



Deliverable D2.1

WUI fire management in touristic areas: gap and needs analysis for a harmonized framework

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Abstract	This deliverable presents the findings of the analysis conducted in WP2 tasks 2.1-2.4 focusing on the existing policies concerning wildfire risk management in the WUI across EU countries. This analysis is linked to the thematic Workshop “Towards a harmonized framework for cross-border fire management in touristic infrastructures” which was held at UPC premises in Barcelona on May 11th, 2023. The workshop primarily discussed the comprehensive fire risk management cycle in the WUI, with a specific emphasis on touristic facilities. The document provides the main results from the overall analysis and concludes with a summary of the identified gaps and requirements for establishing a harmonized framework for wildfire management, specifically aimed at safeguarding the tourism sector.
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1. About this deliverable

WUITIPS stands for Wildland-Urban Interface Fire Touristic Infrastructure Protection Solutions and it is a project funded by the Directorate General for European Civil Protection and Humanitarian Aid Operations (DG ECHO) and coordinated by the Universitat Politècnica de Catalunya (Spain). The project objective is to advance towards a harmonized understanding of the wildfire problem in touristic areas, providing knowledge on the impact of fire on buildings, installations, cultural heritage, infrastructures and the involved population and human behaviour as well as on the performance of fire risk mitigation measures used across EU. New insights will be integrated into a set of tools and guidelines for the appropriate and EU harmonised fire prevention and protection planning in trans-boundary areas in Europe, which are demonstrated in selected cross-border SP-FR (Spain-France) pilots. Thanks to a co-participatory process of key stakeholders from other EU trans-boundary areas, outcomes would be fully applicable at EU level.

The project consists of 7 work packages, with work package 2 specifically focused on gathering information about the current techniques, protocols, methods, and regulations related to the entire cycle of WUI fire management in the identified EU transboundary touristic areas. Special attention is given to the border region between SP and FR, where the implementation of WUITIPS will occur. This document serves as the sole deliverable of WP2 and is structured as follows:

- Section 2 provides a general overview of the objectives specific to WP2 and outlines the methodology employed to generate the results. It is closely connected to the first WUITIPS workshop, which served as a platform for formal discussions among the network of experts involved in WUITIPS.
- Section 3 presents the conclusions derived from Workshop 1, organized according to the overall cycle of wildfire risk management, including governance, risk management planning, risk assessment, risk prevention and preparedness, and emergency response.
- Section 4 delves into a more detailed analysis of the cross-border situation within the focus of WUITIPS, specifically the border between Spain and France. This section offers a meticulous examination of European regulations pertaining to forest fires and conducts a comparative assessment of the relevant aspects found in the regulations of Catalonia and France. By gaining insights into the legal frameworks of each country, this analysis serves as a crucial foundation for the development of potential cross-border policies.
- Section 5 consolidates the conclusions of WP2, highlighting the main findings concerning the harmonization requirements and identified gaps. These findings serve as the foundation for the advancements and progress of the WUITIPS project.

2. Methodology

Wildfire risk and vulnerability definitions, along with the regulations and methodologies employed for wildfire management in touristic areas, vary among EU countries, including the regions on both sides of the SP - FR border where WUITIPS pilots will take place. Given this diverse starting point, the objectives of WP2 are as follows:

- Gather the state of the art in terms of current techniques, protocols, methods and regulations regarding the overall cycle of WUI fire management in the identified EU transboundary touristic areas.
- Review and analyse the different approaches to provide a list of gaps and harmonization needs across EU countries, particularly focussing on SP and FR where WUITIPS implementation will take place.

In order to accomplish these objectives, a comprehensive review of the policy framework pertaining to all aspects of fire management in touristic WUI areas across the EU has been conducted. Additionally, an analysis of methods, models, and tools for fire risk assessment has been carried out, considering the diverse approaches employed. Current practices related to fire risk treatment have been thoroughly reviewed, taking into account various scales such as landscape, community, and property. Lastly, a survey has been conducted to examine the applied protocols concerning the protection and defence of touristic WUI areas. This survey has taken into consideration the unique characteristics and requirements of these scenarios, including evacuation protocols, fire behaviour prediction protocols, shelter-in-place protocols, civil protection operations, and other relevant factors.

This state of the art has been conducted by analysing current literature and past fire events in collaboration with representatives of 8 different countries of the WUITIPS network of experts. This collaborative effort involved active participation and cooperation during the first WUITIPS workshop, which took place at UPC in May 2023. Through this workshop, valuable insights and knowledge were shared among the participants, contributing to the comprehensive understanding of the subject matter. Results from this effort, which are gathered in the next two sections, have provided:

- An in-depth understanding of current policy background across EU.
- The identification of existing fire hazard and vulnerability methods used at large and local scale.
- The identification of risk treatment measures used at different scales.
- The identification of commonalities and differences amongst procedures applied across EU.

3. Conclusions from WS1 round table discussions

On May 11th 2023 the First International Workshop of the WUITIPS Project took place in Barcelona, entitled "Towards a harmonized framework for cross-border fire management in touristic infrastructures" with the presence of experts from 8 European countries (Spain (SP), France (FR), Portugal (PT), Italy (IT), Croatia (CR), Bulgaria (BU), Turkey (TU) and Greece (GR)) of the WUITIPS Living Lab of Knowledge Transfer.

In certain countries, the pursuit of information and discussions regarding policies, regulations, and administrative management has been predominantly centred around specific and well-defined regions, rather than encompassing the entire country. This phenomenon can be observed in regions such as Catalonia (SP), Tuscany (IT), and Département des Pyrénées Orientales (FR).

The Workshop was organized collaboratively by the WUITIPS consortium and chosen experts of the WUITIPS European network. Prior to the workshop, experts were invited to provide an assessment of their respective countries' realities. To facilitate this process, a survey consisting of 14 questions (see Annex 1 and Annex 2 to find an example of the survey made by SP and FR experts) was formulated and distributed to representatives from SP, FR, PT, IT, CR, BU, TU and GR. The purpose of the survey was to gather insights on the complete risk management cycle (encompassing governance, risk management planning, risk assessment, emergency response, and risk recovery) regarding regulations, methods, and protocols related to WUI fire risk management in touristic settings. The responses received were analysed by the WUITIPS consortium prior to the workshop. As a result, the consortium prepared meaningful cross-country discussions centred on the different stages of the wildfire risk management cycle. These discussions were facilitated as round-table sessions. After the workshop, information was processed, distilled and complemented through literature review and further analysis. Key outcomes are now being presented.

3.1. Governance

Discussions regarding governance issues revolved around several key questions. These questions encompassed the structure of the legal framework with special attention at the WUI, the specific preventive measures (with a particular focus on fuel treatments) established by the policy framework in each country, and the extent to which these measures have been implemented. The following summary highlights the conclusions drawn from these discussions.

In all EU member states, the principle of subsidiarity applies, i.e. local administrations are co-responsible key actors for wildfire and WUI fire prevention and defence. Consequently, legislation for wildfire and WUI fire risk management comes from forests acts, civil protection acts, building acts and fire protection acts that are transposed to some extent to regional and municipal levels. An important aspect to highlight is the recognition and inclusion (or lack thereof) of the term "Wildland-Urban Interface" within the legal frameworks of these countries, as well as its definition. When this term is considered, it aligns with the definition of residential areas, settlements, buildings, and isolated facilities located on forestland or within a certain distance (typically hundreds of meters) from forests. Table 1 provides an overview of the differences observed among countries. It is worth noting that SP, FR, PT and IT already acknowledge and explicitly define this term (with the only difference being the distance

considered), demonstrating a higher level of development and detail in the legislation compared to the other analysed countries.

Interestingly, when examining the overall structure of the legal frameworks in these four countries, it becomes apparent that it can be highly complex, particularly in SP and FR, and even somewhat chaotic in SP and IT. This complexity arises from various factors such as the multitude of planning instruments, involvement of multiple administrations, shared responsibilities, etc. Furthermore, certain countries experience overlaps or contradictions between acts and regulations, further complicating the implementation of legal provisions (for example, in SP)¹.

Table 1. Differences in WUI definition (n.a. non available)

WUI EU in legislation	SP	FR	PT	IT	CR	BU	GR	TU
WUI explicitly considered	YES	YES	YES	YES	NO	NO	NO	NO
Definition of WUI	Built areas on forest or < 500 m from it.	Built areas on forest or < 200 m from it.	Built areas on forest or < 500 m from it.	Built areas on forest or < 200 m from it.	n.a.	n.a.	n.a.	n.a.

It is important to note the significance of the newly approved legal framework in PT, which emerged in response to the devastating wildfire events of 2017. This framework introduced the "Integrated Management System for Wildfires" (SGIFR) and its operational guidelines, incorporating several innovative measures specifically addressing WUI fire prevention and protection. These noteworthy aspects will be further elaborated upon in the subsequent sections.

3.1.1. Prevention measures covered by the current legislation and regulation

Legislation and regulation across EU encompass a range of measures implemented at various scales. At the landscape scale, there are measures focused on landscape management, such as actions to reduce fuel load in strategic areas near WUI communities, for suppression manoeuvres, etc. At the community scale, compliance requirements address preventive and preparedness measures, including creating fuel-reduced fringes, establishing water points, ensuring road access, and incorporating urban planning considerations such as building restrictions in high-risk areas. At the homeowner scale, the topics covered include issues related to structure hardening and maintaining defensible spaces around structures.

¹ One area where there is evident overlap in Catalan regulations pertains to civil protection self-protection plans. Decree 30/2015 on civil protection mandates the creation of self-protection plans (PAU) in some urbanisations, population centres and isolated buildings based on specific criteria such as capacity and activity. On the other hand, Law 5/2003 on fire prevention in inhabited areas requires all isolated settlements and constructions, without exception, to have a self-protection plan. This reveals a contrast in the level of stringency between the two legislations addressing the same issue. Furthermore, overlaps are also observed in regulations concerning fuel reduced fringes. Decrees 64/1995 and 123/2005 prescribe measures on fringes but they stipulate different execution periods. The presence of multiple rules of equal authority governing the same spaces and situations creates obstacles to effective prevention measures at the WUI. Conflicting rules and regulations introduce confusion and have the potential to undermine efforts aimed at mitigating fire risks in these regions.

All these measures are supported by different risk planning instruments and risk assessment methods (as discussed in sections 3.2 and 3.3), which guide their implementation alongside other aspects such as emergency preparedness and response. These instruments and methods described in next sections play a crucial role in driving the effective implementation of preventive measures and ensuring comprehensive risk management.

Landscape management

In different countries (e.g. IT, SP, FR), forestry operations are often carried out in priority areas near WUI settlements to modify fuel models and, consequently, alter fire behaviour with the aim of safeguarding WUI communities. An interesting example can be found in IT, specifically in the Tuscany region, where they have implemented specific plans to execute forestry operations as part of 10-year management programs in areas of particular interest (Figure 1).

Furthermore, some of these works are strategically coordinated within broader fuel management strategies at the massif level, as seen in the case of SP. These strategies encompass fuel management activities in key locations to effectively alter fire behaviour and provide firefighters with safer and more efficient working conditions. This includes establishing access points, secure areas for deploying suppression manoeuvres, and other related measures.

While the two examples mentioned demonstrate efforts in landscape management for WUI fire safety, it is important to note that such measures are not widely and explicitly established in regulations across the EU. In contrast, measures at the community level are clearly addressed and classified, as outlined below.



Figure 1. Example of forestry work at landscape scale implemented in Tuscany.

Community scale

Community-scale fire safety requirements in EU primarily encompass regulations concerning fuel treatments (e.g. buffer strips), water networks, access roads and urban planning. In the context of the WUTIIPS project, we will put the focus on examining the provisions related to fuel reduced fringes, which are commonly implemented measures in EU countries and worldwide. Our survey revealed significant variations in the definition of strip width and the characteristics of fuel treatment applied within it (Table 2). While buffer strips around communities are not mandatory in two of the analysed countries (CR and BU), they are required in all others. The

buffer widths range from 25 m to 100 m, depending on the country and even the region within the country (for instance, in SP the overall configuration of the strip can be different according to the region).

Regarding fuel treatment, there are recommended specific distances between tree trunks, tree crowns, and shrubs to disrupt vertical and horizontal continuity within the fringe. However, there are variations between countries that take into account fuel complexes and species-specific characteristics (not shown). For example, in FR, tree crowns must be separated by a distance of 3 m. In PT, this distance is set at 4 m, but for specific species such as maritime pines or eucalypts, it increases to 10 m. In SP, the requirement is determined by the percentage of canopy cover within the fringe, which must be kept below 35%.

Table 2. Differences in buffer strips definitions

Country	Buffer strip width according to the laws
SP	30 m by SP law (25 m fuel reduced fringe plus a 5-m perimeter path). Larger widths are applied in high risk areas in particular SP regions (up to 100 m). In Catalonia, there is a specific requirement to establish perimeter strips with a minimum width of 25 meters. However, it is important to note that these dimensions can be adjusted if there is a valid technical report supporting the modification.
FR	At least 50 m wide but can be increased to 100 m from municipality bindings.
PT	100 m.
IT	At least 25 m and up to 50 m.
CR	20 m (not mandatory).
BU	Not regulated.
GR	100 m.
TU	Between 25 and 50 m.

Homeowner scale

As previously mentioned, at the individual homeowner level, the focus is on topics such as strengthening the structure itself and creating and maintaining clear spaces around the structures to enhance their defensibility against fires. The configuration of defensible spaces around structures generally follows the same characteristics and requirements as the buffer strips implemented at community level. Fireproof building design (e.g., use of fireproof materials, incorporating fire protections like metal screens, spark arresters, etc.) is basically encouraged with recommended guidelines (e.g., OECD, 2023; Ministère de l'Écologie et du Développement durable, 2002; Regione Piemonte, 2023; Manca and López, 2014; Generalitat de Catalunya, 2019) rather than with binding provisions, with particular exceptions (Table 3).

Table 3. Differences in safety requirements at home-owner level

Country	Binding provisions on structures hardening	Binding provisions on surrounding areas
SP	Absent	Buffer strip (as for community scale). Interior plots (including private gardens) and green areas must meet the same conditions as the strips.
FR	Guidelines on performance-based strategies for building envelope hardening	Buffer strip (as for community scale)
PT	Use of non-flammable materials and structural protection measures for new buildings.	50 m fuel management buffer around isolated buildings

	Requirements on retrofitting on existing buildings in high-risk areas	
IT	Absent	Buffer strip (as for community scale)
CR	Absent	Buffer strip (as for community scale), with specificity on camp sites (30 m)
BU	Absent	Not regulated
GR	Use of non-flammable materials and structural protection measures for new buildings Requirements on retrofitting on existing buildings in high-risk areas.	Removal of excess vegetation and other flammable materials (e.g. firewood) from the perimeter surrounding assets
TU	Absent	Absent

3.1.2. Degree of accomplishment / implementation

A recurring finding from our survey is that the implementation of fire prevention measures, particularly those related to fuel treatments is generally inadequate across all countries. There are several reasons that can help explain this situation. Firstly, the implementation of preventive measures often follows the planning and assessment of risks in the risk management cycle. In other words, risk management must be planned and evaluated before measures are implemented, and these activities are not always executed to their full extent. For instance, in Girona province, approximately 70% of municipalities have established fire prevention plans, which involve risk assessment and the description of mitigation measures such as fuel treatments. However, the actual implementation level is much lower, with only 40% of the planned fuel treatments being carried out. Among all the preventive measures, fuel treatments appear to be particularly controversial.

Another concern relates to the allocation of responsibility for carrying out fuel treatments. Generally, according to laws in countries like SP, BU, GR, and FR, the duty falls upon individual property owners or tenants. However, in some countries, such as SP and GR, municipalities can assume this responsibility, either with or without imposing taxes. Furthermore, complications arise when fuel treatments involve lands with different owners, especially in countries where the width of these lands is at least 50 meters, which further complicates the overall implementation process. A third challenge identified is the difficulty in controlling and monitoring the degree of implementation of fuel treatments, particularly in the case of isolated houses or structures.

Several actions have been proposed to address these challenges and improve the current situation. Firstly, there is a need to enhance risk awareness among the general population, emphasizing individual and collective responsibility concerning wildfire risk. Additionally, improved coordination among all stakeholders involved—including the scientific community, practitioners, decision-makers, landowners, and economic entities—is crucial. A unified strategy must be devised to provide technical and financial support from institutions to local communities and homeowners in the WUI. Engaging insurance companies in this process could also prove beneficial. Insurance coverage for wildfire risk can play a significant role, with premiums adjusted based on the level of exposure and vulnerability of insured assets. For example, policyholders who comply with obligations such as maintaining fireproof homes and implementing defensible spaces on their properties could be offered lower insurance premiums.

3.2. Risk management planning

The round-table discussion on risk management planning revolved around two crucial aspects. Firstly, the focus was on the presence of risk management plans mandated by regulations at various levels, such as regional, municipal, community, and asset scales. The discussion also explored the availability of technical guidelines for developing these plans. Secondly, attention was given to the existence of plans or agreements specifically addressing fire management in cross-border areas.

