



FOREST FIRE RISK IN THE WILDLAND- URBAN INTERFACE

**ELEMENTS FOR THE ANALYSIS OF THE VULNERABILITY
OF MUNICIPALITIES AND HOMES AT RISK**



**Efficient fire risk communication for
resilient societies**

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Athors:

Marc Font - Forest Sciences Centre of Catalonia
Sébastien Chauvin - GEIE-FORESPIR
Eduard Plana - Forest Sciences Centre of Catalonia
Joaquim Garcia - Forestry consultant – e-forestland
Julia Gladiné - GEIE-FORESPIR
Marta Serra - Forest Sciences Centre of Catalonia

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1. Introduction: The impact of wildfires on housing in contact with the forest

In many Mediterranean areas, the widespread abandonment of croplands and loss of mosaic landscape due to the natural forest recolonization during the last decades, is resulting in a new forest fire risk scenario. This, together with the effects of climate change has contributed to the emergence of so-called large fires (LF). These types of fires are characterized by extreme and virulent behaviour, moving at high speed, with large flames and intensity, allowing to burn wide surfaces in short time. In this situation, regardless of whether the surface covered is large or small, we are talking about catastrophic and high intensity fires that exceed the **suppression capacity** of emergency services.

Parallel to this dynamic expansion of forests, many regions of the Mediterranean have experienced significant urban development in forest areas or in contact with the forest, either in the form of housing developments or isolated houses. These areas of contact between the forest and houses are called **wildland-urban interface areas (WUI)**, and in particular are subject to the current risk of wildfires. When a large fire approaches an interface area it generates a widespread emergency due both to the ability of fire to penetrate urban areas and propagate itself throughout its interior, as well as the problems arising from an environment dominated by smoke such as lack of visibility, breathing difficulties or high levels of stress and uncertainty on the part of the population. Examples of these crisis situations are present throughout the Mediterranean basin, unfortunately sometimes having meant the loss of human lives.

Regarding the ability to access the fire within the interface, the problem is not restricted to only housing in direct contact with the forest (which are exposed to the impact of the flames), but also the inside of the housing development is also subject to the fire risk, where fire can spread through homes and garden elements. This is due to the ability of high intensity fires to issue **sparks**, small incandescent plant materials that are transported by the column of smoke tens and even hundreds of meters away. A rain of sparks can cause new sources of fire far beyond the main front of the fire. Moreover, the layout between the houses can favour the spread of fire inside the housing development, by means of flammable elements from buildings and gardens (furniture, curtains, piles of wood, landscaping vegetation, etc.).



Example of a wildfire affecting a housing development. The housing development is therefore directly affected by the front of the fire and a rain of sparks issued by the fire when the surrounding forest burns with high intensity.

As a result, we are facing a new paradigm where fires not only affect forest stands, but they also have an impact on housing and people. Consequently, means of suppression have to prioritize and protect the population and their property from the forest, capitalizing a large number of resources to achieve this; resources that becomes unavailable to control and suppress the fire spreading into the forest.

Thus, the challenges to improve the management of wildfire risk and to mitigate the impact of LFs is focus on acting, on the one hand, on the **fire's ability to spread** (related to the amount of vegetation available to burn) and, on the other hand, reducing the **vulnerability of citizenship and property** exposed to the forest fire risk. In this regard, concerning the fire's ability to spread, we can intervene by reducing tree density and the amount of vegetation in forest understory. To minimize the risk to people and property it is essential to reduce the vulnerability of housing to be affected by the flames, and know how to act in case of a fire.

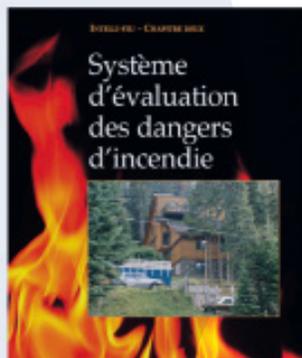
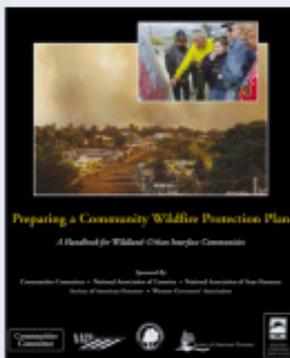
Laws are common that govern preventive measures in the surroundings of wildland-urban interfaces, usually focusing on the creation of a fuel break outside the perimeter of houses and housing developments where the vegetation is reduced to lessen the intensity of the fire when impacting the housing. However, less common are specific obligations aimed at individual property (housing), gardening and exterior construction elements of homes to reduce the risk of fire. Having tools available that enable and facilitate the evaluation of the degree of vulnerability in many areas (from the municipal level to private property) within a locality emplaced in a wildfire risk zone, may facilitate the application of the most appropriate prevention and protection measures.

For further information on fire and wildfire risk management, you can consult the publication: *Plana, E.; Font, M.; Serra, M.; Borràs, M.; Vilalta, O. 2016. Fire and forest fires in the Mediterranean; a relationship story between forest and society. Five myths and realities to learn more. eFIRECOM project. CTFC editions. 36pp.*
http://efirecom.ctfc.cat/?page_id=474 and <http://www.lessonsonfire.eu/>

2. Elements for assessing vulnerability to the risk of forest fire in wildland-urban interface areas

2.1. Guidelines for risk assessment

There are several methodological guides to facilitate the evaluation of social vulnerability to the risk of wildfire in the wildfire-urban interface areas, either by the corresponding municipal technicians or by the inhabitants of interface areas. The first guidelines emerged in countries with a high incidence of WUI fires (USA, Canada and Australia), and over time have positioned themselves as a relevant tool for prevention and awareness.



Some examples of relevant international guides and programs for the prevention of fire risks in interfaces can be found in the United States of America (left), Canada (centre) and New Zealand (right).
Sources: <https://www.forestsandrangelands.gov/communities/documents/cwpphandbook.pdf> (left),
https://www.firesmartcanada.ca/images/uploads/resources/chapter2_fr.pdf (centre),
<https://marlboroughdistrictcouncil.sharefile.com/share?#/view/sae9941d06964e0db> (right) .

However, the peculiarities of each region and the context in which the guidelines are formulated are far from the Mediterranean area. Therefore, we need a process of adaptation based on local construction features as well as local laws. Therefore, it is recommendable to develop guidance tailored to specific traits, taking into account the common risk elements found in most assessment guidelines.

Below are the main elements of risk with the most influence in the analysis of vulnerability and the effective protection of individuals and households in the face of wildfires, not to mention that most of the measures also enable preventing a fire originating within an urban area easily reaching the forest and generating a new wildfire. Therefore, we have organized the considerations of the key elements to evaluate based on two levels of planning: municipal and housing, as the specific objectives of each are complementary.

Finally, in section 3 we propose a tool model for providing information and the evaluation of the risk of fires in wildland-urban interface areas that can be developed with the characteristics of each site.

2.2. Physical scale of assessment; from municipalities level to housing

In general an analysis of the vulnerability of interface areas is usually focused on two distinct but complementary territorial scales; residential (municipal), and housing.

