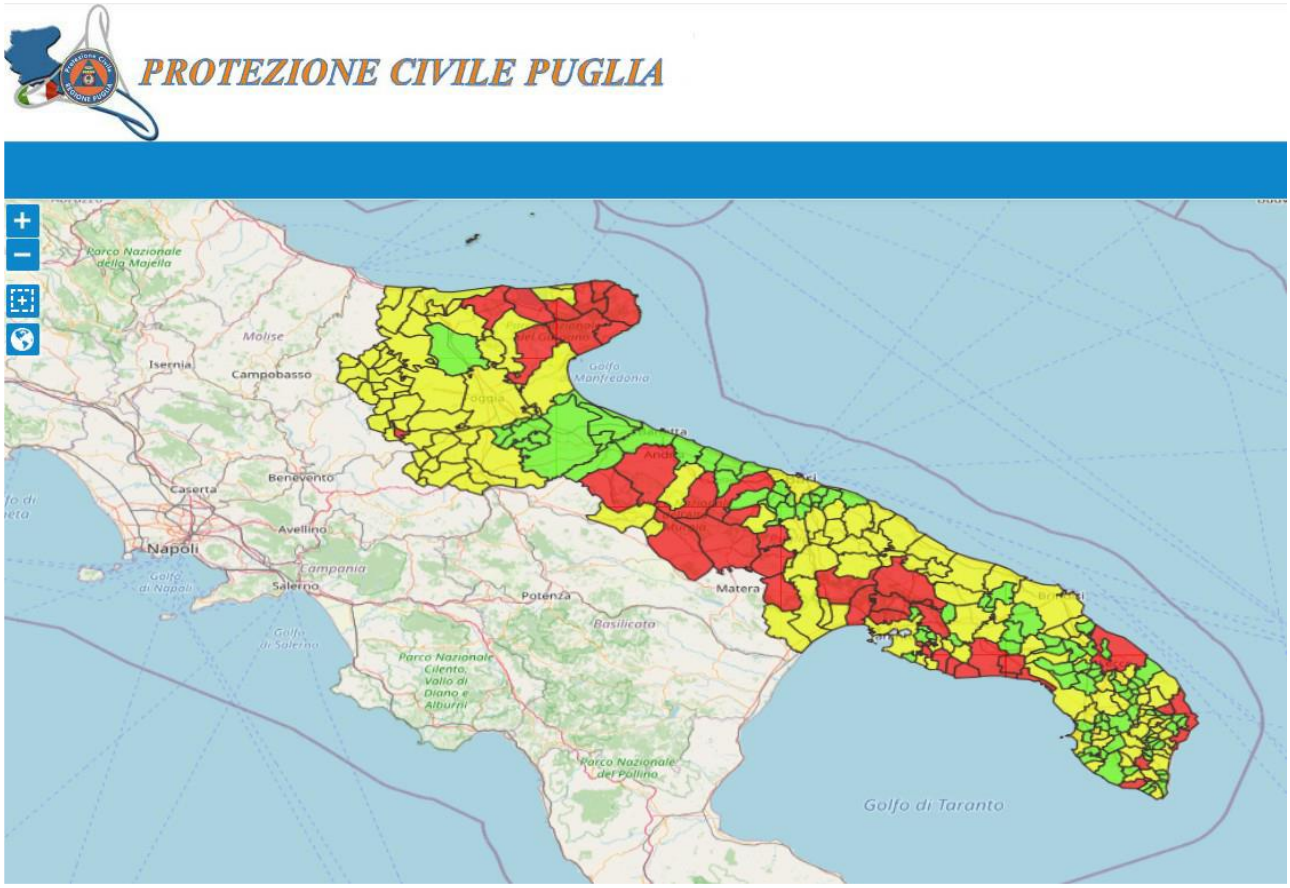
3. Potential Risk Index (IRP): it is calculated by attributing a different weight to the plant formations present, based on the definition of the hazard exclusively linked to the fuel model attributable to each phytocoenosis present and its load, according to the proposed method by Vicente et al. (2000);
4. Real Risk Index (IRR): it is based on the real incidence of the phenomenon, both in terms of the area actually covered by the fire, and in terms of the number of fires that developed in each municipality in the period between 2008 and 2015;
5. Climate Risk (RC): determined on the basis of the maximum temperature and minimum precipitation variables, analyzed individually for the elaboration of the index. The starting information layers, in raster format (1km2 cell), are represented by the monthly average of the maximum temperatures and minimum rainfall recorded in the period 1976-2005 for the whole regional territory;
6. Density of Roads: indicates the distribution of road networks and accessory spaces, railway networks including the adjoining surfaces of the Region. The density was calculated using the "Kernel density" method. Each municipality was then assigned the average density value over the entire municipal area;
7. Presence of pastures (IPAS): it is based on the real presence of pastures present on the regional territory. For this estimate, information on the land use of the Puglia Region was used.

The seven basic indices have very different values and ranges of variation; in order to make them comparable and aggregable in an overall index, they have all been rationalized so as to obtain an interval between 0 and 1 for each variable.

Furthermore, taking into consideration the great variety of ecosystems and vegetation formations that the Puglia Region possesses, immersed in a predominant agricultural and anthropic matrix, it was considered appropriate to diversify the contribution of each variable in the calculation of the overall index.

The overall risk index is therefore calculated on a municipal basis as follows:

$$IR = 4*(IB)+4*(IM)+3*(IRP)+2*(IRR)+RC+DS+IPAS$$



Img. 12: forest fire risk map on a municipal scale

Activities carried out for risk management

The A.I.B. carried out by the regional civil protection system have the purpose of protecting the forest environment, reducing the areas affected by fire and related negative impacts (landscape degradation, habitat loss, greater susceptibility to soil erosion, etc.).