3.2.1. Guidelines and plans for wildfires risk management

Catalonia

In Catalonia forest fires risk is managed at different levels. At the state level, the “*State Civil Protection Plan for Forest Fire Emergencies*” (PEPCEIF, acronym in Spanish) establishes organization and operational procedures of the State's resources and services necessary to ensure an effective response from all Public Administrations in the event of a forest fire emergency when national interest is at stake (Ministerio del Interior, 2014). At the national level, there is in Catalonia a Special Emergency Plan for Forest Fires (INFOCAT, acronym in Spanish) (Generalitat de Catalunya, 2021). At local level, Catalan municipalities (depending basically on their population) must elaborate civil protection plans (PAM, acronym in Catalan) according to Decree 155/2014 (Departament d’Interior, 2014). These plans must include preventive measures and basic emergency management actions. To elaborate these plans there exists a guideline document for their drafting (Direcció General de Protecció Civil, 2016). The general index of these plans is the following:

- Document #1. Generalities and municipal organization
- Document #2. Risk analysis
- Document #3. Municipal vulnerability
- Document #4. Operative procedures according to the type of risk
- Document #5. Actuation sheets
- Document #6. Telephone book and inventory of means and resources
- Document #7. Risk-specific cartography

At submunicipal level, Decree 30/2015 (Departament d’Interior, 2015) establishes the minimum content and the index of self-protection plans (PAU, acronym in Spanish) for residential areas, settlements, isolated facilities, and buildings located on forestland or less than 500 metres:

- Document #1. Identification of the installation. Inventory, analysis and risk assessment:
 - Identification
 - Location
 - Accessibility
 - Description
 - Occupancy
 - Risk analysis
 - Plans
- Document #2. Inventory and description of self-protection means and measures.
 - Equipment available
 - Humans means available
 - Risk and self-protection corrective measures

- Plans
- Document #3. Action manual.
 - Objective
 - Identification and classification of the emergencies
 - Emergency equipment
 - Actions to perform
 - Action sheets
 - Integration at higher-level plans
- Document #4. Implementation, maintenance and updating.
 - Responsibility and organization
 - Update and revision of the plan

There exists a guideline for the draw up self-protection plans (Departement d'Interior, 1994).

France

In France there are many plans related to wildfires risk management (Table 4)

Table 4. French plans related to forest fires risk management

Plan	Acronym (in French)	Level
Natural Risk Prevention Plan	PPRN	National
Forest Fire Prevention Plan	PPRIF	National
Guide of Operational Doctrine. Forest Fires and Natural Areas	GDO FDF	National
“Porter à Connaissance”	PAC	National
Departmental Plan for the Protection of Forests against Fire	PDPFCI	Department
Departmental Risk Analysis and Coverage Scheme	SDACR	Departmental Fire Service
Territorial Coherence Schemes	SCoT	Inter-municipal
Local Urban Plan	PLU / PLUi	Community / inter-community
Communal Safeguard Plan	PCS	Community

The Natural Risk Prevention Plan (PPRN) is a regulatory prevention procedure which aims to raise awareness of natural risks and reduce the vulnerability of people and property. The PPRN specific for forest fires is called Forest Fire Prevention Plan (PPRIF). This document is not specific to WUIs but takes them into account.

The Guide of Operational Doctrine-Forest Fires and Natural areas (GDO) is produced by the Ministry of the Interior. The purpose of the doctrine is to guide action, to propose tools to assist intervention and to facilitate decision-making by fire fighters, without imposing strict methods that are unthinkable in the operational field.

An important tool of the State in informing communities and owners is the “Porter à Connaissance” (PAC). In the chronology of urban planning procedures likely to affect urban development choices, the PAC is the first level by which the State can encourage the consideration of forest fire risks. The PAC makes it possible to transmit, upstream of the planning process, to the holders of local and community plans the information that they need or that may be useful to them for the preparation or revision of their planning documents.

The Departmental Plan for the Protection of Forests against Fire (PDPFCI) makes it possible to plan the forest fire risk management policy for a period of up to 10 years. This plan includes a framework for evaluation, identification of actions and planning of the forest fire risk management policy. It must be part of an overall land use plan that includes the forest, but also urban, agricultural and natural areas.

The Departmental Risk Analysis and Coverage Scheme (SDACR) is a document specific to the fire and rescue service. It is a regulatory document that establishes an inventory of civil protection risks in a department and sets coverage objectives in terms of fundamental land use planning guidelines. It is a master plan with no legal effect on individuals and does not set any obligation to achieve results.

In the specific context of the WUI, the documents produced at local level provide specific details on the risk of forest fires. It is in these local documents that the rules of constructability and sometimes rules on construction methods are described. The prefect can issue a decree which can aggravate the local rules for all or only the WUI of the department. These locally produced documents include:

1. Territorial Coherence Schemes (SCoT), on a territorial or inter-municipal scale
2. Local urban plans (PLU), at the communal or inter-communal level (PLUi)
3. Communal Safeguard Plan (PCS), a document that provides a link between local risk prevention and crisis management policies

According to a methodological guide (Ministère de l'Écologie et du Développement Durable et al., 2002) and an already elaborated PPRIF for the Bouches-du-Rhône Department (Préfet des Bouches-du-Rhône, 2018) a PPRIF document should include these main sections:

- Presentation section (background and regulatory choices are described).
- Regulatory zoning plan (the hazard, the stakes and the defensibility in the zones at risk are taken into account).
- Regulation section (prohibitive measures and requirements applicable in each zone are specified, and also prevention, protection and safeguard measures, and measures relating to the development, use or operation of buildings, works or cultivated areas) (Ministère de l'Environnement, de l'Énergie et de la Mer, et al., 2016).

Greece

In Greece, there is an official guide for the drafting of civil protection plans for decentralized administrations, prefectures and municipalities: *5th Edition of the General Forest Fire Emergency Response Plan* (General Secretariat of Civil Protection, 2023). Plans prepared according to this guide include pre-suppression measures, response procedures and basic emergency management actions for the risks affecting the communities.

Turkey

In Turkey there is an official guide for the drafting of municipal civil protection plans (Ministry of Labour and Social Security, 2012). It includes the preventive measures and basic emergency management actions for the risks affecting the municipality. There are also regulations (No.

15350/1975 and 12937/2007) to determine the minimum content of self-protection plans for residential areas, settlements, isolated facilities and buildings.

Portugal

Local fire management plans (Planos Municipais De Defesa da Floresta Contra Incêndios, PMDFCI) aim to operationalize at local and municipal level the norms contained in legislation, in particular in Decree-Law No. 82/2021 (Presidência do Conselho de Ministros, 2021) and in the Regional Plans for Forest Management (PROF, acronym in Portuguese) and District Plans for the Defense of Forests against Fires (PDDFCI, acronym in Portuguese). Institute for Nature Conservation and Forests (ICNF, acronym in Portuguese) draws up the guidelines for the drafting of local fire management plans. The current guideline available (DUDF, 2012) needs still to be updated according to the latest Decree-Law version. Municipalities are responsible for updating local fire management plans, many of which are more than a few years old, and some having never been approved (Safe Communities Portugal, 2022).

Italy

In Italy each region is obliged (by the National Law n. 353/2000) to draw up an operational plan that contains the regional strategies on prevision, prevention and active fight against forest fires (“Forest Fires Regional Operational Plan”). There is a guideline at municipal level to be used for drafting municipal civil protection plans, where hazard and vulnerability in wildfire scenarios that involve inhabited areas is specifically taken into account (Presidenza del Consiglio dei Ministri, 2007). This is specific for the regions of Lazio, Sicilia, Campania, Puglia and Calabria. The content of the municipal plan should include:

1. General information on the municipal territory
2. Emergency plans which include descriptions for the different levels of alert and of critical conditions communicated by the Functional Centres (national level)
3. Definition of fire risk the municipality is exposed to (with guideline on how to define it)
4. Definition of hydrogeologic risk the municipality is exposed to (with guideline on how to define it).

Additionally, each municipality should draft a “Municipal Urban Plan” (Piano Urbanistico Comunale, PUC), the content of which is defined by town planning regional laws. In these plans, there is however no mention on wildfire management or prevention.

At a local level, there is a guideline prepared by the Italian firefighters where general information is given about how to protect homes from wildfires. In the same document there is a self-assessment tool to evaluate: 1) the vulnerability of the house; 2) rescue difficulties in case of wildfire (Dipartimento dei Vigili del Fuoco del Soccorso Pubblico e della Difesa Civile, 2022).

Bulgaria

In this country, plans are prepared for the activities to protect the “forest territories” from fires and regional plans for the development of the forest territories, which also include the measures

for prevention and fighting fires. Regional and municipal development plans are being prepared for the rest of the country, which include measures for the prevention and fight against fires.

Croatia

In Croatia, the Act on Civil Protection System partially defines the risk management planning, where the sections of disaster risk reduction and response are more precisely defined (European Civil Protection and Humanitarian Aid Operations, 2022). A specific guidelines document for the drafting of this risk management plans has not been found but general provisions are available (Ministry of Internal Affairs, 2021).

3.2.2. Wildfire prone borders risk management

The identified wildfire-prone borders across the analysed countries are:

- Girona – Roussillon border (SP-FR)
- Greece: land borders with Albania in the northwest, with Republic of North Macedonia and Bulgaria in the north and with Republic of Turkey in the northeast. These cross-border areas are fire-prone, and they are among the poorest regions in Europe. Mostly the northwest and the north cross-border areas have operated as communication barriers in the past, due to the political situation and conditions.
- Turkey: it shares fire-prone borders with Greece, Bulgaria and Georgia. Other land borders consist of empty steppes.
- Portugal: the entire border with Spain is wildfire prone. However, the cross-border region of Alentejo presents a lower fire danger level due to its softer orography and lower fuel load.
- Italy: there is a wildfire-prone border between Friuli Venezia Giulia autonomous Region and Slovenia. . There exists also the fire-prone border between the French Department of Alpes-Maritimes and the Italian region of Liguria.
- Bulgaria: the most endangered regions are the cross-border regions of the Southwest State Enterprise and the Southeast State Enterprise. The Southwest is bordered by Serbia, Greece and the Republic of North Macedonia; the Southeast borders Greece, Turkey and the Black Sea. The climate of the entire Southern part of Bulgaria is under Continental-Mediterranean influence.
- Croatia: Wildfire-prone borderlines include the Western part (bordering with Slovenia) and the Southern part (bordering with Bosnia-and-Herzegovina and Montenegro), where fires occur very often.

Protocols and agreements between countries in fire-prone areas

For all European Union countries, international assistance can be requested in accordance with the procedures established by Decision No 1313/2013/EU of the European Parliament and of the Council on a Union Civil Protection Mechanism (17/12/2013). However, the different countries/states considered here have also detailed protocols and/or agreements to specifically establish the framework of cooperation with the neighbouring countries in case of cross-border fires. These are summarized as follows

- In Spain, since 2017, there is an Administrative agreement between the Minister of the Interior of Spain and the Minister of the Interior of the French Republic on assistance and emergency aid in border areas.
- In Catalonia, and more specifically in the Girona county, there is a fire-prone border area with France where specific protocols have already been defined to work together in case of fire. This mutual assistance agreement was developed within the framework of a POCTEFA project named COOPEREM (Departament d'Interior, 2022). Although legally the agreement is still under revision, both areas have already implemented it.
- In France bilateral agreements have been drawn up between each fire and rescue department and their cross-border counterpart in order to define certain methods of action, but they often remain based on mutual assistance and rarely on standard operative procedures linked to simultaneous cross-border activities. At the state level, France has concluded international agreements with its direct neighbours called "Mutual assistance agreements in case of disasters or serious accidents". They define the conditions under which French resources can intervene at the request of a neighbouring state outside the borders or, conversely, the conditions under which cross-border civil protection resources can intervene in France.
- In Greece, the cooperation for wildfire suppression is guided by the international law and bilateral agreements. More specifically, in the cross-border area with the Republic of North Macedonia, an early warning system has been founded aiming to contribute to fire danger reduction (Interreg-IPA CBC, 2021). Also, in the cross-border area with Bulgaria, where the Rodopi mountain range acts as the natural border between the two countries, the project eOUTLAND devoted serious efforts to establish better terms in the protection of NATURA 2000 protected areas from wildland fires (eOUTLAND, 2018).
- In Portugal there is a protocol that allows the Public Protection and Disaster Relief (PPDR) agencies from Portugal and Spain to act in any wildfire event occurring less than 25 km from the border without the need to request help or authorisation from the country where the fire event is occurring (Ministerio de Asuntos Exteriores, Unión Europea y Cooperación, 2019).
- In Italy, in the "Forest Fires Regional Operational Plan" of Friuli Venezia Giulia autonomous Region there is a procedure for managing cross-border wildfires (Di Narda et al., 2007). Tuscany Region is not bordered by countries, but in its "Forest Fires Regional Operational Plan" procedures have been established to handle wildfires with other border Regions (Liguria and Umbria) (Giunta Regione Toscana, 2019).
- In Bulgaria there is an agreement between the Government of the Republic of Bulgaria and the Government of the Republic of Turkey on cooperation in the field of emergency situations (Ministry of Internal Affairs, 2015).
- In Croatia, to offer cross-border assistance in wildfires fighting, there are nationwide standard operative procedures between this country and Slovenia, Bosnia-Herzegovina and RN Montenegro (Ministry of Foreign and European Affairs, 2023). These documents establish and regulate coordination procedures. For example, commanders from different countries can be claimed, or these countries can ask for information, resources, and assistance. There are also general agreements between Croatia and these countries on protection from natural disasters, and on border traffic (Ministry of Foreign and European Affairs, 2023).
- In Turkey, cross-border supports are provided according to international law.

3.3. Risk assessment

The round-table discussion on risk assessment planning revolved around the use of methods, models or approaches for the assessment of hazard and vulnerability in wildfire scenarios involving inhabited areas, with special attention to touristic infrastructures.

Results from the survey revealed that there is no specific risk assessment methodology for touristic infrastructures in none of the countries, because, in general, they are treated as any other kind of infrastructure (except for specific local projects, that will be commented in section 3.6).

The analysed countries have, to some extent, developed general methods to assess wildfire risk at the national, regional, and municipal levels. However, these methods vary greatly in terms of the variables and indicators used, which poses a challenge for cross-border fire management. Although efforts have been made to create a harmonized EU framework for risk assessment at the national level (e.g., recent initiatives by the JRC proposing the Pan-European wildfire risk assessment in Oom, et al., 2022) and community level (e.g., Global Fire Monitoring Center, 2013), practical and explicit implementation of these initiatives in the studied areas has not been achieved thus far.

Most countries conduct risk assessment as outlined in the emergency planning guidelines (as seen in previous section); however, the specific methods employed vary among countries. Notably, in the risk assessment process, vulnerability or defensibility at building level are generally not taken into account (excepting risk assessment involved in Catalan PAUs). After the workshop, further information was gathered regarding risk assessment methods, which is summarized in the following subsections. Among the countries present in the workshop, only IT, SP, FR, and BU have risk assessment methods that consider vulnerability to some extent. The remaining countries solely rely on fire danger as the basis for their risk assessment.

Although all countries possess fire danger maps, some countries also employ additional types of maps to identify hazards or vulnerabilities. For instance, Catalonia has municipal vulnerability maps that identify vulnerable elements within the territory. Generally, GIS-based tools are utilized by all countries to map the risk or danger.

In the following paragraphs, some examples of how risk is defined and calculated in the selected countries is provided to exemplify those differences. These frameworks have been defined at regional level, but can be also followed as a general method to analyse fire risk at smaller scales.

3.3.1. Risk assessment method in Catalonia

In Catalonia the methodology to be followed to assess the risk is described in the INFOCAT document (the Special Emergency Plan for Forest Fires in Catalonia). The risk is assessed by means of two parameters: the forest fire danger and the vulnerability of the different elements that may be affected by the fire. No specific methodology is defined for the WUI although indirectly it is considered in the vulnerability assessment by considering the elements located within a 500 m distance of the forested areas. A summary of the methodology is provided in the following paragraphs.

Forest fire danger assessment

Forest fire danger is quantified by means of the *Basic Map of Forest Fire Danger*. This map is the result of combining the concepts of ignition hazard on one hand, and propagation hazard on the other hand. Ignition hazard refers to the ease of a forest fire starting, while propagation hazard refers to the ease with which the fire can spread. It is a quantitative map where each point (100x100m) in the territory is assigned a hazard value ranging from 0 to 10, resulting from the combination of various factors that determine the forest fire hazard.

This map is "static" in the sense that it defines an estimated state of the territory regarding the frequency and intensity of fire hazard. Consequently, dynamic hazard factors are considered based on the averages of their series (rather than temporary or momentary situations, which are the subject of the dynamic hazard map).

Four parameters are considered to define the *Basic Map of Forest Fire Danger*: historical fires, vegetation, orography and climatology. Historical fires account for the ignition frequency (number of ignitions in a given place divided by the number of years within the period considered) and ignition impact frequency (similar to the previous one but weighting each ignition by the area affected). Vegetation factor accounts for the flammability and combustibility of the vegetation, which is classified in a scale from 0 to 10. The orography factor accounts for the effect of the slope and sunlight exposure, both parameters classified in a scale from 0 to 10. Finally the climatology factor takes into account the annual water deficit, the wind and specific climatic adverse situations.

All these parameters are computed in a raster mesh of 100 m resolution, in a scale from 0 to 10 (being 10 the worst case situation). Then in each cell, the mean value from all the parameters is computed to obtain the final map. The cells are then classified as:

- Low danger: map values ranging from 0 to 4
- Moderate danger: map values ranging from 4 to 5
- High danger: map values ranging from 5 to 7
- Very high danger: map values ranging from 7 to 10

Forest fire danger depends on conditions that vary throughout the day, which is why it is called "dynamic" risk, in contrast to the "static" risk of the *Basic Map of Forest Fire Danger*. That is why a *Dynamic Map of Forest Fire Danger* is also computed daily, taking into account various factors of the territory: wind, humidity, temperature, and others such as the vegetation status and the causality of fire occurrence. From this map, the activation of the Alpha Plan is determined, which involves a series of preventive/preparedness measures in the face of high fire hazard situations. In the regions where it is declared, Alpha 1 implies high risk, Alpha 2 very high risk, and Alpha 3 extreme risk.

A municipal wildfire hazard map is derived from this basic wildfire hazard map.