2.2.1. Municipal and housing development analysis (collective prevention)

This field assessment was primarily aimed at municipal technicians and includes the analysis and planning of all preventive and protective measures of a collective nature (settlements and community associations). Overall, these measures are aimed at complying with the specific regulations applicable in each region in terms of wildfires and municipal responsibility, thus ensuring the necessary infrastructure to facilitate the emergency management by the relevant actors (fire fighters, civil protection, health services, etc.). However, it is considered that the local authorities are very appropriate for informing the population and encouraging awareness of the risk and the implementation of corrective measures.

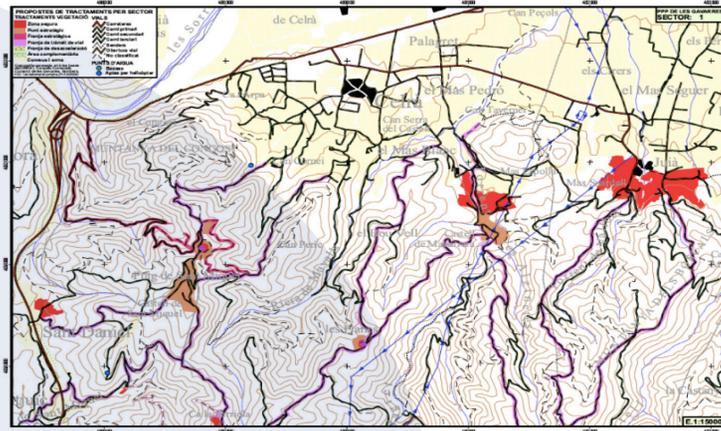
Some of the major actions that local authorities usually execute at this level focus on:

- Development of firebreaks around the perimeter of housing developments to generate a physical discontinuity between the forest and homes.
- Reduction of vegetation in undeveloped plots of land and stationed inside residential areas.
- Ensure signage to implement orderly evacuation in case of fire, as well as secure confinement areas.
- Ensure the smooth functioning of infrastructure and services to support both extinguishing resources as well as means responsible for emergency management (civil protection).
- Promote social awareness, informing citizens affected by the risk of the legal obligations and specific recommendations to take concerning prevention and protection.
- Facilitate fluid communication about the risk of fire and its evolution over time, which allow early warning of all those involved.
- The drafting of fire prevention plans and municipal action plans.
- Drafting of municipal urban planning plans, which can determine the uses and activities allowed to the territory, including for example the maintenance of agricultural areas as a strip of separation between forest and housing.

At times, and in the case of the existence of local public forests, the local authorities can be in charge of its management in order to reduce the risk of fire.

It is important to point out that although often municipal authorities will be very suitable for organizing fire prevention with community residents, the spread of fires is governed by vegetation, topography and climate. Therefore, the municipality should compile the provisions of a risk analysis carried out in accordance with the criteria of the physical spread of fires. A rain of sparks on a housing development in the municipality, for example, may depend on the distribution of forests located in a neighbouring municipality.

The organization of this and other information relevant to assessing the vulnerability of the fire risk is included in the standard model guide in section 3.1.



Example of a plan with the design of vegetation treatments in sensitive areas (roads, residences, etc.). Source: Les Gavarres Perimeter Priority Protection Wildfire Prevention Plan (PPP G4), Government of Catalonia.

2.2.2. Housing analysis (individual prevention): Housing defence space or ignition zone

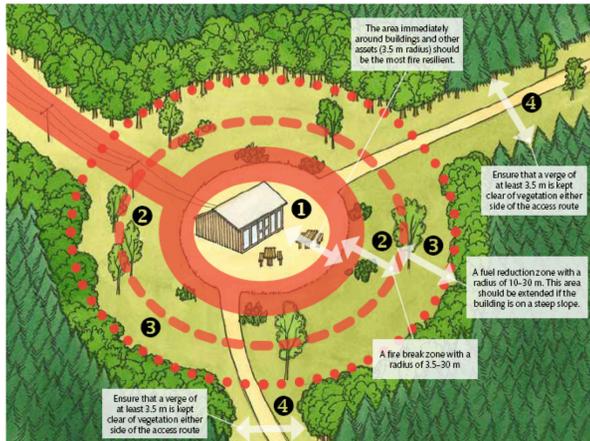
2.2.2.1. Housing defence space or ignition zone

Unlike with municipalities, this level of analysis focuses on the vulnerability within the property. By means of this analysis, the user can evaluate the elements that make up both their property (constructive elements of the building and landscaping) and neighbouring properties. The main objective of this level is focused on identifying and diagnosing the main elements of risk (either by direct contact of the flames as well as the arrival of sparks that generate new ignitions) and that potentially lead to the spread of the fire from the outside to the inside of the house and its spread to neighbouring houses.

With these objectives, all evaluation guidelines first and foremost define the area of the housing defence. The defence space or ignition zone of a home can be defined as the area around the house in which measures and actions are carried out that are necessary to minimize the potential damage that a forest fire would cause on people and their property. The concept is to create a physical discontinuity between the house and the surrounding vegetation to reduce the heat transfer capability from the exterior to the interior of the house. The size of this area varies, depending on each region, the characteristics of the fire or types of constructions (wooden materials, concrete, etc.). The most common size is between 25 and 50 m, taking as a reference point the centre of the housing. Regarding the morphology of the defence space, it is usually circular although other shapes can be used to improve the effectiveness of its protective function in accordance with the slope of the land (the heat is transferred more intensely from the bottom to the top, and therefore in ascending land). Often the defence areas are divided into different concentric subzones, in which various preventive measures are carried out, increasing the intensity as the house is approached.

Generally in the areas close to the housing the actions will focus on the construction elements of the housing, other surrounding building elements and the vegetation of the landscaping. In sub-areas furthest from the housing the vegetation is worked on by reducing the number of trees as well as the understory.

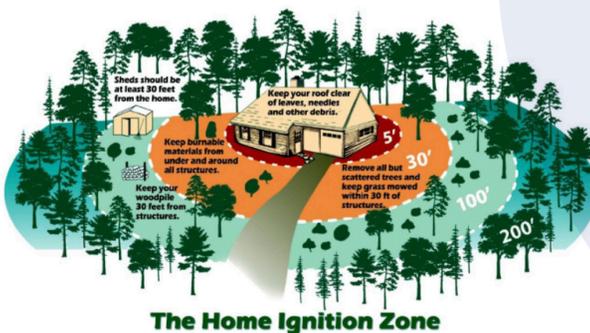
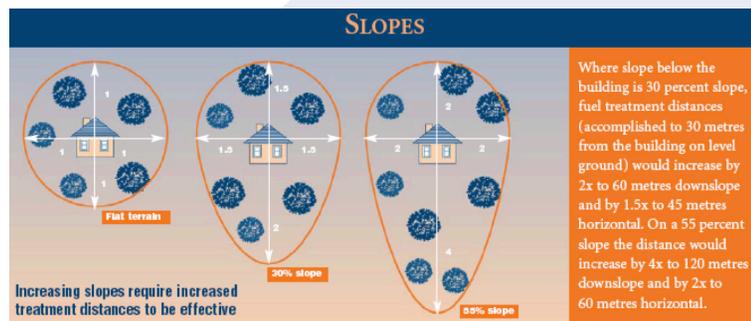
- 1 Area around asset: vegetation in this area should comprise of sparsely-planted, well irrigated fire-resistant species. Carry out annual maintenance before the start of the fire season. Do not burn cleared vegetation in this area - cut, chip and remove. Clear deadwood and remove leaves/needles from rooftops and guttering
- 2 Fire break area: vegetation in this area should comprise of fire-resistant trees kept at a low density. Fragment larger areas of forest or woodland to increase resilience and thin or prune trees to minimise ladder fuels. Manage areas of grassy open space to minimise fuel loading and keep deadwood to a minimum.