The aforementioned purpose is pursued through civil protection planning, the daily forecast of fire criticality levels, the training of A.I.B. operators, information to the population, territorial protection and active fight against forest fires. In the following we will focus on these last two actions, which contribute to the management of risk in real time.

The monitoring of the territory allows the early detection of forest fires by the staff in the field and in the room, also thanks to the views provided by the detection cameras. The latter, equipped with appropriate sensors, were installed in strategic points of the area, characterized by a high naturalistic value and large viewing areas. Furthermore, special patrol services are activated for the territorial control, the intensity of which is linked to the level of fire criticality defined daily in special bulletins issued by the decentralized functional center of the Puglia region.

Active fighting actions, on the other hand, make it possible to reduce the spread of fires and contain the areas affected by the fire. These actions are coordinated by the Unified Permanent Operations Room of the Puglia Region (S.O.U.P.), which avails itself of the active support of the National Fire Brigade, the Forestry Carabinieri, the Regional Agency for Irrigation and Forestry Activities (A.R.I.F.), the fleet regional and national air, of the Organized Volunteer Organizations of Civil Protection duly registered in the Regional List and of the other Local or Functional Bodies.

The SOUP, hinged in the Regional Operational Center (C.O.R.) of the Civil Protection Section, guarantees 24-hour operation in the period of maximum danger of forest fires (15 June - 15 September with possible extension depending on weather-climatic and environmental conditions), defined every year by decree of the President of the Regional Council.

The difficulties encountered due to the regulatory and / or organizational limits of the structure

The difficulties encountered in the management of forest fires are mainly linked to the organizational limits of some components of the civil protection system, which are sometimes undersized in terms of staff and the equipment available. These criticalities do not allow the orderly performance of territorial protection and support activities in the phase of active struggle, especially at the municipal level.

Further organizational criticality is linked to the failure to activate the so-called "Optimal territorial and organizational areas", defined by Legislative Decree 1/2018. These structures would make it possible to plan and deliver civil protection activities at a supra-municipal level, overcoming the

criticalities connected to the reduced capacity of small municipalities to cope with the workloads for managing forest fire risk with their own men and means.

To the above must be added a criticality linked to the lack of interoperability of the data contained in the civil protection plans, useful for the timeliness of active control actions. In fact, one of the main operational limitations encountered during the event phase, in addition to the lack of human resources, is the reduced knowledge of the water withdrawal points and forest roads to reach the sites affected by the fires.

As regards the difficulties due to regulatory limits, it is worth highlighting the absence of a shared methodology for assessing the risk of forest fires in urban-forest interface areas as well as for the definition of an intervention model that defines the distribution of competences between the different structures that participate in the management of such events.

The solutions identified to overcome the difficulties referred to in the previous point

To overcome the difficulties described in the previous paragraph, the Puglia Region has activated various initiatives. Notably:

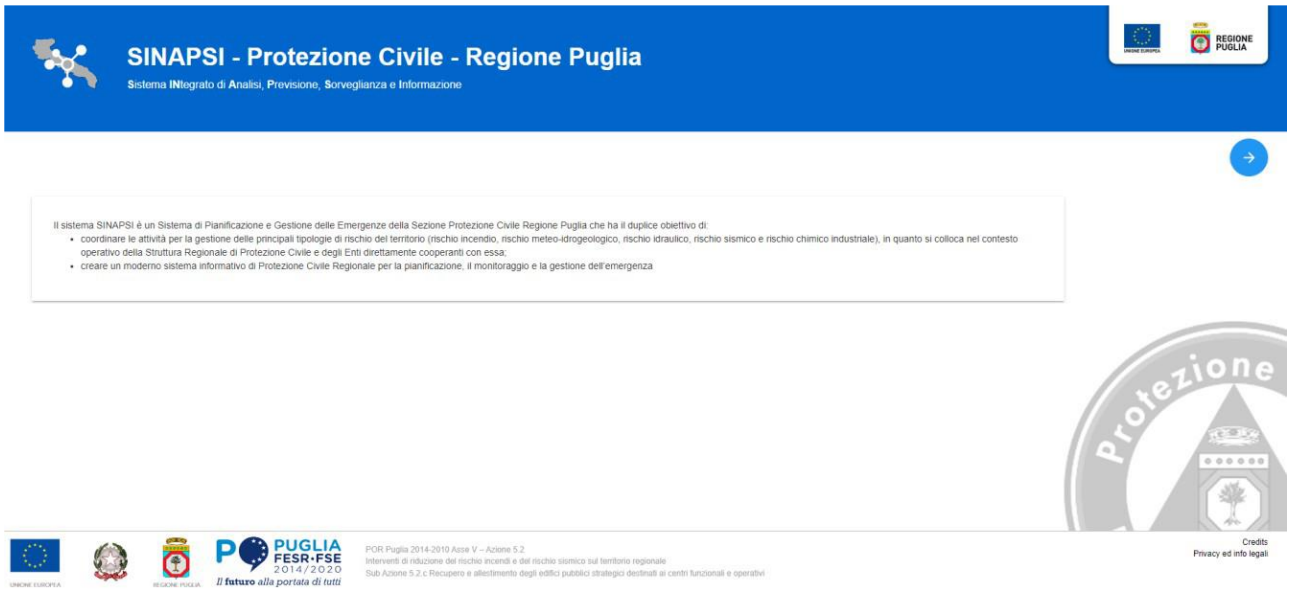
- development of an IT platform for the management of civil protection risks (Integrated System of Analysis, Forecasting, Surveillance and Information - S.IN.A.P.S.I.), which also allows the collection of the contents of civil protection plans and the data that compose them;
- implementation, based on the INTERREG project "Ofidia 2 - Operational FIre Danger preventIon plAtform2", of a highly innovative and cutting-edge system, consisting of a network of wireless sensors, high-resolution cameras and drones useful for detecting fires in wooded areas or in the immediate vicinity of the same;
- financing, under the POR Puglia 2014-2020, in favor of n. 140 Apulian municipalities for the implementation of municipal civil protection plans;
- funding, under the POR Puglia 2014-2020, in favor of the Regional Agency for Irrigation and Forestry Activities (A.R.I.F. Puglia) for the implementation and activation of the territorial civil protection unit;