Vulnerability assessment

To assess the vulnerability, all elements vulnerable to forest fires have been identified in the INFOCAT plan. These are the elements located within forested areas or within a distance of 500 meters from forested areas. The minimum forested area considered is 25 ha, isolated forested areas smaller than 25 ha have been eliminated. The assessment is performed with raster maps at 20 x 20 m resolution. Vulnerable elements are classified into five groups, and given a score

depending on its vulnerability level (see Table 5). Finally, the vulnerability map is obtained by adding the scores of all 5 group of elements in each raster cell.

Table 5. Vulnerable elements classifications and score according to the Catalan risk assessment methodology

Vulnerable element groups	Score	Description
a) Human settlements	30.00	They include population centres, industrial areas, residential complexes, farmhouses, campsites, historical sites, and other elements related to the population.
b) Particularly dangerous elements	12.00	Consideration is given to the dangerous industries listed under the Seveso II Directive, as inventory by the General Directorate of Civil Protection, as well as the geographically known positions of gas stations and pipelines. For industries covered by the Seveso II Directive, two influence radii have been established based on their level (high or low). For those classified as high level, a radius of 500 meters has been established, while for those classified as low level, a radius of 250 meters has been assigned. The same procedure has been followed for gas stations, with a radius of 100 meters.
c) Infrastructures	12.00 – 8.00	This group includes highways, expressways, paved roads, and railway networks. It also includes elements related to utility services such as power lines.
d) Natural protected areas	1.35 – 0.30	The special protection modalities detailed in Catalan Laws 12/1985 and 6/1988 are considered. In addition, wildlife reserves have also been included in this group due to their relevance in wildlife protection.
e) Fuel models	0.20 – 0.01	A score is assigned to each one of the 10 fuel models considered, being model 4 the most dangerous.

According to the results obtained at municipal level, municipalities are classified depending on its vulnerability into low, moderate, medium, high and very high. This defines forest fires risk sectors in which specific Municipal Action Plans (PAM) have to be developed.

3.3.2. Risk assessment method in Italy

In Italy there is a specific methodology to assess the wildfire risk at the WUI, which is described in the document “Operational manual for the preparation of a municipal or inter-municipal civil protection plan” (*Manuale operativo per la predisposizione di un piano comunale o intercomunale di protezione civile*). There, three different types of WUI are qualitatively defined:

- Classic WUI: also known as interface WUI, in which a clear boundary between the vegetation and the structures exists (typical of the urban periphery)
- Mix WUI: also known as intermix WUI, in which structures are distributed among the vegetation
- Occluded WUI: in which areas of vegetation are surrounded by structures (such as in gardens and parks)

The structures considered are the following:

- Hospitals
- Residential settlements
- Schools
- Industrial areas
- Gathering places (stadiums, theatres, picnic areas, etc.)
- Infrastructures and essential services

Areas containing structures are created by grouping together all structures within a relative distance of no more than 50 meters. Then, a 200 m perimeter zone is created around these areas. The perimeter zone is where the risk assessment is carried out (see Figure 2).



Figure 2. Definition of the structures grouped areas (black line) and the 200 m perimeter zone (red areas)

Two parameters are computed to assess the risk: the hazard and the vulnerability. Each one is classified into three levels: low, medium and high; and the combination of both results in four risk levels: R1-Null, R2-Low, R3-Medium, R4-High (see Table 6). The following paragraphs describe how the hazard and the vulnerability are assessed.

Table 6. Risk levels of WUI areas according to the Italian methodology

		Hazard		
		High	Medium	Low
Vulnerability	High	R4	R4	R3
	Medium	R4	R3	R2
	Low	R3	R2	R1

Hazard assessment

To assess the hazard six factors are considered:

- vegetation type
- vegetation density
- slope

- vegetation friction
- past fires
- Municipal classification according to the AIB plan (Regional plan for forecasting, prevention, and active fighting against forest fires)

For each factor diverse criteria are considered and to each criteria a numerical value between 0 and 4 is assigned (see Table 7).

Table 7. Criteria and numerical values assigned to the factors considered to assess the hazard at the WUI according to the Italian methodology.

Factor	Criteria	Numerical value
Vegetation type	Cultivated lands and pastures	0
	Abandoned cultivated lands and pastures	2
	Broadleaf and mountain coniferous forests	3
	Mediterranean coniferous forests and scrubland	4
Vegetation density	Sparse	2
	Dense	4
Slope	Absent	0
	Moderate	1
	Pronounced	2
Vegetation friction	None	0
	Discontinuous or limited	1
	Continuous upstream or lateral contact	2
	Continuous downstream contact; completely surrounded nucleus.	4
Distance to past fires	No past fires	0
	100 m < event < 200 m	4
	Event < 100 m	8
AIB plan classification	Low	0
	Medium	2
	High	4

For each areas within the perimeter zone a total score is obtained by summing all the factors. This value can range from 0 to 26, which represent the lowest and the maximum hazard respectively. Finally three classes of hazard are defined:

- Low hazard: total score ≤ 10
- Medium hazard: $11 \leq \text{total score} \leq 18$
- High hazard: total score ≥ 19

Vulnerability assessment

The vulnerability assessment takes into account three factors: sensitivity of the exposed element, flammability of the exposed element and evacuation routes. For each area of grouped structures with same hazard level, a list of all the structures is done according to the classification in Table 8, and a sensitivity score value is obtained for each category by multiplying the number of elements of this category by its individual sensitivity value.

Table 8. Type of vulnerable elements and their corresponding sensitivity value, according to the Italian methodology.

Vulnerable element category	Sensitivity value
Continuous buildings	10
Discontinuous buildings	10
Hospital	10
School	10
Fire stations	10
Other strategic buildings	10
Power stations	10
Main roads and highways	10
Secondary roads	8
Telecommunications infrastructure	8
Meteorological infrastructure	8
Industrial, commercial or artisans buildings	8
Cultural interest building	8
Airport	8
Railway stations	8
Storage and stockpiling areas	8
Sport and recreational areas and facilities	8
Wastewater treatment plant	5
Landfills	5
Equipped green areas	5
Cemeteries	2
Zoo	2
Construction sites	2
Bare areas	2
Quarries and processing plants	2

Concerning the flammability of the exposed element, only three values are considered: 1 for elements with a reinforced concrete structure far from any fuel source (green area, GLP tank, wood, etc.), 2 for elements with reinforced concrete or masonry structure near fuel sources and 3 for elements made of wood.

Concerning the evacuation routes, also three values are considered: 1 for elements with three or more escape routes, 2 for elements with two escape routes and 3 for elements with only one escape route.

By adding up the partial values corresponding to the sensitivity, the flammability and the evacuation routes for each vulnerable element, a total score corresponding to the element vulnerability is obtained, which can be classified into low, medium or high class.

3.3.3. Risk assessment method in France

The method used in France to assess the risk is based only on the fire danger assessment without taking into account the structures vulnerability. The method to map the fire danger is slightly different from what is done in Catalonia and in Italy as it takes into account the estimated fire-line intensity (see Figure 3).

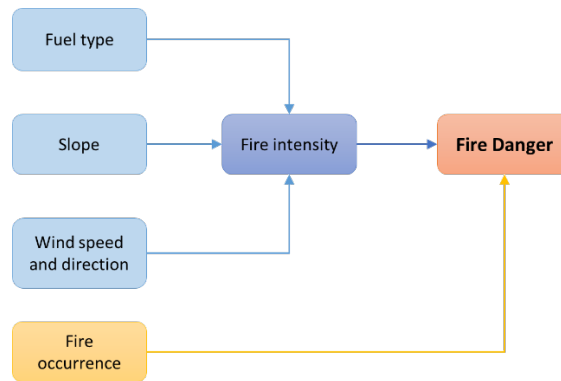


Figure 3. Diagram showing the main parameters taken into account to estimate the fire danger in France.

The first step in this methodology is to produce a land-use map with a good characterization of the vegetation, which enables to compute the fire-line intensity. The steps to be followed are:

1. Urban areas delimitation. From the cadastre, a point is assigned to each building, up to a distance of 200 m from the urban area. Each building is assigned with a 225 m² area and taking into account the number of buildings per hectare, building density (as area built/ha) is computed. All areas having a density larger than 500 m²/ha are automatically delimited. Resolution in urban areas is 50 x 50 m² (0.25 ha)
2. Map of the vegetation distribution. From an ortho-image, vegetation type is identified with a resolution of 1 ha (minimum length of 25 m), and verified with on-site visits.
3. Converting the vegetation into fuel types. Each type of vegetation is classified into one of the two fuel types: highly combustible, low combustible.
4. Correction factors to account for the time evolution of the vegetation. Some factors are considered to take into account the potential evolution of the vegetation with time and also to reduce the fire intensity in urban environments

The second step consists on the definition of the reference conditions used to compute the fire-line intensity. These conditions depend mostly of the vegetation moisture content and the wind speed. The reference values for the moisture content will be slightly higher than the lowest values measured during the last years; and for the wind speed the reference value will be a slightly lower value than the maximum values registered during the last decades. From the reference value, a wind simulation is made to obtain the wind speed and direction over a grid of 150 m x 150 m for the area considered, which allows to take into account the effect of the topography on the wind distribution.

The third step consist on obtaining the slope map, from a numerical model of the terrain with a 50 m resolution, which allows to extract the slope in degrees, aspect and relative orientation of the slope and wind.

The fourth step consist on computing the fire-line intensity. First a physical model (Firetec) or a simpler empirical model (BEHAVE) is used to predict the fire propagation, which provides the rate of spread (ROS) and fuel consumption (M). Then, by applying Byram's equation, the fire-line intensity is obtained. The values of fire-line intensity are grouped into 6 classes, according to Table 9.

Table 9. Fire intensity classification according to the French methodology

Fire class	intensity	Fire-line intensity (I) range (kW/m)	Building damage	Vegetation damage
Very low		$I < 350$	No damage	Surface vegetation partially burned
Low		$350 < I < 1,700$	Minor damage if there is compliance with the regulations	All surface vegetation burnt as well as low tree branches
Medium		$1,700 < I < 3,500$	Minor damage if there is compliance with the regulations, but wooden shutters burnt	Tree trunks and crowns damaged
Strong		$3,500 < I < 7,000$	Possible damage to buildings, even with compliance with the regulations	Tree crowns all burned
Very strong		$7,000 < I < 10,000$	Damage to buildings, even with compliance with the regulations	Charred trees
Exceptional		$I > 10,000$	damage to buildings, even with compliance with the regulations	Charred trees

The fifth step consists on determining the fire occurrence. This is done by looking at the fire history. In each pixel the combination of the previous fire dangerousness and the number of times it has been burnt, according to Table 10, provides the fire occurrence level.

Table 10. Classification of the fire occurrence according to the French methodology

Number of times burnt	Fire dangerousness		
	Low	Medium	Strong
0	Very low	low	medium
1	low	medium	strong
2	medium	strong	Very strong
3 or more	strong	Very strong	Very strong

Finally, the combination of the fire intensity class and the fire occurrence class according to Table 11, provides the fire danger class.

Table 11. Classification of Fire Danger as a function of the fire intensity and occurrence, according to the French methodology.

Fire Class	Intensity	Fire Occurrence Class		
		Low	Medium	Strong
Very low		Very low to none	Very low to none	Low
Low		Very low to none	Low	Medium
Medium		Low	Medium	Strong
Strong		Medium	Strong	Very strong
Very strong		Strong	Very strong	Very strong
Exceptional		Exceptional	Exceptional	Exceptional

As it can be seen, this methodology is mostly centred on the expected fire danger associated to the type of vegetation, orography, fire history and meteorological conditions. It does not take

into account the potential damage to the structures present at the WUI and their specific vulnerabilities.

3.3.4. Risk assessment method in Bulgaria

The methodology used in Bulgaria to assess the forest fire risk is based on the concept of *Risk Register* of the factors that influence the occurrence and spread of wildfires. A set of factors and indicators that reflect the danger of a forest fire occurring in a given area are defined at the level of the smallest territorial unit. The combination of the Risk Register factors allows to visualize “risk maps” to support the planning and organization measures to prevent and limit the possibility of occurrence and development of wildfires.

The Risk Register distinguishes 5 groups of factors: Climatic, topographic, biotic, anthropogenic and technogenic factors. Each factor includes a set of indicators (each one with a given weight), which can be mandatory or recommended, for which a rating scale corresponding to five degrees of probability of wildfire occurrence and spread are defined and a weight assigned to each rate (see Figure 4).

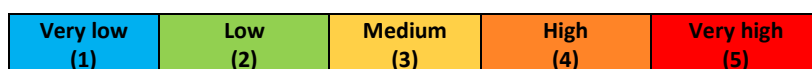


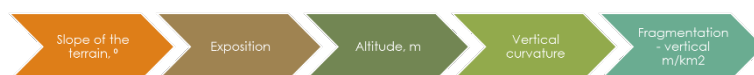
Figure 4. Rating scale and weight (in brackets) used in the Bulgarian risk assessment methodology.

Climatic factor include the following indicators: relative humidity, average maximum temperatures, length of day, precipitation from April to November and wind speed. Figure 5 shows the values associated to the rating scale for all the indicators included in the climatic factor.

The topographic factor includes the following indicators: slope of the terrain, exposition, altitude, vertical curvature and fragmentation-vertical. Figure 6 shows the values associated to the rating scale for all the indicators included in the topographic factor.

№ по ред	Тежест на фактора 1 - най-ниско степен; 5 - най- висока степен	Групи фактори	Допълнителни установки - данни с ниска променливост за	Индикатори и параметри	Оценка на риска от ПОЖАР (ОПР в случая със значение на вероятност от възникване и разпространение на ГОРЕЩИ ПОЖАРИ)				
					Много нисък (1)	Нисък (2)	Среден (3)	Висок (4)	Много висок (5)
1	5	Климатични	В	Относителна влажност на въздуха, %	Над 60	60-50	30-50	30-20	Под 20
2	5		В	Средни максимални температури на въздуха, °C	Под 10	10 - 14	16 - 18	18 - 24	Над 24
3	5		В	Продължителност на деня, min	0-90	91-350	351-600	600-850	850-919
4	5		В	Валежни количества в периода IV-XI l/m3	Над 340	<340-280	<280-180	<180-50	Под 50
5	5		В	Вятър, m/sec	безветрие	0.1-0.6	0.7-1.8	1.9-3.3	Над 3.3

Figure 5. Rating scale corresponding to the climatic factor indicators according to the Bulgarian methodology. Second column from the left indicates the weight of the indicator.



РИСК-РЕГИСТЪР									
№ по ред	Тежест на фактора - 1 - най-ниска степен 5 - най-висока степен	Групи фактори	Данни устойчиви - данни с висoka променливост за	Индикатори и параметри	Оценка на риска от ПОЖАР (ОПР в случая със значение на вероятност от възникване и разпространение на ГОРЕЩИ ПОЖАРИ)				
					Много нисък (1)	Нисък (2)	Среден (3)	Висок (4)	Много висок (5)
6	5	Топографски	У	Наклон на терена, °	Под 5	5 - 10	10 - 15	15-30	Над 30
7	4		У	Експозиция	N	E, NE	NW, SE	W, SW	S
8	3		У	Надморска височина, m	Под 100	100 - 400	400 - 800	800 - 1600	Над 1600
9	3		У	Вертикална закривеност (индикаторът е препоръчителен - при наличие на данни с висока резолюция, официални налични или придобити чрез БЛС)				Вдлъбнатини (конкавини) - за развитие на възникнал пожар	Изпъкнали (конвексии) - за възникване на пожар
10	3		У	Разчлененост - вертикална m/km ²	Под 50	>50-200	>200-400	>400-800	Над 800

Figure 6. Rating scale corresponding to the topographic factor indicators according to the Bulgarian methodology. Second column from the left indicates the weight of the indicator.

The anthropogenic factor includes the following indicators:

- Land use in the immediate vicinity of the forest territories, type of land use;
- Are production activities carried out within the scope of the forest sub-division?;
- The forest subdivision contains/falls fully or partially within the scope of "Hunting area", yes/no;
- Cattle grazing on or crossing the forest subdivision, yes/no;
- Settlement and resort network – distance; transport and energy transmission infrastructure (Asphalt roads; Railway Lines) - distance from the borders of the evaluated territory, m
- Hiking trails (including dirt roads, bicycle routes, eco-paths) - distance from the boundaries of the evaluated territory, m
- Average population density within the scope of the administrative unit in which the habitat falls, p/km²
- Unorganized landfills - distance from the evaluated territory, m
- Cases of forest fires in this area (within the forest subdivision and/or within 1000 meters of its boundary) in the last 5 years, n°.

Figure 7 shows the values associated to the rating scale for all the indicators included in the anthropogenic factor.

The Biotic factor includes the following indicators: vegetation type (predominant percentage of land cover in subdivision), flammability of the materials, dead forest litter, health status, defoliation, % (NDVI). Figure 8 shows the values associated to the rating scale for all the indicators included in the biotic factor.