- 3 Fuel reduction area: larger areas of forest or woodland should be fragmented in this area. Plant fire belts of fire-resistant species and manage these so that the undergrowth remains suppressed. Bonfires and prescribed burning (with appropriate control measures) can be carried out in this zone outside the fire season.
- 4 Access routes: trees and shrubs should be managed along access routes and all vegetation should comprise of fire-resistant species. Remove all ladder fuels and ensure that trees, shrubs and other vegetation do not grow too large and/or close in across the access corridor.

Example of a guide in the UK, which shows the size of a defence zone and the concentric sub-areas that compose it. Source: [http://www.forestry.gov.uk/pdf/FCPG022.pdf/\\$FILE/FCPG022.pdf](http://www.forestry.gov.uk/pdf/FCPG022.pdf/$FILE/FCPG022.pdf)

Examples of optimal morphology of the defence zone of a house depending on the degree of slope on which it is located. Application case from a Canadian guide. Source: https://www.firesmartcanada.ca/images/uploads/resources/chapter3_fr.pdf



Example of a guide from the United States that shows the various intensities of action according to the proximity of the sub-area to the housing. Source: <https://fireadaptednetwork.org/>

2.2.2.2. Main vulnerable elements into the housing defence area

In the area closest to the house, the vulnerability assessment focuses on building elements, which, according to their type and condition, can be more or less susceptible to damage, either by direct contact with flames or the arrival of sparks and potential outbreaks that may occur. Therefore, efforts in this area will “isolate” the housing that is surrounded by the outside to minimize the chances that the fire penetrates inside and, if possible, create a safe space for confinement (to stay in the house if the fire happens suddenly and there is no time to move to a safer place) if necessary.

The main risk elements to be considered for the vulnerability assessment are:

Roof: It is one of the most vulnerable elements of the house since it intercepts the sparks issued by the wildfire, which can light for example the pine needles or leaves accumulated on the roof and facilitate the fire spreading to the inside of the roof and the house. Use materials that are not very flammable (tiles, flagstones and sheet metal among others) that perfectly fit together and avoid the accumulation of dry vegetation (also in water accumulation gutters) to reduce vulnerability.

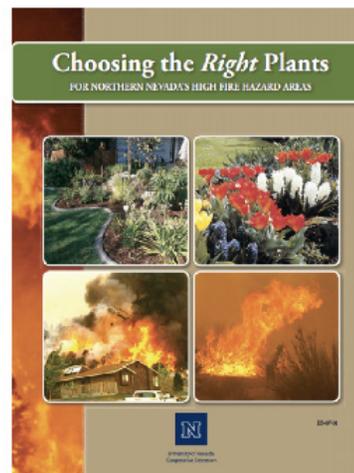
Exterior walls: The coating material of the wall is also a vulnerable element. Similarly to that of the roof, materials that are not very flammable must be used (bricks, concrete, stone, etc.) before other materials such as wood or plastics.

Openings (windows): Normally, windows are extremely vulnerable to the passage of a high-intensity fire because the glass material is a poor conductor of heat and easily breaks with sudden increases in temperature, generating a direct opening to the inside of the housing (by the flames, the sparks and the smoke). You will need to take into account that the currents of air will facilitate the spread of the fire inside the home. It is recommended to prioritize the use of windows with double or triple glazing. In all cases, it is necessary to protect the windows by installing blinds or shutters on the basis of materials that are not very flammable and avoid highly flammable materials, given that if it ignites it represents a burden on the heat resistance of the window.

Chimneys: Chimneys can facilitate sparks entering the interior of the house but they can especially be a source that generates fire from the inside to the outside (due to sparks). In this regard it is recommended to periodically clean the soot from the chimney and install a spark guard over the top. This safety feature stops or decreases the speed of the particles at high speed coming out the chimney, preventing them from falling on the roof or in the garden and provoking the start of a fire.

Surrounding combustible material: Regardless of the vulnerable constructive elements, within the area in direct contact with the housing it is necessary to analyse the presence and distribution of combustible materials. The combustion of these materials may amplify and facilitate the transfer of the fire from the outside to the inside, which is why it is recommended that no fuel elements (pile of firewood, gasoline bottles, various plastics, etc.) are located in the vicinity of a vulnerable construction element, with special attention to openings such as windows and doors.

Vegetation: The layout and type of vegetation is one of the most important aspects to keep in mind as it acts similarly to combustible materials, facilitating the transfer of heat to the house. It is recommended to prevent the presence of vegetation in the vicinity of the structure and establish a distance between the tree canopies and the housing. In the case of wanting to have some occasional scrub, plant parterre and/or hedges, it would be preferable to prioritize species that do not catch fire easily and with a high water content (succulent plants and green lawns or ivy for example) before very combustible species (rosemary, lavender, cypress and thujas in the case of hedges). In this regard there are several specialized guides for “pyro-gardening” (gardening compatible with the risk of fire) that analyse and classify the most suitable plant species and their layout in the design of the garden.