- funding, under the POR Puglia 2014-2020, in favor of the University of Bari for the development of fuel models and for the identification of forest roads;
- provision, under the INTERREG project "TO BE READY - The flOod and Big firE foREst, prediction, forecAst anD emergencY management", of training courses in favor of personnel involved in various capacities in forest fire prevention activities (Director of Shutdown, Operations Room Manager, Room Workers, Safety and coordination of AIB teams, etc.);
- agreements with the Regional Fire Department and the Regional Command of the Forestry Police to support the management of the AIB campaign in the period of serious danger through the presence of its own personnel in SOUP and additional teams in the area;
- identification of a company for the extinguishing service of forest and non-forest fires with the launch of water and / or extinguishing / retardant products, or other compatible additives, through the use of two fixed-wing aircraft;
- approval of the territorial contexts identified as a result of the activities of the PON Governance for the subsequent perimeter of the optimal territorial and organizational areas, useful for their organization.

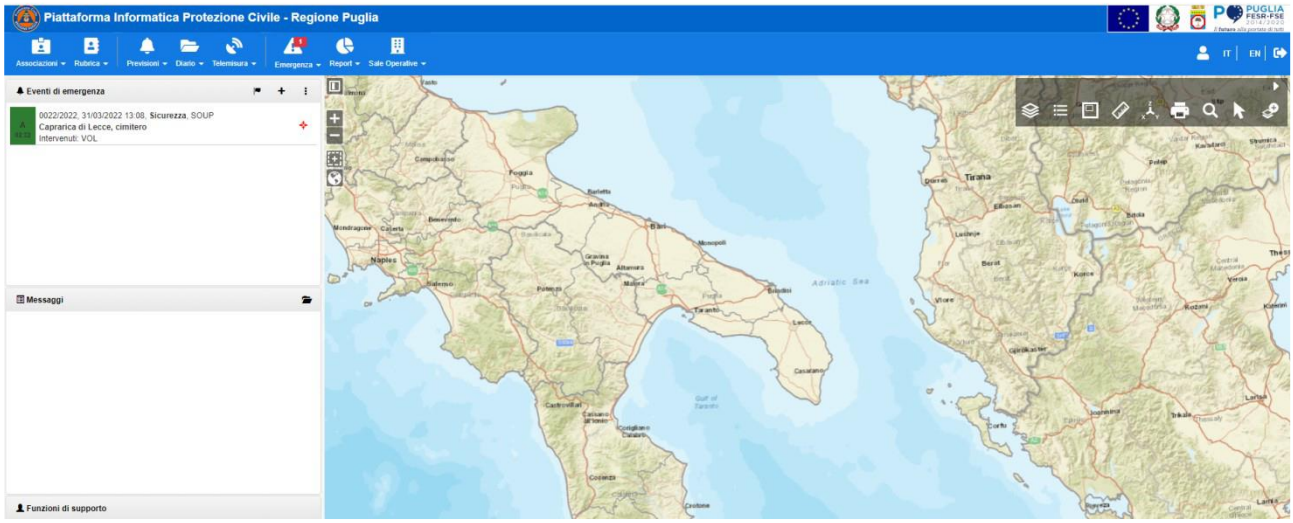
Proposals to adapt the regulations or the structure

For the constant adaptation of the regulations and the structure, the updating of the AIB operational program is proposed annually. In this sense, the Puglia Region annually draws up and approves this program, as part of which the procedures for managing fires are updated. These updates make it possible to take into account the current knowledge of the territory and any changes in the organization of the regional civil protection system. In addition, for the constant updating of geographic information layers and planning tools, it is proposed to use a common platform accessible by all entities involved in the management of civil protection risks, both in deferred time and in the event phase.

In this sense, the Puglia Region has activated the S.IN.A.P.S.I. platform, currently under development and continuous adaptation, to collect, in a systematic and readily accessible way, any information useful for risk management.



Img. 13: S.IN.A.P.S.I. platform interface



Img. 14: S.IN.A.P.S.I. platform interface

7.3 Oil spill

The Mediterranean is one of the areas more exposed to the risk of oil pollution. In the waters of the Mare Nostrum passes 20% of all worldwide product traffic petroleum: approximately 360 million tons per year. In the Mediterranean they operate every day 2000 ferries, 1500 cargo, 300 ships tank. It is estimated that every year they end up in Mediterranean waters between 100 thousand e the 150 thousand tons of petroleum products. It is estimated that every year they end up in Mediterranean waters between 100 thousand ends the 150 thousand tons of petroleum products. Over 40% of the hydrocarbon is caused by the activity operational and routine. The law 31 December 1982, n. 979 in Article 11, paragraph 4, establishes that in the event of pollution of the sea by hydrocarbons or by HNS (Hazardous and Noxius Substances), "when the emergency cannot be faced with the means available to the Ministry of Merchant Marine, the Minister of Merchant Marine asks the Minister of Civil Protection to promote the declaration of national emergency. In this case, the Minister of Civil Protection assumes the direction of all operations on the basis of the National Emergency Plan adopted by the bodies of the national service for civil protection". Pursuant to the aforementioned legislation, the "Plan of national emergency intervention for the defense against pollution of hydrocarbons or other harmful substances caused by marine accidents ".