№ по ред	Тежест на фактора	Променливост на данни	Индикатори и параметри	Оценка на риска от ПОЖАР				
				Много нисък (1)	Нисък (2)	Среден (3)	Висок (4)	Много висок (5)
11	4	У	Земеползване в непосредствено съседство на горските територии, тип земеползване	Водни обекти	Влажни зони	Полустествени пасища, пустеещи земи; Широколистна и смесена растителност; гори; широколистни и смесени.	обработвани земи	гори; иглолистни; територия, попадаща в буфер от 100 м отстояние от пътната мрежа.
12	3	В	Изпълняват ли се производствени дейности в обхвата на горския подотдел?	не (забранителен режим)	Гори, в чиито площи в рамките на годината е разрешено събирането на и – гъби, билки, горски плодове (при наличие на данни)	Промислен риболов (рибарници)		дърводобив (сечища); добив на полезни изкопаеми (нариери).
13	3	У	Горският подотдел съдържа/попада изцяло или частично в обхвата на "Ловен район", да/не	не				да
14	1	В	Паша на добитък върху горския парцел или преминаване през него, да/не	Не, забранителен режим				да
15	5	У	Селищна и курортна мрежа – отстояние от границите на оценяваната територия, m	Над 1500	1000 - 1500	500 - 1000	200 - 500	до 200
16	4	У	Транспортна и енергопреносна инфраструктура (Асфалтови пътища; ЖП Линии); отстояние от границите на оценяваната територия, m	Над 1000	>500 - 1000	>100 - 500	до 100	Точкови и линейни обекти попадащи в обхвата на територията
Променливост на данни:								
У - устойчиви								
В - вариабилни								



№ по ред	Тежест на фактора	Променливост на данни	Индикатори и параметри	Оценка на риска от ПОЖАР				
				Много нисък (1)	Нисък (2)	Среден (3)	Висок (4)	Много висок (5)
17	4	У	Туристически пътеки (вкл. черни пътища, Веломаршрути, екопътеки) - отстояние от границите на оценяваната територия, m	над 500	>100 - 500	> 50 - 100	до 50	линейни обекти, попадащи в обхвата на територията
18	3	У	Средна гъстота на населението в обхвата на административната единица, в която попада местообитанието, д/км2	Под 10	>10-200	>200-900	>900-1500	Над 1500
19	3	В	Неорганизираните сметища, отстояние от границите на оценяваната територия, m	над 500	>100-500	>50-100	ДО 50	Обекти, попадащи в обхвата на територията
20	4	В	Случаи на горски пожари в този район (в пределите на горския подотдел и/или в обхват от 1000 метра от границата му) през последните 5 години, бр.	Всички останали под	Всички подотдели	1	2	повече от 2
Променливост на данни:								
У - устойчиви								
В - вариабилни								

Figure 7. Rating scale corresponding to the anthropogenic factor indicators according to the Bulgarian methodology. Second column from the left indicates the weight of the indicator.



№ по ред	Тежест на фактора	Променливост на данни	Индикатори и параметри	Оценка на риска от ПОЖАР				
				Много нисък (1)	Нисък (2)	Среден (3)	Висок (4)	Много висок (5)
21	5	У	Тип растителност (преобладаващ процент земно покритие в подотдел)	Голи и ерозирали терени; Области с бедна растителност;	Пасища мери и ливади;	Храсти и затревени територии;	Горски територии заети от широколистни и смесени гори;	Горски територии заети от иглолистни гори;
22	5	У	Горивност на материалите	Широколистни гори;		Смесени гори;		Иглолистни гори;
23	5	В	Мъртва горска постилка и почва	Широколистни гори;		Смесени гори;		Иглолистни гори;
24	5	В	Здравословно състояние, обезлистване, % (NDVI)	Преобладаващ процент на земно покритие без растителност или с ниска такава	Преобладаващ процент на растителност в много добро здравословно състояние	Преобладаващ процент на растителност в умерено здравословно състояние	Преобладаващ процент на растителност в слабо здравословно състояние	Преобладаващ процент на мъртва растителност или неживи обекти
Променливост на данни:								
У - устойчиви								
В - вариабилни								

Figure 8. Rating scale corresponding to the biotic factor indicators according to the Bulgarian methodology. Second column from the left indicates the weight of the indicator.

The technogenic factor includes the following indicators: reservoirs, road connections, fire barriers, fire prevention training, observation points and routes. Figure 9 shows the values associated to the rating scale for all the indicators included in the technogenic factor.

Reservoirs

Road connections

Fire barriers in the forest area, mineralized strips, clearings, fire barriers

Is there a fire prevention training of the staff, the population?

observation points and routes

РИСК-РЕГИСТЪР	Теглест на фактора - 1 - най-ниско степен; 5 - най-висока степен	Групи фактори	Данни устойчиви - данни с ниска потенциалност за	Индикатори и параметри	Оценка на риска от ПОЖАР (ОПР в случай със значението на вероятност от възникване и разпространение на ГОРСКИ ПОЖАР)	Много нисък (1)	Нисък (2)	Среден (3)	Висок (4)	Много висок (5)
25	2	Организационно-технически (техногенни)	У	Водоеми (естествени, изкуствени), идентифицирани от отговорните органи като обекти за водочерпване в случай на пожар - отстояние от границите на оценяваната територия, km	до 0.3	>0.3-0.5	>0.5-0.7	>0.7-0.9	над 0.9	
26	1		У	Пътни връзки (Противопожарни: черни, горски пътища), идентифицирани от отговорните органи като приложими в случай на пожар - отстояние от границите на оценяваната територия, m	в обхвата на територията	100	>100 - 500	>500 - 1000	Над 1000	
27	2		У	Наличие на Противопожарни прегради в горската зона, минерализовани извизи, проеми, противопожарни барери и други елементи от актуален „План за дейностите по опазване на горите от пожар“ (част от Горскоопанския план), да/не	да				Не	
28	2		У	Осъществява ли се противопожарна подготовка на персонала, населението?	задължителна противопожарна подготовка на персонала и населението	задължителна противопожарна подготовка само на персонала	понекога	рядко	Не	
29	4		У	В горския участък (или в обхвата на прехода видност) има пожарни наблюдателни пунктове и маршрути. Наблюдението е организирано и е осигурена комуникация (при наличие на данни от актуално проведени мониторинг), отстояние от границите на оценяваната територия, m (разстоянието в метри спрямо локацията на пункта се определя в зависимост от характеристиките на проведения мониторинг)	Територията попада в териториалния обхват на наблюдение				Територията е извън териториалния обхват на наблюдение	

Figure 9. Rating scale corresponding to the technogenic factor indicators according to the Bulgarian methodology.
Second column from the left indicates the weight of the indicator.

Once the value corresponding to the rating scale has been established for each one of the indicators at a given territorial unit (e.g., a municipality), the risk value for a given indicator is obtained by multiplying the weight of the indicator by the value of the rating scale obtained. Then total risk score is obtained by summing the risk scores from all the indicators. According to the total risk score, the following classification is done:

- 183 – 243, very low risk
- 244 – 262, low risk
- 263 – 278, medium risk
- 279 – 294, high risk
- 295 – 335, very high risk

Also, depending on the risk score a classification is made into three groups of values that indicate zones of vulnerability, in which relevant preventive measures should be applied in the management of the territories:

- 108 - 280 Area of low vulnerability and of low priority fire risk
- 280 - 430 Area of medium vulnerability and medium priority fire risk
- 430 - 540 Area of high vulnerability and high priority fire risk

3.4. Risk prevention and preparedness

The measures of risk prevention and preparedness that were discussed during the Workshop predominantly centred around addressing the issue of risk perception and raising awareness

among the general population, with a specific focus on the tourism industry in all the countries under analysis.

The first question posed to the members of the round table touched the topic of the awareness of the local population when it comes to fire risk at the WUI. Risk awareness campaigns are implemented in all of the analysed countries, at national level and at local level. In Spain and in Greece these campaigns do not only highlight the risk of ignition, but they also focus on the importance of preparedness and self-protection. The main issue that has emerged is the need of effective awareness campaigns along with the problem of measuring the awareness level of the population. In the region of Tuscany (IT), the population - with the exception of people living in Firewise Communities - does not seem to be aware of the risk, while in Portugal and Croatia most people are aware of it, but they don't react the appropriate way to this concern (e.g., poor fuel management around the communities, burning dead vegetation during fire season, etc.). These cases highlight that the current risk awareness campaigns might not reach the population appropriately. When it comes to measuring awareness, several examples are given by some of the participating countries: in PT, psychological studies confirm that people are aware about the risk; in Catalonia (SP), more involvement of the population has been seen through the years when it comes to informative talks at the community level, highlighting that awareness and participation is growing. Overall, the round table members agree that awareness campaigns performed at local scale show better results.

The second issue discussed during the round table talk involves the risk awareness of tourists. All participating countries agree that tourists don't have the same level of risk awareness as the local population. Usually, tourists come from countries or areas where the fire danger is different and they might have no knowledge on forest dynamics and wildfire risk. There is therefore a need to educate tourists upon their arrival, and information should be adapted both in terms of language and content. Flyers and brochures specifically targeted to tourists should be available and distributed at tourist accommodation locations. This leads to the third discussed issue, which is the presence of awareness campaigns specifically tailored for tourists. A notable effort on creating awareness among tourist (specifically when it comes to ignition) is carried out by the Bulgarian Tourist Union, which requires companies that organize hikes to give a briefing on fire prevention measures before every hike. On the island of Rhodes (Greece), a brochure specifically tailored for tourists (in both English and Russian) is distributed at points of arrival, hotels, tours, etc. Also in Croatia there are promotional activities and advertising campaigns specifically for tourists, which consist in multilingual leaflets, poster and billboards and educational videos and infomercials on radio and television. In PT, an online platform named "Safe Communities" is mainly tailored for expats that live in the country, and it provides information on fire risk in 8 languages. Awareness campaigns in the other countries do not distinguish between locals and tourists, although some information, especially when it comes to flyers, is translated to English. Overall, the round table members agree that communication on wildfire risk should be adapted to the target public, therefore there should be different information going out to the residents and to tourists, and that the locals should inform and help tourists so they can have a minimum level of awareness.

3.5. Emergency response

The round table discussion centered around strategies for addressing wildland-urban interface (WUI) emergencies, with a particular emphasis on firefighting resources, population behaviour, and evacuation/sheltering policies.

Regarding **firefighting resources**, national-level civil protection plans play a vital role in equipping countries to effectively manage the impact of fires. These plans prioritize preparedness and dedicate substantial resources to fire suppression efforts. During the round table discussion, a notable trend emerged revealing a prevailing emphasis on fire suppression rather than fire prevention in many countries. Besides this general trend, the following specific observations were made:

- In countries like IT and PT, where urban firefighters and forest firefighters coexist, collaboration between these two entities becomes crucial during emergencies, particularly in WUI areas. By coordinating their efforts, these firefighters can effectively respond to and manage the challenges posed by WUI emergencies.
- FR, for instance, employs a strategy of massive attack to combat incipient fires and also extends support to communities in receiving fire impact. Introducing a defensibility map as a proactive measure would further aid in identifying communities that can be defended against wildfires, strengthening overall fire preparedness efforts.

As for **population behaviour** during a fire emergency, the round table participants reached a unanimous consensus on the issue, recognizing it as a prevailing challenge, regardless of the country. Although plans and protocols are in place to guide appropriate actions, the lack of knowledge regarding emergency procedures coupled with the lack of information regarding the course of the events often leads individuals to make misguided decisions. In light of this observed behaviour, the round table discussion put forth a valuable proposition: the implementation of a comprehensive training program aimed at the population, surpassing traditional education and sensitization efforts.

As for **sheltering vs evacuation policies**, it was observed that each country has its own set of protocols tailored to address specific circumstances. Different specificities become evident:

- In FR, the primary approach is shelter-in-place, but they also have designated communal premises to accommodate evacuated individuals.
- IT leans towards evacuation as their strategy, although they acknowledge challenges stemming from population behaviour, resource requirements, and contentious situations.
- GR prioritizes confinement in shelters, especially when safe evacuation is not feasible.
- In PT, there has been a gradual shift from evacuation to sheltering in place. Past experiences with evacuation decisions resulted in disasters and loss of life.
- SP opts for defend in place if buildings and the surrounding environment are adequately prepared.
- In countries like FR, SP, GR, PT and TU, confinement measures are applicable when the surrounding environment is adequately prepared. This includes the presence of defensible areas and the implementation of self-protection measures.
- IT and FR must have a pre-identified escape routes and safe areas to gather and host population in same safe place in municipal civil protection plans and their *Plan Communal de Sauvegarde*. Furthermore, there are no specific protocols for tourist undifferentiated from locals taking in account the combination of different languages, culture and behaviour.
- In IT, escape routes are not mandatory, but recommended depending of the type of fire. Safe places must keep 50 meters from the forest and they are usually used.

Evacuation often presents significant coordination challenges due to the need for extensive coordination of human resources to ensure the safety of individuals. Firefighters commonly express the viewpoint that sheltering is preferable to evacuation whenever feasible. This approach minimizes issues related to mobility, disagreements, collaboration difficulties, and requires fewer human resources. However, ensuring safe sheltering requires adequate preparation of homes, shelters and refugees, and their immediate surroundings to withstand the impact of fire. However, a general notion expressed during the round table discussion was the absence of standardized procedures or clear definitions regarding the specific requirements and implementation of this preparedness.

With regard to tourism, it should be noted that certain open-air events, such as pilgrimages, open-air festivals, open-air concerts, and fairs, attract a significant number of tourists in many municipalities across Mediterranean countries. These events often lack the necessary infrastructure to ensure effective and safe crowd management. Furthermore, camping sites present a particular challenge, as they often accommodate large populations with limited or no structures available for shelter in the event of a fire. Lack of standards and guidelines is also observed regarding boat evacuation in the touristic installations of the coastline, when fire front progression cuts the exit through land, as experienced in several occasions in past fires.

3.6. Wildfire risk management in touristic facilities at the WUI

In all the countries touristic infrastructure must manage the risk of fire as any other entity at the WUI, based on common regulation and local risks according to its activity and capacity, and there is no other specific action to be taken. However, thanks to our survey, we have found some specificities concerning tourism and wildfire risk in some of the areas analysed. These are summarized as follows:

- In Catalonia, municipalities with a population exceeding 20,000 residents, as well as those classified as tourist areas (classification made according to business open hours) or designated as having special risk due to geographical location or industrial activities, are required to comply with civil protection regulations and planning.
- In Italy, touristic infrastructures have to fulfil with a more specific Ministerial Order (“Fire prevention technical regulation for the design, construction and operation of open-air tourist accommodation facilities (campsites, tourist villages, etc.) with an accommodation capacity of more than 400 persons”) (Ministro dell'Interno, 2014).
- In Croatia, there are particular requirements for campsites in forestlands regarding the fuel reduced fringe. It has to have a width of 30 m and it is mandatory.

Moreover, the survey has also provided us with valuable examples of good practices in terms of risk management in touristic infrastructures in Greece, Portugal and Italy:

- In Greece a local fire prevention effort was undertaken in Kythera island (EFI, 2023; Xanthopoulos et al., 2022). Locals, including students, were informed on how to prevent forest fires and on how to prepare their homes and themselves. They were mobilized to carry out fuel management and forest rehabilitation works and they were also informed on how to help neighbours and tourists. An in-depth analysis of fire statistics for the island was conducted and a forest fuel map was developed. Prevention planning was implemented for at-risk settlements based on fire modelling, and the assessment of the

vulnerability of 610 structures was carried out with the contribution of groups of volunteers.

- In Portugal there is an association composed of foreigners living in Portugal (Safe Communities Portugal) that has created a communication platform where information related to rural fires in Portugal (legislation, guidelines and instructions) has been translated into nine of the main foreign languages spoken in Portugal (Safe Communities Portugal, 2022).
- In Italy, in the Tuscany region, there is an example of good practice about cooperation between citizens, local entities and emergency services: the Firewise Communities project (AIB, 2023). Although this is not specifically related to tourism, it has to be highlighted that Tuscany and the communities involved in the Firewise program are frequently visited by tourists.

4. Specific analysis on FR and SP

4.1. EU Regulations

The protection of forests against atmospheric pollution and fires was first addressed by Regulations (EEC) 3528/1986 and 2158/92, which expired on 31 December 2001. The latter approved a "Community Programme for the protection of forests against fire", with an initial duration of 5 years, extended for the same period.

Subsequently, Regulation (EC) 2152/2003, of 17 November 2003, of the European Parliament and of the Council, on monitoring forests and environmental interactions in the Community, created the Community action known as Forest Focus, integrating the above-mentioned Regulations into a single legislative instrument. This new regulation continued the EU initiatives on fire information systems, integrating the European Forest Fire Information System (EFFIS), created in 1998 by the Commission's Directorate-General for the Environment (DG ENV) and the Joint Research Center (JRC) to support the administrations in charge of forest fire defence in the EU and neighbouring countries, both in the areas of prevention, control and restoration. The initiative came to a close on December 31, 2006, following its repeal by Regulation (EC) on the financial instrument for the environment LIFE+. However, EFFIS activities persisted until 2015, when it became integrated into the COPERNICUS program. Presently, EFFIS encompasses a broad network of 43 countries spanning Europe, the Middle East, and North Africa, with a particular emphasis on the Mediterranean region. It is important to note that the annual EFFIS reports on the evolution of forest fires in Europe, the Middle East and North Africa are of great interest. These reports include recommendations, among others, on improving forest fire prevention.

It is noteworthy to recall that in 2012, the EFFIS system introduced a proposal for a standardized classification scheme for the causes of forest fires in Europe (European Fire Database). This initiative aimed to address the significant disparities in national data structures and definitions within the field, which arose due to variations in organizational structures and the absence of a unified forestry policy at the national level. An interesting aspect to highlight is that the data contained within the European database on forest fires is the result of prior agreement on the definition of key concepts (e.g. the terms "forest", "forest land", "natural land" or "agriculture" are based on FAO definitions.). Despite the efforts made by European legislation to standardize national legal frameworks, significant differences still exist among Member States, particularly regarding terminology. The establishment of a harmonized data system remains a challenge in the field of forest fires.

It is also important to mention (and even more in the context of a DG-ECHO funded project) that the EU approach to fires also incorporates the civil protection dimension. Therefore, we must also consider Decision 1313/2013 relating to a Union Civil Protection Mechanism, which also addresses fire prevention, and establishes that EU funds will be used to promote sustainable disaster prevention.