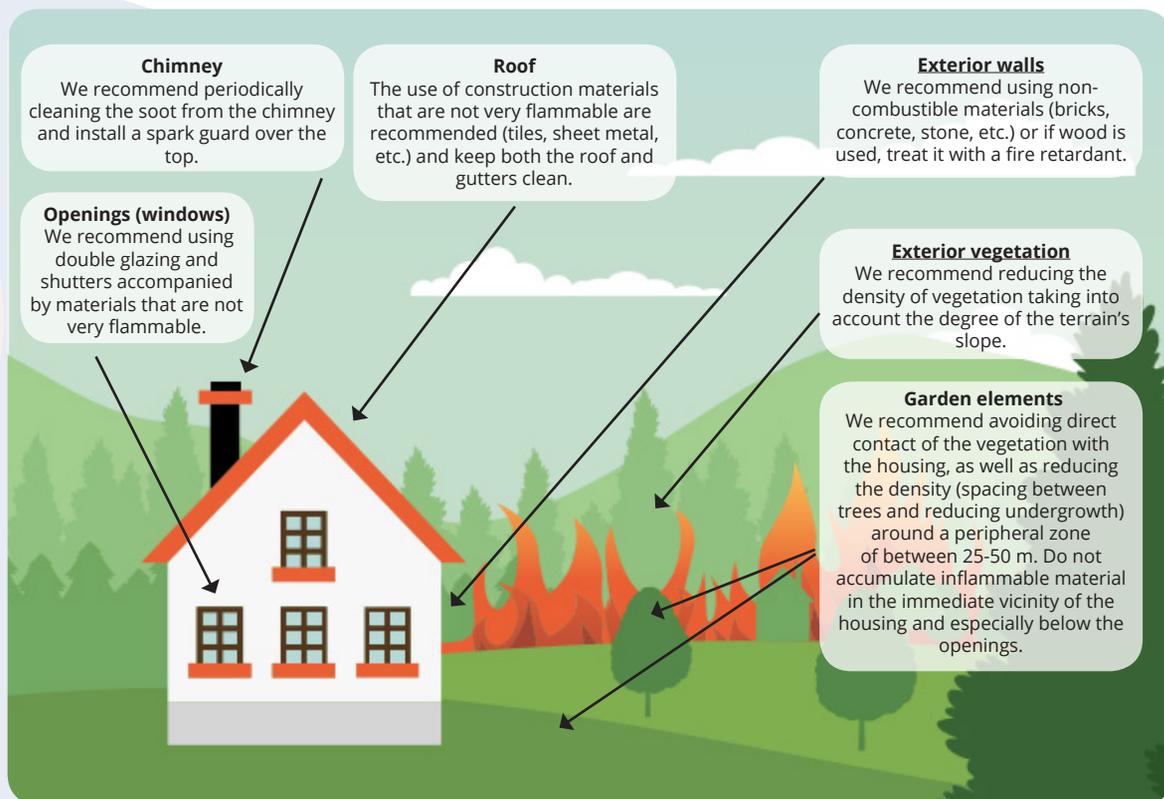


Examples of guidelines with recommendations on the elements of the garden to prevent fires in France (left) and in USA (right). Sources: http://www.irstea.fr/sites/default/files/ckfinder/userfiles/files/feu-interfaces_int.pdf; <http://www.unce.unr.edu/publications/files/nr/2007/eb0701.pdf>

2.2.2.3. Main vulnerable elements out of the housing defence area

Usually these areas correspond to areas that are not landscaped and therefore the vegetation corresponds to structures present in forests and scrub areas. The preventive actions and measures to be implemented will aim to reduce the capacity of the fire to spread through the tree canopies (a situation that causes the generation of large flames and the emission of sparks). Thus, you must evaluate the quantity and layout of this vegetation (trees and shrubs), and reduce the amount to the appropriate thresholds. A standard measurement corresponds to spacing out the trees, avoiding contact between the crown and removing the underbrush that could facilitate the spread of fire under the trees. It is also recommended to encourage tree species with the lowest degree of flammability such as fruit, olive, aspen and oak, compared to resinous species as is the case with pine trees, which despite having fewer calories could ignite easier.

It is very important to consider the degree of slope that is found in the defence area, as this directly affects fire behaviour and its ability to spread. The fire will spread more rapidly and in ascending slopes and greater degrees of slope, then in flat or downhill areas for example. When the defence area is in a flat area, in general it is advised to have a 6 m space in between the trees. In situations with slopes, this distance must increase and the concentration of the bushes must be reduced.



Summary of main wildfire risk preventives measures to undertake in the housing defense area and its surroundings





3. Tools for assessing vulnerability to the risk of forest fire in wildland-urban interface areas

In the framework of the project “Efficient fire risk communication for resilient societies” (eFIRECOM), two tools have been developed to facilitate the evaluation and information of the risk of wildfires as regards municipalities and as regards housing for a French study case, but with reliable applicability to the geographical area of the Mediterranean.

These guides are intended to improve the understanding of the risk of fire in the wildland-urban interface of exposed communities and promote awareness and the degree of self-protection of its users. In this regard there are two specific types of tools according to the territory that focus on a vulnerability analysis; an informative document on the risk of fire at the municipal level and a guide for assessing vulnerability with housing. The first document is intended for municipal managers responsible for wildfire risk prevention while the second is aimed at residents of wildland-urban interface areas. Both have been designed taking into account the diversity and particularities of each Mediterranean region, that is why in the following a generic and standard model is presented for each on an editable format (*indesign*), offering the ability to customize and tailor specific content for each context.

The following summarizes the structure and main content of the tools and their availability is detailed.

To date the two tools have been adapted for the particular case of the South of France with the title “Le risques d’incendi dans la commune; Recommendations & points clés à destination des services techniques municipaux” and “J’habite dans un massif forestier ou à proximité : Ma maison est-elle vulnérable en cas de feu de forêt ?” and are available at http://efirecom.ctfc.cat/?page_id=515 and http://efirecom.ctfc.cat/?page_id=518 respectively.

3.1. Informative document on the risk of wildfires for municipal technicians



Cover of the wildfire risk informative document for municipal technicians in France.

The document aims to be a tool in the service of **local technicians** for the **prevention of wildfire risk**.

The main aspects analysed are: the evaluation of wildfire risk existing in the region, the current legislation on the protection and prevention of wildfires both for municipalities as well as supra-municipalities and finally, identifying the main elements that influence reducing the vulnerability of communities living in the municipality.

The document is divided into three main sections; the first briefly outlines the issues and impact of wildfires on the territory, the main elements involved in the definition of the risk and analysing this on a regional level (municipal level or higher) as well as a summary of specific common vocabulary and key statistics of wildfires in the region.

The second section compiles and summarizes the main legislation (municipal and supra-municipal) in force concerning the prevention and suppression of wildfires, as well as the main figures of protection, planning and management of wildfire risk applicable to the territory that needs to be considered (prevention and fire risk emergency plans, Municipal Action plan, etc.).



Examples of fire prevention provisions applicable in France.

RÉDUIRE LA VULNÉRABILITÉ DES ZONES HABITÉES SUR MA COMMUNE

Sur les commune exposées, la prise en compte du risque incendie dans les documents d'urbanisme est un préalable obligatoire à toute planification. Elle revêt différents niveaux en fonction de l'exposition au risque de la commune, de la taille de la commune, des projets existants et bien d'autres paramètres encore.

LE PLAN DE PRÉVENTION DES RISQUES INCENDIES DE FORÊT (PPRIF)

C'est un document prescrit par le Préfet sur les communes les plus sensibles. Ce plan a pour objectif de mieux protéger les personnes et les biens, d'informer sur les risques encourus et sur les mesures obligatoires à prendre, notamment en matière d'urbanisme.

Au-delà des documents de planification et d'urbanisme, les services techniques municipaux peuvent être sollicités par les résidents pour évaluer une configuration locale. Dans cet esprit, la désignation d'un référent communal en charge de ces questions et formé à ces problématiques, spécifiques d'incendies de forêts renforcera le lien entre la population et la commune.



The final section focuses on the diagnosis and reduction of the vulnerability of communities stationed in wildfire-forest interface areas, by means of practical advice to inform and encourage the application of mandatory preventive measures as well as recommended actions in the field of individual self-protection. Finally, a series of recommendations is included to improve and promote the actions of information and awareness of the risk of fires.

Example of figures and measures to reduce social vulnerability to fire risk applicable in France.