7.3.1 The National Emergency Response Plan for the defense of the sea and coasts from pollution by hydrocarbons or other dangerous and noxious substances.

The Italian response activities to marine and coastal pollution by hydrocarbons and HNS are organized on three management levels which correspond to three planning levels. Level 1 - pollution of light or medium severity, is regulated by the Local Operational Plans (POL) of the maritime compartments and by the coordination plans of the Maritime Departments; level 2 - severe pollution, is subject to regulation in the MiTE Plan; while level 3 - very serious pollution, is regulated by this Plan.

As part of the activities implemented pursuant to this Plan, it is understood that search and rescue operations (SAR), for the safeguarding of human life at sea, have priority over any other type of intervention.

Response systems

Management at national level

The Department of Civil Protection (DPC), following the resolution of the state of emergency implements the coordination of the activities aimed at defending against hydrocarbon or HNS pollution of the sea and coasts, carried out by the Administrations and Bodies, as well as by the operational structures involved at national, territorial and peripheral level. The following contribute to emergency management:

- the Ministry of Ecological Transition (MiTE) through:
    - the General Management (DGPNM);
    - the Marine Environmental Department of the Port Authority Corps - Coast Guard (RAM);
    - the Directorate-General for infrastructures and safety (DG IS) - exclusively in the event of accidents deriving from mining activities for the exploration and cultivation of hydrocarbons, with the coordination of its branch offices (UNMIG) competent for the territory;
- the Higher Institute of Environmental Protection and Research (ISPRA) following activation by the MiTE in the local emergency phase or directly by the DPC as a Center of Competence, for technical and scientific support for emergency management;
- the Ministry of Infrastructure and Sustainable Mobility (MIMS) through the central and territorial organization of the Port Authority Corps - Coast Guard, which is assigned the operational direction of operations at sea through its National Operational Center of the Coast Guard (CONGUARCOST) and / or the Designated Maritime Authority, if delegated for the exercise of operational management;
- the Ministry of the Interior by activating:
    - the Department of Firefighters, Public Rescue and Civil Defense which provides, also through the territorial divisions, the technical contribution in order to ensure public safety both from the point of view of fire risk and from that of exposure to HNS, as well as to contribute to

instrumental monitoring procedures and fire surveillance activities, to make the places affected by the event safe;

- the Prefectures - Territorial Offices of the Government (UTG) territorially affected by the event which in consideration of the nature of the events and the consistent involvement of the state forces, assume the unitary direction of the emergency services at the provincial level, in coordination with the regional structure of civil protection;

- the Ministry of Defense, through the Operational Command of the Joint Forces Summit (COVI), which activates the use of its resources for anti-pollution operations;
- the Ministry of Agricultural, Food and Forestry Policies (MIPAAF) contributes to the management of the emergency, with particular reference to protected areas, activating the central and peripheral organization of the Carabinieri Forestry, Environmental and Agri-food Unit Command;
- the Ministry of Health makes use of the network of experimental zoo-prophylactic institutes;
- the Customs Agency which favors the administrative procedures connected both with any problems of provisional storage and initiation of disposal of the collected oils and other polluting or polluted products or materials, and to facilitate the eventual arrival and use, in the territory national, of means and materials from foreign countries to face the emergency.
- Volunteer Organizations, previously formed for the specific type of intervention and the use of the equipment provided.

Management in the territorial and peripheral areas

- The competent Maritime Authority or, where appropriate, the designated one exercises the operational direction of the activities at sea for the defense against oil pollution or HNS. To carry out these tasks, it appoints and makes use of the Area Coordinator (OSC) who exercises tactical direction, maintaining control of the naval units at sea. The Designated Maritime Authority maintains contact with the Judicial Authority;

- the Prefecture - Territorial Office of the Government competent for the territory which, in the event that the pollution reaches the coast, assumes, in conjunction with the President of the Regional Council and in coordination with the regional civil protection structure, the operational management on land of all emergency services to be activated at the provincial level provided for by the specific Provincial Civil Protection Plan, in order to guarantee public safety, environmental protection, as well as the removal, collection and start of disposal and / or recovery of polluting materials;
- the Regions ensure, the carrying out of the related civil protection activities in the regional context;
- the Environmental Protection Agencies that operate, in conjunction with ISPRA, within the National Network System for Environmental Protection (SNPA), with expertise in the characterization of pollutants and in the monitoring and evaluation of level of contamination and environmental risk;
- Municipalities whose coast has been directly affected by pollution, or is threatened by it, guarantee the implementation of information and assistance measures to the population by taking any further actions, also in consideration of the principles of adequacy and differentiation;
- the Peripheral Territorial Commands of the Armed Forces that intervene with operational and logistical functions with territorial competence, operating in the area affected by the emergency, make their organizations available according to the directives issued by COVI;
- the Carabinieri Forestry Departments, operating in the protected area affected by the emergency, make available the human and instrumental resources available, in accordance with the directives issued by the Carabinieri Forestry, Environmental and Agri-food Unit Command;
- the peripheral UNMIG offices, in conjunction with the Directorate General for Infrastructure and Safety (DG IS) of the MiTE, operate as supervisory authorities and mining police in matters of safety and health of workers in onshore and offshore activities for research, cultivation and storage of hydrocarbons, also providing technical-logistical and administrative support to the peripheral Committee for the analysis and evaluation of major hazard reports, major accident prevention and design communications and other related technical documents for all offshore activities;

- the regional health services, through the local health authorities (departments of prevention / public health) ensure the hygiene control activities of fishery and aquaculture products from the area affected by the event.
- Volunteer Organizations, previously formed for the specific type of intervention and the use of the equipment provided.