In summary, although European legislation has made significant progress in harmonizing national legal frameworks, challenges remain, particularly in establishing a unified data system for forest fires. While the EU's approach includes prevention measures through various programs and addresses the civil protection dimension through the Union Civil Protection Mechanism, there is a need for a comprehensive and integrated approach that encompasses multiple aspects such as urban planning, civil protection, and fire prevention and preparedness

measures. An overarching and holistic approach is essential to effectively address the complexities associated with forest fires.

4.1.1. Spain, Catalonia and France forest fire regulations

In Spain, in relation to the prevention of forest fires, article 44 of the State Forestry Law provides that the General Administration of the State and the Autonomous Communities will coordinate specific forest fire prevention programs. For this planning, the Basic Guideline for emergency civil protection planning for forest fires - published by Ministerial Order of April 2, 1993 - and the specific plans that derive from it will be taken into account. It also foresees that public administrations will develop awareness programs encouraging social participation and favouring the co-responsibility of the population in the protection of forests.

It is from the adoption of this Directive that a specific treatment for WUI zones begins to be defined at the level of the entire territory, establishing the obligation to draw up Self-Protection Plans for all those centres of isolated population, urbanizations, or similar that are located in risk areas.

Regarding the Autonomous Communities, Law 43/2003 imposes the responsibility of regulating activities with fire risk in forests and adjacent areas, as well as establishing safety standards for buildings, structures, electrical installations, and transportation infrastructure in forested regions and their surroundings that may be exposed to or pose a fire risk. Significantly, the law mandates the specific regulation of forest fire prevention and the implementation of safety measures in wildland-urban interface (WUI) areas.

In Catalonia region, with regard to the legislative and regulatory action of the Generalitat de Catalunya, there are a current regulatory framework configured by several laws, a series of regulatory provisions issued by the Government, several orders issued by the competent departments, as well as a Special Emergency Plan for Forest Fires in Catalonia (INFOCAT), approved in its latest version by Government Agreement of 2014.

The French State assumes the legislative function concerning the establishment of regulations for forest fire prevention and response through its central structures. The departmental Prefects play a significant role in implementing these regulations, while municipalities and local authorities also share responsibility for fire prevention and response measures. The legislation and regulations in France encompass both an informative and a preventive aspect, aiming to provide essential information and proactive measures to mitigate fire risks.

4.1.2. Cross-border comparison

As mentioned previously, in Catalonia, the responsibility for forest fire prevention policies lies with the instruments of the Generalitat of Catalonia. This arrangement is reflected in the Catalan regulations and is derived from state legislation, which reserves the authority to establish fundamental rules for environmental and forest protection, while granting autonomous communities the power to regulate prevention measures for forest fires.

It is worth noting that the degree of involvement of municipalities in Catalonia varies depending on the level of fire risk in each municipality. Consequently, collaboration among administrative entities becomes more critical in areas with higher risk levels. Clear rules are necessary to avoid jurisdictional confusion and promote effective inter-administrative cooperation with the government, benefiting the affected municipalities.

In France, the responsibility for forest fire prevention resides with the State, which exercises it through the Prefect. This concentration of functions in the Prefect, despite political considerations, proves advantageous for the effectiveness of the measures. The Prefect often works in collaboration with the Town Councils, who bear the responsibility for ensuring compliance with the preventive measures both initially and continuously.

Regarding WUI areas, both Catalan and French regulations recognize the risk associated with the initial spread of forest fires in these zones. Consequently, they establish preventive measures that can be reinforced based on objective circumstances and the justified discretion of the responsible authorities. Safety zones, which require vegetation-free areas, are established in both regions. In Catalonia, the general rule sets a width of 25 meters, while in France, it is 50 meters. Additionally, action calendars are defined, responsible parties are identified (with the City Council assuming subsidiary responsibility and potential financial compensation), and other measures are put in place. In relation to civil protection regulations, there is no direct equivalent in France of Self-protection Plans for vulnerable elements (as Catalan PAUs are).

While harmonizing all these measures may present challenges, it can be beneficial to learn from and actively promote effective practices on both sides of the border. Rather than aiming for complete harmonization, the focus should be on identifying successful measures and encouraging their adoption in the neighbouring region. Sharing knowledge and experiences will enable cross-border collaboration, leading to a more consistent and coordinated approach to fire prevention and management. This approach acknowledges the unique contexts and regulations of each region while fostering cooperation towards the common goal of enhancing safety and mitigating risks in cross-border areas.

5. Gaps and needs analysis

Once the information on the state of the art has been collected, sorted and analysed, the WUITIPS consortium has identified a list of gaps and harmonization needs across EU countries, which are particularly relevant in Spain and France:

Governance

- It is essential to prioritize forest fire prevention measures in urban planning regulations, including restricting permits for vulnerable types of settlement. Furthermore, incorporating civil protection measures into forest fire prevention rules is also key to guarantee a common and coherent strategy. To achieve this, **there is a need for a European-based regulation that integrates fire prevention regulations with urban planning and civil protection measures, ensuring a coordinated and holistic approach to mitigating fire risks.**
- There are many regulations and recommendations in the different European countries and regions in relation to the fuel-reduced fringes at the WUI. However, many of these regulations lack scientific foundations and fail to account for the realities of current fire intensity. **Developing harmonized criteria based on scientific principles for configuring WUI fuel reduced strips is therefore necessary.**
- The structure and building materials play a crucial role in protecting goods and ensuring the safety of individuals during forest fires. Therefore, **it is essential to establish a harmonized guideline for structures hardening, specifically addressing the unique characteristics and requirements of touristic facilities.**
- **Specific regulations should be designed and implemented in regard to the events in the open gathering large populations**, which could potentially be threatened by a forest fires. This also includes regulations for camping sites and other touristic installations not associated to the presence of structures which could serve as fire shelters.
- As part of the EFFIS update, **implementing a European method for characterizing and mapping WUI zones** would strengthen the effectiveness of joint prevention actions in cross-border areas. This would involve harmonizing concepts such as dimensions, location, surrounding forest characteristics, road networks, and fire protection infrastructure.

Risk management planning and assessment

- **Establishing a European Grouping of Cross-Border Cooperation** between affected administrations and entities can facilitate joint prevention tasks and the harmonization of prevention measures in forest urban interface areas along the Spanish and French borders. Similar cross-border working groups could be replicated in other regions to coordinate fire prevention and suppression efforts between countries.
- At European level, several studies have been carried out on fire exposure at the WUI. To effectively utilize this knowledge, it is crucial to consolidate and harmonize the findings, **develop mapping and modelling methodologies to analyse fire exposure of touristic facilities.**

- Information on socio-economic indicators is not generally integrated in risk assessments and this is particularly evident when it comes to tourism. This is probably due to the existing gaps on data availability regarding wildfire exposure, tourism activity, and the absence of impact assessments to determine the vulnerability of tourists and touristic facilities. **Defining indicators for assessing the vulnerability of tourists and touristic facilities that align with existing municipal risk planning instruments is therefore necessary.**
- Current methodologies for risk assessment vary among countries and rely on different indicators related to fire hazard and vulnerability. Specific risk assessment methods that consider the vulnerability of touristic infrastructures are lacking, as they are often treated similarly to other types of infrastructure. **It is necessary to develop and incorporate vulnerability assessment methodologies for touristic infrastructures that align with existing planning instruments.**

Risk prevention and preparedness

- There is a wide variety of periodic fire hazard maps with different criteria and factors to consider. **Creating a standardized forest fire danger map with harmonized criteria** and reference values across Europe would enable tourists to accurately assess the level of fire risk in foreign countries using consistent measurement units.
- Similarly, the symbols and types of warnings and alerts for forest fire emergencies differ across European countries and regions, leading to confusion among tourists. **Harmonizing and unifying basic symbols and the language, terminology and translation equivalences of risk communication** would ensure that all tourists understand the situation and know how to respond.
- The general population, and particularly tourists, lack sufficient knowledge about forest fire risks and emergency response protocols. **Training staff and developing informative materials capable of educating tourists** about potential dangers and how to protect themselves in emergency situations is essential. Also, the identification and training of key influential persons in communities, as suggested and implemented in other programs across the world (i.e. FireSmart or FireWise).
- Future efforts for risk prevention and preparedness should take in consideration the evolving conditions in which a **new breed of more energetic and destructive fires** are happening over the past years and, consequently, **adapt the prevention strategies, risk awareness campaigns and mitigation measures**. Also, to consider the floating character of the tourist population, frequently doubling or tripling the normal occupation in the affected municipalities.

Emergency response

- Emergency protocols for forest fires vary significantly across European countries, influenced by factors such as the vulnerability of elements at risk, safe evacuation possibilities, and the capacity and resources of the respective fire agencies. Therefore, **coherent EU guidance on emergency protocols is essential to address fire emergencies, with special attention in those involving tourism, as these situations**

typically involve a large number of individuals. This guidance should encompass shelter-in-place, evacuation, stay and defend strategies, with a particular emphasis on the unique considerations and challenges related to tourism.

6. Conclusions

Through WP2, a comprehensive analysis of the overall risk management cycle has been conducted in collaboration with experts from eight different countries. This involved literature reviews and fruitful discussions during a dedicated workshop. Based on the gap and needs analysis, the following conclusions have been drawn, which are relevant for the working program of WUITIPS in the upcoming work packages:

1. There is a lack of predefined data and vulnerability indicators specifically related to tourists and touristic facilities in fire risk situations. Novel criteria need to be developed from scratch in WP3.
2. Hazard and vulnerability assessment procedures vary across EU countries due to differences in past experience, characteristics, resources, and fire culture. While a full EU harmonized framework may not be feasible, existing methodologies can be fine-tuned to incorporate the consideration of fire risk for touristic infrastructures in WUI areas. This involves:
 - Developing guidelines to explicitly account for touristic infrastructure vulnerability in existing planning instruments at municipal and infrastructure scales.
 - Creating a methodology to incorporate touristic infrastructure in WUI fire exposure and vulnerability mapping.
 - Providing guidance on how to harden touristic infrastructures to withstand the impact of fire.
3. Emergency protocols for evacuation or sheltering practices differ among countries and are not specifically tailored to tourism. Guidelines on when and how to evacuate or confine touristic facilities can be developed within the WUITIPS project to address this gap.
4. Countries employ various risk mitigation measures, including fuel reduced fringes at the community and plot scale. However, there is a lack of scientific basis regarding the dimensions of fuel reduced fringes. WUITIPS can develop a scientific-based and harmonized proposal on how these fringes should be sized to effectively protect touristic infrastructures.
5. Tourists generally lack awareness of fire risk, and in many regions, there is insufficient information provided to them. Although fire risk awareness is not initially covered in the WUITIPS program, the project remains committed to contributing to this area if adequate resources and opportunities arise.

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ANNEX 1 – CATALAN QUESTIONNAIRE

1. Governance

[Institutional framework and legislation]

1.1. Are there any regulations or policies in your country/region regarding wildfire risk reduction at the wildland-urban interface (e.g. risk assessment, risk management planning, risk prevention and preparedness, emergency response, risk recovery)? Are there building regulations/codes or guidelines including provisions to deal with fires at the WUI?

In Spain, as in all EU member states, the principle of subsidiarity applies, i.e. local administrations are co-responsible key actors for the WUI fire prevention and defense. As such, the national Spanish laws, which establish the basic legislation on forestry and civil protection, are transferred to the 17 autonomous communities (e.g. Catalonia, Aragón, Andalucía, etc.). Those, in turn, must articulate the laws through regional and local regulations and guidelines, and ensure compliance at municipal scale.

Specifically, in Catalonia, there are several regulations related to forest fire prevention and specific ones for self-protection in WUI areas that apply to all municipalities:

- Decree 64/1995 that establishes the measures on forest fire prevention on forestland.
- Act 5/2003, on measures to prevent forest fires in WUI developments.
- Decree 123/2005, as a complement of Act 5/2003.

Moreover, our legal scheme also includes some other provisions within the framework of i) the building regulation:

- Spanish technical building code, which defines basic measures for built-up areas in WUI.

and the civil protection regulation:

- Act 4/1997, of civil protection in Catalonia
- Decree 155/2014, which approves the minimum content for drafting and approval the civil protection plans at municipal level.
- Decree 30/2015, which approves the catalogue of activities and establishments obligated to adopt self-protection measures.
- INFOCAT: Special Emergency Plan for forest fires in Catalonia.

1.2. If so, what is the structure of this legal framework? What are the topics/measures covered? Upon who rests the duty/obligation of these measures to be accomplished?

The **specific regulations of WUI fire prevention** (Act 5/2003 and Decree 123/2005) define the following obligations for residential areas, settlements, buildings, and isolated facilities on forestland or less than 500 metres from it:

- a) Ensure the existence of an outer buffer strip of at least 25 m wide, free of dry vegetation and thinned tree stands.
- b) Maintain the land of all plots and interior green areas within the buffer strip in the same condition as the buffer strips.
- c) Drawing up a forest fire self-protection plan (PAU) to be incorporated into the Municipal Action Plan (PAM), according to INFOCAT and Act 4/1997 of civil protection in Catalonia.
- d) Have a network of certified hydrants for fire suppression.

- e) Keep privately owned roads (both internal and access ones) and ditches free of dry vegetation.

The obligations to carry out these measures belong to the community or to the individual owners. If they do not carry them out, it is up to the local councils to do so, and a public tax can be levied. If the land affected by the buffer strip does not belong to the settlement or to the neighbours to be protected, the owners of this land must allow the necessary work to manage the WUI to be performed and are entitled to compensation.

Furthermore, **the Spanish Technical Building Code** determines that in built-up areas bordering or inside forest areas, the following conditions must be accomplished:

- a) There must be a 25-m wide strip separating the built-up area from the forest area, free of bushes or vegetation that could carry the fire, plus a 5-m perimeter path, which may be included in the strip.
- b) The built-up or urbanised area must preferably have two alternative access routes.
- c) When it is not possible to have the two alternative access routes, the single access must end in a 12.50-m radius circular ditch, in which the conditions expressed in a) are fulfilled.

As for **regulations on civil protection** in WUI zones, Decree 155/2014 determines that the municipalities that must draw up civil protection plans are:

- Municipalities with more than 20.000 inhabitants and those that without reaching this population are considered **tourist areas**, or those that are considered of special risk due to their geographical location or industrial activity.
- Municipalities affected by risks subject to special plans duly approved by the Government are obliged to incorporate into their Municipal Action Plans the provisions derived from this special plan.
- Municipalities not included in the above cases that are affected by specific risks different from the risks covered by special plans may draw up and approve the corresponding specific municipal plans.

Decree 30/2015 establishes the obligation to create a Self-Protection Plan (PAU) in housing developments and settlements located on forestland or in the 500-m strip that surrounds them, the works of which are not received by the City Council, or which are not included in a municipal civil protection plan. Likewise, the regulation also determines which of the constructions, isolated buildings, activities, and installations must draw up the PAU depending on the activity and its capacity. It must be highlighted that this PAU and the self-protection plan determined by Act 5/2003 on fire prevention is actually the same document.

The INFOCAT establishes the warnings, organisation and procedures to be followed by the Government of Catalonia, other public administrations and private entities that play an important role in forest fire emergencies. The INFOCAT includes the quantification and localisation within the territory of Catalonia of the fundamental aspects for risk analysis, zoning of the territory, localisation and deployment of emergency infrastructures, means and resources. It also establishes the basic and the dynamic fire hazard map and the municipal vulnerability map.

As for the planning instruments mentioned above, some characteristics are:

- The Municipal Action Plans (PAM) are plans drawn up and approved by the municipality and are associated with a corresponding special plan. They establish the actions that the municipality will take in the face of the special risk it is dealing with and how these actions will be coordinated with those contemplated in the special plan for Catalonia. When the municipality is obliged to draw up a PAM for more than one risk, these are grouped together in a single document known as the Single Municipal Civil Protection Document (DUPROCIM).
- The Self-Protection Plan (PAU) is the document that foresees a certain activity, a facility or an establishment the emergencies that may occur because of the activity itself and the mitigation measures in case of risk situations, catastrophes, public calamities, etc. The responsibility for drawing up these plans lies with the owner of the facility or activity.

1.3. What is the degree of accomplishment/implementation of the mentioned measures? What could be done to improve the situation?

The specific fire prevention regulations in the WUI date back to 2003 and until 2014 there was a very low level of compliance. From 2014 onwards, with the creation of the Girona Provincial Council's fire prevention assistance programme, a major boost was given in the Girona region. We can estimate that more than 70% of the municipalities in the province of Girona have planned fire prevention measures but the level of execution would be around 40%. It should be noted, however, that there is practically no self-protection plans (PAU) drawn up in the Girona region and it is necessary to determine the reason for this low level of compliance.

To improve the situation it is necessary to improve risk awareness and to insist on the messages regarding individual and collective responsibility in relation to fire hazard. All related actors should be involved to delineate a common strategy and to provide technical and economic support from institutions to local communities.

As for civil protection plans, the level of compliance is higher, but it is very difficult to determine because not all municipalities have to generate the PAM/DUPROCIMS for all risks. They must be reviewed every 4 years and once they have been drawn up, these documents have to be approved by the competent body.

2. Risk management planning

[Prioritization, policy coherence]

2.1. Are there protocols or guidelines available for drafting risk management plans (i.e. prevention, preparedness, emergency response) at either local, regional or national level?

In Catalonia, there is an official guide for the drafting of municipal civil protection plans (https://interior.gencat.cat/web/.content/home/030_arees_dactuacio/proteccio_civil/plans_de_proteccio_civil/plans_de_proteccio_civil_a_catalunya/documents/Guia_Plans_Proteccio_Civil_Municipal.pdf). It incorporates the minimum content determined by Decree 155/2014, which includes the preventive measures and basic emergency management actions for the risks affecting the municipality and which must be led by the mayor.