In the frame of the eFIRECOM project, it has been developed an editable matrix, that can be downloaded at the following website address: http://efirecom.ctfc.cat/?page_id=515

3.2. Example of self-evaluation guide for the vulnerability of housing at risk of forest fire in the wildland-urban interface areas



Cover of the vulnerability assessment guide for housing at risk of wildfires for residents of the wildland-urban interface in France.

The wildfire risk assessment guide is directed to residents who live in the municipality's wildland-urban interface. Just as in the previous case, the necessary adjustments in content are recommended in order to be applied at the user level according to each context.

The guide consists of three sections; firstly the incidence of wildfire risk in the region is contextualized in general, highlighting the main fire statistics specific to the region in order to quantify the potential occurrence risk of the phenomenon. These data are accompanied by relevant cases of fires that have occurred in the region, by means of photographs and a brief explanation.

The second section includes the proposed methodology for assessing the vulnerability of housing to the risk of wildfires. This methodology is based on a scoring system based on different situations associated with varying degrees of vulnerability, where you must identify and associate the real situation evaluated with one of the most similar cases proposed and add the scores obtained. The weighting factor for each assessment must be made and validated by technicians with extensive knowledge in the field of wildfire prevention.

Finally in the last section, we assess the final evaluation of the degree of vulnerability that has resulted from the sum of all intermediate evaluations. The result will be included in a range of classification for the vulnerability proposed, offering for each level a recommendation provided to improve the current situation.

1 / LA SITUATION DE VOTRE MAISON

Où se situe votre habitation ? Nombre de points :

Le relief influence grandement la vitesse de propagation du feu.
Fond de vallée ?
Sur un versant ?
Sur une crête ?
Évaluez la localisation de votre habitation par rapport au relief et reportez le nombre de points correspondant.

Vos voisins sont près de vous ? Nombre de points :

La densité d'habitation : un facteur important dont il faut tenir compte.
Zone d'habitation très dense ?
Moyennement dense ?
Isolé ?
Reportez le nombre de points qui correspond le plus à votre cas.

RÉSULTATS

Êtes-vous bien protégés ?

Additionnez les points obtenus dans les 4 catégories de questions et vérifiez votre niveau de protection face aux incendies de forêt.

ENTRE 0 ET 16 Votre maison est **protégée mais elle n'est pas invulnérable**. Soyez vigilant et continuez à entretenir votre débroussaillage.

ENTRE 17 ET 30 Votre habitat est **vulnérable** au risque d'incendie. Vous devez mettre en place des mesures de sécurité pour bien protéger votre maison et ceux qui y vivent. Renseignez-vous auprès de votre mairie !

ENTRE 31 ET 48 Votre habitat est **très vulnérable** au risque d'incendie. Vous devez agir très rapidement pour vous protéger et protéger vos proches. Vous pouvez réduire grandement les risques de propagation en agissant sur la végétation présente sur votre propriété. Renseignez-vous vite auprès de votre mairie !

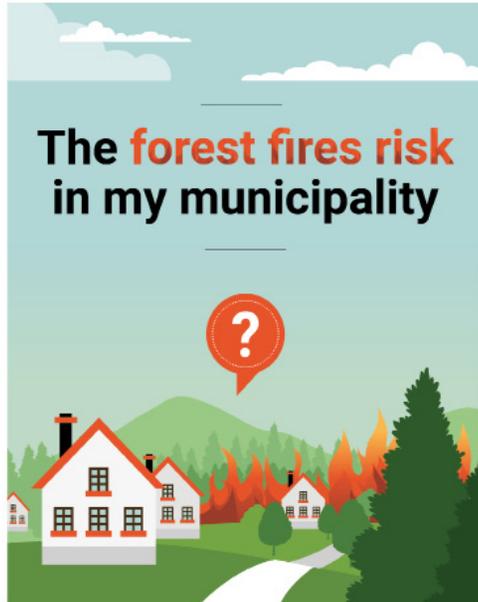
PLUS DE 49 Votre habitat est **extrêmement vulnérable** au risque d'incendie et vous devez agir immédiatement. Votre parcelle n'est pas protégée et peut être ravagée par un incendie ayant de graves conséquences sur vos biens et votre famille. **Renseignez-vous au plus vite** auprès de votre mairie qui saura vous indiquer les règles indispensables à connaître et à appliquer pour **vous protéger des feux de forêt**.

Example of some of the risk items assessed in the guide adapted to the French context (left) and the degree of protection obtained at the end of the assessment, associated with a general recommendation to improve the result (right).

In the frame of the eFIRECOM project, it has been developed an editable matrix, that can be downloaded at the following website address: http://efirecom.ctfc.cat/?page_id=518

4. Annex

4.1. Pictures of the standard editable matrix “ The forest fire risk in my municipality”



- A SHORT DESCRIPTION OF FOREST FIRES P. 3
- FIRE RISK IN MY MUNICIPALITY P. 6
- BE AWARE OF REGULATORY MEASURES..... P. 10
- PROTECTION OF FOREST OR PROTECTION OF HOMES? P. 11
- REDUCE THE VULNERABILITY OF RESIDENTIAL AREAS IN MY MUNICIPALITY P. 13
- THE IMPORTANCE OF VEGETATION CLEARANCE AROUND THE HOME P. 16
- PREVENTIVE ACTIONS CARRIED OUT BY THE MUNICIPALITY TO RAISE AWARENESS AND PROVIDE INFORMATION P. 18

RECOMMENDATIONS & KEY POINTS aimed at the municipal technical services

A SHORT DESCRIPTION OF FOREST FIRES

3 INTERVENTION'S PHASES

In Mediterranean forest areas, forest fires represent a very frequent natural phenomenon which, depending on the weather conditions and intensity of the flames, can quickly get out of control and pose a serious problem to firefighters.

Every year, thousands of hectares of forest go up in smoke, and fires can also destroy property and pose a threat to human life.

A forest fire is a complex event which is intricately linked to local conditions (topography, weather and vegetation), and any change on those conditions will affect also the fire behaviour.

Despite all the efforts made in terms of prevention and firefighting techniques, certain weather situations turn into large-scale fires requiring numerous firefighting resources in order to protect sensitive zones and evacuate people from the areas concerned.

Local council technical services can take action or raise awareness among the local population, according to the three distinct phases that characterise forest fires.



WHY ARE MEDITERRANEAN FOREST AREAS PARTICULARLY PRONE TO FIRES?

The forest has adapted to the climatic conditions of the Mediterranean region. Consequently, it undergoes frequent periods of serious drought, leading to significant water stress for plants.

The presence of dry combustible vegetation in the forest and the heat of the summer months, combined with some very windy days, are the main factors that determine the way fire spreads.

In such conditions, even the slightest spark can start a fire and result in a destructive forest fire.



WHAT ARE THE CAUSES OF FOREST FIRES?

Lightning is the only natural cause, but in reality only a very small percentage of fires are actually caused by this. However, most fires are caused by humans and its activities.

- X% ACCIDENTAL
 - X% NEGLIGENCE
 - X% NATURAL (LIGHTNING)
 - X% INVOLUNTARY
 - X% DELIBERATE
- Place here your own %.