Event scenarios

The event scenario, both for hydrocarbon and HNS pollution, is defined on the basis of the type of accident, pollution, even potential, and its severity.

- Level 1, pollution of light or medium severity, or potentially such, which by extent and / or extent and / or type of pollutant can be managed with locally available personnel, equipment and equipment, without representing a direct, immediate and substantial threat to the it costs. This situation also includes accidental spills occurring at or near an identified structure / ship, which have a slight or low environmental impact;
- Level 2, severe pollution, or potentially such, which due to extent and / or extent and / or type of pollutant cannot be managed with locally available personnel, equipment and equipment and represents a serious threat to the coast. This situation includes pollution that requires assistance and additional local, regional, state or in compliance with international agreements;
- Level 3, very serious pollution, or potentially such, which by extent and / or extension and / or type of pollutant and the areas concerned, requires the resolution of the state of emergency of national importance. This includes pollution that requires additional state or international assistance and resources.

Intervention model

The intervention model defines the actions that the various peripheral, territorial and national bodies must take to deal with the emergency both for the pollution of the sea and the coast by hydrocarbons, and for that relating to HNS.

Level 1 - Light or medium-severity pollution

The intervention, in cases of pollution scenarios, even potential, of Level 1, is regulated by the Local Operational Plans (POL) of the maritime compartments and by the Coordination Plans of the Maritime Departments.

This is a situation that can be managed locally with the resources available there.

Level 2 - Severe Pollution, Local Emergency

The intervention, in the cases of pollution scenarios, even potential, of Level 2, is regulated by the MiTE operational plan both as regards the choice of operational strategies and their management. This is a more complex situation than Level 1 and requires the declaration of the status of Local Emergency by the Head of the Maritime Department with the implementation of the actions provided for by the alert phase and the measures provided for by the Provincial Plans if the pollution reaches the coast. This Level also includes pollution that is managed under international agreements and that which by extension and / or entity involves several Maritime Compartments, until the national emergency declaration intervenes. If the pollution is no longer compatible with the territorial resources used, the state of mobilization of the National Civil Protection Service may be ordered pursuant to art. 23 of the Civil Protection Code.

Alert phase during the level 2 emergency

This phase begins with the declaration of the Level 2 Local Emergency status, following which the General Command of the Port Authority Corps - Coast Guard and the Ministry of Ecological Transition alert and keep the Civil Protection Department constantly updated.

Actions of territorial and peripheral bodies in the Level 2 emergency

During the alert phase in a Level 2 emergency, the following actions will be ensured by the local and peripheral bodies:

- the Head of the Maritime Department who implemented the POL and declared the Local Emergency (Level 2) complies with the MiTE operational plan, ensuring a continuous flow of data and information that allows to have the real situation of the event as well as its evolution, keeping the MiTE - COIMAR and RAM, the DPC - COEMM, the CONGUARCOST, the Prefecture - U.T.G., the Region and the Mayors involved in the emergency;
- the Prefect, in agreement with the Head of the Maritime Department, takes action to prepare and implement, where necessary, all the measures on the threatened stretches of coast, based on the specific Provincial Plan, liaising with the Mayors involved in the emergency. The Prefect keeps the MiTE - COIMAR and RAM, the DPC - COEMM, CONGUARCOST and the Region constantly updated on this activity and the evolution of the situation;
- the Region, in conjunction with the Prefect, ensures the use of regional resources to deal with the emergency in progress by activating, where necessary, the Crisis Unit. In relation to the evolution of the scenario, if the means and forces in the field at their disposal are not sufficient, they evaluate the need to make a specific request for additional means and resources to the DPC;
- the Mayor ensures information and assistance to the population, also contributing to emergency management, also in relation to the provisions of the Provincial Plan.

Actions of the Civil Protection Department in the Level 2 emergency

The Civil Protection Department, as soon as it receives the news of the local emergency declaration, through the Italy Situation Room and the Maritime Emergency Operations Center, helps to ensure a constant flow of information with:

- the Ministry of Ecological Transition;
- Directorate-General for naturalistic heritage and the sea (DG PNM);
- Marine Environmental Department of the Port Authority-Coast Guard Corps (RAM); - Directorate General Infrastructure Security (DG IS);
- the General Command of the Port Authorities - Coast Guard - National Operations Center (CONGUARCOST);
- the Higher Institute of Environmental Protection and Research (ISPRA);
- the Ministry of the Interior - National Fire Brigade Operations Center (CONVVF);
- the Ministry of Defense - Operational Command of Vertice Interforze (COVI) if naval vessels of the M.M. with adequate command, control and logistical support capabilities or with specific anti-pollution capabilities, as well as other resources of the Armed Forces;
- the Ministry of Agricultural, Food and Forestry Policies Forestry, Environmental and Agri-food Unit Command of the Carabinieri.