Decree 30/2015 (updating the pre-existent Decree 123/2005) establishes the minimum content and index of self-protection plans for residential areas, settlements, isolated facilities, and buildings located on forestland or less than 500 metres.

2.2. Are there any wildfire-prone borders in your country (if so, please specify)? How do you work in case of cross-border fires? Is there in your region any type of protocol or agreement that establishes the framework of cooperation with neighbouring countries?

In Catalonia, and especially in the Girona area, there is the cross-border area with France that is particularly fire-prone. This zone has been the scene of several fires due to the high cross-border urban continuity in contact with the natural environment, strong northerly winds, and high frequency of vehicle and people circulation. That is why a way of common framework with the French colleagues has been established over the years and made official with the [POCTEFA COOPEREM project](#) (Operational emergency cooperation and fire prevention). Within this project, a binational plan was drawn up between France and Catalonia to define the emergency management strategy in the event of a cross-border forest fire. Simulations and joint trainings were also carried out with fire-fighters and technicians from the two countries and communication problems and other technical issues were studied and solved.

2.3. How do touristic infrastructures manage wildfire risk in your region? Do you have specific examples of good practices in terms of risk management?

In Catalonia, fire risk in tourist infrastructures is not managed differently from the risk of fire in other types of infrastructure.

What does exist is a list of tourist municipalities for the purposes of civil protection and these are obliged to have the PAM for the risk that they may have (snowfall, fires, winds, etc.)

In addition, touristic developments / settlements and infrastructures (hotels, camping sites, etc.) will have to have a PAU according to its activity and capacity, as other communities and infrastructures at the WUI must.

3. Risk assessment

[hazard identification, risk analysis, risk evaluation]

3.1. Do you have or use methods, models, or approaches for the assessment of hazard and vulnerability in wildfire scenarios that involve inhabited areas, especially touristic infrastructures?

For tourist infrastructure there is no specific methodology or tool either for vulnerability or for risk assessment. However, several tools and models are used by public agencies to determine vulnerability and risk for fire management purposes (e.g. definition of prevention strategies, resources allocation, emergency planning, etc.).

As a starting point, in Catalonia there is the basic map of forest fire hazard (which is the result of the danger of ignition and the danger of propagation), the [dynamic map](#) of forest fire hazard (depending on the fire weather) and the municipal vulnerability map (which is determined from the population, infrastructure, dangerous elements, natural value and available fuel). Based on the hazard and vulnerability maps, the municipalities that have to draw up a municipal action plan (PAM) for forest fires are gathered in the INFOCAT plan.

There are also the following specific tools / resources:

- High Fire Risk municipalities: List of municipalities defined in Decree 64/1995 that may suffer a large forest fire.
- Priority Protection Perimeters: list of forest areas defined in INFOCAT that, due to the fuel continuity, may suffer large forest fires.
- Previncat ([PREVINCAT \(ctfc.cat\)](http://PREVINCAT.ctfc.cat)): is a web server providing the required information to plan fuel and forest management actions to reduce the risk of large forest fires in Catalonia. It contains several pieces of information such as:
 - A vegetation cartographic server (forest landscape and fuel models) and pre-defined meteorological scenarios.
 - Data on Homogeneous areas of fire regime (ZHR), with similar characteristics in terms of types of fire, orography, general and local winds and vegetation.
- WUIX index map: WUIX is an index developed by Caballero (2019) that accounts for the continuity of vegetation and its friction with housing in WUI areas. It determines the fire percolation capacity through WUI communities and the exposure of buildings to fuel. Girona has this index mapped throughout the province.
- FOER cards (Risk Items Operational Files): These files contain an inventory of elements to be taken into account in the event of a forest fire in a residential area. These are basically dangerous elements (e.g. gas stations and gas depots) or elements to optimize fire-fighter response time (e.g. water points, main streets, buffer strips, etc.)
- Civil protection map of Catalonia for different risks ([Mapa de protecció civil de Catalunya \(icgc.cat\)](http://Mapa de protecció civil de Catalunya (icgc.cat)))

In addition, in Catalonia, we have ongoing research on risk and vulnerability analysis in WUI areas that are expected to have a real application soon (e.g. method for vulnerability analysis in [metropolitan WUI areas](#), method for vulnerability analysis at [plot scale](#), etc.).

4. Risk prevention and preparedness

[Landscape planning, awareness, risk communication, training, early warning systems]

4.1. Do you think that the general population in your region is aware of the fire risk at the wildland-urban interface?

Since 2014, various campaigns have been carried out by public administrations and some organizations to raise awareness and provide information on wildfire risk. Particularly, it has been highlighted the importance of preparedness and self-protection. Indeed, there is a certain level of awareness, and this level is much higher than it was 10 years ago.

4.2. Do you think tourists have the same perception of risk as locals? What could be done to improve it?

The general perception is that tourists generally do not have the same level of risk awareness as locals. Firstly, because their stay is temporary and enjoyable and therefore the most complex aspects of the place they visit are not of their interest. On the other hand, it is possible that in their countries of origin the fire danger is different from that in Catalonia or that no campaigns and information measures are being carried out on wildfire risk. Moreover, this is also linked to people's origin and knowledge of the rural environment. Normally, the population living in WUI

areas has urban origin and do not usually have the knowledge that the rural population has in relation to forest dynamics, wildfire risk and the ability to move along forest tracks.

Information campaigns for tourists should be adapted, in terms of both language and content. In addition, tourism services (hotels, campsites, activities, etc.) should provide training and information on the risks in the area being visited (as done in other countries with seismic risks or other types of risks).

4.3. What practices are usually carried out in relation to fire risk treatment at the WUI, specifically in cross-border touristic areas at the different scales (landscape scale, community scale and property scale)?

Practices regarding the reduction of fire hazard in tourist WUI areas are not different from practices in other WUI areas. Common practices that are carried out, whether enforced by the regulations or recommendations, are:

- Landscape scale: conservation and improvement of the basic network of roads, construction and conservation of water points and fuel reduction in strategic areas.
- Community scale: Ensure the perimeter buffer strips with cleared and pruned trees, cleared undergrowth and without dry vegetation. Maintenance of green areas and interior plots under the same conditions. Keep roads clean of vegetation.
- Property scale: Ensure the perimeter strips in isolated plots. [Fire resistant gardening](#) practices are also recommended.

4.4. Are there in your region awareness campaigns specifically tailored for tourists?

In the Girona region, no specific tourist campaigns have been carried out, but the information and awareness material that has been edited for the general population has been translated into [English](#). Moreover, media resources have been subtitled in [various languages](#). Leaflets are distributed with the help of the city councils. Information sessions are also held in municipalities with the screening of videos.

Specifically, in 2019 a FireWise-type [Preparedness Day](#) was held in the tourist township of Begur. This event consisted of a joint session of the different actors involved in preventing forest fires (Girona Provincial Council, City Council, Firefighters, Forest officers, Forest Defence Groups, etc.) to brief and train neighbours in various residential areas on the fire hazard and the self-protection.

5. Emergency response

[Rescue, containment and suppression operations, response coordination]

5.1. In the event of a wildfire affecting the WUI, what type of wildfire management or fire suppression operations do your fire agencies most frequently apply? Fire attack? Defensive operations (e.g. confinement, protection of vulnerable elements, etc.)? Other strategies?

If the residential area is prepared and has the necessary self-protection measures, the fire-fighting service can choose between different types of response operations and devote all its efforts to suppressing the fire instead of preparing the community to receive the fire impact.

If the residential area or dwelling is not prepared, this makes decision-making very difficult and limits the resources of the firefighters to defend it. In this situation, fire suppression capacity can be jeopardized.

5.2. In the event of a wildfire affecting the WUI, how do you reduce risk to population? What type of protocols do you have? Evacuation? Shelter-in-place? Stay-and-defence? Do you apply different protocols for vulnerable population (as tourists)?

The guidelines are clear: as long as the population can be confined because the environment is prepared, it is confined. If confinement is not possible because the residential area is not protected and there is time to evacuate, the population is evacuated. If there is no time to evacuate safely, the community is confined and active protection is provided by the fire-fighting service. This is the worst case scenario.

The protocol is the same for everyone and makes no difference for tourists. If the residential area or the facility has a self-protection plan (PAU), a protocol for action during the emergency has already been defined and the vulnerable elements and people (including possible tourists) have been identified. When an emergency is declared, the PAU is activated and all the information it contains is taken into account and communicated to the authorities.

In the case of tourists, no special protocols or measures are used. In any case, if first-responders can communicate in English or in their own language, they do so. The difference between tourists and local inhabitants is that the locals are supposed to have received civil protection training, have carried out emergency drills and culturally know the risks of the area where they live. Tourists do not normally know the risks of the area where they are spending a few days.

6. Risk recovery and lessons learnt

[Past fires: scenarios, data gathering]

6.1. Are you aware of past wildfires involving touristic infrastructure in your region? What type of actions were undertaken considering tourists? (Evacuation, shelter-in-place, stay-and-defend)? If so, please indicate the details and if official/unofficial information sources are available.

In Catalonia, and particularly in the Girona region, there have been several fires that have affected the tourist population. The last fires that occurred in Catalonia in March 2023 (Calafell and Cubelles in Barcelona) affected tourists.

In the Portbou fire (July 2012), which occurred at the same time as the large forest fire in Alt Empordà that burnt 14,000 hectares, two French persons lost their lives.

6.2. Is there any disaster loss data catalogue/repository for wildfires at national or subnational level?

On the website of the Climate Action Department (Catalan Autonomous government), there is basic information on all the [fires that have occurred in Catalonia](#) from 2011 to the present (perimeters, area burnt, location, etc.). On the Catalan fire and rescue service website, there is a repository of [technical reports](#) on the most important fires with the corresponding operational reports.

ANNEX 1 – FRENCH QUESTIONNAIRE

Governance

[Institutional framework and legislation]

1. Are there any regulations or policies in your country/region regarding wildfire risk reduction at the wildland-urban interface (e.g. regarding risk assessment, risk management planning, risk prevention and preparedness, emergency response, risk recovery)? Are there building regulations/codes or guidelines including provisions to deal with fires at the WUI?

Several legal sources implement forest fire mitigation or planning measures and are applicable in the WUI.

The **Natural Risk Prevention Plan (PPRn)** is a regulatory prevention procedure, the aim of which is to raise awareness of natural risks and reduce the vulnerability of people and property. Set up within the framework of the Barnier Law in February 1995, its purpose is to :

- to gather knowledge of natural hazards in a given territory,
- to deduce a delimitation of the exposed areas and,
- to define conditions for urban planning, future construction and management of existing buildings in risk areas.

It also defines prevention, protection and safeguard measures and thus makes it possible to direct urban development towards risk-free areas.

The declination of the PPRN to forest fires is called **PPRIF**: plan de prévention des risques 'incendie de forêts. This document is not specific to WUIs but takes them into account.

In the specific context of the WUI, it is the documents produced at local level that will provide specific detail on the risk of forest fires.

These locally produced documents will be :

Urban planning documents, in particular:

- the territorial coherence schemes (**SCoT**), at the territorial or intermunicipal level
- local urban plans (**PLU**), at the communal or inter-communal level (**PLUi**), and documents in lieu thereof

An important state tool for informing communities and owners is the *porté à connaissance* (PAC).

In the chronology of urban planning procedures likely to affect urban development choices, the "porter à connaissance" (PAC) is the first lever by which the State can encourage the consideration of forest fire risks. 2-1 Legal scope of the PAC The "porter à connaissance" is defined by article L132-2 of the town planning code. Defined in articles L. 132-2 et seq. and R. 132-1 et seq. of the town planning code and mandatory for certain procedures, the CAP makes it possible to transmit, upstream of the planning process, to the holders of SCoTs, PLUs (communal and inter-communal) and communal maps, the information that they need or that may be useful to them for the preparation or revision of their town planning documents. Indeed, article R. 132-1 of the town planning code provides for the preparation of a PAC for the

preparation and revision of SCoTs, PLUs and cartes communales. Through it, the State services communicate or remind local authorities of the following:

- the applicable legislative and regulatory provisions (for example, those concerning the risk of forest fires and those of the national planning regulations taking into account public safety¹³), including public utility easements (including the PPRIF) in force
- projects of local authorities and the State that are being drawn up or that already exist (in particular the PPRIF projects underway)
- It also provides the State with a vehicle for communicating to local authorities the measures it would like to see incorporated into their urban planning documents with a view to preventing and limiting the risk of fire. It also provides the State with a vehicle for communicating to local authorities the measures it would like to see integrated into their town planning documents with a view to preventing and limiting this fire risk.

Notion of construction in a forest fire zone: The rules of construction and constructibility are today integrated in the PPRIF and are declined in the local documents of town planning (PLU, PLUI). They differ according to the territory, but the common base is the reduction of propagation zones or the reinforcement of openings to make them fireproof (exclusion of PVC gutters, PVC shutters and windows, etc.)

The technical note of 29 July 2015 on taking into account the risk of forest fires in prevention and land-use planning documents, which clearly describes the notion of defensibility, should also be taken into account.

GENERAL: Forest fire management is generally managed in France through the Forestry Code. However, certain rules are applicable from other legal sources such as the rural code, the maritime code, the territorial expropriation code, etc. It is important to note that in France the WUI are represented by a 200 m extension of the forest or woodland perimeter.

The Forestry Code applies rules throughout the country through articles L131-1 to L131-18. All these articles apply in the WUI.

Article L131-1

It is forbidden for any person other than the owner of land, whether wooded or not, or other than the occupants of this land on behalf of their owner, to carry or light fires on this land and up to a distance of 200 metres from woods and forests as well as assimilated land subject to the provisions of article

Article L131-2

Where a landfill presents a fire hazard to woods and forests, the mayor shall take all necessary measures to stop the hazard.

Article L131-3

The emergency commander may, even in the absence of authorisation from the owner or occupiers of the land concerned, use tactical fires for fire-fighting purposes.

Article L131-4

Grazing after fire in woods and forests not covered by the forestry regime is prohibited for a period of ten years.

For a second period of up to ten years, grazing may be prohibited by the competent administrative authority of the State on all or part of the area thus burnt and reforested.

In the departments determined by decree, the provisions of the two preceding paragraphs are applicable in the event of fire to land assimilated to woods and forests. When the owners or occupants of the land concerned undertake to carry out improvements and maintenance operations to improve protection against fire, the period of prohibition of grazing may be reduced by the competent administrative authority of the State.

Article L131-5

When a property is included in the perimeter of a fire protection syndicate, any transfer is subject to notification by the notary to the president of the association, pursuant to the provisions of article 4 of order n° 2004-632 of 1st July 2004 relating to syndicate owners' associations.

The transferor informs the future owner of the possible existence of easements.

The landlord shall also inform the tenant of this when the lease is concluded or renewed.

Article L131-6

The representative of the State in the department may, independently of the powers of the mayor and those which he himself holds under the general code of local authorities :

- 1° Regulate the use of fire, for periods of the year and according to information procedures specified by decree in the Council of State;
- 2° Prohibit, in the event of an exceptional fire risk and within a determined perimeter :
 - The bringing in and use on the land included in this perimeter of any apparatus or material which may be the cause of a fire;
 - (b) The movement and parking of any vehicle, as well as any other form of traffic, except for the owners of the threatened property and the occupants of such property on behalf of the latter;
- 3° To enact any other measure likely to ensure the prevention of forest fires, to facilitate the fight against these fires and to limit their consequences.

Article L131-7

Outside the territories exposed to the risk of fire mentioned in chapters II to IV of this title, the representative of the State in the department may, in the event of an exceptional risk of fire, decide on a specific territory:

- 1° That after a forestry operation, the owner cleans the cuttings of slash and branches;
- 2° That in the event of windfall before the risk period in the forest, the owner cleans the plots of land of snags, volis, windfall, slash and branches.
- If the owner fails to do so, the administration may carry out the work ex officio at the owner's expense.

Article L131-8

Insofar as protection against fire makes it necessary, the representative of the State in the department may, in the vicinity of roads open to public traffic, require owners to respect special forest management rules on lateral strips without the total width of these strips exceeding 100 metres.

Article L131-9

By way of derogation from the provisions of article L. 131-1, incineration and prescribed burning may be carried out, with the written or tacit agreement of the owners, as part of other forest fire prevention measures by :

- 1° The State;
- 2° Local authorities and their groupings;
- 3° Authorised trade associations.
- This work may be entrusted to agents such as the departmental and territorial fire and rescue services or the National Forestry Office.

Article L131-10

For the purposes of this title, "clearing of undergrowth" means operations to reduce plant fuels of all kinds with the aim of reducing the intensity and limiting the spread of fires. These operations ensure a sufficient break in the continuity of the vegetation cover. They may include the pruning of maintained subjects and the elimination of slash.

The representative of the State in the department decides on the modalities for implementing brushwood clearance according to the nature of the risks. In territories that are not deemed to be particularly exposed to fire risks within the meaning of Article L. 133-1, if they identify fire risks in areas of their municipalities that are not covered by a plan for the prevention of foreseeable natural risks in terms of forest fires provided for in Article L. 131-17 or whose woods and forests are not classified as being at risk of fire within the meaning of Article L. 132-1, the mayors or presidents of the public establishments for inter-communal cooperation shall indicate this to the representative of the State in the department.

Article L131-11

In areas particularly exposed to fire, located outside of the territories exposed to fire risks mentioned in chapters II to IV of this title, the representative of the State in the department may, independently of the powers of the mayor, decide that the owner will be provided with automatic brush clearing at his expense, if the latter or the occupants of his property fail to clear their land to a maximum distance of 50 metres from the constructions, building sites and installations of any kind belonging to him.