A QUICK EXPLANATION OF KEY TERMS

A "risk" is a natural phenomenon with a given probability and intensity.

"Elements" refer to the property, people and forest land that are exposed to this hazard.

"Defensibility" refers to the defence equipment available and the context in which the defensive action must be taken.

"Vulnerability" is a means of expressing the defensibility of a sector and the exposed elements.

HAZARD X VULNERABILITY = RISK

WHAT ARE THE RISKS FOR THE FOREST?

Fire is part of the Mediterranean forest's life cycle, but the fact that this natural phenomenon has been exacerbated (due to climate change and frequent severe fires) could significantly alter the landscape and reduce the forest's ability to recover and regrow.

AND FOR PEOPLE?

When a forest fire reaches a certain level of intensity and spreads at a certain speed, it poses a serious threat to people. Hikers, local residents and people driving through the area can all find themselves trapped by fire.

Each emergency situation is unique, reason why it is important to be aware of certain rules in order to anticipate and counteract a crisis situation as effectively as possible.



HOW CAN I REDUCE THE RISK TO RESIDENTIAL AREAS IN MY MUNICIPALITY?

Avoid any fire. Naturally, this is the best strategy, and in order to achieve it, the main focus should be on informing people and raising awareness among local residents about the risks inherent to all types of fire (carelessness, building work, cigarette butts and so on). These measures help to reduce forest fires, but in any case will suppress it at all, because of the natural and accidental causes, fire will still get presence in a territory.

Reinforce the defensibility of residential areas to limit the damage caused and ensure that firefighters can focus exclusively on putting out the fire. Efforts in this regard are focused on improve the home's protection and its surroundings, as well as the basic infrastructures supporting the suppressions tasks (accessibility, road signs, hydrants nets).

Build up a risk culture to ensure that all stakeholders at all levels of society are aware of the risks responsibilities posed by fire in the Mediterranean region.

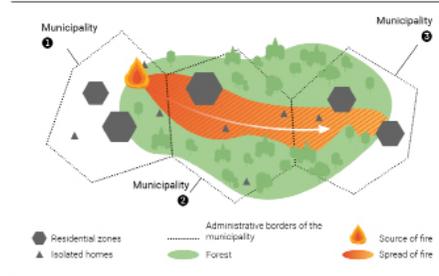
FIRE RISK IN MY MUNICIPALITY

Place here a brief introduction about the mains risks areas in your own contry.

FULLY UNDERSTAND THE PHENOMENON TO ANTICIPATE THE RISKS EFFECTIVELY!

Wildfire does not stop at administrative and geographical borders: the notion of fire risk must therefore be considered with respect to the municipality's location within a given risk area.

A "risk area" refers to an homogeneous geographical entity that is subject to a natural phenomenon. This scale of reference is fundamental, as it enables us to study phenomena as a whole and in the context of their physical reality, beyond the notions of administrative borders, which hinder our analysis.



It is important to consider the land covered by a municipality in the context of a given risk area.

HELPFUL HINTS:

Depending on your municipality's level of exposure to fire risk, a number of documents and information sources can help local council technical services deal with the phenomenon as effectively as possible.

EXTRA MUNICIPAL ANALYSIS

Place here a brief 2 sentences to introduce the map of your areas .

Place here a map of the regional level showing the number and the surface burnt by forest'sfire in each sub administrative levels

Several documents are available to raise awareness and understand the actions to be implemented to counteract fire risks.

TITLE

Place here a brief description of a document related with the forest's fire risk at the administrative level concerned

More informations :
[web site]

TITLE

Place here a brief description of a document related with the forest's fire risk at the administrative level concerned

More informations :
[web site]

MUNICIPAL LEVEL :

Analysis of previous fires which have had an impact on the land covered by the municipality is important in terms of understanding the phenomenon and drawing up a comprehensive strategy for forest areas. In some regions, the fire prevention agencies have mapped the historical wildfire occurred on latest years.

Firefighters services have analyzed each historical fire in the highest risk areas, in order to establish and define the proactively the suppression strategies and measures more efficient in each case.

More informations :
[web site]

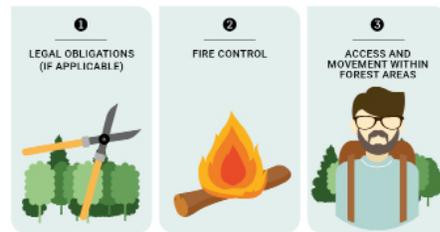
BE AWARE OF REGULATORY MEASURES

In addition to documents that provide information and details of operational preparations, there are a number of regulatory measures in place concerning the prevention and protection of wildfire risk.

Local council technical services, responsible of informing the local population about these measures, must be fully aware of the regulations in order to provide adequate technical resources, interpret public authority rules correctly and ensure the right message gets across to the people concerned.

HELPFUL HINTS!

The regulatory measures concerning the protection of citizenship and their infrastructures from fire risk are published in the form of various technical documents available for consultation by municipalities and their inhabitants. These documents are divided into three major topics:



TITLE

Place here a brief description of a document related with the forest's fire risk at the municipal level

TITLE

Place here a brief description of a document related with the forest's fire risk at the municipal level

TITLE

Place here a brief description of an organization related with the forest's fire risk surveillance

PROTECTION OF FOREST OR PROTECTION OF HOMES?

It is important to understand how fire protection measures concerning forest areas, and actions aimed at protecting the people and property within those areas, are all interlinked.

FOREST FIRES PREVENTION MEASURES

Certain fire prevention measures must be fully known and understood in order to provide an appropriate answer to the needs and expectations of local residents and stakeholders.

These measures include the forest massif management actions such as the construction of tracks, water sources or zones where the forest has been thinned or cleared. The aim of these actions is to enable firefighting services to operate safely to limit the spread of fire.

REMINDER

The work carried out in the framework of a risk area protection strategy must first be agreed by elected representatives, forest rangers and firefighting services after a period of consultation, to ensure maximum protection of the forest land. Collective efforts based on consultation are most likely to result in effective actions that are fully supported by all the stakeholders involved.



In the event of a forest fire, firefighters must first and foremost ensure the protection of people and property. Depending on the areas concerned, these actions require a significant number of firefighting resources which must be readily available.

Any resources used to protect homes are no longer available to fight the fire spreading into the forest and bring it under control!

It is therefore vital that the self-protection of residential areas exposed to fire risk is achieved using as few emergency resources as possible, so that maximum effort is given over to fighting and controlling the wildfire.

In addition, in cases of large-scale, highly intensity fires, firefighters are unable to defend all the sensitive zones. This is why the notion that buildings must be autonomously fire-resistant via rigorous clearance of excess vegetation and the use of appropriate building materials is strongly recommended in order to ensure a minimum level of safety while waiting for the emergency services.



WATER TANK

Due to
Picture caption
Example of behavior of large-scale, highly destructive fire on which firefighters have to focus their efforts to protect first houses and evacuate people

IMPORTANT

- **Contact the services responsible** for coordinating prevention actions within your département and municipality.
- **Consult the relevant websites** to be aware of fire risks.
- **Encourage consultation** between elected representatives/technicians/government departments/Public authorities/firefighters.