In particular, in relation to the evolution of the scenario, it provides:

- make contact with the Region and the Prefecture - Territorial Office of the Government concerned, in order to ascertain that the measures of their respective competence have been prepared;
- alert the national voluntary organizations formed and equipped to deal with any beaching of hydrocarbons and the specialized centers for the care of avifauna, mammals and marine reptiles;

- activate any air competition, in addition to the one already put in place by the aircraft of the Port Authority - Coast Guard, of other structures of the Defense Administration and / or other Bodies / Administrations of the State in support of monitoring activities environmental.

Furthermore, again through the Italy Situation Room and the Maritime Emergency Operations Center:

- maintains operational communications with the MiTE - COIMAR and RAM, CONGUARCOST, with the Prefecture - U.T.G., the Region and the Mayors interested in the emergency to acquire any useful information on the evolution of the event;
- follows the situation to acquire and process any useful information;
- follows any activations requested by the MiTE for emergencies in execution of national and international Agreements and Conventions for cooperation and fight against accidental marine pollution; - follows through the MiTE the alerting of the industrial sector of the research and cultivation of hydrocarbons at sea for the possible provision of its anti-pollution resources;
- activates, as a national focal point for the CECIS marine pollution telematics platform, any requests for help from the Participants of the Union Civil Protection Mechanism and EMSA and at the same time, sends requests for help if necessary.

Level 3 - Very serious pollution, National Emergency

The intervention, in cases of pollution scenarios, even potential, of Level 3 is regulated by this Plan. This is a situation that, due to its size or gravity, requires the use of extraordinary resources even in the imminence of the event, through the resolution of the national state of emergency (Article 24 of the Code).

This level follows the alert phase and provides for the implementation of the actions of the national emergency phase.

Following the alert phase initiated for Level 2, when the pollution is no longer faceable with the means and resources deployed by the MiTE, the Council of Ministers resolves the state of National Emergency pursuant to art. 24 of the Civil Protection Code.

Actions of the Department of Civil Protection in Level 3

The Head of the Department, in relation to the news and information flowing into the Italy Situation Room and the Maritime Emergency Operations Center, orders the convocation of the National Civil Protection Operational Committee which ensures the coordination of emergency activities.

The DPC assumes the strategic direction of all operations on the basis of this Plan, in particular, through the Italy Situation Room and the Maritime Emergency Operations Center, requires:

- to the CONGUARCOST the dispatch of the personnel of the Corps to ensure the continuous service 24 hours a day at the COEMM;
- COIMAR to designate its own personnel for the function of liaison with the MiTE;
- to COVI the dispatch of the personnel designated for the liaison function in the case of use of naval units of the M.M.;

Furthermore, the DPC ensures the unitary direction of all the forces employed and specifically it:

- issues civil protection ordinances for the coordination of the implementation of the interventions to be carried out during the state of emergency;
- activates, where necessary, a technical-scientific table to support decisions, composed of representatives of Bodies / Administrations / Organizations deemed appropriate to deal with the emergency, making use, if activated by the MiTE during the Level 2 Emergency, also of the results produced within the "Emergency Coordination Committee";
- establishes the intervention strategies also on the basis of the proposals arising from the technical table;
- coordinates the operations necessary for the assessment of pollution on the coast (SCAT) and the consequent clean-up activities on land and at sea, respectively through the Prefect responsible for the territory to whom the operational management of the state forces on land is assigned, and

through the Competent or designated maritime authority to which the operational management of the interventions at sea is assigned, making use of the contribution of the Regions concerned;

- asks the Ministry of Defense, through the COVI, for any other resources and assets of the Armed Forces;
- activates and coordinates the intervention of all available national resources, both of a scientific and operational nature, including those of the national industry in the sector of competition in the clean-up activities and, if necessary, it provides purchase, rental of materials, means and anything else necessary in relation to the type of intervention;
- requests, if necessary, through the CECIS - marine pollution telematics platform at the ERCC, additional resources from participating countries and EMSA;
- coordinates the request for international aid, in conjunction with the Ministry of Ecological Transition and, if necessary, with the Ministry of Foreign Affairs and International Cooperation, on the basis of cooperation agreements and the fight against accidental marine pollution (RAMOGE and others), or in the framework of international conventions also from non-neighboring foreign countries, as well as from both operational and scientific collaborations from international organizations such as the IMO, REMPEC;
- activates and coordinates the use of national voluntary organizations formed and equipped to deal with any beaching of hydrocarbons and specialized centers for the care of avifauna, mammals and marine reptiles;
- maintains the link with the Regions with the purpose of involving territorial voluntary organizations;
- evaluates the possible activation of the Di.Coma.C. in relation to the evolution of the emergency;
- coordinates relations with the press and / or public information media in a unified form.

Actions of peripheral and territorial bodies in National Emergency, Level 3

The peripheral and territorial bodies continue with the activities already put in place in the alert phase (Level 1 and 2), implementing the provisions issued at national level by the DPC and ensuring further measures on the stretches of coast affected by pollution, based on the provisions of the Provincial Plan. In particular:

- the Prefect, in agreement with the Head of the Maritime Department, in conjunction with the Region, continues to implement the measures already put in place on the stretches of the concerned coast, implementing in conjunction with the DPC, the coordination of state forces and related peripheral structures used in the emergency to support the municipalities concerned. It ensures a constant flow of information with the DPC and draws up a daily report on the evolution of the operations in progress and on the evolution of the situation;
- the Region ensures the contribution of the competent regional departments to the regional civil protection structure and, in conjunction with the Prefect, continues to ensure the use of regional resources by implementing the provisions of the Provincial Plan;
- the Mayor ensures information and assistance to the population, also contributing to emergency management, also in relation to the provisions of municipal planning and the Provincial Plan.