When the nature of the frequentation or occupation of a dwelling justifies special precautions for the protection of human life, it may also make it compulsory to clear the undergrowth on neighbouring land up to a distance of 50 metres from the dwelling and, if necessary, to provide for this automatically at the expense of the owner of the dwelling.

Article L131-12

When the presence on a property of constructions, building sites and installations of any kind entails, in application of articles [L. 131-11](#), [L. 134-6](#) and [L. 134-10 to L. 134-12](#), an obligation to clear brushwood that extends beyond the limits of this property, the owner or occupier of neighbouring land included in the perimeter subject to this obligation may not oppose their implementation by the person from whom the obligation arises and who is responsible for it. He may carry out the work himself. In the event of refusal of access to his property, the obligation to clear or maintain in a cleared state is placed on him.

Article L131-13

Subject to the provisions of [article L. 134-14](#), in the event of overlapping obligations to clear brush on the same parcel, the implementation of the obligation is the responsibility of the owner of the parcel if he is himself subject to it.

In cases where all or part of a parcel of land subject to the obligation to clear brushwood belongs to an owner not bound by the said obligation, the obligation to clear brushwood shall be incumbent in its entirety on the owner of the construction, site or installation of any kind closest to a boundary of this parcel.

Article L131-14

The communes, their groupings and the mixed syndicates have the option of carrying out or having carried out, at the request of the owners, the clearing and maintenance of brushwood prescribed in application of articles [L. 131-18](#), [L. 134-5](#) and [L. 134-6](#).

In this case, they are reimbursed for the costs incurred by the owners who are required to meet these obligations.

Article L131-15

The clearing of brushwood and the maintenance in a cleared state of the land concerned by the obligations resulting from this title may be entrusted to a syndicate association constituted in accordance with [order n° 2004-632 of 1st July 2004](#) relating to syndicate associations of owners.

Article L131-16

Where there are woods and forests within 20 metres of the boundary of a railway track, the owner of the railway infrastructure shall have the right, subject to the application of [Article 1240 of the Civil Code](#) and after having notified the owners of the woods and forests, to clear a longitudinal strip of undergrowth 20 metres wide from the outer edge of the track.

Within one month of clearing, the owners of the woods and forests may remove all or part of the products, with the owner of the railway infrastructure remaining responsible for removing the surplus.

Disputes arising from the exercise of the easement shall be brought before the judicial court.

The exercise of the easement shall not restrict in any way the right of the owner to exploit his property as he sees fit, subject to the requirements of [Article L. 341-3](#).

Article L131-17

In order to define the prevention measures to be implemented in areas where protection against fires makes them necessary, the competent administrative authority of the State shall draw up plans for the prevention of foreseeable natural risks in terms of forest fires, established under the conditions defined in Articles L. 562-1 et seq. of the Environmental Code.

Article L131-18

In the zones delimited by a plan for the prevention of foreseeable natural risks in terms of forest fires, any new development operation mentioned in Title I of Book III and in Chapter II of Title IV of Book IV of the town planning code includes within its perimeter a strip of unbuilt land to be maintained in a cleared state, with a width of at least 50 metres and no more than 200 metres, isolating constructions from woods and forests.

In addition, the prevention plan may impose a brushwood clearing easement on land delimited for the protection of constructions. These interventions are at the expense of the owners of the constructions benefiting from the easement.

Forests sensitive to forest fires: Specific measures have been regulated in the Forestry Code for woods and forests subject to the risk of fire in a privileged manner: Articles L132-1 to L132-3. These articles provide for the classification of forests according to risk and the creation of structures for the Defence of forests against fire (DFCI), which must carry out appropriate work to reduce the risk.

Article L132-1

Woods and forests located in areas at risk of fire may be classified as such by the competent administrative authority of the State after consultation with the municipal councils concerned and the departmental council. If there is opposition, the classification is pronounced by decree in the Council of State.

Article L132-2

When, within a period of one year from the date of the classification decision, the owners of woods and forests located in classified fire risk areas have not formed a free trade union for the execution of fire defence works, the competent administrative authority of the State may, in accordance with the provisions of article 43 of order no. 2004-632 of 1st July 2004 relating to trade unions of owners, bring the owners together in an authorised trade union. It submits to them a summary programme of works to be undertaken.

If an association has not been able to form, or if it does not provide, within six months of its creation, projects deemed appropriate for fire prevention, it may be constituted ex officio on the basis of the work decided by the competent administrative authority of the State in accordance with the provisions of Article 30 of the aforementioned Ordinance.

The procedural rules set out in Articles L. 215-16 and L. 215-17 of the Environment Code are applicable to actions carried out under this article.

Article L132-3

In the event of a forest fire in municipalities with a syndicated association whose mission is to prevent or defend forests against fire, the persons previously designated by the association and

approved by the mayor are responsible for assisting the commander of the emergency operations.

Territories particularly exposed to risk: Articles L133-1 to L133-11 describe the rules that apply to territories that are particularly sensitive to fire risk. These are often the same territories that have a major tourist activity. They include the obligation to implement departmental plans (PDPFCI). These provisions are very strong and commit the Territories to developments and works in the WUI zone in particular.

Article L133-1

Woods and forests located in the regions of Aquitaine, Corsica, Languedoc-Roussillon, Midi-Pyrénées, Poitou-Charentes, Provence-Alpes-Côte d'Azur and in the departments of Ardèche and Drôme are deemed to be particularly exposed to the risk of fire, with the exception of those located in less risky forest areas appearing on a list drawn up by the representative of the State in the department, following the opinion of the departmental commission responsible for safety.

Article L133-2

For the regions or departments covered by this chapter, the competent administrative authority of the State shall draw up a departmental or interdepartmental plan for the protection of forests against fire, defining priorities for each territory made up of forests or parts of forests. In this respect, this plan may include provisions relating to the development of rural areas with the aim of protecting woods and forests.

In the interest of the safety of people, property, economic and social activities and the natural environment, the plan aims to reduce the number of forest fires and the area burnt, as well as to prevent the risk of fires and limit their consequences.

The draft plan is submitted to the local authorities concerned and their groupings for their opinion. The opinion is deemed to be favourable if it is not given within two months.

Article L133-3

In the forest areas mentioned in Article L. 133-2, when, due to their extent, frequency or consequences, fires risk compromising public safety or damaging the soil and forest stands, development and equipment work to prevent fires, limit their consequences and restore the forest shall be declared to be in the public interest at the request of the State, a territorial authority or a group of territorial authorities.

The declaration of public utility is pronounced after consultation with the local authorities concerned and a public enquiry carried out in accordance with Book I of the code of expropriation for public utility.

The act declaring the public interest determines the perimeter of protection and forest restoration within which these works are carried out and the provisions of Articles L. 133-4 to L. 133-10 are applicable.

This declaration of public utility entails, if necessary, the declassification of classified wooded areas to be protected or created in application of article L. 113-1 of the town planning code.

Article L133-4

The public person at whose request the declaration of public utility has been issued may, under the conditions provided for in Articles L. 151-36 to L. 151-40 of the Rural and Maritime Fishing Code, make the persons who have made these works and developments necessary or who have an interest in them participate in the expenses relating to the development and equipment works mentioned in Article L. 133-3, excluding cultivation works.

At their request, the owners may carry out the work themselves and ensure its maintenance. To this end, they shall enter into an agreement with the public person mentioned in the first paragraph.

Article L133-5

The proceeds of the disposals mentioned in 6° of Article L. 411-1 of the Code de l'expropriation pour cause d'utilité publique (Code of Expropriation for the Public Interest) as well as the cash balances awarded to the public authority in property exchanges concerning the forest protection and reconstitution areas are used by the State, in the form of a contribution fund, for expenditure in the public interest with a view to purchasing land or carrying out work within these areas.

Article L133-6

In forest protection and reconstitution areas, or for works declared to be in the public interest in application of articles L. 151-36 to L. 151-40 of the rural and maritime fishing code, forest fire prevention works may, outside of prohibited periods, include the use of fire, by way of derogation from the provisions of article L. 131-1 of the present code, and in particular the controlled burning of pastures as well as of perimeters cleared of brush in application of articles L. 131-6 to L. 131-8, L. 131-13 to L. 131-18 and L. 134-5 to L. 134-12, subject to compliance with a set of specifications drawn up by the competent administrative authority of the State.

The owners or occupiers of the land concerned shall be informed of these operations within a period of time and in accordance with procedures laid down by decree. The act declaring the public interest shall determine, where applicable, the areas in which the use of this technique is prohibited.

Article L133-7

In the geographical area delimited pursuant to Article 1 of Order No. 45-852 of 28 April 1945 on the development and reforestation of the Landes de Gascogne region, the works mentioned in Article L. 133-3 may include the works on the drainage channels and ditches mentioned in Articles 3 and 4 of this Order.

Article L133-8

The departmental or interdepartmental plan for the protection of forests against fire specifies the land which, within a forest protection and reconstitution perimeter, may be the subject of development and equipment work to maintain or develop agricultural use in order to constitute the breaks necessary for the partitioning of massifs.

These works, when they contribute to the partitioning of massifs through agricultural use and excluding cultivation as such, may be declared to be in the public interest under the conditions defined in Article L. 133-3.

Article L133-9

In areas where work has been declared to be in the public interest, for the purposes of forest protection or restoration or in application of Articles L. 151-36 to L. 151-40 of the Rural and Maritime Fishing Code, the competent administrative authority of the State may, in the forms and conditions provided for in Article L. 125-3 of the same Code, give notice to the owners and, where applicable, the holders of the right to use wooded land or land covered with shrubbery, to carry out, in addition to the said work, a forestry project. 125-3 of the same code, give notice to the owners and, where applicable, the holders of the right to use wooded land or land covered with shrubbery, to carry out, in addition to the said works, agricultural or pastoral development in the areas where the declaration of public utility has deemed it possible and appropriate.

Article L133-10

The owner may, by way of derogation from the provisions of the third paragraph of article L. 125-6 of the Rural and Maritime Fishing Code, have the land concerned by the formal notice exploited under the multiannual grazing agreement provided for in article L. 481-1 of the same code.

When these lands are under the forest regime, grazing is granted under the conditions set out in Articles L. 213-24 and L. 214-12 of this Code. The concession may, with the agreement of the competent State administrative authority and subject to compliance with a set of specifications, authorise the grazing of animal species not mentioned in these articles. This provision may apply to the massifs mentioned in Article L. 133-2.

The provisions of IV of Article 1509 of the General Tax Code and Article 16 of Law n° 80-502 of 4 July 1980 on agricultural orientation are not applicable to land in the nature of woods and forests on the date of the formal notice mentioned in Article L. 133-9.

At the request of the owners concerned, the competent administrative authority of the State shall revoke this decision to give formal notice when it finds that the agricultural or pastoral development causes repeated damage likely to compromise the future of the forest stands remaining after the work, or that of neighbouring forest land.

The competent administrative authority of the State may, after consultation with the departmental council of the departments concerned, determine the crops which may be grown on the land situated within these perimeters. Priority is given to the construction of water supply networks for farms.

Article L133-11

The provisions of Titles I to III of Book I of the Rural and Maritime Fishing Code shall apply to agricultural cuts created pursuant to this section.

Brushwood clearance obligations: the road easements and brushwood clearance obligations common to territories, woods and forests exposed to fire risks are described in Articles L134-1 to L134-18.

The road easement is a very important legal tool imposing the obligation of access to plots to allow the engagement of fire fighting means.

The legal obligation to clear undergrowth is the major tool for protecting dwellings against forest fires.

Article L134-1

The provisions of this chapter shall apply to territories classified as fire risk as defined in Article L. 132-1 as well as to departments where woods and forests are particularly exposed, as mentioned in Article L. 133-1.

Article L134-2

In order to create fire defence routes for woods and forests, to ensure their continuity and durability and to establish and maintain equipment for the protection and surveillance of woods and forests, a right of way and development easement shall be established by the State for its own benefit or for the benefit of another public authority, a group of local authorities or a trade association.

If the tread of these roads exceeds 6 metres or if the surface area of these facilities exceeds 500 square metres, the establishment of this easement is preceded by a public enquiry, carried out in accordance with the provisions of the code of expropriation for public utility.

In other cases, the owners are informed of the project to establish an easement under conditions set by decree in the Conseil d'Etat, specifying the methods by which they can submit their observations to the competent administrative authority of the State.

In no case may the easement encumber land adjoining dwellings, enclosed by walls or equivalent fences according to local custom.

If the exercise of this easement makes normal use of the encumbered land impossible, the owners may request the acquisition of all or part of the land on which the easement is based and, if necessary, the remainder of the plots. In the absence of an amicable agreement, the judge sets the compensation as in the case of expropriation.

The beneficiary of the easement may, at his own expense, clear the brush around the track or equipment on two lateral strips without the total width of these strips exceeding 100 metres.

Article L134-3

Woodland and forest fire defence roads have the status of specialised roads, not open to general traffic.

The deed establishing the easement sets out the categories of persons having access to these roads and the conditions of their access.

Article L134-4

The mayor may, in the event of an exceptional fire risk, decide on a specific territory:

- 1° That after a forestry operation, the owner cleans the cuttings of slash and branches;
- 2° That in the event of windfall before the risk period in the forest, the owner cleans the plots of land of snags, volis, windfall, slash and branches.

If the owner fails to do so, the mayor may carry out the work at the owner's expense.

Article L134-5

In order to protect constructions, building sites and installations of all kinds, the prevention plan for foreseeable natural risks provides for the clearing of undergrowth and the maintenance of undergrowth in the zones it delimits and according to the methods it defines.

Article L134-6

The obligation to clear and maintain undergrowth applies, for land located less than 200 metres from woods and forests, in each of the following situations:

- 1° In the vicinity of constructions, building sites and installations of any kind, for a depth of 50 metres; the mayor may increase this obligation to 100 metres;
- 2° In the vicinity of private roads giving access to these constructions, building sites and installations of any kind, over a depth fixed by the prefect within a maximum limit of 10 metres on either side of the road;
- 3° On land located in urban areas delimited by a local urban plan that has been made public or approved, or an urban planning document in lieu thereof;
- 4° In urban areas of municipalities without a local town planning plan or a town planning document in lieu thereof; the representative of the State in the department may, after consulting the municipal council and the departmental committee responsible for safety and after informing the public, increase the obligation set out in 1° beyond 50 metres, without however exceeding 200 metres;
- 5° On land used as a basis for one of the operations governed by [articles L. 311-1, L. 322-2 and L. 442-1](#) of the town planning code;
- 6° On the land mentioned in [articles L. 443-1 to L. 443-4](#) and [L. 444-1](#) of the same code.

Article L134-7

Without prejudice to the [provisions of Article L. 2212-1 of the General Local Authorities Code](#), the mayor shall monitor the performance of the obligations set out in [Articles L. 134-5 and L. 134-6](#).

Article L134-8

The work mentioned in [Article L. 134-5](#) is at the expense of the owner of the constructions, building sites or installations of any kind for the protection of which the easement is established.

The work mentioned in [Article L. 134-6](#) shall be borne by :

- 1° In the cases mentioned in 1° and 2° of this article, the owner of the constructions, building sites and installations of any kind, for the protection of which the easement is established;
- 2° In the cases mentioned in 3° to 6° of this article, the owner of the land.

Article L134-9

I. - If the interested parties do not carry out the work prescribed in application of Articles L. 134-4 to L. 134-6, the municipality shall automatically carry out the work after giving formal notice to the owner and at the latter's expense.

The expenses incurred by the works are compulsory expenses for the municipality.

The corresponding sums shall be recovered in the same way as in the case of State debts other than taxes and property.

In the event that the mayor fails to exercise his police powers as defined by articles L. 134-4 to L. 134-6 and by the present article, the representative of the State in the department replaces the mayor after a formal notice has remained without result. The cost of the clearing work carried out by the State shall be charged to the commune, which shall proceed to recover this sum under the conditions set out in the previous paragraph.

II - The mayor may impose a fine of up to €100 per day of delay on the formal notice provided for in I. The total amount requested may not exceed €5,000.

The penalty shall run from the date of notification of the formal notice until the prescribed measures are fully implemented or until the municipality carries them out automatically. Recovery of the sums is initiated by quarterly instalments.

The mayor may, at the time of the quarterly liquidation of the astreinte, grant a partial or total exemption of its proceeds if the debtor establishes that the non-fulfilment of his obligations is due to circumstances that are not of his making. The astreinte is recovered under the conditions provided for by the provisions relating to communal products.

The application of the penalty payment and its liquidation do not prevent the ex officio execution of the prescribed measures, under the conditions provided for in the first paragraph of I.

Article L134-10

The State and local authorities or their groupings that own roads open to public traffic, as well as motorway concession companies, shall carry out at their own expense the clearing of undergrowth and the maintenance in a cleared state of undergrowth, on a strip of land the width of which is fixed by the competent administrative authority of the State and which cannot exceed 20 metres on either side of the right-of-way of these roads, in the crossing of woodlands and forests and in the zones situated less than 200 metres from woodlands and forests. The owners of the land may not oppose this clearing of undergrowth within the limit of a strip of land of a maximum width of 20 metres on either side of the right-of-way of the roads.

These provisions are applicable to private roads open to public traffic.

Roads open to public traffic may be listed as fire prevention roads or registered as such in the departmental or interdepartmental plan for the protection of forests against fire, at the request of the local authorities on whose territory they are located, or of their interested groupings, and with the agreement of the owner of these roads. In this case, these communities or groupings shall proceed at their own expense, beyond the obligations mentioned in the first paragraph, to the clearing and maintenance in a cleared state of lateral strips whose widths are fixed by the competent administrative authority of the State without the total cleared width exceeding 100 metres. The owners of the land cannot oppose this clearing of brushwood.