REDUCE THE VULNERABILITY OF RESIDENTIAL AREAS IN MY MUNICIPALITY

Municipalities exposed to fire risk, must be taken into account the risk level and its characteristics when drawing up an urban planning document, must be taken into account in town planning documents. The plan produced is divided into different levels depending on the degree of risk exposure, the size of the municipality, other projects already in place amongst other parameters.



Place here a brief description of a document related with the awareness of forest fires risk in urban planning documents

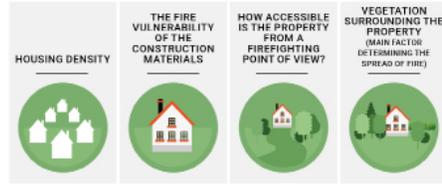
In addition to plans and urban planning documents, residents can contact their local council technical services if they have specific questions. These services can put them in contact with the relevant authorities if need.

As part of this approach, dialogue between local inhabitants and the municipality can be reinforced by the appointment of a person in charge of these issues, who is trained in specific aspects related to forest fires.



WHAT YOU NEED TO KNOW

Local residents who want to evaluate the vulnerability level of their homes have to take account of several parameters.



The density of housing and the location with respect to the forest is important because these factors can determine the volume of vegetation available to sustain the fire. A greater number of neighbouring properties means less space for vegetation.

To ensure that buildings offer maximum protection to their inhabitants in the event of wildfire, it is vital that they do not allow flames or embers to enter via doors, windows, verandas or roofing. It must therefore be possible to seal all the openings to a home with materials that are highly resistant to the extreme heat produced by fire.

It is essential to ensure that your home is accessible:

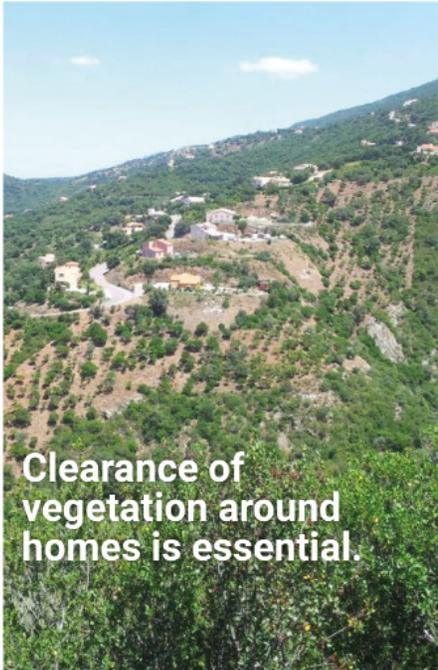
- so that firefighters can intervene quickly, in adequate conditions.
- in the event that houses have to be evacuated.

In this respect, a number of features

are important in safety terms: width of driveways and the fact that they are not obstructed, sufficient space for two vehicles to pass or make a U-turn.

These elements enable municipalities to classify the importance of different situations, make an initial assessment of the vulnerability level of wildland-urban interface areas and issue basic advice.

For complex situations or if you require further information, please contact with the specialised experts in the field of fire protection measures.



Clearance of vegetation around homes is essential.

Please consult the next page →

THE IMPORTANCE OF VEGETATION CLEARANCE AROUND THE HOME

WHAT DO WE MEAN BY CLEARANCE?

Clearance consists in reducing the amount of combustible vegetation – of all types – in order to limit the intensity and spread of fire.

Clearance operations should ensure that there are enough breaks in the vegetation so that the landscape is not fully covered.

WHY IS CLEARANCE IMPORTANT?

By clearing and thinning the vegetation around their homes, residents enable firefighters to intervene more effectively and in safer conditions. Clearance also reduces the intensity of the fire, and as a result, home's protection would be safer and successfully.

WHO IS RESPONSIBLE FOR CLEARANCE, AND OVER WHAT EXTENSION?

The extent of the defensible space to be cleared by homeowner at risk, can vary depending on the region, however it is quite common the needed defensible space comprises neighbours properties. In these situations the vegetation treatments could result in extra efforts, due to possible interest conflicts between landowners. Municipality's technicians are well positioned to deal with and propose an voluntary agreed.

Local council technical services need to be fully familiar with the regulations and meaning of official documentation issued by the authorities in order to discuss these matters with local residents.



PREVENTIVE ACTIONS CARRIED OUT BY THE MUNICIPALITY TO RAISE AWARENESS AND PROVIDE INFORMATION

HELPFUL HINTS!

Please consult the websites of the relevant departments within the various institutions in charge of these issues, to find a solution to the different situations encountered in your municipality.



MESSAGES TO BE CONVEYED

- 1 **By reducing the amount of combustible vegetation** via clearance operations, I make sure that my home is protected and I help to protect the forest.
- 2 **THIS DOCUMENT WILL BE ADDRESSED TO LOCAL COUNCIL TECHNICIANS: PLEASE LEAVE ANY MESSAGES YOU WISH TO SUBMIT TO THEM**
- 3 _____

PUBLIC MEETINGS ORGANISED BY THE MUNICIPALITY

Holding public meetings within the municipality to discuss forest fires and their consequences, preventive actions or contingency plans in the event of a crisis can be an effective way of getting everyone involved in the issue of fire prevention in the municipality.

Verbal accounts of past events and a focus on the local context provide real added value to any communication initiative and reinforce the impact of the messages conveyed. Here again, you can enlist the help of specialised technicians from government departments or firefighters.

TOWN HALL INFORMATION BOARDS AND DAILY INFORMATION ABOUT THE RISK LEVEL

For information: activity and movement within forest areas are often conditioned by the daily risk level, in order to:

- Limit the risk of fires being started by people in forest areas

- Avoid putting people in dangerous situations

During the summer, the Met Office can provide a daily assessment, for each meteorological area, of the risk level, based on a set of criteria related to weather conditions and how dry the vegetation is at a given time.

To find out the daily risk level for your municipality, you can consult the official websites which give the risk levels for each meteorological area.

Based on these official sources, and depending on the resources provided by your municipality (town hall display board, digital information board, municipality website and so on), you can pass on this information to your local residents and play your part in conveying prevention messages

TITLE

THIS DOCUMENT WILL BE ADDRESSED TO LOCAL COUNCIL TECHNICIANS: PLEASE LEAVE ANY ADVISES YOU WISH TO SUBMIT TO THEM

17 18



SELF-ASSESSMENT GUIDE FOR RESIDENTS

The self-assessment sheet aimed at local residents can be consulted and downloaded free of charge from the project's website.

<http://efirecom.ctfc.cat>



RELATED WEBSITES:

-
-
-
-
-
-

Provide a list of the websites that can be consulted for reference

19 20

A STORY TO HELP YOU UNDERSTAND

Children of all ages can understand the way fire works

Fire risk is an integral part of life in the Mediterranean region.

All areas can be subject to the risk of wildfire.

In order to live in these areas safely and without fear, everyone must be aware of the potential risks and know which practices to avoid and which protection measures to implement in and around their home.