Union Cooperation

European Civil Protection is based on the Directorate General for Humanitarian Aid and Civil Protection (DG-ECHO) of the European Commission.

In case of pollution of the sea and coasts by hydrocarbons and by HNS, when its size exceeds the national reaction capacities, the country where the accident occurred can appeal to the EU civil protection mechanism and in particular to the ERCC.

DG-ECHO has set up a 24/7 system capable of:

- providing assistance in civil protection operations including marine pollution;
- intervening specifically on the issue of marine pollution through EMSA whose personnel, specialized naval units, equipment and services can be activated through requests from Member States formulated through the ERCC. The Agency also provides a satellite service for monitoring oil spills through the CleanSeaNet system.

Communications on current emergencies and requests for help from Member States are the responsibility of the DPC, with the use of the CECIS Marine Pollution telematics system via the COEMM.

If there is a need to acquire specific information on the characteristics and behavior in the marine environment of chemical and noxious substances that cause pollution, it is also possible to contact the MAR-ICE Network (MARine Intervention in Chemical Transport Emergencies), activated by the '' EMSA in close collaboration with the CEDRE (Center of Documentation, Research and Experimentation on Accidental Water Pollution) and the CEFIC (European Chemical Industry Council) and to consult databases and guidelines developed internationally and available on the institutional websites of EMSA and REMPEC.

International Agreements

The MiTE is the national authority authorized to act on behalf of the State for the signing of international agreements for cooperation and fight against accidental marine pollution (RAMOGE, etc.), as well as for both operational and scientific collaborations from organizations of an international such as IMO, REMPEC, EMSA, etc. In the event of events falling within the scope of the aforementioned Agreements, it will be the responsibility of the MiTE to request / offer aid to the co-signatory countries of the Agreement and, in the event of a national emergency, in close coordination with the DPC.

7.3.2 The contribution of Arpa FVG in managing the risk of oil spills

Firespill oil risk management is one of the main activity goals defined by ARPA FVG as part of the firespill project, with a specific focus on firespill emergency response planning.

Arpa is accordingly conducting a hazard analysis aimed at a subsequent oil spill risk analysis for subjects exposed in the pilot area.

Massive numerical simulations are used for this analysis through the PyGNOME model of NOAA; for each potential identified source, a spill is simulated every hour for a whole year and the trajectory of the pollutant is then followed for the next 48/72 hours.

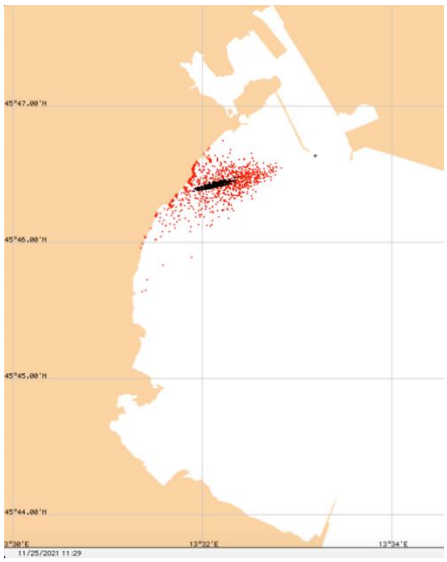
Once the numerical simulations completed and the exposed areas identified, statistics are subsequently produced, differentiated according to weather conditions concerning the quantity of pollutant poured into the observed areas. Moreover, ARPA FVG will conduct a proper risk analysis, thus evaluating, in addition to danger, vulnerability and exposure of the studied subjects.

The ultimate purpose of these activities is to provide stakeholders, specifically the Regional Civil Protection and the Port Authorities in the pilot area, with various tools, such as statistical data and hazard maps, as well as, at a later stage, risk maps, useful for preparing responses to any oil spill emergencies, therefore for a more effective risk management by the bodies in charge.

ARPA FVG has a Prompt Availability service which provides for the activation of multiple specialist teams depending on the need and type of intervention.

Modeling specialists need both context information relating to the area environmental conditions at the time of the accident and information relating to the source to set up the models.

Pointedly, marine modeling requires wind and surface current fields relating to the precise moment in which the accident occurred and information relating to the type and amount of the spilled pollutant.



Img. 15: Numerical simulation with the GNOME Oil Spill model carried out during the exercise.

The information obtained from the simulation models guide the intervention operations for damage containment. Actually, information is provided on the development of the pollutant spot, on the drift times of the spot itself and on the probability of stranding.

Based on previous experiences, some sensitive points emerged in the provision of technical support offered by the Agency to the competent authority for emergency management.

These points risk generating critical issues if not adequately strengthened in the preventive phase.

These aspects are related to the use of simulation models and particularly: the availability of use of a reliable simulation model to describe the area involved in the spill, the availability of environmental data input to the model, the availability of frequent updates of the meteo-marine conditions determining the dispersion of the spill, the use of modeling outputs for a prompt and correct planning of the emergency containment intervention.

Solutions identified to overcome regulatory and / or structure limits

<u>Environmental data Availability in input to the model</u>

In the context of emergency management, ARPA FVG is developing and implementing some forecasting tools for simulating the dispersion of oily pollutants in the sea. These modeling tools act as a support to the bodies in charge of the effective emergencies management at sea, providing useful information for the activities related to the pollutant containment.

Specifically, the oil spill model currently used in this area is GNOME. Moreover, ARPA FVG prepares and makes available the environmental data which act as input for this model on a daily basis, so that they are available in the event of a spill of hydrocarbons; starting from these input data, it is then possible to conduct simulations and view the outputs through the GNOME desktop version. To improve the quality of the service offered, ARPA FVG works to diversify the sources of these environmental data, in order to guarantee their redundancy in case of absence of data from one of the them as well as to improve adherence to reality of the same sources, through the use of meteorological and hydrodynamic models with suitable resolution for the pilot area.