Article L134-11

The competent administrative authority of the State shall require the electricity transporter or distributor operating overhead lines to take, at its own expense, the necessary special safety measures, and in particular the construction of insulated conductors or any other appropriate technical measures such as burial, as well as the clearing of undergrowth and the maintenance in a cleared state of a strip of land whose width on either side of the axis of the line shall be determined according to the width and height of the line and its characteristics.

Article L134-12

Where there is land in the nature of woods and forests within 20 metres of the boundary of the railway right-of-way, owners of railway infrastructures are obliged to clear and maintain in a cleared state at their own expense a longitudinal strip the width of which is fixed by the competent State administrative authority and which may not exceed 20 metres from the outer edge of the track, in accordance with the provisions of [Article L. 131-16](#).

Article L134-13

The competent administrative authority of the State may decide, on the proposal of the owners of the facilities mentioned in Articles [L. 134-10](#) to [L. 134-12](#), on alternative measures to brushwood clearing which allow for the elimination of the strips of land to be cleared of brushwood or to be maintained in a state of brushwood clearing, or to reduce their width, as long as these measures ensure the safety of property and people with the same effectiveness.

Article L134-14

When the obligations to clear or maintain undergrowth resulting from the provisions of articles [L. 134-10](#) to [L. 134-12](#) are superimposed on obligations of the same nature mentioned in this title, the implementation of all these obligations is the responsibility of those responsible for the infrastructures mentioned in these articles as far as they are concerned.

Article L134-15

When land is concerned by an obligation to clear brushwood or maintain it in a permanent state of clearing, resulting from the provisions of articles [L. 134-5](#) and [L. 134-6](#), this obligation is annexed to the local urban plans or urban planning documents in lieu thereof.

Article L134-16

In the event of a transfer, the transferor shall inform the future owner of the obligation to clear or maintain in a cleared state as well as of the existence of any easements resulting from the provisions of Chapters II to IV of this title.

At the time of any conclusion or renewal of the lease, the owner shall bring this information to the attention of the lessee.

Article L134-17

When the person subject to the obligations to clear or maintain in a cleared state as defined in Articles [L. 134-10](#) to [L. 134-12](#) has not fulfilled this obligation after a formal notice has remained without effect for two months, the competent administrative authority of the State may take action at his expense.

Article L134-18

When the person subject to the obligations mentioned in Article L. 134-11 other than those of clearing brush and maintaining it in a cleared state has not carried out the work resulting from these obligations after a formal notice has remained without effect for one year, the administrative authority may impose a fine of up to 300 euros per metre of power line that has not been subject to the special safety measures prescribed.

2. If so, what is the structure of this legal framework? What are the topics/measures covered? Upon who rests the duty/obligation of these measures to be accomplished?

As previously explained, the legal framework that governs the application of measures related to the protection of WUIs against forest fires is broadly the forestry code and covers all prevention issues as detailed in the previous point. It is the prefect, the mayor and the landowner who are in charge of the obligations stemming from the code and the various regulations.

3. What is the degree of accomplishment/implementation of the mentioned measures? What could be done to improve the situation?

To date, the application of the rules of the forestry code is rather well achieved. However, one main element of the regulation (brushwood clearance) is not implemented on more than 20% of the plots. The reason is both political and technical. Indeed, this rule requires the mayor to carry out a series of works involving significant costs for the owners, which is not a positive electoral source. Secondly, on a technical level, the implementation of brushwood clearance is quite complex to define and carry out because the application zone (50 metres around the dwelling) very often encroaches on neighbouring plots, making the application delicate.

Finally, the notion of defensibility has never been put forward outside the Var department. This notion is however very interesting because it allows to define criteria by crossing a set of data related to prevention and to get an index. Technically, however, this concept is complex to implement because brushwood clearance is not sufficiently well documented in a database, monitored or controlled.

Although France has many rules (see point 1) to protect the population from the risk of forest fires, insurance companies do not currently provide any incentives for owners to implement them. The reason is that the current French system has an efficiency that has little impact on homes and little cost to insurers. This is in line with the costs caused by floods. Also, work with insurers should make tools available to owners for the application of the rules, as the impact of fires will be increasingly important with the massive drought events and the multiplication of fire outbreaks as well as the increase in large-scale fires.

Risk management planning***[Prioritization, policy coherence]*****4. Are there protocols or guidelines available for drafting risk management plans (i.e. prevention, preparedness, emergency response) either at local, regional or national level?**

Of the plans listed in 1), the following plans are considered important in the approach to emergency preparedness, prevention and response:

1. The PPRN
2. The PPRIF

3. The PDPFCI
4. The SCOT
5. The PLU and PLUi
6. The PCS
7. The CAP
8. The FDF GDO
9. The SDACR

1. The Natural Risk Prevention Plan (PPRn) is a regulatory prevention procedure, which aims to raise awareness of natural risks and reduce the vulnerability of people and property. Set up under the Barnier Law in February 1995, its purpose is to :

- to gather knowledge of natural hazards in a given territory,
- to deduce a delimitation of the exposed areas and,
- to define conditions for urban planning, future construction and management of existing buildings in risk areas.

It also defines prevention, protection and safeguard measures and thus makes it possible to direct urban development towards risk-free areas.

2. The declination of the PPRN to forest fires is called **PPRIF**: plan de prévention des risques d'incendie de forêts. This document is not specific to WUIs but takes them into account.

3. Departmental Plan for the Protection of Forests against Fire (PDPFCI)

The departmental plan for the protection of forests against fire makes it possible to plan the forest fire risk management policy for a period of up to 10 years.

Its objectives, in the interest of the safety of people, property, economic and social activities and the natural environment, are to

- a decrease in the number of forest fires,
- the reduction of burnt areas,
- the prevention of fire risks and the limitation of their consequences.

This plan includes a framework for evaluation, identification of actions and planning of the forest fire risk management policy. It must be part of an overall land use plan that includes the forest, but also urban, agricultural and natural areas.

In the specific context of the WUI, it is the documents produced at local level that will provide specific detail on the risk of forest fires.

4. territorial coherence schemes (SCoT), on a territorial or inter-municipal scale

5. local urban plans (PLU), at the communal or inter-communal level (PLUi), and documents in lieu thereof

It is in these local documents that the rules of constructability and sometimes rules on construction methods are described. The prefect can issue a decree which can aggravate the local rules for all or only the WUI of the department.

6. The communal safeguard plan (**PCS**) is a document that provides a link between local risk prevention and crisis management policies.

It is compulsory for municipalities affected by a prescribed or approved plan for the prevention of foreseeable natural risks (PPRN) or mining risks (PPRM), woods and forests classified as being at risk of fire or deemed to be particularly exposed to the risk of fire.

A communal safeguard plan may also be drawn up on the initiative of the mayor, outside of these mandatory cases.

The PCS organises, under the authority of the mayor, the preparation and response for the benefit of the population during crisis situations. In particular, it provides for :

- the grouping together of all documents of communal competence contributing to preventive information and protection of the population;
- immediate measures to safeguard and protect people (with regard to known risks),
- the necessary organisation for the dissemination of the alert and safety instructions,
- the identification of available resources
- and the definition of the implementation of accompanying and support measures for the population.

The communal safeguard plan is adopted by the mayor.

Reference text(s): Mainly articles L. 731-3, R. 731-1 to R. 731-4 and R. 731-8 to D. 731-14 of the code de la sécurité intérieure. See also L. 731-4 of this same code on the articulation of PCSs with inter-municipal safeguard plans.

7. An important tool of the state in informing communities and owners is the *porté à connaissance* (PAC).

In the chronology of urban planning procedures likely to affect urban development choices, the "porter à connaissance" (PAC) is the first lever by which the State can encourage the consideration of forest fire risks. 2-1 Legal scope of the PAC The "porter à connaissance" is defined by article L132-2 of the town planning code. Defined in articles L. 132-2 et seq. and R. 132-1 et seq. of the town planning code and mandatory for certain procedures, the CAP makes it possible to transmit, upstream of the planning process, to the holders of SCoTs, PLUs (communal and inter-communal) and communal maps, the information that they need or that may be useful to them for the preparation or revision of their town planning documents. Indeed, article R. 132-1 of the town planning code provides for the preparation of a PAC for the preparation and revision of SCoTs, PLUs and cartes communales. Through it, the State services communicate or remind local authorities of the following:

- the applicable legislative and regulatory provisions (for example, those concerning the risk of forest fires and those of the national planning regulations taking into account public safety¹³), including public utility easements (including the PPRIF) in force
- local and national government projects that are being prepared or that already exist (in particular, the PPRIF projects underway)
- It also provides the State with a vehicle for communicating to local authorities the measures it would like to see incorporated into their urban planning documents with a view to preventing and limiting the risk of fire. It also provides the State with a vehicle for communicating to local authorities the measures it would like to see integrated into their town planning documents with a view to preventing and limiting this fire risk.

8. The **GDO FDF**: The guide of operational doctrine for fires in natural areas and forest fires produced by the Ministry of the Interior.

Operational doctrine is the responsibility of the State, in application of article L112-2 of the internal security code: The State is the guarantor of the coherence of civil security at national level. It defines the doctrine and coordinates its resources.

In application of article L 723-6 of the internal security code and article 3 of decree 90-850 of 25 September 1990 on common provisions for all professional fire fighters, it is applicable to professional and volunteer fire fighters. Linked to the territorial contracts for responses to risks and the effects of threats and the risk analysis and coverage plan, it enables the fire and rescue services to build their operational response. The purpose of the doctrine is to guide action, to propose tools to assist intervention and to facilitate decision-making by fire fighters, without imposing strict methods that are unthinkable in the operational field.

9. The SDACR: Schema départemental d'analyse et de couverture des risques (departmental risk analysis and coverage scheme) produced by each departmental fire service and validated by the prefect.

The departmental risk analysis and coverage plan (SDACR) is a document specific to the fire and rescue service. It is a regulatory document that establishes an inventory of civil protection risks in a department and sets coverage objectives in terms of fundamental land use planning guidelines. It is a master plan with no legal effect on individuals and does not set any obligation to achieve results,

5. How do you work in cases of cross-border fires? Is there in your region any type of protocol or agreement that establishes the framework of cooperation with neighbouring countries?

To date, in the context of cross-border interventions, bilateral agreements have been drawn up between each fire and rescue department and their cross-border counterpart in order to define certain methods of action, but they often remain based on mutual assistance and rarely on SOPs linked to simultaneous cross-border activities.

At state level:

For several decades, France has concluded international agreements with its direct neighbours called "mutual assistance agreements in case of disasters or serious accidents". They define the conditions under which French resources can intervene at the request of a neighbouring state outside our borders or, conversely, the conditions under which cross-border civil protection resources can intervene in France. These conventions, which concern our direct neighbours, are nevertheless restricted to the notions of disasters or serious accidents. The only exception is the Franco-Italian agreement of 16 September 1992. This was reinforced by an administrative arrangement dated 6 February 2006 which "...aims to organise the day-to-day management of assistance..." in a predefined sector.

6. How do touristic infrastructures manage wildfire risk in your region? Do you have specific examples of good practices?

Tourist facilities do not directly manage the risk of fire, as this is the responsibility of landowners, mayors and prefects, and departmental and regional political bodies associated with the forestry and fire services. However, tourist facilities have an important role in spreading knowledge of the risk of fire among the population by actively relaying risk awareness campaigns as well as prevention and warning messages from the local authorities, such as access authorisations to the massif according to the daily risk.

Risk assessment

[hazard identification, risk analysis, risk evaluation]

7. Do you have or use methods, models, or approaches for the assessment of hazard and vulnerability in wildfire scenarios that involve inhabited areas, especially touristic infrastructures?

Within the framework of the realization of the PDPFCI and the PCS, the scenarios carried out to determine the zones at risk are issued by engineering companies specialised in Environment and forestry, following a standard protocol (based on Byram formulas) defined by the prefectural authority. This fire risk map is of course applied to the WUI. However, this map shows the state of exposure to risk but does not produce a map of the sensitivity of the dwellings to risk. In order to carry out this action, the notion of defensibility should be used because it crosses the data on brushwood clearance, the state of the building, the availability of water for extinguishing, and the state of the roads for evacuation. However, this notion of defensibility is still very rarely produced.

Risk prevention and preparedness

[landscape planning, awareness, risk communication, training, early warning systems]

8. Do you think that the general population in your region is aware of the fire risk at the wildland-urban interface?

Knowledge of the risk is made public by each municipality in the framework of the PCS and the PLU but also in the DICRIM:

The municipal information document on major risks (DICRIM) provides information on major risks as close as possible to the inhabitants (municipal scale).

It is based in particular on the departmental file on major risks (DDRM) and on other information transmitted by the prefect in terms of risk prevention: existing maps of areas exposed to risks, list of decrees declaring a state of natural disaster, information contained in certain documents such as the plans for the prevention of natural risks (PPRN) and mining risks (PPRM), etc.

The DICRIM, in particular :

- indicates the preventive, protective and safeguard measures to be taken in response to these risks, including (where necessary) the safety instructions to be implemented in the event of the risk occurring;
- includes maps delimiting sites where underground cavities or potholes are located that may cause ground collapse, where the commune is subject to such risks.

The existence of the DICRIM is brought to the attention of the population by the mayor, by means of a notice posted in the town hall for at least 2 months. The DICRIM must also be available for consultation free of charge at the town hall.

The local authorities provide continuous information to the public through different tools and organisations (Entente Valabre...) as well as awareness-raising sessions in schools.

Each department publishes on their website and social media the fire risk level (French adaptation of the classical Canadian “fire-weather index”) of the next day with specific restrictions (BBQ, fireworks not allowed, etc) depending on fire risk level, associated with the colour code (green to red). This practice has been ongoing for years in southern departments but will soon be generalised to the whole country and published daily during the weather forecast report.

9. Do you think tourists have the same perception of risk as locals? What could be done to improve it?

Tourists' perception of risk is different. Their origin, culture and rules may be very different and the understanding of the real risk may not be very comprehensible even if the world news has raised the awareness of all inhabitants of the planet. In France, the action targeted at tourists is carried out by tourism organisations.

However, this action does not seem to allow for the deployment of information on a large enough scale to have an impact on risk prevention.

A number of avenues could be explored to improve this state of affairs: making a risk awareness booklet available in each tourist reception area, which should be validated online. Multi-language communication campaigns, spots associated with the major social networks with a geo-personalised message, etc.

10. What practices are usually carried out in relation to fire risk treatment at the WUI, specifically in cross-border touristic areas at the different scales (landscape scale, community scale and property scale)?

The particularity of a WUI in a cross-border area is not characterised in the treatment related to fire and it is the application of the national rules from the forestry code that are implemented.

Within this framework, the prefecture publishes a daily information bulletin on the risk of forest fires applicable to its territory. This map has two objectives: to inform the population (and therefore tourists) of the possibility of accessing forest or natural areas. The first is to inform the population (and therefore tourists) of the possibility of accessing forest or natural areas, which will be closed or restricted in the event of a major fire risk. The second point is to provide information on the use of fire or pyrogenic tools (discusers, etc.), particularly for work.

<https://www.prevention-incendie66.com/la-circulation-dans-les-massifs/vigilance-feux-de-forets-affichage-du-risque-journalier>

11. Are there in your region awareness campaigns specifically tailored for tourists?

The awareness campaign on the risk of forest fires is produced mainly (at national and local level) without distinction of target. It is of a general nature and does not distinguish between the local, national and international tourist population. Some institutions do this kind of targeted campaign but never in a coordinated way.

Emergency response

[Rescue, containment and suppression operations, response coordination]

12. In the event of a wildfire affecting the WUI, what type of wildfire management strategy do your fire agencies most frequently apply? Fire attack (attacking the fire, confronting it, etc.)? Defensive operation (containment, protection of vulnerable elements, etc.) other strategies?

The French strategy is based on an immutable notion: massive attack of incipient fires. As a result, the entire fire-fighting system is conditioned by this rule, with preventive pre-positioning of fire-fighting resources according to the level of risk, the use of armed aerial guards and the massive use of water bombers...

However, with the emergence of new types of fires, with rapid and particularly complex kinetics, the French fire and rescue services are pushing for the use of the notion of defensibility which would allow them to consider the possibilities of attack, protection or evacuation in a systematic way. This is the next work in progress on a national scale.

13. In the event of a wildfire affecting the WUI, how do you reduce risk to population? What type of protocols do you have? Evacuation? Shelter-in-place? Stay-and-defence? Are those mandatory or recommended? Do you apply different protocols for vulnerable population (as tourists)?

In the event that the population is in danger following a fire, the **GDO** and the **ONO FDF** (<https://protectiris-formations.com/Base%20documentaire%20protectiris/ordre-doperations-national-feux-de-forets-et-despaces-naturels-combustibles/>) give priority to the protection of people. The rule is to give priority to protection without evacuation if the area is defensible and the means are sufficient.

In the case of an evacuation, the public security forces are in charge of the action and the town hall welcomes the victims in communal premises as foreseen in the **PCS**.

Town halls with a large number of tourists will provide French and foreign tourists with the necessary facilities for their reception, rest and catering during the period of confinement.

Risk recovery and lessons learnt

[past fires: scenarios, data gathering]

14. Are you aware of past wildfires involving touristic infrastructure in your region? What type of actions were undertaken considering tourists? (Evacuation, shelter-in-place, stay-and-defend)? If so, please indicate the details and if official/unofficial information sources are available.

Numerous forest fires have had consequences for the management of tourists. If we take into account the last fire that took place in New Aquitaine, several dozen villages were evacuated preventively. This action has led to numerous disorders in the organisation of the emergency services as well as in the care of the evacuees. Feedback is currently being provided to modify practices and set up standardised procedures.

15. Is there any disaster loss data catalogue/repository for wildfires at national or subnational level?

All national forest fire data are catalogued in the national database BDIFF: <https://bdiff.agriculture.gouv.fr/incendies>

This database is fed by each fire and rescue service.