All of this begins at a very early age.



Get to know Baby Burn and Fierce Flame and download their story here: <http://efirecom.ctfc.cat> and www.lessonsonfire.eu

This publication has been developed in the framework of the 2014/PREV/13 'Efficient fire risk communication for resilient societies' (eFIRECOM) project, co-funded by the European Civil Protection and Humanitarian Aid Operations (DG-ECHO). The aim of the project is to improve information and knowledge transfer of wildfires to society and promote a culture of the risk. This publication is available in five languages (English, Catalan, Spanish, French and Arabic) and can be downloaded at the following links:

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Cooperació FEDER 2014-2020. Informació: DG ECHO. Gràfics: DG ECHO. Gràfics: DG ECHO. Gràfics: DG ECHO.

4.2. Pictures of the standard editable matrix “I live in a forest area or close by: Is my home at risk in the event of a forest fire?”

I live in a forest area or close by:

Is my home at risk in the event of a forest fire?



Read on to find out more about this hot topic!

MAJOR RISK

Fire doesn't just happen to other people...

Forest fires constitute the **most common natural risk in the Mediterranean region**. Higher density residential areas and the accumulation of vegetation throughout forests have resulted in zones that are particularly vulnerable to wildfire, especially during the summer period.

Within these sensitive zones, and during high fire risk periods, the houses located in direct contact with forest or nearby can:

- BE THE CAUSE** of ignition of wildfires, due to accidental or negligent behaviour with barbecues, gardening works, cigarette butts, fireworks, etc.
- AND/OR**
- BE VICTIMS** of forest fires that threaten to destroy homes, cars or even the citizenship safety!

Place here a map of your own region concerned by this document

[describe here the most fire prone area into your region]



X% of forest's fires are due to the action of human

Municipality name, Location, Month Year

Place here a photography of a relevant forest fire

picture caption

KEY FIGURES

[number] fires / year in the Mediterranean region.

Almost half of these could have been avoided by applying certain good practices

→ **Human carelessness is the primary cause of fire**

The impact on homes could be significantly reduced

→ **By protecting your home you can significantly reduce the risk of having your property and memories destroyed by fire**

Fire is an integral part of the Mediterranean forest landscape. It is a privilege to live in a forest area, but doing so also constitutes a risk and carries certain responsibilities.



Municipality name, Location, Month Year.

[Number] ha burnt.

Forest fire cause

Place here a photography of a relevant forest fire

Since [year of reference], an average of [NUMBER] ha have been destroyed by fire every year in the [region of reference]

[NUMBER] ha PER YEAR

Municipality name, Location, Month Year.

[Number] ha burnt.

Forest fire cause

SELF-ASSESSMENT

What about you? Are you playing with fire?

ASSESS YOUR VULNERABILITY LEVEL as regards the risk of forest fire by answering the questions below. Refer to the results at the bottom of the survey to find out whether **YOU ARE SUFFICIENTLY PROTECTED**.

1 / LOCATION OF YOUR HOUSE

Where is your home located? Number of points:

The topography of the landscape has a significant impact on the speed at which wildfire spreads.

At the bottom of a valley?

On a slope?

At the top of a hill?

Assess your home's location with respect to the landscape and note down the corresponding number of points.



Do you have close neighbours? Number of points:

Density of the residential area: an important factor to be taken into consideration.

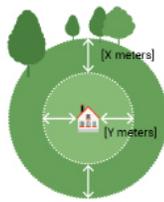
A high-density residential area?

Average density?

Isolated?

Note down the number of points that correspond most accurately to your situation.





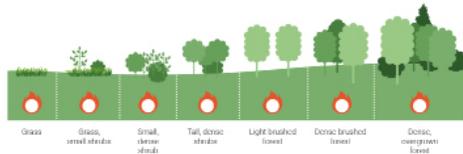
THE HOUSING DEFENSE ZONES TO BE AWARE OF

- Vegetation in the immediate vicinity of your house
- Vegetation further away from your house

What type of vegetation can be found in the immediate vicinity of your house? Number of points:

And further away? Number of points:

Add up all the points corresponding to the types of vegetation found



The type and amount of vegetation in the immediate vicinity of your home is the main factor that determines the spread of fire!

2 / YOUR HOUSE

By protecting your home, you can significantly reduce its risk of being destroyed.

- The roofing and gutters are often littered with old vegetal matter.....
 - The building materials and joineries (gutters, shutters, door and window frames) are made of plastic.....
 - The building materials and joineries are made of wood.....
 - The building materials and joineries are made of metal or aluminium.....
 - The chimney and/or air vents are not protected.....
- Number of points:

3 / YOUR GARDEN AND SURROUNDING LAND

An appropriate outdoor environment helps reduce the spread of fire.

- You store flammable materials outside your home (paint, gas canister, firewood, garden furnitures, and so on).....
 - The house has a veranda or a bay window without shutters.....
 - The property is surrounded by a hedge.....
 - The property is not enclosed, or is surrounded by a fence.....
 - The property is surrounded by a wall.....
 - There are trees located less than 3 metres from the sides of the house, or which overhang the roof.....
 - The property has a barbecue installed on a non-flammable floor surface (slabs, concrete, etc.).....
 - The property is closed by a remote-controlled gate.....
 - The property is closed by a manually opened gate, or is not closed at all.....
 - The driveway is wide enough for two cars to pass.....
 - The driveway is not wide enough for two cars to pass.....
- Number of points:

4 / CLEARANCE AND BRUSH

By regularly clearing and brushing the vegetation on your land, you can reduce the spread of fire.

- The vegetation of the property has not been cleared and brushed.....
- The vegetation of the property has been cleared and brushed.....



RESULTS (NUMBER OF POINTS)

Are you sufficiently protected?

Add up the points obtained in the 4 categories of questions to determine your level of protection in the event of a forest fire.

- BETWEEN X AND X** Your home is **quite well protected** from fire risk. Make sure you continue to clear and brush your land correctly and don't let your guard down!
- BETWEEN X AND X** Your home is **vulnerable** in the event of fire. You need to implement some safety measures to ensure your house and its inhabitants are sufficiently protected. Contact your local council for more information!
- BETWEEN X AND X** Your home is **very vulnerable** in the event of fire. You must act quickly to provide protection for yourself and your family. You can significantly reduce the potential spread of fire by clearing and brushing the vegetation on your land. Contact your local council as soon as possible for more information!
- OVER X** Your home is **extremely vulnerable** in the event of fire and you must take immediate action. Your home **is not protected** and may be destroyed by wildfire. Contact your local council straight away: they will provide you with the essential rules and recommendations to be aware of and applied in order to protect your home in the event of forest fire.

A STORY TO BETTER UNDERSTAND FIRE

Children of all ages can understand the way fire works

Fire risk is an integral part of life in the Mediterranean region. All areas can be subject to the risk of wildfire. In order to live in these areas safely and without fear, everyone must be aware of the potential risks and know which practices to avoid and which protection measures to implement in and around their home. All of this begins at a very early age.



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Efficient fire risk communication for
resilient societies



Co-financed by the EU-Union
Civil Protection Mechanism