Currently, ARPA FVG is also implementing the MEDSLIK-II oil spill model in operational mode, to provide stakeholders with an additional forecasting tool in case of emergencies.

Use of modeling outputs for prompt and correct planning of emergency containment intervention

As part of the response planning to oil spill events, ARPA FVG is carrying out, as previously mentioned, hazard and risk analyzes in the pilot area, with the aim of providing those in charge of emergency interventions with statistics and risk maps, useful for improving the planning of such interventions, thus overcoming the limits currently found.

Use of a reliable simulation model to describe the area affected by the spill.

The numerical models currently used by ARPA FVG in response to emergencies have demonstrated so far their effectiveness in providing in a clear and timely manner the displacement of an oily pollutant in the event of a spill into the sea.

To guarantee a continuous and always operational service, it is necessary that the input data for the functioning of the numerical models, are always available.

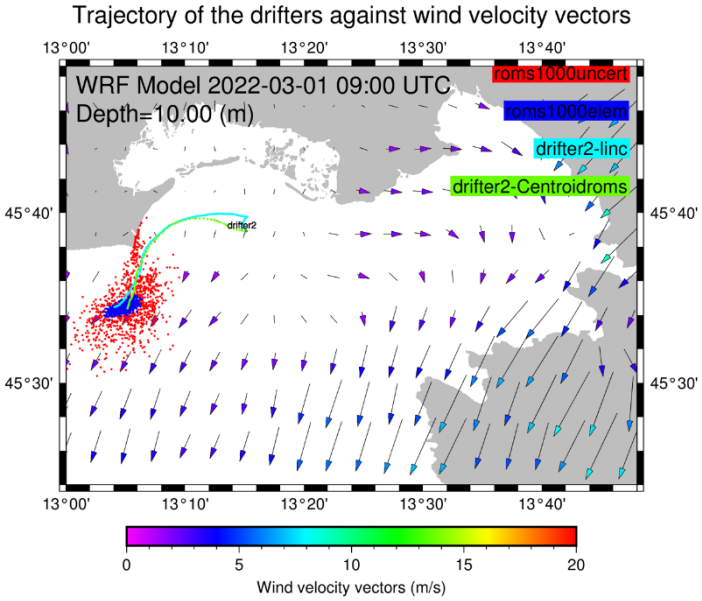
For this purpose it is fundamental to have multiple providers of this data. This redundancy on the input data, as well as guaranteeing the service in case of malfunction, allows a comparison of the results obtained from the numerical models with the different data input.

It may happen that different numerical models or different input data provide different predictions. Understanding which is the most reliable model for a given environmental situation is one of ARPA FVG tasks.

In order to extract this information, a continuous validation campaign of the used codes is needed. Currently, the codes in use are constantly updated and subsequently validated through the use of "Stokes Drifters".

The release of these tracing devices must be carried out on an almost regular basis in order to collect a database that is gradually increasing in size to cover all the possible environmental scenarios in the region of interest of ARPA FVG.

Since its introduction, this validation campaign highlighted the operational limits of some models, especially in cases of spills in the lagoon and / or inside ports.



Img. 16: Validation of the GNOME oil spill model with a Stokes Drifter.

Availability of frequent updates of weather and sea conditions determing spill dispersion

The experience gained during the exercises on the response to oil spill emergencies, in the Gulf of Trieste, and deriving from the training courses of the personnel in charge of interventions clearly indicates that the monitoring, in real time, of the dispersion of the pollutant, is an essential element of the set of information necessary for an effective intervention to contain the environmental impact.

Knowledge of the impacted area, to be considered as an initial condition for the evaluation of the subsequent evolution, and of the physical and chemical characteristics of the pollutant,together with the forecast modeling of the hydrocarbon dispersion, are essential information on which decisions for emergency intervention are taken.

Furthermore, the frequent updating on the evolution of the meteo-marine conditions determining spill dispersion, also allows attributing and keeping the quality level of the modeling forecasts,which are used to estimate the areas that are likely to be impacted by the pollutant in the following hours, updated.

In light of this, to overcome the current limits in monitoring the very early stages of an oil spill emergency in the Gulf of Trieste,goals have been set to be achieved, also thanks to the resources and collaborative environment of the INTERREG IT-HR FIRESPILL project

Limits can be overcome according to two complementary approaches to improving environmental monitoring, which can be adopted through investments in latest generation technological systems. The first approach involves the continuous detection of environmental conditions on the marine and coastal area at risk of oil spills; the second concerns the rapid deployment of a high-resolution monitoring, focused on the specific place where the release takes place.

More specifically, ARPA FVG, has identified in the installation of a HF marine RADAR for the continuous detection of surface currents and wave height, which completes and increases the

observational quality of the current coastal RADAR network, present on the Gulf of Trieste, the substantial contribution to continuous environmental monitoring.

In addition to the information available in the event of an emergency, the marine RADAR will make it possible to create a database that gradually grows over time and is very useful for the validation of dispersive models and for the updating of the factors contributing to the environmental impact risk analysis, in the event of a release of hydrocarbons into the sea.

As for the increase in spatial resolution and number and type of information to be acquired with monitoring activated only in case of emergencies, ARPA FVG is organizing a fleet of drones, specially equipped with multispectral cameras, and a team of pilots able to overflight and reduce the acquired data into useful information for defining the area concerned and the physical characteristics of the hydrocarbon present on the sea surface.